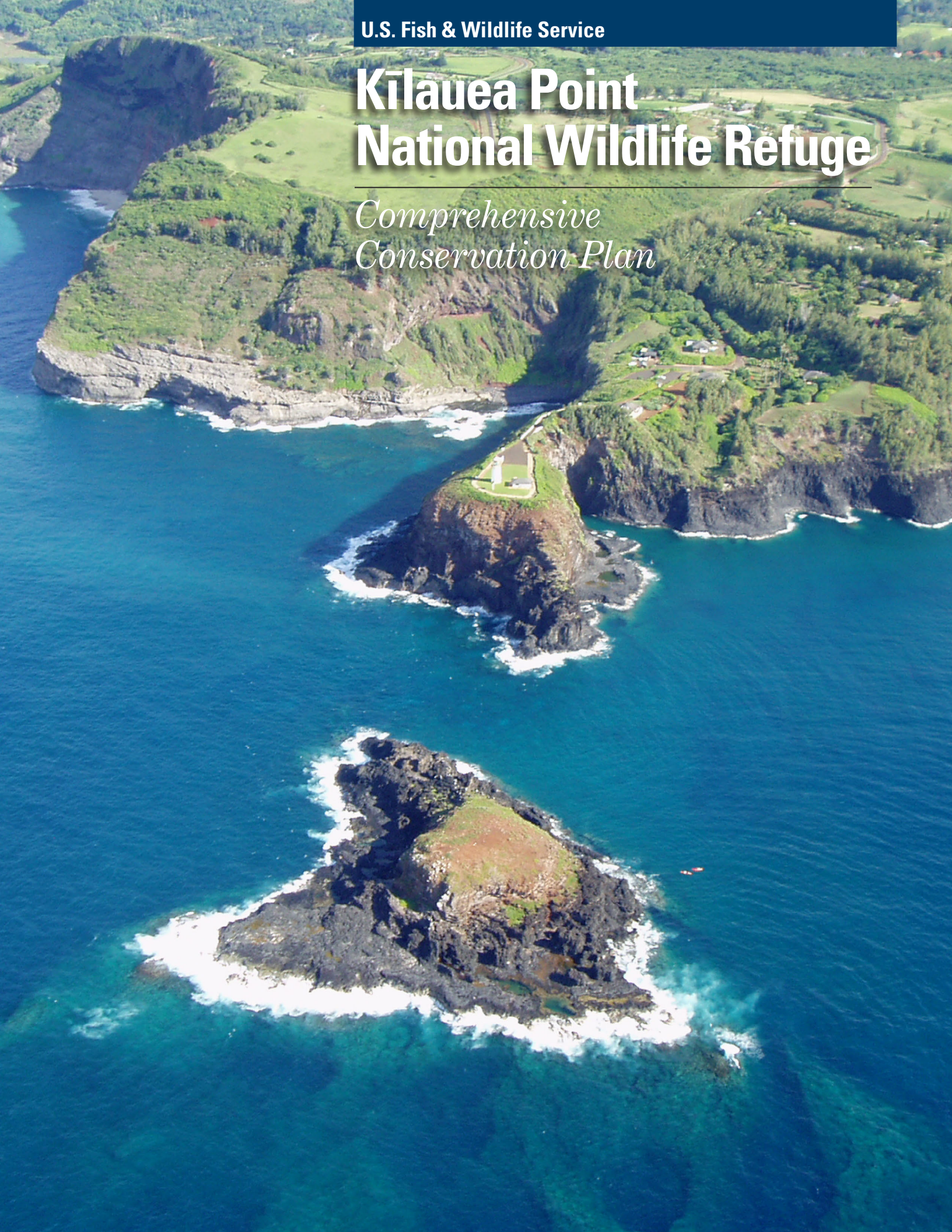
U.S. Fish & Wildlife Service

Kīlauea Point National Wildlife Refuge

Comprehensive Conservation Plan



Refuge Vision

Shrouded in a salty mist, the steep cliffs of an ancient volcano plunge into a pounding north swell as Kīlauea Point National Wildlife Refuge stands as an oasis where abundant seabirds blanket the pali and ride updrafts. Here a symphony of sounds reverberates — from the whinny of mōlī to a chorus of rattling squawks from thousands of ʻā. Nēnē nestle within thriving native plant communities that blanket the red soil throughout the Refuge. ʻĪlio-holo-i-ka-uaua and honu bask in tranquil solitude at the edge of the turquoise waters teeming with marine life.

The dynamic and awe-inspiring experiences of Kīlauea Point provide kamaʻāina and visitors alike a sense of place and lasting interconnectedness with the natural world. Interwoven with cultural heritage, environmental education links the island's keiki and the youth beyond with the Refuge's unique ecosystems and native wildlife. Through strong community support, the Kīlauea lighthouse endures, telling its story, and remains a beacon promoting stewardship of the Refuge's resources for future generations.

He nu ʻukia no ka pu ʻuhonua

Kau maila ka ʻehukai i ka pali kū o ka luapele, a papā mai ka nalu poʻi. Kū kilakila ʻo Kīlauea Point National Wildlife Refuge ma ke ano he kīpuka no ka manu o ka moana kūhohonu, a ma aneʻi lākou e kīkaha a kaʻaniu ai. Kūpinaʻi aʻe ka leo o ka mōlī, ua lau. Hauwalaʻau mai ka leo o ka ʻā, ua mano. Nonoho iho ka nēnē i ka nāhele ʻoiwi e uhi ana i ka lepo ʻulaʻula o neʻi. Lalala mehameha ka ʻīlio-holo-i-ka-uaua a me ka honu ma kaʻe o ke kai pāpaʻu piha o ka iʻa.

Poina ʻole nēia wahi ke hoʻokipa ʻia e ke kamaʻāina, pau pū me ka malihini i ke ʻano o nā mea a lākou i ʻike ai, i laʻa me ka pilina ma waena o kō a uka, a kō a kai. ʻO ka nohona kanaka a me ke aloha ʻāina ke kahua o ka haʻawina e aʻo aku ai i ka poʻe ʻōpio, i moākaka ia mau mea i ka ʻike a kō lākou mau maka ma kēia mua aku. Ma o ke kākoʻo a ke kaiāulu, kū mau ka hale ipu kukui ʻo Kīlauea i lama kuhikuhi o ka mālama ʻāina no nā hanauna e hiki mai ana.

Comprehensive Conservation Plans provide long-term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

Mōlī. Amanda Gladics/USFWS

Kīlauea Point
National Wildlife Refuge

Comprehensive Conservation Plan

Prepared by:
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May 2016

U.S. Fish and Wildlife Service
Kīlauea Point National Wildlife Refuge
Comprehensive Conservation Plan
Approval Submission

In accordance with the National Wildlife Refuge System Administration Act, as amended, the U.S. Fish and Wildlife Service completed a Comprehensive Conservation Plan (CCP) for Kīlauea Point National Wildlife Refuge. The purpose of this CCP is to specify a management direction for the Refuge for the next 15 years. The goals, objectives and strategies for improving Refuge conditions—including the types of habitat we will provide, partnership opportunities, and management actions needed to achieve desired future conditions—are described in the CCP. The effects of the CCP on the human environment were described in the draft CCP and Environmental Assessment. This CCP is submitted for approval by the Regional Director.

Submitted by:

[signature] 9/9/15
Project Leader, Michael Mitchell — Date
Acting
Kaua'i National Wildlife Refuge Complex

Concur: Barry W. [signature] 9/10/15
Refuge and Monument Supervisor, — Date
Pacific Islands Refuges and Monuments Office

Concur: KEVIN S FOERSTER 9/16/15
Regional Chief, — Date
National Wildlife Refuge System, Region 1

Approved: Robyn Thorson 9/17/15
Regional Director, — Date
Region 1, Portland, Oregon

Finding of No Significant Impact
for the
Kīlauea Point National Wildlife Refuge Comprehensive Conservation Plan
Kaua‘i County, Hawai‘i

The U.S. Fish and Wildlife Service (Service) has completed a Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for Kīlauea Point National Wildlife Refuge (Refuge). The CCP/EA describes our proposals for managing the Refuge and their effects on the human environment under four alternatives, including the "no action" alternative.

The need for the CCP is derived from the overall National Wildlife Refuge System (Refuge System) mission, goals, and policies, as described in or promulgated by the National Wildlife Refuge System Administration Act (16 U.S.C. 688dd–688ee, et seq.), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Developing the CCP provides the Refuge with a management plan for conserving fish, wildlife, plant resources, and their related habitats, while providing opportunities for compatible, wildlife-dependent recreation. The CCP, when fully implemented, should achieve Refuge purposes, help fulfill the Refuge System mission, maintain, and, where appropriate, restore the ecological integrity of the Refuge and the Refuge System, and meet other mandates. The CCP will guide management of the Refuge for 15 years, or until it is revised, and actions will be implemented as funding becomes available.

Features Common to All Alternatives

Features common to all alternatives include considering climate change effects in all management actions; monitoring and control of invasive species; coordinating with State, county, and other partners; protecting cultural resources; fishing; allowing traditional cultural practices by native Hawaiians; volunteer opportunities; re-evaluating public use visitation days at Kīlauea Point; and continuing land protection within the approved Refuge boundary. Operational and infrastructure changes for better management of transportation issues associated with Kīlauea Point proper (Point) or at the Kilauea Road terminus (Overlook) were evaluated.

Alternatives Considered

Alternative A (Current Management): Under Alternative A, current wildlife and habitat management aimed at long-term protections and population and habitat enhancements for migratory seabirds and endangered nēnē (Hawaiian goose, *Branta sandvicensis*) would continue. Strategies include invasive species control, outplanting native plants, mowing and weeding grassland-shrubland habitat for nēnē, maintaining or replacing fencing, enhancing the threatened ‘a‘o (Newell's shearwater, *Puffinus auricularis newelli*) population, and inventories, monitoring, and research.

The majority of public use activities offered at the Refuge would continue to revolve around wildlife observation and photography, environmental education (EE), and interpretation located on the Point or at the Overlook. The Kāhili Quarry area would remain open to wildlife-dependent uses (fishing, wildlife observation, and photography) and for access to off-Refuge areas (Kīlauea River, Kīlauea Bay, and Kāhili Beach) for boating and other stream, beach, and ocean uses (e.g., surfing, swimming, sunbathing, snorkeling, and dog walking).

Alternative B: Under Alternative B, wildlife and habitat management activities would continue in existing areas and be expanded on Crater Hill and Mōkōlea Point. In addition, native plant

communities would be restored to provide recovery habitat for threatened and endangered coastal plants. Priority research, inventories, monitoring, and other scientific assessments would be expanded.

Public use changes, compared to Alternative A, include different uses of some existing buildings, as well as improving public parking, traffic flow, and visitor activities on the Point. Strategies include offering an optional shuttle, a public/tour bus stop, and bike parking at the Overlook; increasing onsite public parking; and expanding outreach, EE, and volunteer programs.

Public access to the Kāhili Quarry area would remain open; however, there would be new stipulations for anglers on temporary shelters and fires, and for all visitors, new stipulations on dogs. Additionally, nonanglers would be limited to daytime use only.

Alternative C: The chief distinctions between Alternative C and Alternative B are the relocation of non–site-dependent functions (e.g., fee collection, restrooms, bookstore, administrative offices, parking) off the Point to a new visitor welcome and orientation center on the southwestern corner of Crater Hill, the use of a shuttle system to provide public access to the Point and Overlook, and the addition of guided interpretive hikes on Crater Hill. The main administrative offices and a new maintenance baseyard (e.g., storage sheds, bays, pole barns, and nursery) would be built in the same area as the new visitor welcome and orientation center.

Wildlife and habitat management under Alternative C would be similar to Alternative B. However, approximately 3–4 acres of nēnē and seabird habitat would be lost due to construction of the new facilities on the southwestern portion of Crater Hill. Public use and access of Kāhili Quarry under Alternative C would be similar to Alternative B.

Alternative D: In response to public comments received on the draft CCP/EA, elements of the facilities and transportation strategies were modified. As a result, the main differences between this alternative and Alternative C are the options for relocating welcome and orientation, non–site-dependent functions, and maintenance facilities off current Refuge lands but within 1 mile of the Refuge boundary. Other medium- to long-term strategies that may be implemented include the removal of public parking on the Point, development of a mandatory shuttle system, and reconfiguring the use of existing buildings. The success of short- to medium-term strategies, such as operational and infrastructure changes, may preclude implementation of the described medium- to long-term strategies. Wildlife and habitat management would be similar to Alternative C.

Public use and access of Kāhili Quarry under Alternative D were modified based on public comments received on the draft CCP/EA. The Quarry area will continue to be open to wildlife-dependent uses and for access to off-Refuge areas 24 hours per day. There will be new stipulations for visitors on temporary shelters, fires, and dogs. Additionally, the Refuge will work in partnership with local nonprofit organizations and community leaders of Kīlauea on promoting community stewardship of the Quarry through habitat protection, monitoring, and managing threats to natural and cultural resources; outreach; and environmental, cultural, and historical interpretation.

Summary of Effects

Alternative A (Current Management): Under Alternative A, the overall effects of current management on the physical environment within the Refuge would generally be negligible to minor negative due to erosion and water quality degradation. Impacts to wildlife would generally be

negligible to intermediate positive. However, we project minor to intermediate negative impacts to sea cliff and beach strand habitats primarily due to human trespass and disturbance (e.g., at Kāhili Quarry).

Impacts to the social and economic environment within and surrounding the Refuge would generally be negligible to minor positive due to public use, volunteer, and outreach programs. However, impacts related to transportation would be intermediate negative, primarily due to traffic-related effects from visitation at the Point and Overlook (e.g., congestion, noise, public safety, and pollution).

Alternative B: Management actions in Alternative B would generally result in long-term minor to intermediate positive effects to the physical environment due to increased restoration of native habitats and removal of nonnative vegetation, and efforts to stabilize areas of accelerated erosion. In the short term, individual actions may have negative effects on soils, water resources, and air quality; however, due to the limited duration, area, and intensity of these activities, the effects would be negligible to intermediate. Overall, a long-term minor to intermediate beneficial effect would be expected for Refuge habitats and associated species from these habitat management actions.

Overall effects to the social and economic environment would be expected to be minor positive due to expanded public use, volunteer, and outreach programs. The availability and quality of wildlife-dependent recreation on the Refuge would have minor to intermediate improvements under Alternative B. Alternative B would alleviate some parking limitations at the Overlook and traffic congestion at the Point (due to the optional shuttle) and would provide more transportation options to the Overlook (bicycle, pedestrian, and bus access), leading to minor positive effects to transportation and the general visitor experience. The effects from implementing Alternative B would not be expected to have any significant beneficial or adverse effects on Refuge resources or other elements of the human environment.

Alternative C: Impacts to the physical environment from Alternative C would be comparable to Alternative B. However, under Alternative C, the development of new facilities at the southwestern corner of Crater Hill would have long-term, minor, negative effects. Regarding effects to Refuge habitats and associated species, Alternative C would be similar to Alternative B; however, the construction of new facilities at Crater Hill and a trail from the new facilities to the Overlook would reduce the quality and quantity of habitat for nēnē and seabirds. Thus, the net result of Alternative C would be an intermediate negative impact, specifically to the coastal mixed woodland-grassland habitat, and minor to intermediate negative impact to seabirds and nēnē.

Overall effects to the social and economic environment would be expected to be similar to Alternative B; however, the availability and quality of wildlife-dependent recreation on the Refuge would be slightly higher compared to Alternative B. Alternative C would have minor to intermediate positive impacts to transportation and general visitor experience by reducing traffic congestion at the Overlook and Point from the use of a mandatory shuttle. The effects from implementing Alternative C would not be expected to have any significant beneficial or adverse effects on Refuge resources or other elements of the human environment.

Alternative D: Impacts to the physical environment will be comparable to Alternative B. Regarding overall effects to Refuge habitats and associated species, Alternative D will be similar to Alternative B, except there will be more restoration at the Point and, compared to Alternative C, wildlife habitat in the southwestern corner of Crater Hill will remain intact.

Overall effects to the social and economic environment are expected to be minor positive. Due to improvements on the Point and increased community engagement and stewardship at Kāhili Quarry, the availability and quality of wildlife-dependent recreation on the Refuge will have minor to intermediate improvements. Alternative D will result in a reduction of traffic-related effects at the Point from visitation and, overall, minor to intermediate positive effects to transportation and the general visitor experience. The effects from implementing Alternative D are not expected to have any significant beneficial or adverse effects on Refuge resources or other elements of the human environment.

Comparison of Overall Effects across Alternatives: Effects to the physical environment would be most beneficial under Alternatives B or D. Regarding wildlife and habitats, Alternative D will have more beneficial wildlife management effects than Alternatives A, B, or C. Impacts under both Alternatives B and D would be minor to intermediate positive; however, Alternative D is considered slightly more beneficial due to the strategies for addressing parking and visitor experience on Kīlauea Point without the loss of habitat at Crater Hill under Alternative C.

Effects to the social and economic environment would be more beneficial under all action alternatives compared with Alternative A. However, Alternative D will lead to more benefits to wildlife, visitor opportunities, including wildlife-dependent recreation, and more positive impacts to transportation and the general visitor experience than Alternatives A, B, or C.

Public Involvement

The Service incorporated a variety of public involvement techniques in developing and reviewing the CCP/EA. This included talk story sessions; public open houses during scoping, draft alternatives development, and the draft CCP/EA review; three planning updates; meetings with various county, State, and Federal partners and interested parties. The draft CCP/EA was available for a 44-day period of public review and comment from February 12, 2015, to March 27, 2015. During that period, the Service received comments from over 70 entities. The details of our public involvement are described in Appendix I. The Service prepared responses to all substantive comments, which are in Appendix K.

Selection of Management Alternative for the Final CCP

Based on our review and analysis in the CCP/EA and the comments received during the public review of the draft CCP/EA, we selected a slightly revised Alternative D for implementation due to the positive benefits of addressing parking and visitor experience on Kīlauea Point and improved visitor experience and wildlife management on the Refuge. In response to comments, strategies regarding wildlife and habitat, transportation, public uses, and cultural and historic resources management were added, modified, or deleted. Corrective, clarifying, and editorial changes were also made. Implementing the selected alternative will have no significant impacts on the environmental resources identified in the CCP/EA. Refuge management under the selected alternative will protect, maintain, and enhance habitat for priority species and resources of concern and improve the public's opportunities to enjoy wildlife-dependent recreation.

Conclusions

Based on review and evaluation of the information contained in the supporting references, I have determined that implementing Alternative D as the Comprehensive Conservation Plan for Kīlauea Point National Wildlife Refuge is not a major Federal action that would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969. Accordingly, we are not required to prepare an environmental impact statement.

Robyn Thorson

Regional Director
Pacific Region

SEP 17 2015

Date

Note: This Finding of No Significant Impact and supporting references are available for public review at the Kaua'i National Wildlife Refuge Complex, 3500 Kīlauea Road, Kīlauea 96754; and U.S. Fish and Wildlife Service, Division of Planning, 911 NE 11th Avenue, Portland, OR 97232. These documents can also be found on the Internet at www.fws.gov/refuge/kilauea_point. Interested and affected parties are being notified of our decision.

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Appendices

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Readers' Guide

Native species discussed in this document are referred to by their Hawaiian names. Common English names and scientific nomenclature can be found in Appendix J. The U.S. Fish and Wildlife Service endeavors to be accurate in its use of the Hawaiian language and correctly spell Hawaiian words, including the diacritical marks that affect the meaning and aid in pronunciation. This guide is provided to simplify pronunciation for the reader and provide examples of some of the species found in the CCP.

When Captain Cook arrived in the Hawaiian Islands in 1778, the Hawaiians had a totally oral tradition. In 1820, western missionaries standardized a written version of the Hawaiian language that features eight consonants and five vowels

Consonants
H - as in English
K - as in English
L - as in English
M - as in English
N - as in English
P - as in English
W - after i and e pronounced like v
- after u and o pronounced like w
- at the start of a word or after a, pronounced like w or v
(‘) - ‘okina - a glottal stop

Vowels
A - pronounced like the a in far
E - pronounced like the e in bet
I - pronounced like the ee in beet
O - pronounced like the o in sole
U - pronounced like the oo in boot

Special Symbols

Two symbols appear frequently in Hawaiian words: the ‘okina and the kahakō. These two symbols change how words are pronounced. The ‘okina itself looks like an upside-down apostrophe and is a glottal stop – or a brief break in the word. An example of this in English is in the middle of the expression “uh-oh.” The ‘okina is an official consonant – just as any of the other consonants

The kahakō is a stress mark (macron) that can appear over vowels only and serves to make the vowel sound slightly longer. The vowels ā, ē, ī, ō, and ū sound just like their non-stressed Hawaiian vowels with the exception that the sound is held slightly longer. Missing the ‘okina or kahakō can greatly change not only how a word sounds, but also its basic meaning. A popular example of how an ‘okina and a kahakō can change the meaning of a word is “pau”:

- pau = finished, ended, all don
- pa‘u = soot, smudge, ink powder
- pa‘ū = moist, damp
- pā‘ū = skirt

Refuge Place Name

Kāhili	(Kah-HEE-lee)
Kīlauea	(KEE-loh-WAY-ah)
Mōkōlea	(Moh-koh-LEE-ah)

Seabirds

‘Ā (AHH)

Brown booby *Sula leucogaster*

HarmonyonPlanetEarth

‘Ā (AHH)

Red-footed booby *Sula sula rubripes*

Mark MacDonald

‘A‘o (AH-oh)

Newell’s Shearwater *Puffinus auricularis newelli*

Federally listed as threatened

Brenda Zaun

‘Iwa (EE-vah)

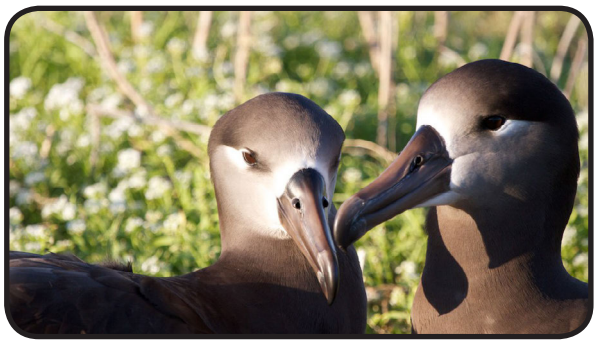
Great frigatebird *Fregata minor palmerstoni*

Charles Sharp

Ka‘upu (kah-OO-poo)

Black-footed albatross *Phoebastria nigripes*

State-listed as threatened



HarmonyonPlanetEarth

Seabirds

Koa‘e kea (Koh-ah-eh-KEE-ah)

White-tailed tropicbird *Phaethon lepturus*

kansasphoto

Koa‘e‘ula (Koh-ah-eh-oo-lah)

Red-tailed tropicbird *Phaethon rubricauda*

Sean Hoyer

Mōlī (MOE-lee)

Laysan albatross *Phoebastria immutabilis*

Michael Lusk

‘Ua‘u (OO-ah-oo)

Hawaiian petrel *Pterodroma sandwichensis*

Federally listed as endangered
State-listed as endangered

©Jim Denny

‘Ua‘u kani (OO-ah-oo-kah-nee)

Wedge-tailed shearwater *Puffinus pacificus (Ardenna pacifica)*

Forest and Kim Starr

Migrant Shorebirds

ʻAkekeke (ah-kay-KAY-kay)

Ruddy Turnstone *Arenaria interpres*

Kat Vitulano Photos

Hunakai (hoo-nah-KYE)

Sanderling *Calidris alba*

Vadim Kreynin

Kioea (kee-oh-AY-ah)

Bristle-thighed Curlew *Numenius tahitiensis*

Forest and Kim Starr

Kōlea (KOHH-lay-ah)

Pacifi Golden Plover *Pluvialis fulva*

Patrick_K59

ʻŪlili (OOO-lee-lee)

Wandering Tattler *Heteroscelus incanus*

Aaron Maizlish

Other Native Animals

ʻĪlio holo i ka uaua (EEE-lee-oh HO-loh EE kah OO-ah OO-ah)

Hawaiian Monk Seal *Monachus schauinslandi*

Federally listed as endangered
State-listed as endangered

USFWS

Nēnē (NAY-NAY)

Hawaiian Goose *Branta sandvicensis*

Federally listed as endangered
State-listed as endangered

Linda Martin

ʻŌpeʻapeʻa (OHH-pay ah-PAY ah)

Hawaiian Hoary Bat *Lasiurus cinereus semotus*

Federally listed as endangered
State-listed as endangered

Forest and Kim Starr

Pueo (poo-AY-oh)

Hawaiian Short-eared Owl *Asio flammeus sandwichensis*

State-listed as endangered on Oʻahu

©Tom Dove

Native Plants

‘**Akoko** (ah-KOH-koh)

Chamaesyce celastroides

USFWS

Hala (HAH-lah)

Screw pine *Pandanus tectorius*

USFWS

‘**Ilima** (ee-LEE-mah)

Hibiscus *Sida fallax*

USFWS

Naupaka Kahakai (now-PAH-kah kah-HAH-kye)

Scaevola sericea

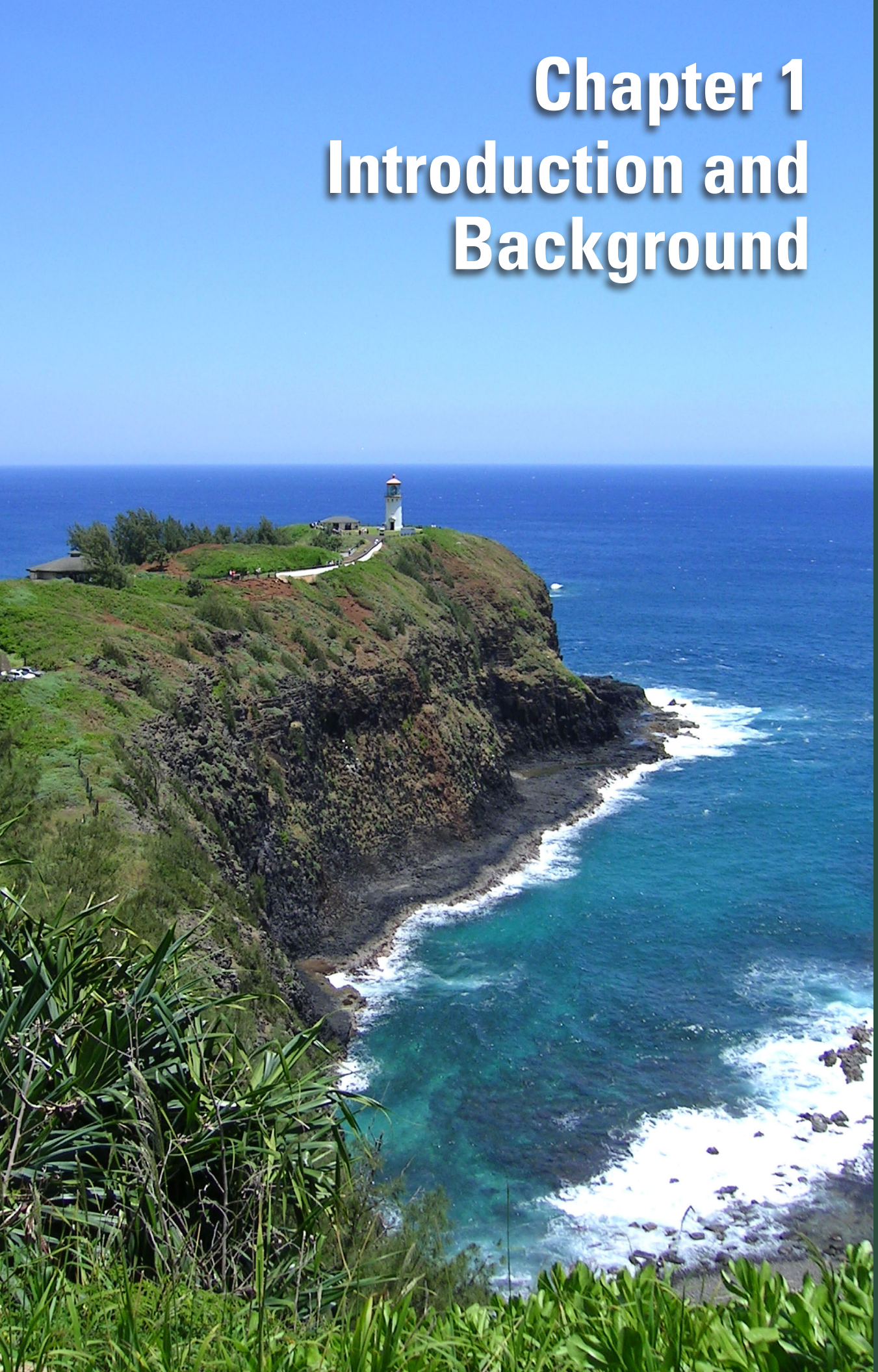
USFWS

Pōhuehue (POHH-hoo-ay-HOO-ay)

Beach morning glory *Ipomoea pescaprae*

USFWS

Chapter 1 Introduction and Background



USFWS

Chapter 1. Introduction and Background

1.1 Introduction

Kīlauea Point National Wildlife Refuge (NWR or Refuge) is managed by the U.S. Fish and Wildlife Service (Service) as part of the National Wildlife Refuge System (Refuge System). It is one of three refuges that make up the Kauaʻi National Wildlife Refuge Complex (KNWRC or Complex): Kīlauea Point, Hanalei, and Hulēʻia (Figure 1-1). This Comprehensive Conservation Plan (CCP) applies only to Kīlauea Point NWR.

The 199-acre Kīlauea Point NWR, located on the northernmost tip of Kauaʻi 2 miles north of Kīlauea Town (Figure 1-2), was established on February 15, 1985, becoming the 425th refuge in the Refuge System. Originally established to preserve and enhance seabird nesting colonies, the Refuge also provides habitat for the endangered nēnē (Hawaiian goose, *Branta sandvicensis*), other migratory birds, endangered ʻīlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*), and native coastal plant communities which include naupaka kahakai (*Scaevola taccada*), ʻilima (*Sida fallax*), ʻakoko (*Chamaesyce celastroides*) and others. The focus of Refuge management is to expand and enhance existing habitat for these species while combating the primary threats of invasive species and predators and allowing for public uses that are compatible with Refuge purposes and the Refuge System mission.

The Refuge is also home to a historic lighthouse that was once owned and operated by the U.S. Coast Guard. The lighthouse, as well as easy access to wildlife viewing and dramatic ocean and cliff views, makes this Refuge a top attraction on the island. Kīlauea Point NWR has among the highest visitation within the entire Refuge System with up to 500,000 people visiting annually.

1.2 Significance of the Refuge

Kīlauea Point NWR is one of the few places in the main Hawaiian Islands with an abundant diversity of seabirds, and it provides a high-island refugium for seabird populations potentially affected by climate change (e.g., rising sea levels impacting low-lying nesting areas on the islands and atolls of the Northwestern Hawaiian Islands). ʻUaʻu kani (wedge-tailed shearwaters**,** *Puffinus pacificus*) are the most numerous species on the Refuge, with an estimated 8,000–15,000 breeding pairs. The colony of ʻā (red-footed boobies**,** *Sula sula*) may be the largest in the main Hawaiian Islands, with a maximum of 2,536 nests counted in 2006. About 200 pairs of mōlī (Laysan albatross**,** *Phoebastria immutabilis*) nest on and near the Refuge, the largest colony outside the Northwestern Hawaiian Islands.

An estimated 150–350 pairs of koaʻe ʻula (red-tailed tropicbirds**,** *Phaethon rubricauda*) nest on the Refuge, as well as smaller numbers of koaʻe kea (white-tailed tropicbirds**,** *Phaethon lepturus*). The Refuge harbors at least 11 prospecting or breeding pairs of ʻaʻo (Newell's shearwater**,** *Puffinus auricularis newelli*), whose numbers are dwindling on Kauaʻi. The Refuge is the only easily accessible location where this threatened species nests and thus is a source of much information on its breeding biology. A remarkable total of 33 seabird species have been observed at Kīlauea Point over the years, making it one of the premier sites for seabirds in Hawaiʻi. Additionally, there are 300 nēnē in the Kīlauea Point area, making the Refuge one of the largest nēnē concentrations on the island.

Dedicated in 1913, the Kīlauea Point Lighthouse Station guided ships and boats along Kaua‘i’s rugged North Shore for 63 years before being deactivated by the Coast Guard in 1976. In 1979, the structure was placed on the National Register of Historic Places. The lighthouse was renamed in honor of the late Senator Daniel Inouye in May 2013.

1.3 Proposed Action

We, the U.S. Fish and Wildlife Service, manage wildlife refuges as part of the Refuge System. This document is the Refuge’s Comprehensive Conservation Plan for Kīlauea Point National Wildlife Refuge. A CCP sets forth management guidance for a refuge for 15 years, as required by the National Wildlife Refuge System Administration Act (16 U.S.C. 688dd–688ee, et seq.) (Refuge Administration Act) as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) (Improvement Act). The Refuge Administration Act requires CCPs to identify and describe:

- The purposes of the Refuge;
- The fish, wildlife, and plant populations, their habitats, and the archaeological and cultural values found on the Refuge;
- Significant problems that may adversely affect wildlife populations and habitats and ways to correct or offset those problems;
- Areas suitable for administrative sites or visitor facilities; and
- Opportunities for fish and wildlife-dependent recreation.

The Service developed and examined four alternatives for future management of Kīlauea Point NWR and disclosed anticipated effects for each alternative, pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321–4347). The Service selected Alternative D for implementation. The goals, objectives, and strategies under Alternative D best achieve the purpose and need for the CCP while maintaining balance among the varied management needs and programs. The selected alternative represents the most balanced approach for achieving the Refuge’s purposes, vision, and goals; contributing to the Refuge System’s mission; addressing relevant issues and mandates; and managing the Refuge consistently with sound principles of fish and wildlife management.

Figure 1-1. Regional Area, Kaua‘i County.

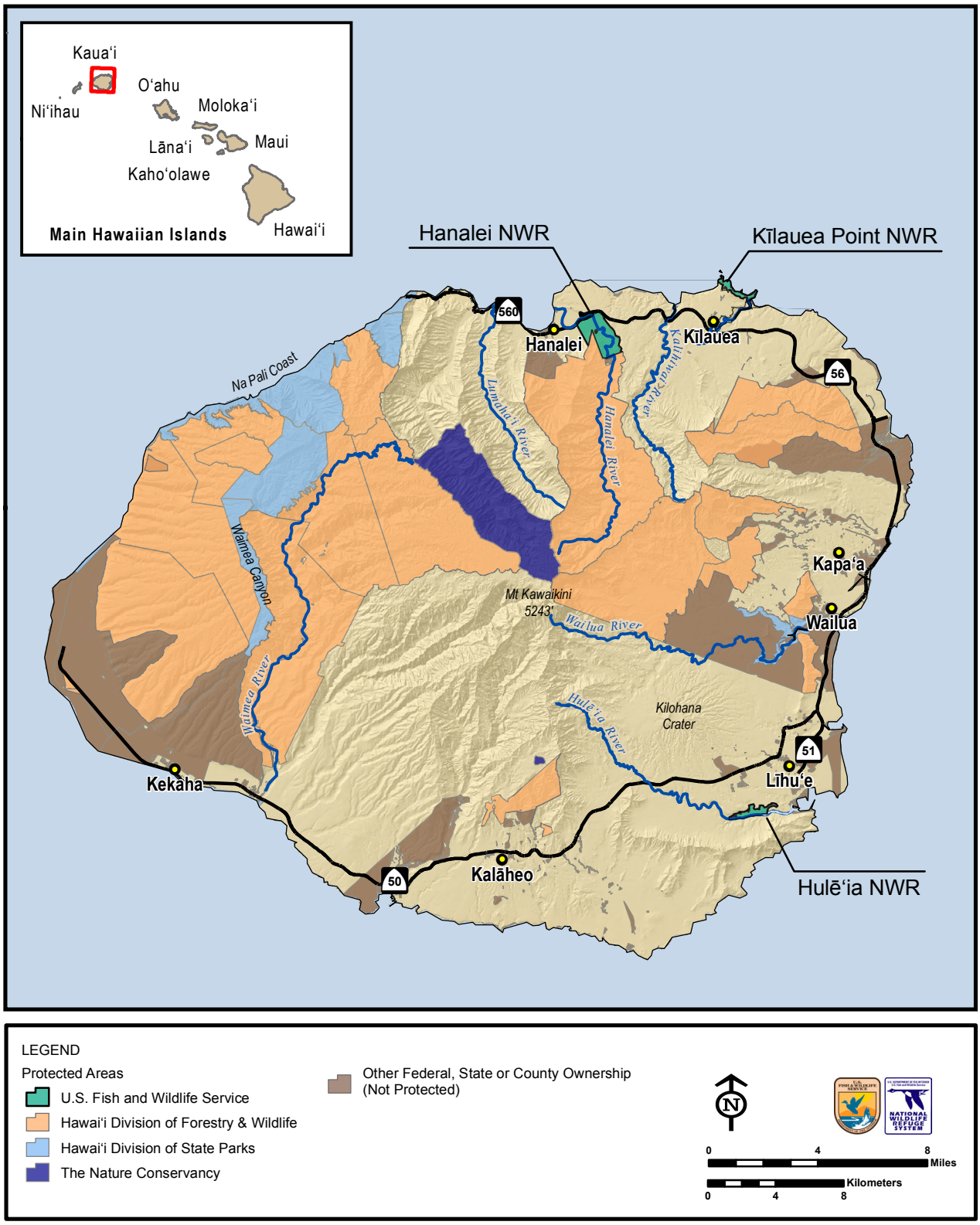


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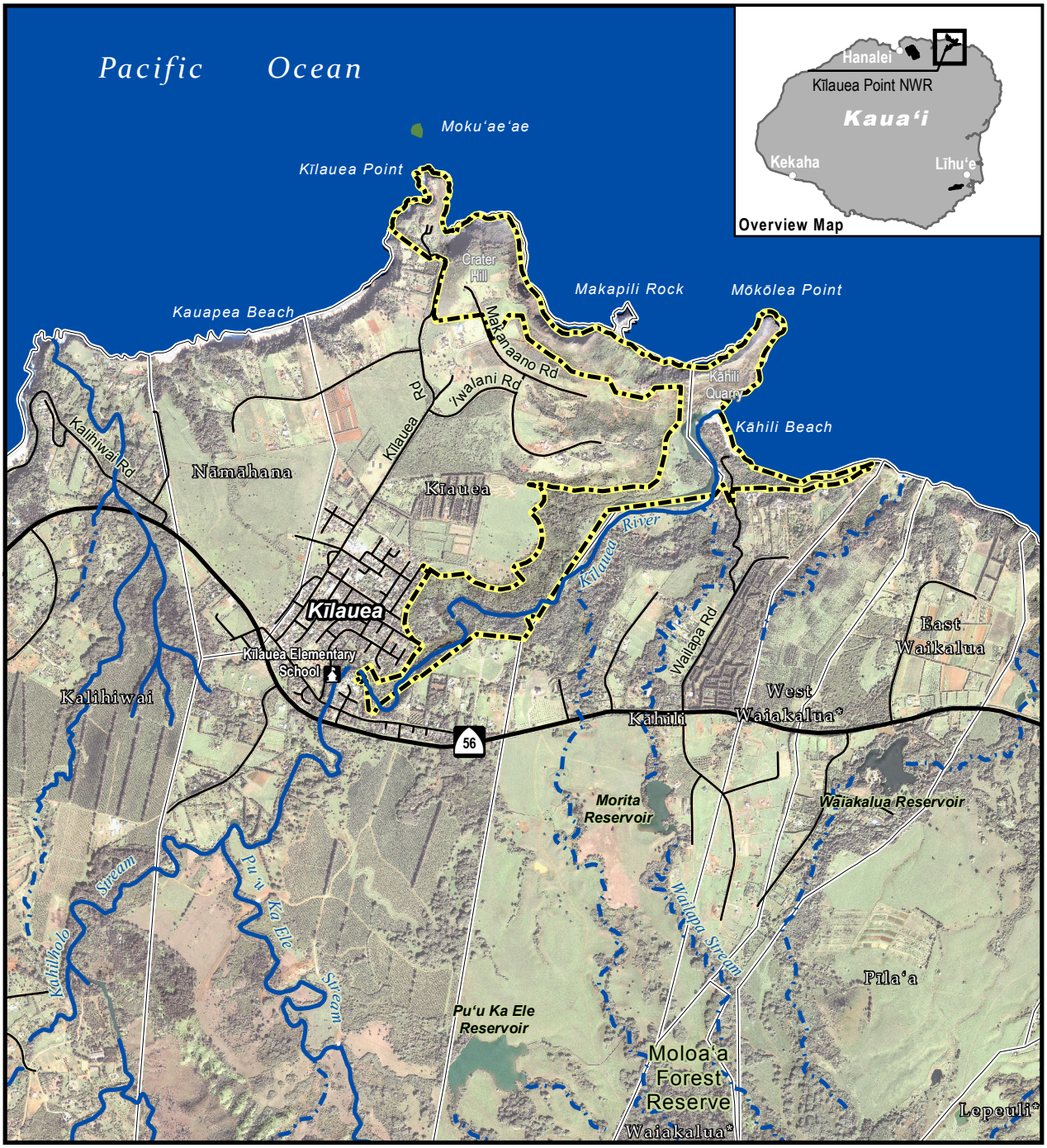
Figure 1-2. Local Area, Kīlauea Point NWR, Kaua'i County.



Map Date: 9/16/2014 File: 11-067-3.mxd
Image: NAIP 2004

Title: Local Area, Kilauea Point
USFWS R1 Refuge Information Branch

The back sides of maps are blank to improve readability.

1.4 Purpose and Need for Action

The purpose of developing the CCP is to provide the Refuge Manager with a 15-year management plan for the conservation of fish, wildlife, and plant resources and their related habitats, while providing opportunities for compatible, wildlife-dependent recreational uses. The CCP, when fully implemented, should achieve Refuge purposes; help fulfill the Refuge System mission; maintain and, where appropriate, restore the ecological integrity of the Refuge and the Refuge System; help achieve the goals of the National Wilderness Preservation System; and meet other mandates. The CCP must be specific to the planning unit and identify the overarching wildlife, public use, or management needs for the Refuge (602 FW 3.4C1d). The need for the CCP is derived from the overall Refuge System mission, goals, and policies, as described in or promulgated by the Refuge Administration Act.

1.5 Legal and Policy Guidance

1.5.1 The U.S. Fish and Wildlife Service

All national wildlife refuges are managed by the Service, an agency within the Department of the Interior (DOI). The Service is the principal Federal agency responsible for conserving, protecting, and enhancing the Nation's fish and wildlife populations and their habitats.

The mission of the Service is "working with others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people." Although we share this responsibility with other Federal, State, Territorial, tribal, local, and private entities, the Service has specific trust responsibilities for migratory birds, endangered and threatened species, interjurisdictional fish, and certain marine mammals. The Service has similar trust responsibilities for the lands and waters we administer to support the conservation and enhancement of fish, wildlife, plants, and their habitats. The Service also enforces Federal wildlife laws and international treaties for importing and exporting wildlife, assists with State and Territorial fish and wildlife programs, and helps other countries develop wildlife conservation programs.

1.5.2 National Wildlife Refuge System

A refuge is managed as part of the Refuge System within a framework provided by legal and policy guidelines. The Refuge System is the world's largest network of public lands and waters set aside specifically for conserving wildlife and protecting ecosystems.

The needs of wildlife and their habitats come first on refuges, in contrast to other public lands that are managed for multiple uses. Refuges are guided by various Federal laws and Executive orders, Service policies, and international treaties. Fundamental are the mission and goals of the Refuge System and the designated purposes of the refuge unit as described in establishing legislation, Executive orders, or other documents establishing, authorizing, or expanding a refuge.

Key concepts and guidance of the Refuge System are derived from the Refuge Administration Act, the Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4), as amended, Title 50 of the Code of Federal Regulations (CFR), and the Fish and Wildlife Service Manual (FW). The Refuge Administration Act is implemented through regulations covering the Refuge System, published in

Title 50, subchapter C of the Code of Federal Regulations. These regulations govern general administration of units of the Refuge System.

National Wildlife Refuge System Mission and Goals

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" (Refuge Administration Act).

The goals of the Refuge System, as articulated in the Mission, Goals, and Purposes policy (601 FW 1) are:

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered;
- Develop and maintain a network of habitats for migratory birds, anadromous and inter-jurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life-history needs of these species across their ranges;
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts;
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation); and
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

National Wildlife Refuge System Administration Act

Of all the laws governing activities on National Wildlife Refuges, the Refuge Administration Act undoubtedly exerts the greatest influence. The Improvement Act amended the Refuge Administration Act in 1997 by including a unifying mission for all national wildlife refuges as a system, a new process for determining compatible uses on refuges, and a requirement that each refuge be managed under a CCP, developed in an open public process.

The Refuge Administration Act states that the Secretary of the Interior shall provide for the conservation of fish, wildlife, and plants and their habitats within the System as well as ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained. House Report 105–106 accompanying the Improvement Act states ''… the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first.'' Biological integrity, diversity, and environmental health are critical components of wildlife conservation. As later made clear in the Biological Integrity, Diversity and Environmental Health (BIDEH) Policy (601 FW 3) "the highest measure of biological integrity, diversity, and environmental health is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions."

Under the Refuge Administration Act, each refuge must be managed to fulfill the Refuge System mission as well as the specific purposes for which it was established. The Refuge Administration Act requires the Service to monitor the status and trends of fish, wildlife, and plants in each refuge.

Additionally, the Refuge Administration Act identifies six wildlife-dependent recreational uses for the Refuge System. These uses are hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Under the Refuge Administration Act, the Service is to grant these six wildlife-dependent public uses, when compatible, special consideration in the planning for, management of, establishment, and expansion of units of the Refuge System. The overarching goal of the wildlife-dependent public uses program is to enhance opportunities and access to quality wildlife-dependent visitor experiences on refuges while managing refuges to conserve fish, wildlife, plants, and their habitats. When determined compatible on a refuge-specific basis, these six uses assume priority status among all uses of the refuge in question. The Service is to make extra efforts to facilitate priority wildlife-dependent public use opportunities.

When preparing a CCP, Refuge Managers must re-evaluate all general public, recreational, and economic uses (even those occurring to further refuge habitat management goals) proposed or occurring on a refuge for appropriateness and compatibility. No refuge use may be allowed or continued unless it is determined to be appropriate and compatible. Generally, an appropriate use is one that contributes to fulfilling a refuge's purposes, the Refuge System mission, or goals or objectives described in an approved refuge management plan. A compatible use is a use that, in the sound professional judgment of the Refuge Manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purpose(s) of the refuge. Appropriate use findings and compatibility determinations for existing and new uses for Kīlauea Point NWR are in Appendices A and B of this CCP.

The Refuge Administration Act also requires that, in addition to other formally established guidance, the CCP must be developed with the participation of the public. Issues and concerns articulated by the public play a role in guiding alternatives considered during the development of the CCP, and together with the formal guidance, can play a role in selection of the preferred alternative. It is Service policy that CCPs are developed in an open public process and that the Service is committed to securing public input throughout the process. Appendix I of the CCP details public involvement that has been undertaken during this CCP process.

1.5.3 Other Laws and Mandates

Many other Federal laws, Executive orders, Service policies, and international treaties govern the Service and Refuge System. Examples include the Migratory Bird Treaty Act of 1918 (MBTA), Refuge Recreation Act of 1962, National Historic Preservation Act of 1966 (NHPA), and the Endangered Species Act of 1973 (ESA). For additional information on laws and other mandates, a list and brief description of Federal laws of interest to the Service can be found in the Laws Digest at http://www.fws.gov/laws/Lawsdigest.html.

In addition, over the last few years, the Service has developed or revised numerous policies and Director's orders to reflect the mandates and intent of the Improvement Act. Some of these key policies include BIDEH; Compatibility (603 FW 2); Comprehensive Conservation Planning Process (602 FW 3); National Wildlife Refuge System Mission and Goals and Refuge Purposes (601 FW 1); Appropriate Refuge Uses (603 FW 1); General Guidelines for Wildlife-Dependent Recreation (605 FW 1); Wilderness Stewardship (610 FW 1-5); and the Director's Order for Coordination and Cooperative Work with State Fish and Wildlife Agency Representatives on Management of the National Wildlife Refuge System. These policies and others in draft or under development can be found at http://refuges.fws.gov/policymakers/nwrpolicies.html.

In developing a CCP, refuges must consider these broader laws and policies as well as Refuge System and ecosystem goals and vision. The CCP must be consistent with these and Refuge purposes. For Kīlauea Point NWR, specific examples of these broader laws include:

- ESA;
- MBTA;
- NHPA;
- Historic Sites, Buildings, and Antiquities Act of 1935.

1.6 Refuge Establishment and Purposes

1.6.1 Legal Significance of the Refuge Purpose(s)

The purpose(s) for which a refuge was established or acquired is of key importance in refuge planning. Purposes must form the foundation for management decisions. Refuge purposes are the driving force in the development of the refuge vision statements, goals, objectives, and strategies in a CCP and are critical to determining the compatibility of existing and proposed refuge uses.

The purpose(s) of a refuge is specified in or derived from the law, proclamation, Executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.

Unless the establishing law, order, or other document indicates otherwise, purposes regarding the conservation, management, and restoration of fish, wildlife, and plants, and the habitats on which they depend, take precedence over other purposes in the management and administration of any unit. Where a refuge has multiple purposes related to fish, wildlife, and plant conservation, the more specific purpose will take precedence in instances of conflict. When an additional unit is acquired under an authority different from the authority used to establish the original unit, the addition takes on the purpose(s) of the original unit, but the original unit does not take on the purpose(s) of the newer addition. When a conflict exists between the Refuge System mission and the purpose of an individual refuge, the refuge purpose may supersede the mission.

1.6.2 Purpose and History of Refuge Establishment

Since 1985, the Refuge has continued to undergo expansion and as such, there are several authorities related to its establishment. They are as follows:

- *The Transfer of Certain Real Property for Wildlife Conservation Act (16 U.S.C. 667b-667d, May 19, 1948, as amended 1949, 1972, and 1995).* This act provides authority to the Administrator of the General Services Administration to transfer real property no longer needed by a Federal agency to the Secretary of the Interior if the land has particular value for migratory birds.

- *Refuge Recreation Act (16 U.S.C. §§ 460k through 460k-4, September 28, 1962, as amended 1966, 1972, 1973, and 1978).* This act authorizes the Secretary of the Interior to allow public recreation in Federal conservation areas when compatible with the purposes of these areas, acquire lands that are suitable for incidental fish and wildlife-oriented recreational development, protect natural resources, and conserve endangered or threatened species.

- *Endangered Species Act (ESA) (16 U.S.C. §§ 1531-1544, December 28, 1973, as amended 1976, 1977, 1978, 1979, 1980, 1982, 1984, 1988, 1992, and 1997).* The ESA provides for the conservation of threatened and endangered species of fish, wildlife, and plants by Federal action and by encouraging the establishment of State programs. It supersedes and strengthens two earlier endangered species acts, the Endangered Species Preservation Act of 1966 and The Endangered Species Conservation Act of 1969. Section 5 of the ESA provides guidance for the Service to use its existing authorities to acquire lands to conserve those species listed as endangered or threatened. It also provides for the determination and listing of endangered and threatened species and the designation of critical habitats. Section 7 of the ESA requires refuge managers to perform consultations before initiating projects that affect or may affect endangered species.

- *Kīlauea Point Expansion Act of 2004 (Expansion Act) (16 USC 668dd December 23, 2004).* The Expansion Act, Public Law 108-481, directs the Secretary of the Interior to acquire by donation, purchase with donated or appropriated funds, or exchange, all or a portion of approximately 234 acres of land adjacent to the Kīlauea Point NWR to be managed for the protection and recovery of endangered Hawaiian water birds and other endangered birds, including nēnē (Hawaiian goose), and the conservation and management of native coastal strand, riparian, and aquatic biological diversity.

As a result of the various establishment authorities above, there are several purposes for Kīlauea Point NWR:

- ... particular value in carrying out the national migratory bird management program.16 U.S.C. § 667b (An Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes)

- ... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ...16 U.S.C. § 460k-1

- ... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ... 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended)

- ... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants … 16 U.S.C. § 1534 (Endangered Species Act of 1973)

- (1) the protection and recovery of endangered Hawaiian waterbirds and other endangered birds, including the nēnē (Hawaiian goose); and (2) the conservation and management of native coastal strand, riparian, and aquatic biological diversity. Public Law 108-481 (Kīlauea Point National Wildlife Refuge Expansion Act of 2004).

1.6.3 Land Status and Ownership

The Refuge approved boundary is made up of lands owned in fee by the Service, non-Service owned lands (in-holdings), and easements (Figure 1-3). The following provides a summary of major land status and ownership actions from past to present.

- 1976–Agreement with the U.S. Coast Guard allowed the Service to use Kīlauea Point to administer its other refuges on Kauaʻi (Hanalei and Hulēʻia);

- 1985–Under Public Law 80-537, the U.S. Coast Guard transferred 31-acre Kīlauea Point (Tract 10) and a 3.75-acre road easement (Tract 10R) to the Service (negotiations began in 1984);

- 1988–With assistance from the Trust for Public Lands, the Service added Mōkōlea Point (Tract 11), a 4.55-acre road easement (Tract 11R), and Crater Hill (Tracts 12, 12C, 12R, and 12R-1; 91 fee acres, 8.52 easement acres) to the Refuge under the authority of the ESA:

    - Mōkōlea Point was purchased in fee with the Land and Water Conservation Fund for $1.6 million dollars. There is an access easement in favor of Seacliff Plantation (formerly the Pali Moana Corporation) for beach access and parking over and across Kāhili Quarry Road (Tract 11) as well as for emergency and maintenance operations. This access is subject to reasonable rules and regulations for the protection of wildlife;

    - The Crater Hill parcel was donated by Pali Moana Corporation (which is now Seacliff Plantation) through the Trust for Public Lands. Seacliff Plantation retained two access easements for pedestrian and equestrian access within the Refuge boundary; the easements are 20 feet wide, with only 10 feet of this allowed for improvements of an unpaved surface. Both easements enter the Refuge from a gate at the northeast end of Makana Ano Place and continue to the eastern boundary of Tract 12. The use of these properties is highly regulated under the conveyance documents; general unsupervised public use and construction of any buildings or other structures are prohibited on Tract 12. In addition, the State retained the mineral and metallic mines rights and easements for utilities maintained. The Service also has a right of ingress and egress for emergency and maintenance purposes over portions of Seacliff Plantation's property;

- 1993–Tract 14 (7 acres) was purchased at $2.7 million dollars from ARC Partners, Ltd., with existing utility easements and State rights for mineral and metallic mines intact;

- 1994–Tracts 13a (7 acres) and 15 (7 acres) were also purchased. Tract 15, at $1.975 million, was purchased from an individual, subject to existing utility and irrigation ingress and egress easements and State rights for mineral and metallic mines intact. Tract 13a was acquired by exchange from Pali Moana Company for the release of a conservation easement on 3.154 acres (small triangle protruding from the south of Tract 13) and an equalization payment of $200,000. There is also an Open Space Easement area within Tract 13a;

- 2004–Congress approved the expansion of the Refuge boundary by up to 234 additional acres (Kauaʻi county council passed a resolution in support of this expansion). A Land Protection Plan and Environmental Assessment were conducted and completed in 2007. The Service selected the alternative that expanded the Refuge boundary by 202 acres. However, no land in this expanded boundary area has been acquired by the Refuge (though a landowner did donate 5 acres to the Kauaʻi Land Trust (now part of the Hawaiian Islands Land Trust) to hold as an addition to the Refuge).

The following is a list of additional easements on the Refuge not identified above:

- Kaua‘i Island Utility Cooperative currently has easement rights under a Special Use Permit to allow placement of electric utility lines underground;

- The U.S. Coast Guard reserved an access easement over the existing roadway for maintenance and repair of the beacon and aids-to-navigation light. They also reserved a visual easement to provide an unobstructed view from the sea to the beacon. Additionally, they have jurisdiction over a 30x30-foot inholding on Kīlauea Point.

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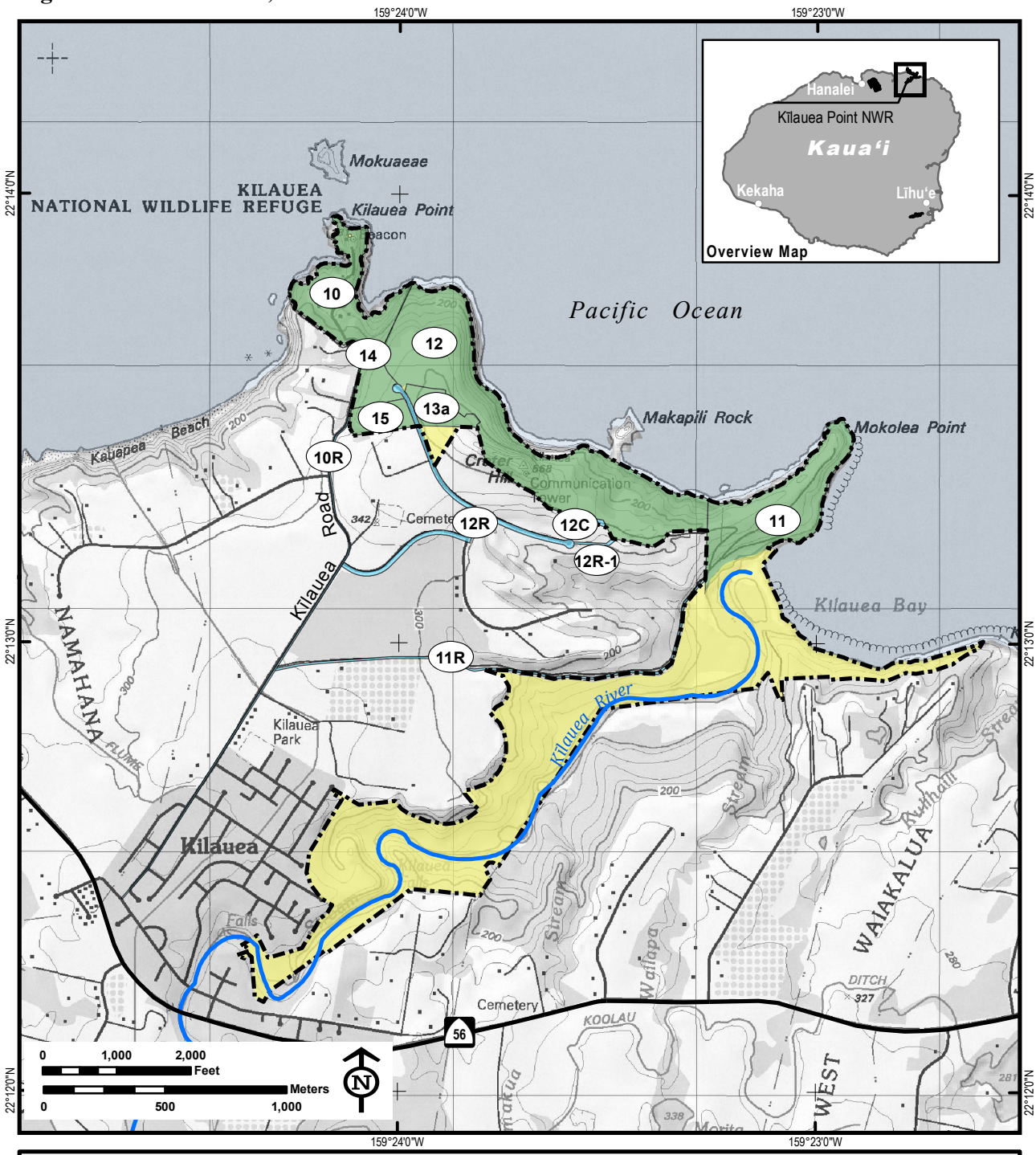
Figure 1-3. Land Status, Kīlauea Point NWR.



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Under the State Land Use Law (Act 187), Hawai‘i Revised Statute Chapter 205, all lands and waters in the State are classified into four districts: Agriculture, Rural, Conservation, and Urban. Conservation Districts, under the jurisdiction of the Hawai‘i Department of Land and Natural Resources, are further divided into five subzones: Protective, Limited, Resource, General, and Special (Hawai‘i Administration Rules, Title 13, Chapter 5). The other three districts are under the jurisdiction of the counties.

According to the land use classifications, the fee portion of Kīlauea Point NWR is zoned mostly as agriculture, though not considered prime agricultural land according to the State's agricultural lands of importance. Areas along the coast are zoned as conservation. A majority of the Refuge (everything east of the Overlook, a turnaround at the end of a road) is also zoned as a special management area according to the Coastal Zone Management program.

1.7 Relationship to Other Planning Efforts

When developing a CCP, the Service considers the goals and objectives of existing national, regional, State, Territorial, and ecosystem plans, and assessments. The CCP is expected to be consistent, as much as possible, with existing plans and assist in meeting their conservation goals and objectives (602 FW 3). This section summarizes some of the key plans reviewed by members of the core team while developing this CCP.

1.7.1 Relationship to Refuge Plans

Kīlauea Point NWR

- Draft Public Use Management Plan (1989);
- Complex-wide Draft Plant Restoration Strategy (1999);
- A Handbook for Outreach (2001);
- Visitor Uses Study (2002);
- Visitors Services Evaluation Report (2003);
- Complex-wide Wildland Fire Management Plan (2004);
- Alternative Transportation System Study (2006);
- Kīlauea Point NWR Alternative Transportation Systems Study, Refuge Visitor Projections Report (March 2006);
- Kīlauea Point Light Station Historic Structures Report (April 2006);
- Kīlauea Point NWR Alternative Transportation Systems Study, Final Report (September 2006)
- Environmental Assessment for the Proposed Expansion of Kīlauea Point National Wildlife Refuge (August 2007);
- Complex-wide Invasive Species Management Plan (2008);
- Transportation Assistance Group Report (2009);
- Environmental Assessment for the Nihoku Ecosystem Restoration Project (2014).

1.7.2 Other Plans and Assessments

A Conservation Action Plan for Black-footed Albatross (*Phoebastria nigripes*) and Laysan Albatross (*P. immutabilis*) (Naughton 2007). This plan is intended to provide a framework for partnership-based conservation and management actions and facilitate a collaborative, proactive approach to albatross conservation. Recommendations focused mainly on population monitoring and management; fisheries bycatch mitigation and monitoring; habitat restoration and invasive species control; contaminant and disease monitoring and abatement; at-sea habitat utilization; and education and outreach.

Draft Revised Recovery Plan for the Nēnē or Hawaiian Goose (*Branta sandvicensis*) (USFWS 2004). The nēnē was declared a federally endangered species in 1967. It is considered one of the most endangered geese in the world. The recovery plan aims to restore and maintain multiple self-sustaining nēnē populations on Hawai‘i, Maui Nui (Maui, Moloka‘i, Lāna‘i, Kaho‘olawe), and Kaua‘i. The recovery of the nēnē focuses on the following objectives:

- Identify and protect nēnē habitat, focusing on the identification and protection of sufficient habitat to sustain target population levels;
- Manage habitat and existing populations for sustainable productivity and survival complemented by monitoring changes in distribution and abundance;
- Control alien predators, which addresses control of introduced mammals to enhance nēnē populations;
- Continue captive propagation program, which describes techniques and priorities for the captive propagation and release of nēnē into the wild;
- Establish additional nēnē populations, which focuses on partnerships with private landowners;
- Address conflicts between nēnē and human activities, which includes potential management and relocation of nēnē that are in unsuitable areas;
- Identify new research needs and continue research, which describes general categories of research needed to better evaluate threats to nēnē and develop and evaluate management strategies to address these threats;
- Provide a public education and information program, which describes important outreach and education activities; and
- Validate recovery actions, which calls for formalizing the Nēnē Recovery Action Group and evaluating management and research projects to determine if recovery objectives have been met.

Newell's Shearwater and Hawaiian Petrel Recovery: A Five-year Action Plan (Holmes et al. 2011). This action plan provides specific recovery objectives for the ‘a‘o. Although the nature of the threats (e.g., mammalian predators, habitat degradation and loss) to this species has not changed appreciably since the recovery plan was issued in 1982, the severity of these threats (e.g., increased development) and thus the urgency of addressing them have increased as shearwater populations have declined. The recovery strategy for the ‘a‘o includes five components to reduce mortality, maintain or increase suitable nesting habitat, and to fill in gaps in our knowledge of the species:

1. Minimize adult/breeder mortality and maximize fledgling production by developing and implementing effective predator control methods in colonies;

2. Reduce the potential for collisions with power lines, towers, and other structures;
3. Protect existing colonies from degradation due to invasive plants and pigs;
4. Reduce fallout associated with lights;
5. Improve monitoring methods, initiate studies to determine the effects of the tuna fishery on Newell's shearwater populations, and collect needed demographic data.

Interim Recovery Objectives include:

1. Implement predator control in at least two colonies and install ungulate fencing around at least two colonies;
2. Determine or estimate the number of adults that collide with power lines and structures;
3. Collaborate with the Kauaʻi Invasive Species Committee to identify priority areas where invasive alien plants are a problem and help develop effective techniques for their control and interdiction;
4. Encourage Kauaʻi County to adopt a light pollution ordinance, and shield all remaining lights around hotels, playing fields, shopping centers, and other areas determined to be a hazard to shearwaters;
5. Develop and implement effective monitoring techniques in at least two colonies that would facilitate the estimation of the effects of recovery actions;
6. Continue broad-scale monitoring to assess population-wide trends throughout Hawaiʻi to better understand threats and guide recovery efforts;
   Develop studies to address fishery-related questions and collect demographic data.

From these interim recovery objectives, the five-year action plan focuses on predator control, light attraction and collision, invasive plants and pigs, Save Our Shearwaters program, and monitoring.

Recovery Plan for the Hawaiian Monk Seal (*Monachus schauinslandi*) (NMFS 2007). The ʻīlio-holo-i-ka-uaua has the distinction of being the only endangered marine mammal whose entire species range–historic and current–lies within the United States. The majority of the population of seals now lies in the Northwestern Hawaiian Islands with six main breeding subpopulations. The species is also found in lower numbers in the main Hawaiian Islands where the population size and range both appear to be expanding. The main terrestrial habitat requirements include haul-out areas for pupping, nursing, molting, and resting. These are primarily sandy beaches, but virtually all substrates are used at various islands. The goal of this revised recovery plan is to assure the long-term viability of the ʻīlio-holo-i-ka-uaua in the wild, allowing initially for reclassification to threatened status and, ultimately, removal from the List of Endangered and Threatened Wildlife.

Recovery Plan for the Kauaʻi Plant Cluster (USFWS 1995). This plan covers 37 plant taxa, 34 of which are federally listed as endangered and 3 listed as threatened. The recovery actions identified in the plan include protecting current populations, controlling threats, and monitoring; expanding current populations; conducting research essential to conservation of the species; establishing new populations as needed to reach recovery objectives; validating and revising recovery objectives; and devising and implementing a public education program.

Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*) (NMFS and USFWS 1998). The honu is listed as threatened throughout its Pacific Range, except for the endangered population nesting on the Pacific coast of Mexico, which is covered under the Recovery Plan for the East Pacific green turtle. By far, the most serious threat to these honu is from direct take of turtles and eggs, both within U.S. jurisdiction, and on shared stocks that are killed when they

migrate out of U.S. jurisdiction. In Hawai‘i, honu populations appear to have a somewhat less dire status, probably due to effective protection at the primary nesting areas of the Northwestern Hawaiian Islands and better enforcement of regulations prohibiting take of the species. However, an increase in the incidence of the tumorous disease, fibropapillomatosis, in the Hawaiian honu threatens to eliminate improvements in the status of the stock. Human development is also having an increasingly serious impact on nesting beaches.

Recovery Plan for the ‘Ōpe‘ape‘a (Hawaiian Hoary Bat,* Lasiurus cinereus semotus*) (USFWS 1998). The ‘ōpe‘ape‘a is the only native land mammal in the Hawaiian Islands. There is a general lack of historic and current data on this subspecies, and its present status is not well understood. The Service’s recovery objective is delisting from the ESA, with the interim goals of determining present population status and downlisting to threatened status. Distribution and abundance of ‘ōpe‘ape‘a will also provide information on specific roosting habitat associations and food habits. With basic information on the location of ‘ōpe‘ape‘a and their resource needs, threats can then be identified and managed. Management actions that may be needed to address threats include protection of key roosting and foraging areas, particularly if ‘ōpe‘ape‘a or their food resources depend on native vegetation. Predation, the potential impacts of pesticides to bats or their food resources, and other threats may also need to be addressed.

Kaua‘i Island-wide Draft Recovery Plan (USFWS in prep.): This draft recovery plan is being developed to incorporate all listed and candidate species on the island of Kaua‘i, including those in other recovery plans. In total, it will address 173 species. For multi-island species, this recovery plan will only address the recovery needs and actions for Kaua‘i populations. Recovery goals for Kaua‘i island endemic species will be developed in this recovery plan.

Hawai‘i’s Comprehensive Wildlife Conservation Strategy (Mitchell et al. 2005). The U.S. Congress mandated each State and Territory to develop a comprehensive wildlife conservation strategy (CWCS) in order to continue to receive State Wildlife Grants, which assist states with wildlife management. Hawai‘i’s CWCS reviews the status of the full range of the State’s native terrestrial and aquatic species (over 10,000 of which are found nowhere else on Earth) and provides management recommendations for their continued conservation. Hawai‘i’s Species of Greatest Conservation Need include all native terrestrial animals, all endemic aquatic animals, additional indigenous aquatic animals identified as in need of conservation attention, a range of native plants identified as in need of conservation attention, and all identified endemic algae. This list includes a terrestrial mammal (1), birds (77), terrestrial invertebrates (~5,000), freshwater fishes (5), freshwater invertebrates (12), anchialine pond-associated fauna (20), marine mammals (26), marine reptiles (6), marine fishes (154), marine invertebrates (197), and flora (over 600).

U.S. Pacific Islands Regional Shorebird Conservation Plan (Engilis and Naughton 2004). Conservation and restoration of shorebird habitats is essential for the protection of endangered and declining shorebird populations. Wetlands, beach strand, coastal forests, and mangrove habitats are particularly vulnerable on Pacific islands due to increasing development pressures and already limited acreage. Monitoring and research needs include assessment of population sizes and trends; assessment of the timing and abundance of birds at key wintering and migration stopover sites; assessment of habitat use and requirements at wintering and migration areas; exploration of the geographic linkages between wintering, stopover, and breeding areas; and evaluation of habitat restoration and management techniques to meet the needs of resident and migratory species. Education and public outreach are critical components of this plan. Resource management agencies of Federal, Territorial, Commonwealth, and State governments will need to work together with

military agencies, nongovernmental organizations, and the scientific community. On a larger scale, coordination at the international level will be key to the conservation of vulnerable species, both migratory and resident.

U.S. Fish and Wildlife Service Regional Seabird Conservation Plan (USFWS 2005). The purpose of this plan is to identify Service priorities for seabird management (maintenance, protection, enhancement, and restoration); threat management; inventory and monitoring; research; outreach and education; planning; and coordination. The most serious threats to seabirds identified in this regional plan involve invasive (nonnative) species, interactions with fisheries, oil and other pollution, habitat loss and degradation, human disturbance, and global climate change.

Kauaʻi Seabird Habitat Conservation Plan (KSHCP) (in prep.). The KSHCP is currently being developed by the Service and the State of Hawaiʻi's Department of Land and Natural Resources Division of Forestry and Wildlife (DLNR-DOFAW) to provide interested businesses and agencies with a streamlined, cost-effective way to attain legal authorization and coverage for unavoidable incidental take of endangered and threatened seabirds on the island of Kauaʻi. While both the CCP and KSHCP planning efforts seek to benefit endangered Hawaiian seabirds through similar actions, it should be noted that the KSHCP is focused on mitigating the effects of current and future take of endangered seabirds.

North Shore Community Development Plan (1980). The North Shore Development Plan is intended as a statement of policy that reflects the community's desires, intentions, and aspirations for the area. The last update was completed in 1980. The plan emphasizes preserving the rural atmosphere of the area and conserving land and water resources.

Kauaʻi General Plan (County of Kauaʻi 2000). The General Plan fulfills legal mandates of State law and the Charter of the County of Kauaʻi. More importantly, it provides guidance for land use regulations, the location and character of new development and facilities, and planning for County and State facilities and services. The General Plan states the County's 20-year vision for Kauaʻi and sets policies for achieving that vision. The policies are intended to guide County decision-making by mapping the direction of future development; by describing what kind of future development is desirable; and by setting priorities for public improvements. The policies will guide the County in making revisions to land development regulations; in deciding on zone changes and development permits; and in setting strategies for capital improvements. The General Plan also establishes a framework and priorities for future community-level planning and long-range planning for public facilities.

Kīlauea Town Plan (County of Kauaʻi 2006). This plan was adopted as an amendment to the Kauaʻi General Plan. The plan addresses concerns related to agricultural lands, resident housing and services, and future expansion. Recommendations were made concerning regional and town form, housing development, and the town character.

State Comprehensive Outdoor Recreation Plan, update 2008 (DLNR 2009). In order to continue to receive Land and Water Conservation Fund support, states must prepare a State Comprehensive Outdoor Recreation Plan (SCORP). The SCORP is a tool for statewide outdoor recreation planning, leadership, and action. It is intended to guide Federal, State, County and private agencies in the planning, development, and management of Hawaiʻi's outdoor recreation resources. The SCORP directs LWCF grant funding into facilities that best meet the public's outdoor recreation needs.

Statewide Pedestrian and Bicycle Master Plans. Though these plans have yet to be developed, several public meetings have already taken place on Kaua‘i to discuss possible routes and areas for pedestrian and bicycling.

1.8 Special Designation Lands

1.8.1 Important Bird Areas (IBA)

The Important Bird Areas (IBA) program is a global effort to identify the most important areas for maintaining bird populations and focusing conservation efforts on protecting these sites. Within the United States, the program has been promoted and maintained by the American Bird Conservancy (ABC) and the National Audubon Society (NAS). The ABC is coordinating the identification of nationally significant IBAs while NAS is working to identify sites in individual states. The NAS is working within each state to identify a network of sites across the U.S. that provide critical habitat for birds. This effort recognizes that habitat loss and fragmentation are the most serious threats to birds across North America and around the world. By working through partnerships, principally the North American Bird Conservation Initiative, to identify those places that are critical to birds during some part of their life cycle (breeding, wintering, feeding, migrating), the effects that habitat loss and degradation have on bird populations could be minimized. The IBA program has become a key component of many bird conservation efforts. More information is available at http://www.audubon.org/bird/iba/index.html.

The goals of the IBA program are to identify the sites that are the most essential for long-term conservation of birds and to take action to ensure the conservation of these sites. An IBA is a site that provides essential habitat for one or more species of birds. The IBA selection process examines sites based on the presence and abundance of birds and/or the condition and quality of habitat. IBAs are chosen using standard biological criteria and expert ornithologists' review. All sites nominated as potential IBAs are rigorously evaluated to determine whether they meet the necessary qualifications. IBAs represent discrete sites, both aquatic and terrestrial, that are critically important to birds during their annual life cycle (e.g., breeding, migration, and/or wintering periods).

Kīlauea Point NWR is identified as an IBA because it regularly holds significant numbers of a globally threatened species, or other species of global conservation concern (criterion A1) and because the site is known or thought to support, on a regular basis, 1 percent or more of the global population of a congregatory seabird or terrestrial species simultaneously, or 5 percent over a season (criterion A4ii). The A4ii category applies to those species that are vulnerable as a consequence of their congregatory behavior at regularly used sites.

1.8.2 National Register of Historic Places

Established under the NHPA, the National Register includes over 77,000 districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. The register's entries were identified and documented in partnership with State, Federal, and tribal preservation programs. The documentation provided for each property consists of photographs, maps, and a registration form which provides a physical description of the place, information about its history and significance, and a bibliography. Documentation is now available online through the National Register Information System at http://www.nr.nps.gov. The Kīlauea Point Lighthouse Station is on the National Register of Historic Places.

1.9 Planning Process and Issue Identification

The CCP planning team evaluated the issues and concerns raised both by staff and the public during public scoping, as well as throughout the multi-year planning process. Issues are defined as matters of controversy, dispute, or general concern over resource management activities, the environment, land uses, or public use activities. Issues are important to a refuge's planning process because they identify topics to be addressed in a CCP, pinpoint the types of information to gather, and help define alternatives for a CCP. It is the Service's responsibility to focus planning and analysis on the major issues. Major issues typically suggest different actions or alternative solutions, are within the Refuge's jurisdiction, and have a positive or negative effect on the resource. Major issues influenced the decisions the Service made in selecting Alternative D for the CCP. Key issues that were analyzed are presented below.

1.9.1 Planning Process

The core planning team for Kīlauea Point NWR consists of a project leader, deputy project leader, biologist, visitor services staff person, and conservation planner. The full list of core and extended team members and their roles is provided in Appendix I. The extended team assisted in the development of this CCP, particularly in providing comments at key milestones.

The initial CCP planning process for the Complex began in 2007. Public scoping began in the fall of 2009 with a notice in the *Federal Register* (September 28, 2009, 74 FR 49399), and public meetings and talk story sessions were held in Hanalei, Hulēʻia, Kīlauea, and Līhuʻe from October 2009 to January 2010. Public input was also solicited through planning updates (Planning Updates 1 and 2) distributed to our mailing list. Additionally, workshops/meetings with local, State, Federal agencies, community groups, Refuge users, nonprofits, and others were held. In all, over 80 people participated. The comments and suggestions made through this process helped further develop and refine the management alternatives for the CCP.

The draft CCP/EA was issued for public review and comment on February 12, 2015. The availability of the plan was announced through a notice in the *Federal Register* (February 12, 2015, 80 FR 7876) and via direct contact with approximately 800 people on our mailing list. The plan was made available for downloading on the Refuge website and was made available upon request in CD or printed format. Printed copies of the draft CCP/EA were available at local public libraries, and upon request. Public meetings were held in Kīlauea on February 24 and 25, 2015. A total of over 50 people attended. Additionally, the planning team met separately with specific partners and interested parties including DLNR-DOFAW, the County of Kauaʻi, one County council member, the Kīlauea Neighborhood Association, and kūpuna. Comments were received from over 70 entities during the 44-day public comment period held February 12, 2015, through March 27, 2015. All changes made as a result of public and agency comments were documented. A summary of public involvement is included in Appendix I; public comments on the draft CCP/EA and the Service's responses to comments are included in Appendix K.

1.9.2 Key Issues Addressed in the CCP

Wildlife and habitats. What is the most important ecological contribution the Refuge can make? How can we expand and improve habitat for priority species? What are our priority research and survey needs to support management? What can be done for nonpriority species and habitat areas given limited personnel and resources?

Facilities and maintenance. What facilities and maintenance are needed to support greater Refuge management? Where should such facilities and maintenance be located?

Cultural/historic resources. How can cultural and historic resource management be improved? How can they be woven together with public interpretation?

Visitor services and wildlife-dependent recreation. What is the appropriate use and level of wildlife observation and photography, environmental education and interpretation, and recreational fishing?

Law enforcement. How can trespass, illegal activity, and human-caused disturbance to wildlife be managed more effectively given limited personnel?

1.9.3 Issues Outside the Scope of the CCP

While CCPs are comprehensive plans, no single plan can cover all issues. The planning team has compiled a list of issues which are currently considered to be outside the scope of this CCP or as actions considered but not developed (see Chapter 2 for further detail on these issues):

Kīlauea Town bypass. Kīlauea Town, through its plan development, has concluded a need for establishing a bypass road in order to alleviate traffic through the main part of town along Kīlauea Road. The role of the Refuge in securing such a bypass has been discussed with local officials. However, the lead for such an initiative would fall under the authority and jurisdiction of both the State Department of Transportation as well as the County. As such, this action would not be a Service-led initiative as it falls outside our jurisdiction. However, given that 25 percent of traffic utilizing Kīlauea Road results from vehicles destined for the Refuge, we recognize the potential impacts a bypass may have for visitors to the Refuge and will continue to be engaged and involved with the Kīlauea Neighborhood Association (KNA) and other partners (e.g., private landowners), where appropriate, to discuss feasibility of a bypass if initiated by State or County agencies.

1.10 Refuge Vision and Goals

The following vision and goals for Kīlauea Point NWR were developed during the planning and public scoping process.

1.10.1 He nu‘ukia no ka pu‘uhonua (Refuge Vision)

Shrouded in a salty mist, the steep cliffs of an ancient volcano plunge into a pounding north swell as Kīlauea Point National Wildlife Refuge stands as an oasis where abundant seabirds blanket the pali and ride updrafts. Here a symphony of sounds reverberates—from the whinny of mōlī to a chorus of rattling squawks from thousands of ‘ā. Nēnē nestle within thriving native plant communities that

blanket the red soil throughout the Refuge. ʻĪlio-holo-i-ka-uaua and honu bask in tranquil solitude at the edge of the turquoise waters teeming with marine life.

Kau maila ka ʻehukai i ka pali kū o ka luapele, a papā mai ka nalu poʻi. Kū kilakila ʻo Kīlauea Point National Wildlife Refuge ma ke ano he kīpuka no ka manu o ka moana kūhohonu, a ma aneʻi lākou e kīkaha a kaʻaniu ai. Kūpinaʻi aʻe ka leo o ka mōlī, ua lau. Hauwalaʻau mai ka leo o ka ʻā, ua mano. Nonoho iho ka nēnē i ka nāhele ʻoiwi e uhi ana i ka lepo ʻulaʻula o neʻi. Lalala mehameha ka īlioholoikauaua a me ka honu ma kaʻe o ke kai papaʻu piha o ka iʻa.

The dynamic and awe-inspiring experiences of Kīlauea Point provide kamaʻāina and visitors alike a sense of place and lasting interconnectedness with the natural world. Interwoven with cultural heritage, environmental education links the island's keiki and the youth beyond with the Refuge's unique ecosystems and native wildlife. Through strong community support, the Kīlauea lighthouse endures, telling its story, and remains a beacon promoting stewardship of the Refuge's resources for future generations.

Poina ʻole nēia wahi ke hoʻokipa ʻia e ke kamaʻāina, pau pū me ka malihini i ke ʻano o nā mea a lākou i ʻike ai, i laʻa me ka pilina ma waena o kō a uka, a kō a kai. ʻO ka nohona kanaka a me ke aloha ʻāina ke kahua o ka haʻawina e aʻo aku ai i ka poʻe ʻōpio, i moākaka ia mau mea i ka ʻike a kō lākou mau maka ma kēia mua aku. Ma o ke kākoʻo a ke kaiāulu, kū mau ka hale ipu kukui ʻo Kīlauea i lama kuhikuhi o ka mālama ʻāina no nā hanauna e hiki mai ana.

1.10.2 ʻO nā pahuhopu o ka puʻuhonua (Refuge Goals)

Refuge management goals are descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose, but do not define measurable units. Goals must support the Refuge vision and describe the desired end result. The following are goals for Kīlauea Point NWR:

He mau manaʻo laulā nā pahuhopu no ke ʻano o ka nohona i kēia mua aku. Kākoʻo a hoʻākāka nā pahuhopu i ka nuʻukia o ka puʻuhonua. Ua helu ʻia lākou ma lalo nei:

Goal 1: Protect, enhance, and manage the coastal ecosystem to meet the life-history needs of migratory seabirds and threatened and endangered species.

ʻO ka pahuhopu 1: E mālama a hoʻomāhuahua i ka ʻaekai i paʻa ka nohona o ka manu o ka moana, pau pū me ka lāʻau ʻoiwi o ka ʻāina.

Goal 2: Restore and/or enhance and manage populations of migratory seabirds and threatened and endangered species.

ʻO ka pahuhopu 2: E hoʻola a mālama i nā pūʻulu manu o kēlā ʻano a kēia ʻano, pau pū me nā mea kākaʻikahi o ka ʻāina.

Goal 3: Gather scientific information (surveys, research, and assessments) to support adaptive management decisions.

ʻO ka pahuhopu 3: E ʻohi i ka ʻike hunehune a ka poʻe akeakamai i mōakāka ke ʻano o ka mālama pono ʻana i ka ʻāina.

Goal 4: Ensure that visitors and kamaʻāina of all ages and abilities feel welcome, enjoy a safe visit, and are provided high-quality opportunities for wildlife-dependent recreation which allows them to connect with, while having limited impacts to, the wildlife, habitats, and cultural and historic richness of the Refuge.

ʻO ka pahuhopu 4: E hoʻokipa pono i ka poʻe kamaʻāina, pau pū me ka poʻe malihini i hiki iā lākou ke "aloha aku, a aloha mai" i nā mea waiwai o nēia wahi.

Goal 5: Identify, protect, evaluate, and interpret the cultural (including historic) resources and heritage of the Refuge while consulting with Native Hawaiian organizations and preservation partners, and complying with historic preservation legislation.

ʻO ka pahuhopu 5: E kuhikuhi, mālama, nānā, a aʻo aku me ka pono i nā waiwai ʻāina, pau pū me nā waiwai kanaka; ʻoiai e hoaʻoaʻo ana kahi ʻahahui Hawaiʻi a me nā keʻena ʻaupuni i ʻole kākou e hū hewa aku.

Goal 6: Ensure that all visitors enjoy safe and well-maintained operations that contribute to a positive visitor experience.

ʻO ka pahuhopu 6: Ponopono kō mākou hale, a mālama pono ʻia ka poʻe e kipa mai ana me ke aloha.

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Chapter 2 Management Direction

USFWS

Chapter 2. Management Direction

2.1 Overview

During development of this CCP, the Service reviewed and considered a variety of local and regional physical and biological resource conditions, as well as social, economic, and organizational aspects important for managing the Refuge. This background information is described more fully in Chapters 3, 4, and 5. As is appropriate for a national wildlife refuge, resource considerations were fundamental in designing alternatives. House Report 105-106 accompanying the Improvement Act states "…the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first." Toward this end, the planning team reviewed relevant plans, studies, and past and current research to better understand ecosystem trends and the latest scientific recommendations for species and habitats.

Public involvement was an important part of the planning process. Federal, State, and local agencies, community groups, Refuge users, nonprofit organizations, and others were contacted by Refuge staff to ascertain priorities and issues. Public scoping meetings and workshops were held during 2009–2010 and involved more than 80 people. We also provided planning updates throughout the development of this CCP, which allowed for comment opportunities. The CCP planning team reviewed and evaluated all of the comments received during the 44-day draft CCP/EA public comment period held from February 12, 2015, through March 27, 2015. Alternative D within the draft CCP/EA was selected for implementation. In some cases, the management direction has been either clarified or modified based upon public feedback. Appendix K, Public Comments and Service Responses, includes descriptions of the major changes between the draft and final CCP. The details of public involvement and participation can be found in Appendix I.

2.2 Management Directions Considered but not Developed

During development of the alternatives, the planning team considered the actions detailed below. All of these actions were ultimately eliminated from further consideration for the reasons provided.

Recreational hunting. Part of the Improvement Act identifies compatible hunting as a priority public use for consideration on national wildlife refuge lands. Though hunting has been discussed in the past, due to the endangered species present on the Refuge, recreational hunting is not a use that would align with the purposes of this Refuge. Hunting would cause unacceptable disturbance and potential take of these endangered animals and plants. Additionally, a Refuge hunt program would create public safety concerns due to an insufficient buffer acreage. Recreational hunting opportunities are allowed on other parts of the island such as State forest reserves.

Sunset viewing opportunities. In past discussions as well as during public scoping, residents expressed interest in having more opportunities to view the sunset from the Refuge. Suggestions included building a parking lot or providing more access via Crater Hill for sunset trail hikes. However, providing sunset viewing opportunities via the Refuge does not align with the mission of the Refuge System nor would it contribute to the fulfillment of Refuge purposes. Additionally, people are currently allowed to access Crater Hill during daytime hours via the Seacliff Plantation

entrance gate. Sunset viewing opportunities are also provided elsewhere on the island and in areas that would not adversely impact wildlife or their habitat.

Co-locating a visitor welcome and orientation center at the proposed new Hanalei NWR overlook site. In 2004, the Service expanded the refuge acquisition boundary of Hanalei NWR by 6 acres (USFWS 2004a and 2004b) to accommodate parking and facilities for a new Hanalei Valley scenic overlook. The site, facility design, and operations were described in the final EA and Finding of No Significant Impact (FONSI) for the Hanalei Valley/Hanalei National Wildlife Refuge Scenic Stop developed by the State of Hawai‘i Department of Transportation (HDOT) and Federal Highway Administration (FHWA) (HDOT and FHWA 2003). Currently, the Service is continuing to work with willing landowners to acquire interests (fee title, conservation easements, or cooperative agreements) within the proposed new overlook site. Should land acquisition occur, the Service would work with other agencies, partners, the local community, and others on the design, construction, and management of any visitor-support facilities at this site.

The new Hanalei NWR overlook site is located approximately 7 miles, or 15 minutes driving time without traffic, west of Kīlauea Point NWR. Thus, visitors traveling from the east along Kūhiō Highway (State Route 56) would have to overshoot the Refuge to get to the visitor welcome and orientation center and then double back in order to get to the Refuge. In order to ensure that visitor access to the Refuge remains convenient and tied to a sense of place (e.g., proximal to the wildlife and habitats occurring on the Refuge), co-locating a visitor welcome and orientation center with opportunities at the new Hanalei overlook site was considered but not developed.

2.3 Description of Management Direction

A brief description of the management direction follows. Table 2-1 contains additional details regarding actions associated with the CCP. Maps displaying management direction for the Refuge are located at the end of this chapter (Figures 2-1 and 2-2).

Wildlife and Habitat Management. Management programs aimed at long-term protection and enhancement of migratory seabird populations and their habitats will be expanded to larger areas on Crater Hill and Mōkōlea Point, including exploring the expansion of or additions to predator-proof fenced units. The Refuge currently supports six species of breeding seabirds, including the threatened ‘a‘o, and at least 30 species of non-breeding migratory birds on or adjacent to the Refuge. As sea levels rise over the next century, protected areas on high islands will become increasingly important to seabirds that currently nest primarily on the low islands and atolls of the Northwestern Hawaiian Islands. In addition, the Refuge will protect and enhance habitat for the endangered nēnē population and restore native plant communities to provide recovery habitat for threatened and endangered coastal plants.

Management activities, including weed control and outplanting native plants by volunteers, mowing and weeding grassland-shrubland habitat for nēnē, and controlling introduced predators, will continue. Biological programs also include maintaining a 7-acre predator-proof fence (Nihoku Ecosystem Restoration Project), enhancing and monitoring the threatened ‘a‘o population through social attraction and other devices, exploring with partners the feasibility of translocation techniques to support declining ‘a‘o populations, and banding and monitoring reproductive success and survival of seabirds and nēnē. Additionally, a combination of ‘ua‘u chick translocation and social attraction,

artificial burrows, and decoys to lure prospecting ʻuaʻu to the Nihoku Ecosystem Restoration Project site will be used to reduce the potential for extirpation of this endangered seabird from Kauaʻi (USFWS 2015). Priority research, inventories, monitoring, and other scientific assessments will support management objectives.

Public Use and Access. With an estimated 500,000 people annually visiting the Refuge, accounting for visitors who may stop at the Kīlauea Road Overlook (Overlook) as well as those who visit Kīlauea Point proper (Point), public use of this Refuge is high. A 100-year-old lighthouse once used by the U.S. Coast Guard and currently on the National Register of Historic Places is the number one attraction at this Refuge. A majority of activities offered revolve around wildlife observation and photography, interpretation, and environmental education (EE).

Current Refuge infrastructure cannot adequately support this high level of public use at the Overlook and Point. As a result, there is traffic congestion at the Refuge entrance; inadequate access, parking, and EE and visitor center (VC) infrastructure to provide a quality visitor experience; and impacts to endangered species. To address these issues, the Service will implement, in a phased manner, short-, medium-, and long-term strategies. In the short- to medium-term, the Refuge will adopt an incremental approach and experiment with small-scale operational and infrastructure improvements based on recommendations from the interagency Transportation Assistance Group (TAG). The recommended changes provided in the TAG report (TAG 2009) include, but were not limited to, the following: improving off-Refuge signage directing visitors to the Refuge; testing a parking reservation system; arranging a transit demonstration service; implementing transportation system management, transportation demand management, and intelligent transportation system strategies to encourage visitation at nonpeak dates and times; making changes to the parking areas and internal vehicle and pedestrian circulation system on the Point to improve flow and efficiency; and/or moving the fee booth further out on the Point. When implemented on an experimental or demonstration basis, the Service will include an evaluation component for these initiatives to determine efficacy and to document a basis for moving forward or not. These initiatives may be tested individually or in combinations.

Strategies which will require a large capital investment and extensive planning process are considered medium- to long-term. These strategies, to relocate welcome and orientation and non–site-dependent functions (e.g., bookstore, administrative functions, fee collection, parking) off the Point, include options to construct a new visitor welcome and orientation center, modify an existing facility, or co-locate the Refuge welcome and orientation center with a partnering conservation organization within 1 mile of the Refuge boundary. Other medium- to long-term actions may include the development of a transit hub and mandatory shuttle system. The success of short- to medium-term strategies may preclude implementation of the described medium- to long-term strategies.

The Kāhili Quarry (Quarry) area will continue to be open to wildlife-dependent uses (fishing, wildlife observation, and photography) and as general public access to off-Refuge areas (Kīlauea River, Kīlauea Bay, and Kāhili Beach) for boating and other stream, beach, and ocean uses (e.g., snorkeling, sunbathing, surfing, swimming, and walking, including dog walking). The Refuge will work in partnership with local non-profit organizations and community leaders of Kīlauea on promoting community stewardship of the Quarry through habitat protection; monitoring and managing threats to natural and cultural resources; outreach; and environmental, cultural, and historical interpretation. Other strategies related to reducing impacts to wildlife and habitats due to public use at the Quarry include posting the Refuge boundary, replacing and re-aligning the predator-

resistant fence, adding bollards, exploring the possibility of cooperatively managing with the State, and requiring all dogs to be on a short leash and under direct control at all times.

Kīlauea Point NWR will remain open for recreational fishing per Refuge-specific regulations for hunting and fishing, Hawai‘i, 50 CFR 32.30. Fishing on the Refuge occurs in the ocean at Kāhili Quarry and in the estuary of Kīlauea River. Fishing will be allowed on a 24-hour basis in accordance with State regulations and will include harvest via hook and line, throw net, spear, or shellfish gathering. Fishing is not limited to any designated location. However, access to the northernmost portion of Mōkōlea Point will be by foot as the most sensitive bird nesting area will be closed to vehicles.

The Service will continue to work with the County of Kaua‘i and the Kīlauea community to allow a passable road to the beach and shoreline; the road will be repaired and maintained to a standard approved by both the Service and the County (e.g., using crushed coral). The Service does not plan to place a gate at the entrance to Kāhili Quarry.

Traditional cultural practices including native Hawaiian fishing at Kīlauea (East) Cove will also remain open. See Appendix B for compatibility determinations.

Various events will continue to be offered throughout the year such as Lighthouse Day and National Wildlife Refuge Week. Guided interpretive hikes will be offered on Crater Hill. Outreach and volunteer programs will be expanded.

Cultural and Historic Resources Management. The emphasis for cultural and historic resources management will be to develop relationships and better partnerships with Native Hawaiian organizations, historical institutions, and other preservation partners to identify and prioritize resources to protect and manage. We will share information on methods of resource protection and preservation. Nomination of the Refuge (or portions thereof) as a Traditional Cultural Property will be investigated. The Crater Hill radar station and Mōkōlea Point sugar loading complex will be re-inventoried and re-evaluated for designation to the National Register of Historic Places. The Refuge will integrate cultural and historic resources into outreach, interpretation, and planning, including specific focus on the Kīlauea Point Light Station and Kāhili Quarry. A cultural interpretive guided trail walk to Mōkōlea Point will continue to be offered during National Wildlife Refuge Week. Historic interpretive events will also be offered during the same event as well on Lighthouse Day.

Maintenance and Law Enforcement. The Refuge will continue to maintain current infrastructure such as the VC, historic buildings, walkways and other historic structures, interpretive displays/signs, pedestrian walkways, parking area, fences, gates, roads, and signs. A step-down Master Site Plan will be developed to evaluate and detail building use and remodeling/maintenance needs. There currently is no covered building or parking for large Refuge equipment and vehicles (e.g., maintenance baseyard) and the Refuge has only two small storage areas for equipment and a native plant nursery. Under the CCP management direction, a new maintenance baseyard (e.g., storage sheds, bays, pole barns, and nursery) will be developed off current Refuge lands. Options include leasing, purchasing, or co-locating with another entity.

The construction of a new visitor welcome and orientation center and maintenance facilities within 1 mile of the Refuge boundary would be associated with several actions that would need to occur prior to or in conjunction with the actual construction. Those actions could include (1) completion of a

transportation implementation study; (2) expansion of the Refuge boundary to encompass the new site; (3) land acquisition, easement, or interim lease; (4) complete design of the new building and associated infrastructure; and (5) complete development of an associated transportation system. An alternative to off-Refuge land acquisition and construction of a new building would be to modify an existing facility or co-locate the Refuge welcome and orientation center with a partnering conservation organization located within 1 mile of the current Refuge boundary (e.g., in Kīlauea Town, near the proposed Kīlauea Town Bypass), as described in the site selection criteria listed under Objective 4.2, which would preclude several actions listed above. Within this CCP, these actions are addressed at a conceptual level. Thus, more detailed land acquisition planning, facility and transit design, and appropriate evaluation would be undertaken, including additional effects assessment in compliance with NEPA, evaluation and consultation under Section 7 of ESA, and surveys and consultation under Section 106 of NHPA.

KNWRC law enforcement personnel will continue to patrol all three Refuges comprising KNWRC. Law enforcement will also develop an enforcement monitoring system. More partnering, workshops, outreach, and training on law enforcement will be conducted for Refuge staff and volunteers, partners, and the community.

Acquisition of Inholdings and Cooperative Agreements. Each refuge must be managed to fulfill the Refuge System mission as well as the specific purpose(s) for which the refuge was established. In order to protect high quality coastal and lowland areas (wetlands, coastal strand, aquatic habitats, and their associated uplands), contribute to the recovery of endangered or threatened species, support other native plants and animals, and enhance opportunities for compatible wildlife-dependent public use, the Service will continue to work with willing sellers and other partners to acquire interests (fee title, conservation easements, and/or cooperative agreements) in inholding lands within the approved Refuge boundary.

The Service will explore the possibility of working with the State to cooperatively manage the tidelands adjoining Kāhili Quarry through interagency cooperative agreement or other mechanisms. Cooperative management of this area will contribute to achieving the Service's mission, the Refuge's purposes, and will help meet several of our goals by allowing us to protect wildlife resources through oversight of public use activities and Refuge law enforcement.

Adaptive Management. Based on 522 Departmental Manual (DM) 1 (Adaptive Management Implementation), Refuge staff shall utilize adaptive management for conserving, protecting, and, where appropriate, restoring lands and resources. Within Title 43 of the Code of Federal Regulations (CFR) 46.30, adaptive management is defined as a system of management practices based upon clearly identified outcomes, where monitoring evaluates whether management actions are achieving desired results (objectives). Adaptive management accounts for the fact that complete knowledge about fish, wildlife, plants, habitats, and the ecological processes supporting them may be lacking. Adaptive management emphasizes learning while doing based upon available scientific information and best professional judgment, considering site-specific biotic and abiotic factors on Refuge lands and waters. In the presence of accelerated climate change, adaptive management is an increasingly important management decision process. The Refuge will employ adaptive management as a standard operating procedure. Part of measuring the success of and adaptively managing the Refuge includes 5-year reviews and a 15-year revision of the CCP, which will be initiated by the Service and involve many of the same steps and engagement with partners and the public as the original CCP.

Appropriateness and Compatibility. Consistent with relevant laws, regulations, and policies, prior to allowing any public use of the Refuge (including commercial use), each use will first need to be found appropriate and determined compatible (16 U.S.C. 668dd-668ee, 50 CFR 25, 26, and 29; and 603 FW 1 and 2). The findings and determinations regarding the appropriateness and compatibility of each use described in the CCP are further discussed in Appendices A and B.

Climate Change. The Refuge will participate in and contribute to climate change assessment efforts, including those underway at a landscape scale. These efforts may include collaboration with the Pacific Islands Climate Change Cooperative (PICCC), which is a landscape conservation cooperative (LCC). The LCCs are formal science-management partnerships between the Service, Federal agencies, states, tribes, NGOs, universities, and other entities to address climate change and other biological stressors in an integrated fashion. LCCs provide science support, biological planning, conservation design, research, and design of inventory and monitoring programs. As needed, objectives and strategies will be adjusted to assist in enhancing Refuge resources' resiliency to climate change. The Refuge will also continue to pursue and engage in mechanisms to conserve energy in Refuge operations, including the use of fuel-efficient vehicles.

Cultural and Historic Resource Protection and Section 106 Compliance. Cultural and historic resources on refuges receive protection and consideration in accordance with Federal cultural resources laws, Executive orders, regulations, and policies and procedures established by the Department of the Interior (DOI) and the Service. Actions with the potential to affect cultural and historic resources will undergo a thorough review before being implemented, as is consistent with the requirements of cultural resource laws. Refuge management actions will support the State of Hawai‘i's vision statement "to promote the use and conservation of historic and cultural resources for the education, inspiration, pleasure and enrichment of the public in a spirit of stewardship and trusteeship for future generations" (DLNR HPD 2009). All ground-disturbing projects will undergo a review (including, but not limited to, archaeological and cultural surveys) under Section 106 of the National Historic Preservation Act (NHPA).

The Service will provide our Regional Historic Preservation Officer (RHPO) a description and location of projects and activities that affect ground and structures, including project requests from third parties. Information will also include any alternatives being considered. We will also coordinate and consult with the State Historic Preservation Office (SHPO) and seek assistance from Native Hawaiians on issues related to cultural resources education and interpretation, special programs, and NHPA. Examples of projects identified in this CCP include fencing and building new maintenance and visitor services (VS) facilities, and acquisition of inholdings.

Native Hawaiians believe that the mana, or spiritual essence and power of a person, resides in the bones, their iwi. Unmarked Native Hawaiian burial sites have been exposed in the coastal strand/dunes area of the approved Refuge boundary but can be encountered almost anywhere. Care of inadvertently discovered iwi is an important issue for Native Hawaiians and the entire community in Hawai‘i. The Service has the responsibility to care for the iwi with utmost respect for Hawaiian protocol, the laws of the state of Hawai‘i, and all of the recognized cultural descendants. Strict protocols come into force whenever human skeletal remains are encountered inadvertently, through maintenance activities or through natural erosion.

When human remains are encountered, all work in the immediate area is stopped and the police are notified, as well as the DLNR. A qualified archaeologist then examines the burial context to assist in

determining jurisdiction. If the remains appear to have been in place for less than 50 years, or appear to be a possible homicide victim or missing person, the local police secure the scene and investigate. If the remains appear to have been in place and interment for more than 50 years, they may be a burial. The DLNR, in consultation with the Service, the island burial council, and any identified descendants, determines whether the burial can safely remain in place where discovered or whether relocation may be needed.

Implementation Subject to Funding Availability. After the CCP is completed, actions will be implemented over a period of 15 years as funding becomes available. Project priorities and projected staffing/funding needs are in Appendix C, although special funding initiatives, unforeseeable management issues, and other budget issues will likely require adjustments to the implementation schedule in the future. The CCP will be reviewed at least every 5 years and updated as necessary.

Integrated Pest Management (IPM). In accordance with DOI and Service policies 517 DM 1 and 569 Fish and Wildlife (FW) 1 respectively, an IPM approach would be utilized, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on the Refuge. IPM would involve using methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to nontarget species and the Refuge environment. Pesticides may be used where physical, cultural, and biological methods, or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. If a pesticide is needed on Refuge lands or waters, the most specific (selective) chemical available for the target species will be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage would be further restricted because only pesticides registered with the U.S. Environmental Protection Agency (EPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by EPA may be applied on lands and waters under Refuge jurisdiction.

Environmental harm by pest species refers to a biologically substantial decrease in environmental quality as indicated by a variety of potential factors, including declines in native species populations or communities, degraded habitat quality or long-term habitat loss, and/or altered ecological processes. Environmental harm may be a result of direct effects of pests on native species, including preying and feeding on them; causing or vectoring diseases; preventing them from reproducing or killing their young; out-competing them for food, nutrients, light, nest sites, or other vital resources; or hybridizing with them so frequently that within a few generations few, if any, truly native individuals remain. Environmental harm also can be the result of an indirect effect of pest species. For example, decreased seabird use may result from pest plant infestations reducing the availability and/or abundance of suitable habitat for breeding.

Environmental harm may involve detrimental changes in ecological processes. For example, Guinea grass infestations can alter fire return intervals by displacing native species and communities of bunch grasses, forbs, and shrubs. Environmental harm may also cause or be associated with economic losses and damage to human, plant, and animal health. For example, invasions by fire-promoting grasses that alter entire plant and animal communities by eliminating or sharply reducing populations of many native plant and animal species can also greatly increase fire-fighting costs.

Predator control is aimed at minimizing entry of introduced predators to the Refuge using exclusion (e.g., hog wire fences), habitat modification (e.g., removal of trees used by cattle egrets for roosting),

and control/eradication (eradicating or reducing and maintaining low numbers of rats, mice, cats, dogs, pigs, and mongooses if they are detected). Live trapping and use of bait stations (e.g., 0.005 percent diphacinone) will continue to be used to control rats and mice. These species are euthanized when live-trapped. Live traps are used to capture cats, dogs, and pigs on the Refuge.

When other methods are impractical, use of firearms is employed to humanely dispatch introduced predators and other pests such as pigs, chickens, and cattle egrets. Given the need to minimize stress on animals, gunshot at times is the most practical and logical method for wild or free-ranging animals. Personnel and public safety override any dispatching of animals by gunshot.

Shooting follows protocols for humane dispatch (AVMA 2007) and is only performed by highly skilled personnel trained and federally certified in the use of firearms. Predator and pest control will be conducted by Service personnel or contractors.

See Appendix G for the Refuge's IPM program documentation to manage pests for this CCP. Along with a more detailed discussion of IPM techniques, this documentation describes the selective use of pesticides for pest management on refuges, where necessary. Throughout the life of the CCP, most proposed pesticide uses on the Refuge will be evaluated for potential effects to biological resources and environmental quality. These potential effects will be documented in "Chemical Profiles" (see Appendix G). Pesticide uses with appropriate and practical best management practices (BMP) for habitat management as well as nursery/facilities maintenance will be approved for use on the Refuge where there likely will be only minor, temporary, and localized effects to species and environmental quality based upon non-exceedance of threshold values in Chemical Profiles. However, pesticides may be used on the Refuge where substantial effects to species and the environment are possible (exceed threshold values) in order to protect human health and safety (e.g., mosquito-borne disease).

Migratory Bird Protection and Conservation. Statute and policy at several levels mandate the protection and management of migratory bird populations at the Refuge. The primary Federal protective measure for these species is the Migratory Bird Treaty Act of 1918 (MBTA), which prohibits hunting, taking, capturing, killing, or selling of migratory bird species, and also fully protects eggs, nests, and feathers from collection or destruction. Additional directives from international treaties, domestic legislation, Executive orders, State law, and Service policy require the protection, monitoring, and assessment of migratory nongame birds, determination of the effects of environmental changes and human activities on migratory birds, and active protection of colonies, roosts, and adjacent waters for seabirds. At least 35 species of migratory birds, primarily seabirds, occur on or adjacent to the Refuge.

Participation in Planning and Review of Regional Development Activities. The Service will actively participate in planning and studies pertaining to future agricultural, industrial, and urban development, transportation, recreation, contamination, and other potential concerns that may affect Refuge resources. The Service will continue to cultivate working relationships with County, State, and Federal agencies, nongovernmental organizations, and community groups to stay abreast of current and potential developments. We will utilize outreach and education as needed to raise awareness of Refuge resources and dependence on the local environment.

Implementation of transportation strategies, in particular, will require coordination with Kauaʻi County, Kauaʻi Bus, Hawaiʻi Department of Transportation, Federal Highways Administration, and other stakeholders (e.g., Kīlauea Neighborhood Association and the public). The transportation

elements of the CCP will also take into consideration the Kīlauea Town Plan, the Kaua‘i North Shore Development Plan, the County of Kaua‘i General Plan, the State Transportation Improvement Plan and Long-Range Transportation Plan (LRTP), the Service's Region 1 LRTP, and other plans.

Partnerships. Partnerships are critical components in maintaining and continuing efforts to implement resource management improvements, such as restoring habitat for threatened and endangered species, or enhance recreational opportunities. These partnerships typically involve joining forces with Federal, State, and local agencies, organizations, schools, and Refuge Friends groups.

Reevaluation of public use visitation days at the Kīlauea Point. Due to flat and declining budgets, starting in February 2014, the Service reduced the days that Kīlauea Point proper is open to the general public from 7 to 5 days a week. The Refuge is closed each Sunday and Monday. The visitation days will be reassessed to see if it would be possible to reopen on a 6- or 7-day a week schedule. However, closures will continue to be a management option depending upon the availability of staff and resources.

Refuge Revenue Sharing. Annual payments to local governments under the Refuge Revenue Sharing Act (16 U.S.C. 715s) would continue according to the established formula and subject to congressional appropriations.

Regulatory compliance. The draft CCP/EA provided descriptions of the affected environments and resources, potential environmental consequences of certain types of activities, and general themes for management alternatives. Consequently, this document can be incorporated by reference into future proposals to avoid lengthy recital and repetitive information. However, since this document is programmatic in many issue areas, it may not contain the necessary detail on every future action outlined to adequately present and evaluate all physical, biological, and socioeconomic impacts. Some of these details are dependent on funding and implementation schedules. Therefore, prior to implementation, all activities will undergo appropriate reviews and consultations, and permits and clearances will be secured, as necessary, to comply with legal and policy requirements. This includes appropriate evaluations and documentation under the National Environmental Policy Act (NEPA), evaluation and consultation required by Section 7 of the Endangered Species Act (ESA), and review and consultation required by Section 106 of the National Historic Preservation Act.

State Coordination. KNWRC will continue to coordinate with Hawai‘i State agencies regarding areas of mutual interest.

Step-down Management Plans (SDMP). The CCP provides guidance in the form of goals, objectives, and strategies for several Refuge program areas, but may lack some of the specifics needed for implementation. Step-down plans will be developed to implement strategies. For example, the CCP may note that signage is needed to accomplish a certain management objective. However, it will take a Refuge Sign Plan to specifically define design standards.

All step-down plans require appropriate NEPA compliance and implementation may require additional County, State, and Federal permits. Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down plans. The following SDMPs have been identified for the Refuge (implementation schedule can be found in Appendix C):

- Refuge Sign Plan
- Facilities, Equipment, and Vehicle Maintenance Plan
- Safety Plan
- Visitor Services Plan (for entire KNWRC)
- Inventory and Monitoring Plan
- Cultural/Historic Resource Management Plan
- Master Site Plan
- Wildland Fire Management Plan
- Habitat Management Plan
- Plant Restoration Strategy

Sustainability. For any projects that identify either new building or enhancements to existing structures or the transportation system, the Service will use, to the extent possible, sustainability measures, such as alternative transportation options, reusing materials, utilizing renewable technology such as solar power, and acquiring goods and services in the most environmentally friendly way possible in order to minimize our footprint and effects to climate change as outlined in Executive Order 13514.

Threatened and Endangered Species Protection and Recovery. The protection of federally listed species is mandated through the ESA, which provided establishment authority and was one of the purposes for this Refuge. It is also Service policy to give priority consideration to the protection, enhancement, and recovery of these species on national wildlife refuges. To ensure adequate protection, Section 7 of the ESA requires the Service to review all activities, programs, and projects occurring on lands and waters of refuges to determine if they may affect listed species or modify their designated critical habitat; this is known as an informal consultation. If the determination is that an action may affect and is likely to adversely affect a listed species or modify designated critical habitat, then we conduct a formal consultation and prepare a biological opinion to identify those negative effects and the means to offset those effects.

Transportation Implementation Study. The Refuge has received funding from the Federal Transit Administration's Paul S. Sarbanes Transit in Parks Program to assist in planning for the implementation of the transportation components that emerge from the CCP. The study will provide recommendations on how to implement components, such as data collection, coordination with other entities, and as necessary, service planning for any proposed shuttle services.

Volunteer Opportunities. Volunteers are key components of successful management of public lands and are vital to refuge programs, plans, and projects, especially in times of static or declining budgets. Currently the Refuge makes extensive use of volunteers in habitat restoration and public use programs. In the future, successful implementation of native habitat restoration, survey and monitoring activities, and environmental education (EE) and interpretation programs will require the use of volunteers and partnerships.

Wilderness Review. The Service's CCP policy requires that a wilderness review be completed in all CCPs. If it is determined that the area meets the minimum requirements for wilderness, the process moves on to the wilderness study phase. The CCP planning team completed a wilderness inventory which can be found in Appendix D. This review concluded that the Refuge is not suitable for wilderness designation.

Wildlife and Habitat Management Review. The Improvement Act directs that each refuge shall be managed to fulfill the mission of the Refuge System and the specific purposes for which the refuge was established. Modifications are made to Refuge wildlife and habitat management programs based on periodic informal or formal evaluations that ensure these programs are consistent with national, regional, ecoregional, and administrative policies and reflect consideration of current scientific knowledge. These evaluations provide feedback, determine if wildlife and habitat management goals and objectives are being met, and guide the Refuge in setting CCP priorities.

More formal evaluations, such as the wildlife and habitat management review, are conducted by Regional Office biological staff with refuge managers and biologists and a multi-disciplinary team of biologists and natural resources specialists. The Refuge conducted a habitat review in February 2013. In addition to a report summarizing the habitat review team's recommendations, the review will also inform development of the Final Plant Restoration Strategy for KNWRC and the step-down Habitat Management Plan.

Table 2-1 Summary of Management Direction.

Objective	Management Direction
Coastal ecosystem	
1.1 Enhance coastal mixed woodland-grassland habitat for seabird breeding and roosting	Manage 97 acres and enhance 2–5 acres per year (within the 97 acres). Strategies include: - Reduce pest ironwood and other species in priority areas. - Mowing to set back invasive shrub succession. - Small-scale outplanting of native plants. - Integrated pest management. - Ensure no obstacle or light hazards occur onsite; work with community to promote bird-friendly lighting. - Public use access restrictions. - Maintain or replace 2.7 miles of existing hogwire fence. - Keep area under fence at the Point free from weeds. - Evaluate the potential for restoration of some portion of the parking areas on the Point. - Explore the use of a predator control index based on the loss of mōlī eggs and chicks, on a 5-year average. - Maintain predator-proof fence east of Crater Hill. - Explore expansion of or separate additions to the Nihoku Ecosystem Restoration Project.
1.2 Enhance coastal grasslands for nēnē foraging, breeding, and roosting	Manage 32–34 acres and enhance 5–7 acres per year (within the 32–34 acres). Strategies include: - Mowing to stimulate vigorous growth of grasses. - Rehabilitate and maintain irrigation system at Crater Hill for native plant establishment. - Enhance grasslands with native shrubland plant communities that provide suitable habitat structure and function for nēnē. - Integrated pest management. - Public use access restrictions. - Maintain or replace 2.7 miles of existing hogwire fencing. - Evaluate the feasibility of redesigning the Overlook area in order to provide a corridor for nēnē transiting between the Point and Crater Hill.

Objective	Management Direction
1.3 Protect sea cliff and beach strand habitat	Protect approximately 59 acres. Strategies include: - Conduct a road and trail assessment and analysis and identify problem areas and solutions. - Stabilize areas of accelerated erosion identified in the road and trail assessment and analysis. - Design and implement a monitoring program for 1–2 indicator species to detect natural or anthropogenic variation in habitat conditions. - Continue to support the National Oceanic and Atmospheric Administration and Department of Land and Natural Resources (DLNR)'s Marine Mammal Response Network. - Public use closure. - In partnership with the community, work to reduce wildlife disturbance and habitat degradation due to public use at Kāhili Quarry.
2.1 Restore/enhance breeding populations of 'a'o and other seabirds	- Maintain 'a'o colony on the Point, while increasingly putting emphasis for 'a'o recovery on Crater Hill/Mōkōlea Point areas. - Manage suitable habitat for seabirds including a control of vertebrate and invertebrate pests and habitat-modifying plants, minimal human activity, and no flight or light hazards. - Use social attraction techniques to enhance the 'a'o and other seabird populations; monitor for bird and predator responses to stimuli. - With partners, determine feasibility of the Refuge as a potential 'a'o and/or 'ua'u chick translocation site.
2.2 Restore/enhance native coastal plant communities (including endangered plants)	- Restore and/or enhance 10–30 acres. - Maintain the current onsite greenhouse while exploring options for creating an offsite greenhouse and/or partnerships to support outplanting of native plants. - Within 2 years, develop a Restoration Working Group (RWG) and finalize draft Plant Restoration Strategy for KNWRC. - Expand involvement of both volunteers and native plant organizations. - Work with RWG and others to implement Final Plant Restoration Strategy. - Integrated pest management. - Time and conduct restoration activities to minimize disturbance to breeding birds.
Inventory and monitoring, research, and assessment	
3.1 Conduct high-priority inventory and monitoring (survey) activities	- Re-evaluate, develop, and implement a prioritized inventory and monitoring program within regional framework.
3.2 Conduct high-priority research projects and scientific assessments	- Develop a collaborative research program for priority research projects and scientific assessments that directly support management objectives.
Visitor Services	
4.1 Improve visitor access	- Coordinate transportation network with existing public transport options. - Continue to integrate Refuge planning efforts with Kīlauea Town

Objective	Management Direction
	planning efforts. - Develop a data collection plan. - Within the first 5–10 years, implement recommendation from the Transportation Assistance Group (TAG), suggesting testing operational changes to determine their effectiveness in reducing congestion. - Improve parking safety and efficiency. - Provide bicycle parking at Overlook. - Explore options for a mandatory shuttle which would prohibit private vehicles from traveling into the Refuge. - Explore options for removing parking currently on Refuge and renovate area for shuttle stop from the visitor welcome and orientation center. - Improve pedestrian circulation. - If a shuttle system is implemented, examine the feasibility of allowing pedestrian and/or bicycle access from the Overlook into the Point.
4.2 Improve visitor information and orientation	- Develop a Refuge Sign Plan within 3 years. - Improve directional signage and signs to reduce impacts to wildlife. - Identify and develop methods to provide greater information to visitors prior to entering the Refuge. - Every 5 years, evaluate Refuge fees and conduct a visitor survey. - Ensure public use facilities, interpretive materials, and programs are accessible to and usable by persons with various disabilities. - Explore options for redesigning and enhancing the scenic Overlook at the entrance to the Refuge. - Explore establishment of a new offsite visitor welcome and orientation center on lands adjacent to or within 1 mile of the Refuge (~3–4 acres) which would include the following: visitor contact, orientation and information, fee collection, restrooms, bookstore/retail, multipurpose room, outdoor spaces, administrative offices, private vehicle and tour bus parking, public bus stop, and shuttle pick up/drop off. - Continue to provide on an on-call basis golf carts to transport visitors who may need assistance getting to the VC or Lighthouse. - Provide for greater site orientation. - Re-examine the site layout at Kīlauea Point and evaluate non–site-dependent functions currently located there and move as many as is feasible and possible off the Point. - Explore options for remodeling the existing VC for either EE or new interpretive exhibits and displays. Maintain bookstore operations at the new visitor welcome and orientation center, if constructed.
4.3 Enhance/expand environmental interpretation	- Within 5 years, prepare an interpretive chapter of the KNWRC Visitor Service Plan. - Develop orientation materials and/or train Service staff, volunteers, partners, and tour operators on interpretive messages. - Develop themes for interpretation areas. - Explore options to provide greater flexibility in interpretive exhibits and signage. - Expand opportunities to provide limited access to the interior of the Lighthouse.

Objective	Management Direction
	- Explore possibilities for increasing the frequency of lighting of the Lighthouse. - Expand current and new partnerships. - Continue to evaluate items sold in the bookstore. - Regularly evaluate visitor perceptions of resources and interpretive programming. - Develop methodologies for evaluation of interpretive programs. - Every 5–10 years, conduct visitation trends analysis. - Continue to provide guided interpretive activities. - Remodel the VC for interpretative displays. - Remodel the Contact Station. - Explore the restoration and conversion of Quarters #1. - Offer a limited number of guided interpretive hikes to Crater Hill. - Work in partnership with local nonprofit organizations and community leaders of Kīlauea to develop environmental, cultural, and historical interpretation materials for Kāhili Quarry.
4.4 Enhance/expand EE	- Utilize interns and volunteers to assist in facilitating the EE program. - Continue to partner with KPNHA. - Enhance current partnerships and explore new partnerships. - Continue participation in Statewide natural resource interpretation and EE initiatives. - Annually disseminate current EE program guidelines and activities. - Ensure EE programs are accessible to and usable by children of various abilities. - On a yearly basis, define and measure results of all EE programs and modify as needed. - Review the Refuge's EE programs on a regular basis with a focus group. - Update curricula and materials as necessary. - Develop a multifaceted Junior Ranger program. - Design and implement a training program. - Work with partners to provide teacher training workshops. - Maintain the KNWRC's Website to promote current educational opportunities, post curricula, and other learning resources. - Re-examine the site layout of Kīlauea Point to improve the facilitation of EE. - Convert an existing structure to a designated facility/facilities for EE.
4.5 Enhance/expand wildlife observation and photography	- Continue to provide free viewing scopes and binoculars for loan, and expand to include quality field identification guides. - Continue to work with KPNHA to provide wildlife viewing tools and books for purchase. - Continue to work with existing partners and explore new partnership opportunities. - Provide current and accurate wildlife viewing information online and onsite. - Promote wildlife observation and photography opportunities through various media. - Clearly identify closed areas and direct visitors to comparable alternative sites.

Objective	Management Direction
	- Promote the Refuge's designation as an Important Bird Area (IBA) and explore further designation. - Work with the Hawai'i Department of Transportation and the County of Kaua'i to identify the Refuge as a watchable wildlife location on direction signs. - Expand program offerings, workshops, activities, and exhibits. - Increase compatible opportunities for up-close and personal viewing of wildlife. - Expand citizen science opportunities. - Increase staff visibility among wildlife clubs/organizations. - Offer guided interpretive hikes to Crater Hill designed (location of trail, timing, group size) to have negligible negative effects on breeding birds yet provide a quality experience for visitors. Impacts to Seacliff Plantation residents and their roads will be considered as access options are developed.
4.6 Reduce wildlife disturbance, habitat degradation, and user conflict potential while increasing public safety at Kāhili Quarry	- The Service will continue to work with the County of Kaua'i and the Kīlauea community to allow a passable road to the beach and shoreline; the road will be repaired and maintained to a standard approved by both the Service and the County (e.g., using crushed coral). The Service does not plan to place a gate at the entrance to Kāhili Quarry. - Post jurisdictional boundary, as appropriate, within the Quarry area. - Explore the possibility of cooperatively managing tidelands with the State. - Replace the existing fence with a predator-resistant fence in a modified alignment for approximately 600 feet, following the base of vegetation growing down the cliffs defining Mōkōlea Point. - Install bollards at the northeast end of the Quarry area to protect seabird nesting areas. - Work in partnership with local nonprofit organizations and community leaders of Kīlauea on promoting community stewardship of the Quarry through habitat protection; monitoring and managing threats to natural and cultural resources; outreach; and environmental, cultural, and historical interpretation - Partner with community groups to develop welcome and orientation, educational, and interpretive signage and messaging. - General public access to Kāhili Beach, Kīlauea Bay, and the Kīlauea River through the Kāhili Quarry area will be allowed 24 hours a day. - Allow visitors to bring and use portable stoves or self-contained barbeques (e.g., off-the-ground portable enclosed fires), or fires within a Refuge-designated fire ring or pit. Refuge-designated fire rings or pits will be sited to minimize the potential spread of uncontrolled fires. Visitors will need to bring charcoal or firewood. Fires must be attended at all times. - All dogs brought into the Quarry area will be required to be leashed on a short (8-foot maximum) leash and under control at all times and will not be allowed to run free. - Explore opportunities for an overnight site host program through Special Use Permits to provide resource protection, outreach and interpretation, and compliance monitoring.

Objective	Management Direction
	- Work with the community stewardship partnership to explore opportunities for providing camping. Stipulations would need to ensure that camping opportunities are compatible. - Allow temporary shelters in the Quarry area during daylight hours only.
4.7 Enhance/expand outreach	- Identify key themes and messages that support Refuge goals and related conservation priorities. - Identify target audiences. - Explore various outreach tools and strategies, including new media technology. - Invite elected officials and their staff to an annual site visit and face-to-face meeting. - Provide the news media with accurate and current information. - Provide media with Refuge-related stories. - Partner with offsite opportunities. - Review current and potential onsite special events. - Increase visibility in the community. - Ensure outreach and information programs are accessible to and usable by persons with various disabilities. - Review all existing and potential publications. - Monitor and evaluate results of outreach by obtaining feedback and modify as needed. - Engage all staff in regular face-to-face visits with organizational leaders and decision-makers. - Encourage employees to join professional organizations and community organizations. - Evaluate all outreach products. - Provide staff with opportunities for outreach training. - Work in partnership with local nonprofit organizations and community leaders of Kīlauea to develop outreach materials for Kāhili Quarry.
4.8 Enhance/expand volunteer and Friends group opportunities	- Develop a general orientation packet and orientation checklist. - Regularly review and update handbooks and training materials. - Expand efforts and explore various tools and strategies to provide effective, up-to-date, and accurate communication to volunteers, interns, and KPNHA staff. - Regularly recognize volunteers, interns, as well as KPNHA, for their contributions. - Continue coordination with KPNHA. - Review and amend, as necessary, the KPNHA Cooperative Agreement/Memorandum of Understanding. - Enhance and expand existing volunteer/intern program. - Develop a volunteer program that combines resource management with interpretation. - Expand current and new partnerships. - Design and implement a training program. - Every 5 years, obtain feedback and suggestions from volunteers and interns through a feedback form, survey, or other instrument. - Provide an orientation for Refuge staff on how to effectively work with volunteers and interns.

Objective	Management Direction
	- Host at least 2 community work days per year. - Strengthen coordination with KPNHA through an annual whole-day planning meeting. - Strengthen coordination with KPNHA to implement relevant CCP-related goals, objectives, and strategies.
Cultural and historic resources	
5.1 Implement a proactive cultural (including historic) resource management program	- Comply with Section 106 of the NHPA when conducting ground-disturbing activities. Identify cultural resources that coincide with existing and planned roads, facilities, public use areas, and habitat projects. Consult with Native Hawaiian organizations and interested parties. Evaluate cultural resources for eligibility to the National Register of Historic Places. Avoid or offset impacts as necessary. - Develop and maintain liaison with Native Hawaiian organizations, historical institutions, and other preservation partners. - Conduct archival research and communication with Native Hawaiian organizations, kūpuna, communities, and institutions. - Prepare a cultural resource overview of the Refuge and step-down management plan. - Conduct a field inventory and evaluation of cultural resources. - Establish a Refuge-specific protocol for handling discoveries of human remains, burial objects, sacred objects, and objects of cultural patrimony in partnership with Native Hawaiian organizations within 1 year of CCP completion. - Orient and train staff to recognize and be sensitive to cultural resources. - Investigate and evaluate nomination of the Refuge as a Traditional Cultural Property (TCP). - Re-inventory and re-evaluate for designation to the National Register of Historic Places the Crater Hill radar station (State Historic Site 50-30-04-1810), and Mōkōlea Point sugar loading complex (State Historic Site 50-30-04-1811).
5.2 Create and implement with partners a program for Kīlauea Point Light Station	- Prepare or update historic structure reports for each element of the Kīlauea Point Light Station within 3 years of CCP completion. - Prepare a historic structure treatment plan within 5 years of CCP completion. - Consult with historical societies, and other preservation partners to identify and prepare interpretive media. - Develop an outreach program and materials.
Operations	
6.1 Replace, maintain, enhance visitor/ administrative/ maintenance facilities	- Prepare a step-down Master Site Plan to evaluate and detail building use and remodeling/maintenance needs. - Include main administrative offices with new offsite visitor welcome and orientation center, if constructed. - Develop new maintenance baseyard (storage sheds, bays, pole barns, nursery) off the Refuge. Options include leasing, purchasing, or co-locating with another entity. - Remodel Quarters #3 for basic administrative and volunteer offices.

Objective	Management Direction
6.2 Enhance law enforcement	- Continue to work with partners and other law enforcement agencies to protect natural resources, eliminate criminal activity, and disturbance to sensitive areas. - Explore concurrent jurisdiction with the State of Hawai‘i. - Ensure the Refuge Sign Plan developed integrates law enforcement signage. - Develop a law enforcement monitoring system. - Develop outreach tools specifically for Refuge protection and safety issues and circulate. - Provide law enforcement expertise at workshops, community/partner meetings, and public talk opportunities. - Provide annual training to non-law enforcement Refuge staff and volunteers on law enforcement incident reporting, monitoring, and procedures. - Orient new Refuge staff, including law enforcement officers and refuge managers, and volunteers to the local culture and community.

2.4 Goals, Objectives, and Strategies

Goals and objectives are the unifying elements of successful refuge management. They identify and focus management priorities, resolve issues, and link to refuge purposes, Service policy, and the Refuge System mission.

A CCP describes management actions that help bring a refuge closer to its vision. A vision broadly reflects the refuge purpose(s), the Refuge System mission and goals, other statutory requirements, and larger-scale plans as appropriate. Goals then define general targets in support of the vision, followed by objectives that direct effort into incremental and measurable steps toward achieving those goals. Strategies identify specific tools and actions to accomplish objectives.

The goals for the Refuge for the 15 years following completion of the CCP are presented on the following pages. Each goal is followed by the objectives that pertain to it. All objectives are for the lifetime of the CCP unless otherwise specified. Some objectives pertain to multiple goals and have simply been placed in the most appropriate spot. Similarly, some strategies pertain to multiple objectives. The goal order does not imply any priority in this CCP. Priority actions are identified in the staffing and funding analysis (see Appendix C).

Below each objective statement are the strategies that could be employed in order to accomplish the objectives.

Other symbols used in the following tables include:

~ Approximately
% Percent sign;
> Greater than;
< Less than;
≥ Greater than or equal to;
≤ Less than or equal to.

2.4.1 Goal 1: Protect, enhance, and manage the coastal ecosystem to meet the life-history needs of migratory seabirds and threatened and endangered species.

Objective 1.1 Enhance and manage coastal mixed woodland-grassland habitat for seabird breeding and roosting.
Annually manage 97 acres and enhance 2–5 acres per year (within the 97 acres) mixed woodland-grassland habitat for seabird breeding and roosting with the following attributes: • Safe flight corridors free of obstacles (e.g., pest trees, signs, and antennas) and light hazards; • Broad habitat characteristics of seabirds currently breeding on Refuge: o Large grasslands (<6 inch vegetation height) or open-canopy, open-understory woodlands next to open windward runways for take-off and landing (mōlī); o Substrates with rock and root crevices or good soil/root structure or sub-canopy layer for burrowing (‘ua‘u kani); o Hala/naupaka woodlands with an open understory or dense subcanopy layer (e.g., hala leaf litter) for burrowing (‘a‘o); o Rocky ledges and crevices of steep cliffs (koa‘e kea); o Open-understory woodlands, rock and root crevices (koa‘e ‘ula); o Large patches of woodlands >3.0 feet tall (‘ā); availability of small woody debris (‘ā) • Minimal human disturbance in areas designated for seabird breeding (time varies by species); • Predation by introduced predators (e.g., dogs, cats, rats) zero for threatened ‘a‘o; ≤20 adults per year for ‘ua‘u kani; ≤1 adult per year for all other species.
Strategies Applied to Achieve Objective:
a. Reduction in pest ironwood and other species by 2–5 acres/year in priority areas (e.g., obstacles to flight, limiting nesting)
b. Mowing an additional 2–3 acres of grasslands per year to set back invasive shrub succession (<6 inch vegetation height)
c. Small-scale outplanting native plants (e.g., ‘āheahea, hala) that provide suitable habitat structure and function for seabirds
d. Use IPM strategies including mechanical/physical (e.g., mowing, brush-cutting, excavation, prescribed fire), cultural, chemical (e.g., herbicides), biological, and other suitable techniques to control Christmasberry, lantana, ironwood, and other pest/undesirable plants (see Appendix G)
e. If insect threats (e.g., mosquitoes, ants, scale insects) to breeding seabirds are detected during monitoring, use IPM control techniques (e.g., removing potential breeding sites for mosquitoes, ant bait stations (e.g., Fipronil), approved biocontrols, hand removal of infected leaves, granular and spot-treating plants with insecticides (e.g., Sevin ®))
f. Ensure no obstacle or light hazards occur onsite; work with community (e.g., Town of Kīlauea, Department of Land and Natural Resources (DLNR)) to promote appropriate, bird-friendly lighting, lighting including downward shielding, seasonal reduction in outdoor lighting, and window shades

g. Complete public use closure around threatened ʻaʻo burrows
h. Partial public use access in designated public use areas (parking lot and trail to Lighthouse on the Point) and on Crater Hill for a limited number of guided interpretive hikes; complete closure in all other parts of the Refuge
i. Maintain or replace 2.7 miles of existing hogwire fencing (same as in Objective 1.2 and also includes Objective 4.6, strategy c)
j. Keep the area under the chain-link fence at the Point free from weeds to prevent bird entrapment
k. During implementation planning for the shuttle system, evaluate the potential for restoration of some portion of the parking areas on the Point focusing on shrubland revegetation for the benefit of shearwaters
l. Live-trapping, shooting, and bait stations to reduce predation on migratory birds by introduced vertebrate pests
m. Explore the use of a predator control index based on the loss of mōlī eggs and chicks on a 5-year average
n. With partners, maintain predator-proof fence east of Crater Hill (Nihoku Ecosystem Restoration Project; Anden Consulting 2014)
o. Explore the possibility of expansion of, or separate additions to, the Nihoku Ecosystem Restoration Project predator-proof fence (e.g., adding fence panels)
Rationale: Safe habitats for breeding and foraging are essential for all migratory seabirds using the Refuge. While most seabirds exhibit some flexibility in their habitat requirements, features of the plant community (species and structural characteristics) favor or limit populations. Thus, control or eradication of pest plants will be focused mainly on areas where they have a negative effect on seabird survival and reproduction. The Refuge consists of degraded coastal grasslands and woodlands (scrub, shrub, and forest) dominated by pest plants which require annual maintenance. For example, rapid growth of ironwood trees at the base of Mōlī Hill creates obstacles within primary mōlī flight corridors. In 2010, a mōlī fledgling taking its first flight crashed into an ironwood tree and was grounded cliff-side for a day. This will be an annual occurrence if ironwoods are not removed. In addition, when wind direction shifts, mōlī land from the west (versus north) where there is a large pest oleander patch obstructing this secondary flight corridor. The Refuge will prioritize problem areas for pest control based on bird habitat requirements, human safety, and plant species' aggressiveness, and enhance approximately 2–5 acres each year. Pest insect species can affect survival and reproduction of migratory seabirds by causing mortality through predation or parasitism or by modifying habitat to make it less suitable. Ants can attack seabird chicks or pipping eggs and have short-term but widespread detrimental effects (Plentovich et al. 2008, USFWS 2005). Urban lights can disorient seabirds, particularly ʻaʻo fledglings making their first flights to sea. Subsequently, birds crash into vegetation or obstacles and die, get crushed by vehicles, or get killed by predatory animals (Ainley et al. 2007). The total acreage managed for seabirds is estimated to be 97 acres where additional management activities include controlling introduced predators and other pest species, such as ants, around ʻaʻo burrows, minimizing human disturbance during breeding, removing debris from artificial ʻaʻo and ʻuaʻu kani burrows prior to breeding season, and ensuring safe onsite flight corridors free of obstacles and light hazards.

Opportunities for restoring native habitats for seabirds exist when there is a high likelihood of restoring native-dominated plant communities (e.g., human-caused factors contributing to the spread of pest species have ceased, invasive competitors have been eradicated, or there is a commitment for long-term pest control). Translocation, propagation, and outplanting appropriate native plants to improve habitat for migratory seabird nesting. For example, ʻā are known to nest on the native shrub ʻāheahea and use its foliage to line nests. Restoring native plant communities may also provide more stability within the plant community to suppress new weed invasions. Small-scale outplantings will be conducted following recommendations in the draft Plant Restoration Strategy for KNWRC. The Plant Restoration Strategy will be finalized within 2 years of CCP completion.

Studies show that even passive human activities like birdwatching or photography could be harmful to some birds by altering normal feeding and breeding patterns. Birds are particularly wary of large groups, loud noises, and rapid movements. When people are present, birds may spend less time tending their young and more time on the lookout for danger, or may leave the area expending time and energy that could have been spent successfully foraging and raising young. Human disturbance of breeding birds could result in increased desertion of nests, reduced hatching success, and decreased chick survival (Dahlgren and Korschgen 1992, Staine and Burger 1994). Although effects on chick survival were not examined, a Refuge pilot study comparing ʻuaʻu kani chick stress hormone levels near and far from the Lighthouse Trail, which receives high visitor usage, found smaller chicks and elevated stress hormones (up to 100 times higher) in trailside chicks (Kitaysky et al. unpublished). Thus, stress affects animals in different ways (physical, physiological) and may not be expressed outwardly by changes in their behavior. Studies such as these could assist in determining whether or not human activities at the Refuge are affecting bird survival and reproduction (see Objective 3.2).

On the other hand, seabird viewing provides an opportunity for people to gain first-hand experience, learn about wildlife, and take an active interest in wildlife conservation. The Refuge is required to consider compatible public uses, particularly those that may provide long-term benefits for wildlife. Thus, the Refuge will continue to allow wildlife viewing in designated public use areas (parking lot and trail to Lighthouse) but continue to limit visitation hours to limit negative effects on breeding birds (e.g., 10:00 a.m.–4:00 p.m.) and prohibit entry to other areas of the Point, including the breeding areas of listed species. The Refuge will allow a limited number of guided interpretive hikes on Crater Hill. Hikes will be routed and scheduled to avoid key breeding areas and seasons by seabirds and endangered nēnē. Interpretive and other activities on Crater Hill will be compatible with the Refuge System mission and Refuge purpose, and will be continually monitored and adapted to minimize negative effects on native wildlife. At this time we do not have specific guidelines for other species because sensitivity varies by species, life stage, and many other factors. Specific guidelines for minimizing disturbance to native birds will be developed in a step-down Visitor Services Plan (see further discussion in Objective 4.5 Rationale).

Monitoring migratory seabird populations and habitats is necessary to detect changes in excess of natural variation that might be attributed to human activities. Refuge activities such as biological monitoring, maintenance, vegetation management, and predator control will be timed to minimize disturbance on breeding birds. Such techniques for natural resources management activities include limiting the number of visits to once per week, minimizing physical contact with birds, moving slowly in colonies, keeping voices and noise levels low, and approaching birds tangentially (Carney and Sydeman 1999). See Appendix B for Compatibility Determinations.

The foremost threat to adult seabirds on land is introduced predators, including cats, rats, mongooses, dogs, and barn owls. In the Pacific Region, cats and rats have been responsible for colony extirpations and range-wide population declines of numerous species (USFWS 2005). Seabird eggs and chicks are

easy prey for pigs, mice, and introduced cattle egrets, and unattended (or abandoned) eggs can be eaten by common mynah (Byrd et al. 1984), chickens, and red-crested cardinals. Cats, rats, mongooses, dogs, and barn owls regularly prey on adult seabirds. In 2010 at the Refuge, >75 adult ʻuaʻu kani were found preyed upon by owls (compared with 5 in 2009 and an average of 4.2 over the 4 years from 2011–2014), and carcass recoveries subsided after removal of 4 introduced barn owls. Also in 2010, dogs entering the Refuge at the unfenced end of Mōkōlea Point killed at least nine adult ʻuaʻu kani on the Refuge. Even when this number is low, such losses could affect local populations because adult survival is an important factor regulating seabird populations. All of those introduced predators also regularly prey on nestling seabirds, goslings, and seabird and nēnē eggs (Zaun and Weathers 2009). Thus, it is critical to control predators to reduce seabird mortality and increase reproductive success and survival, which will also benefit migratory waterfowl and shorebirds and endangered nēnē and is important to achieve Refuge purposes.

In collaboration with several partners, including the American Bird Conservancy, the Kauaʻi Endangered Seabird Recovery Project (a Hawaiʻi Division of Forestry and Wildlife and Pacific Cooperative Studies Unit effort), the National Fish and Wildlife Foundation, and others, construction of an approximately 2,400-foot long predator-proof fence around 7 acres of the Refuge slightly east of Crater Hill (i.e., the Nihoku Ecosystem Restoration Project) was completed in September 2014 (Anden Consulting 2014). The Service will explore the possibility of expansion of or separate additions to the Nihoku Ecosystem Restoration Project fence. It is hoped that the creation of predator-free refugia will improve nesting success for nēnē and mōlī, facilitate natural re-colonization by other seabirds, such as the kaʻupu or ʻou, and support future plans to potentially translocate the threatened ʻaʻo and/or endangered ʻuaʻu and reintroduce rare and endangered plants.

Objective 1.2 Enhance and manage coastal grasslands habitat for nēnē foraging, breeding, and roosting.

Within 2 years, annually manage 32–34 acres and enhance 5–7 acres (within the 32–34 acres) of coastal grassland habitat for nēnē foraging, breeding, and roosting at Crater Hill and Mōkōlea Point with the following attributes:

- Mosaic of grassland and native shrublands including large contiguous patches (>3 acres) of Kikuyu-Spanish clover grasslands;
- Kikuyu-Spanish clover grasslands managed <4–6 inches vegetation height;
- 15–20% native-dominated shrublands (canopy >75% cover; e.g., naupaka (*Scaevola*) coastal dry shrubland);
- <10% cover of pest woody vegetation (e.g., lantana, Christmasberry, ironwood);
- Minimal human disturbance during the peak breeding season (approximately October–March);
- Predation levels by introduced predators (e.g., dogs, cats, rats) ≤2 adult nēnē per year.

Strategies Applied to Achieve Objective:

a. Mowing at a frequency to stimulate vigorous growth of grasses; maintain <4–6 inches tall

b. Rehabilitate and maintain irrigation system at Crater Hill for native plant establishment

c. Enhance grasslands with native shrubland plant communities that provide suitable habitat structure and function for nēnē (e.g., naupaka, ʻakoko, nehe for nēnē food and cover)
d. Use IPM strategies, including mechanical/physical (e.g., mowing, brush-cutting, excavation, prescribed fire), cultural, chemical (e.g., herbicides), biological, and other suitable techniques, to control lantana, Christmasberry, ironwood, and other pest/undesirable plants (see Appendix G)
e. Public use closures and Refuge activities will be timed to minimize disturbance on breeding birds
f. Maintain or replace 2.7 miles of existing hogwire fencing (same as in Objective 1.1 and also includes Objective 4.6, strategy c)
g. Live-trapping, shooting, and bait stations to reduce predation on migratory birds by introduced vertebrate pests
h. In conjunction with transportation planning, evaluate the feasibility of redesigning the Overlook area in order to provide a corridor for nēnē transiting between the Point and Crater Hill
Rationale: Nēnē are browsing grazers of grasses, sedges, forbs, and shrubs and typically nest in edges of open-understory woodlands. No studies have been conducted on nēnē lowland foods or habitat use (see Objective 3.2). However, research conducted in mid-elevation Hawai‘i Island found nēnē fed mainly on cultivated grasses and that legumes and grass leaves had more protein than berries and grass seeds; pasture grasses had more protein than shrubland grasses; mowed or livestock-grazed grasses had more protein than rank grasses; and breeding success was higher for nēnē with more grasses in their diet (Black et al. 1994). Birds selected forage with high water and protein content, which indicates high forage quality, such as the young shoots of a Kikuyu grass-Spanish clover grassland, and preferred sward-forming (turf-like growth) over bunch grasses, and short (2–4 inches) over tall grasses (Woog and Black 2001). Currently, approximately 27 acres of Kikuyu grasslands are managed for nēnē at Crater Hill year-round. Kikuyu grass was introduced for cattle forage prior to acquisition by the Refuge. Removal of 5–7 acres of pest Christmasberry, lantana, and other aggressive weeds to open up existing historic Kikuyu grass-Spanish clover grasslands will increase habitat managed for nēnē to 32–34 acres total. Enhancement of these grasslands by planting patches of native shrublands to create a mosaic will provide additional food, cover, and close-proximity nesting, escape, and thermal cover. Although Kikuyu grass is considered an aggressive pest, the species originates in tropical Africa at elevations of 5,000–10,000 feet and appears to be less aggressive in the coastal zone. Currently, there are no known native grasslands that could be restored to provide the same nutrition as Kikuyu-Spanish clover grasslands. In lieu of artificial water features for nēnē, the Refuge will improve mowing regimes to manage short grasslands with high moisture and enhance areas with native shrubs such as naupaka, which provide moisture in berries. Managed grasslands at Crater Hill also provide habitat for prospecting seabirds such as mōlī and stopover or wintering habitat for migratory waterfowl and shorebirds, including cackling goose, kōlea, and the candidate species kioea. Small-scale outplantings will be conducted following recommendations in the draft Plant Restoration Strategy for KNWRC. The Plant Restoration Strategy will be finalized within 2 years of CCP. Nēnē eggs and goslings are vulnerable to introduced predators including rats, mongooses, dogs, cats, and pigs. Adult nēnē are vulnerable mainly to dogs and cats, especially during their synchronous molt of flight feathers, which renders birds flightless. It is critical to control predators to reduce mortality and increase reproductive success and survival. Controlling introduced predators will also benefit

migratory seabirds, waterfowl, and shorebirds and is important to achieve the Refuge purpose (USFWS 2004c).

In conjunction with the step-down transportation planning, we will evaluate the feasibility of redesigning the Overlook area in order to provide a corridor for nēnē transiting between the Point and Crater Hill. The objectives are to provide a better connection for nēnē adults and their young to travel for forage and to reduce the risk of vehicle impacts while crossing Kīlauea Road.

Objective 1.3 Protect sea cliff and beach strand habitat.

Protect approximately 59 acres of sea cliff and beach strand habitat for seabird breeding and roosting and ʻīlio-holo-i-kauaua basking year-round, with the following attributes:

- No signs of accelerated human-caused erosion;
- Minimal or no human disturbance year-round;
- Seabird populations stable or increasing.

Strategies Applied to Achieve Objective:

a. Conduct a road and trail assessment and analysis and identify problem areas (e.g., accelerated erosion, compaction) and solutions (e.g., water bars, erosion matting, re-vegetation) (Objective 3.2)

b. Stabilize areas of accelerated erosion identified in the road and trail assessment and analysis

c. Design and implement a monitoring program for 1–2 indicator species (e.g., ʻā) to detect natural or anthropogenic variation in habitat conditions (Objective 3.1)

d. Continue to support the National Oceanic and Atmospheric Administration and Department of Land and Natural Resources (DLNR)'s Marine Mammal Response Network

e. Public use closure

f. In partnership with the community, work to reduce wildlife disturbance and habitat degradation due to public use at Kāhili Quarry (Objective 4.6)

Rationale: Sea cliff habitat is characterized by nearly vertical or vertical cliff faces (>45% slope) with highly erodible soils exposed to wind and sea. Given the vertical topography and unstable substrates of these areas, access is very difficult to hazardous. This area is important breeding habitat for ʻuaʻu kani, koaʻe ʻula, koaʻe kea, and ʻā and roosting habitat for ʻiwa, ʻā (brown boobies and red-footed boobies), and endangered nēnē. The beach strand habitat, consisting of small areas totaling approximately 8 acres of sand or gravel within or just above the tidal zone, provides protected basking habitat for the critically endangered ʻīlio-holo-i-kauaua and potentially the threatened honu and foraging habitat for migratory shorebirds such as ʻūlili, akekeke, kōlea, and marine fauna.

Trespassing is a regular occurrence in several areas, including unleashed pet dogs and the illegal harvest of firewood to build fires during fishing or camping. Unleashed dogs impact endangered and migratory wildlife in both public and remote areas. In addition, trespassers have been caught scaling steep cliffsides to access remote surfing areas. The areas are closed to the general public. Management will be limited to protection from the potentially devastating effects of human (e.g., crushing birds in

underground burrows) and predator (e.g., dogs preying upon endangered nēnē goslings or ground-nesting seabirds) intrusion, conducting public education, and population and habitat monitoring.

2.4.2 Goal 2: Restore and/or enhance and manage populations of migratory seabirds and threatened and endangered species.

Objective 2.1 Restore and enhance breeding populations of ʻaʻo and other seabirds.

Restore and enhance breeding populations of ʻaʻo and other seabirds, including on Crater Hill and Mōkōlea Point, with the following attributes:

- Viable breeding populations;
- Trends suggest stable or increasing population sizes and distributions;
- High genetic diversity.

Strategies Applied to Achieve Objective:

a. Continue to maintain ʻaʻo colony on the Point (NESH Hill), while increasingly putting emphasis for ʻaʻo recovery on Crater Hill/Mōkōlea Point areas (including the Nihoku Ecosystem Restoration Project area)

b. Manage suitable habitat for seabirds including a control of vertebrate and invertebrate pests and habitat-modifying plants, minimal human activity, and no flight or light hazards (Objective 1.1)

c. Re-establish populations of extirpated seabird species

d. Provide a high-island refugium for seabird populations potentially displaced by climate change or other stressors

e. Use social attraction techniques to enhance the ʻaʻo and other seabird populations; monitor for bird and predator responses to stimuli

f. With partners, determine feasibility of the Refuge as a potential ʻaʻo and/or ʻuaʻu chick translocation site (Objective 3.2)

Rationale: As habitat components are managed and threats are controlled, the Refuge could take on the role of passive or assisted restoration and enhancement of seabird populations. Many examples of successful conservation programs are based on the principle that populations can be restored to an area if limiting threats are removed (e.g., human disturbance, introduced predators). Re-colonization rates may be improved with chick translocation (Miskelly et al. 2009) or social attraction techniques which use sound or visual stimuli to modify behavior (Gummer 2003). However, there is evidence that colony establishment can occur faster at a considerably cheaper rate using fencing and social attraction versus fencing and chick translocations, and that chick translocations may be required at some locations but not others (Courtot et al. 2014, Sawyer 2014). Since 2007, two loudspeakers project ʻaʻo colony calls to attract prospecting birds to Kīlauea Point where they may have a higher chance of successful reproduction and long-term survival. Between 1978 and 1980, 65 and 25 ʻaʻo eggs were translocated from mountain habitats to the Refuge and Mokuʻaeʻae Island, respectively, and cross-fostered by ʻuaʻu kani (Byrd et al. 1984).

Currently, the Refuge supports at least 11 prospecting or breeding ʻaʻo pairs, some presumably the fledglings of the translocated eggs or their progeny. In partnership with the Kauaʻi Endangered Seabird Recovery Project, the ʻaʻo social attraction program will be expanded to select areas on Crater Hill and Mōkōlea Point. With partners, the Service will explore the feasibility of the Refuge as a potential ʻaʻo chick translocation site for mountain colonies in severe decline (USFWS 2011).

As discussed in Objective 1.1, seabird breeding habitat, free of introduced predators, is a pressing need in the Hawaiian Islands. ʻAʻo translocations may also increase genetic diversity at the Refuge. These techniques will be considered for other species of high conservation concern such as kaʻupu (black-footed albatross) (Arata et al. 2009) and ʻuaʻu (Hawaiian petrel). Specific projects related to translocation will undergo additional detailed planning, including an effects assessment under NEPA, surveys and consultation under Section 106 of NHPA, evaluation and consultation under Section 7 of ESA, and compliance with other applicable laws and policies.

Today's bird distributions may be uninformative about their pre-human distributions. Of 40–43 native bird species found at a Māhāʻulepū, Kauaʻi, fossil site, only about one-fourth occur in the vicinity today, one-fourth have been extirpated from Kauaʻi or its lowlands, including ʻaʻo, and ʻuaʻu, and half are extinct (Burney et al. 2001). The Refuge currently supports six species of breeding seabirds. Lehua Islet, located just 19 miles west of Kauaʻi, is a 271-acre State seabird sanctuary comparable in size, elevation, and aspect to the Refuge. Lehua supports over 25,000 pairs of 8–12 breeding seabird species, including kaʻupu, ʻā (brown booby), the candidate species ʻakeʻake (band-rumped storm petrel), Bulwer's petrel, and noio (Hawaiian noddy) (Vanderwerf et al. 2007), which are not known to breed at the Refuge. In addition, an estimated 90,000 pairs of 18 breeding seabird species, including Christmas shearwater, endangered ʻuaʻu (Hawaiian petrel), noio kōhā (brown noddy), ʻewaʻewa (sooty tern), and pākalakala (grey-backed tern) breed on Kaʻula Rock, a 158-acre State seabird sanctuary located 54 miles southwest of Kauaʻi (Harrison 1990, Vanderwerf et al. 2007). Breeding populations of many of these species, now absent or rare on Kauaʻi, could be established or re-established using passive and assisted restoration techniques.

Climate change is one of the most serious threats to wildlife today. Scientists are already documenting the effects of global warming on low-lying islands through accelerated coastal erosion. Models predict an increase in the frequency and severity of droughts and storms. Rising sea levels are expected to disrupt habitat functions and eliminate terrestrial habitat on important seabird breeding areas such as Midway Atoll and Laysan Island, where elevations peak at 13 and 50 feet, respectively (Baker et al. 2006). As sea levels rise over the next century, protected areas on high islands, including the Refuge, will become increasingly important for seabirds that currently nest primarily on low islands and atolls of the Northwestern Hawaiian Islands (Arata et al. 2009, Young 2010).

Objective 2.2 Restore and/or enhance and manage native coastal plant communities including habitat for endangered plants.

Restore and/or enhance and manage 10–30 acres of native coastal plant communities (e.g., naupaka (*Scaevola*) coastal dry shrubland and/or ʻilima (*Sida*) coastal dry mixed shrub and grassland) on Crater Hill and Mōkōlea Point with the following attributes:

- 15–20% native-dominated plant communities (canopy >75% cover; e.g., naupaka-dominated canopy with pohuehue locally dominant along seaward edges (naupaka shrubland); ʻilima-

dominated dense canopy with ʻāheahea and pōpolo co-dominants (ʻilima shrubland));
- <10% cover of pest plants (e.g., lantana, koa haole, Christmasberry);
- Endangered plants (3–8 species) interplanted into existing matrix (e.g., dwarf naupaka, ʻohai, ʻawiwi);
- Restoration enhances and has negligible negative effects on breeding bird populations.

Strategies Applied to Achieve Objective:

a. Maintain the current onsite greenhouse while exploring options for creating an offsite greenhouse and/or partnerships to support outplanting of native plants that are from local seed sources and conditioned to the local environment

b. Within 2 years, develop a Restoration Working Group (RWG) and finalize draft Plant Restoration Strategy for KNWRC

c. Expand involvement of both volunteers and native plant organizations

d. Work with RWG and others to implement Final Plant Restoration Strategy (e.g., plant propagation, restoration ecologist, site preparation, restoration and repatriation, site maintenance, monitoring, evaluation, adaptive management)

e. Use IPM strategies, including mechanical/physical (e.g., mowing, brush-cutting, excavation, prescribed fire), cultural, chemical (e.g., herbicides), biological, and other suitable techniques, to control Christmasberry, lantana, ironwood, and other pest/undesirable plants (see Appendix G)

f. Use IPM techniques to control pest insects (approved biocontrols, hand removal of infected leaves, granular and spot-treating plants with insecticides)

g. Restoration activities are timed and conducted to minimize disturbance to breeding birds

Rationale: The Refuge consists of degraded coastal and lowland, dry and mesic woodlands, grasslands, and mixed woodland-grassland plant communities. Over 30 native coastal and lowland plant species are appropriate for re-establishment. Of these species, approximately one-third will be established as dominant members of the communities, while the remaining two-thirds will be integrated as sub-dominants and associated species. Populations of eight species of endangered plants could be established within these restored habitats, thereby contributing to their Statewide recovery. Beginning in 1980, approximately 13 acres on the Point and portions of Crater Hill's west slope were restored with hala, ʻakoko, ʻilima, naupaka kahakai, ʻāheahea, and pohinahina. The Refuge has a small native plant nursery that is staffed largely by volunteers (Bruegmann and Castillo 1999).

With nearly 300 species of plants listed as threatened or endangered, nearly one-third of Hawaiʻi's remaining native flora is threatened with extinction. Over 100 species of plants now listed as threatened or endangered occur, or historically occurred, on the Island of Kauaʻi; 49 species are found only on Kauaʻi. Plants that grow in coastal shrublands and low elevation forests are particularly rare due to the long-term presence of humans and the negative effects of their actions, specifically, development, agriculture, fire, and the introduction of pest species. Only 11 percent of lowland mesic and dry native plant communities remain intact on Kauaʻi, compared to 22 percent for all of the Hawaiian Islands combined (The Nature Conservancy 1998). Thus, the Refuge could play a key role in recovery of listed plant species.

Finalization of the draft Plant Restoration Strategy for KNWRC will be completed within the first 2 years of CCP implementation. The scope of the draft Plant Restoration Strategy includes 50 acres restored (fully functioning, stable plant communities) over 50 years (plant community restoration is a slow process). For the CCP, this translates to approximately 10 acres (in highly degraded sites) or 30

acres (in sites with native-dominant upper canopy) of restoration over 10–12 years. The term "restoration" is used in the context of rebuilding an ecological community comprised of predominantly native species including its form, function, and processes, while "enhancement" is used in the context of increasing or improving but not attempting to fully restore a former ecological state, based on our limited historical knowledge of the coastal and lowland plant communities of Kaua'i. As stated in the draft Plant Restoration Strategy, achieving this level of restoration will require dedicated full-time staff and funding. Thus, implementation will be dependent on a Final Plant Restoration Strategy and partnerships to acquire and leverage restoration and maintenance funding (Bruegmann and Castillo 1999). Plant restoration activities will be timed to have minimal negative effects on breeding birds and be compatible with migratory seabird management and endangered wildlife recovery priorities.

2.4.3 Goal 3: Gather scientific information (surveys, research, and assessments) to support adaptive management decisions.

Objective 3.1 Conduct high-priority inventory and monitoring activities.

Conduct high-priority inventory and monitoring activities that evaluate resource management and public use activities to facilitate adaptive management. These activities contribute to the enhancement, protection, use, preservation, and management of wildlife populations and their habitats on and off Refuge lands. Specifically, they can be used to evaluate achievement of resource management objectives identified under Goals 1–2. These surveys have the following attributes:

- Data collection techniques will likely have minimal animal mortality or disturbance, minimal habitat destruction, and minimal long-term or cumulative impacts on resources of concern;
- Proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary, will minimize the potential spread or introduction of pest species and pathogens;
- Projects will adhere to scientifically defensible protocols for data collection (e.g., sample size), where available and applicable.

The following is a list of priority activities to support resource management decisions on the Refuge:

a. Within 1 year, map type and status of all fences and gates

b. Within first 2–3 years, re-evaluate, develop, or initiate Refuge-specific monitoring plans (protocols, sample designs, and databases) for high-priority taxa (e.g., listed, highly invasive, or indicator species, species/species groups of regional concern) within the regional Inventory and Monitoring (I&M) framework; work with U.S. Geological Survey (USGS) Biological Resources Discipline, universities, and other partners to develop efficient systems for synthesis, analysis, and reporting of Refuge monitoring data

c. Within first 2 years, design and conduct a vegetation monitoring program that will allow for assessment in reaching habitat management objectives

d. Within first 5 years, conduct a comprehensive inventory of plants, invertebrates, and vertebrates occurring at the Refuge. Use initial inventories as baseline data to assess past and future changes in plant and animal communities

e. Monitor population size of all native breeding birds at least each decade and species of high conservation concern annually (e.g., ʻaʻo, mōlī, nēnē)
f. Map soils, vegetation, and bird distributions
g. Conduct early detection and rapid response pest plant species and assessment; rank species to target for control
h. Develop GIS layers to support biological goals and objectives and I&M program
i. Monitor effects of visitor activities on wildlife and re-evaluate the program every 5 years
j. Monitor seabird and nēnē populations and mortality and morbidity
k. Continue to partner with DLNR to conduct nēnē banding
l. Monitor response of pest species and habitat to management actions within an adaptive management framework
m. With partners (e.g., Kauaʻi Endangered Seabird Recovery Project): - Conduct yearly auditory and visual surveys to detect new ʻaʻo breeding burrow or prospecting locations; - Monitor response of ʻaʻo and non-target species (e.g., owls) to social attractions; - Monitor burrow activity of two ʻaʻo pairs using PIT monitoring system; and - Band and monitor reproductive success and survival
n. In partnership with the Migratory Bird Program, DLNR, private landowners, and volunteers, conduct banding and monitoring reproductive success and survival of mōlī within regional demographic monitoring framework; formalize this partnership
o. Monitor sex structure and demography of the mōlī population using molecular or other techniques
p. With partners, such as the Pacific Islands Climate Change Cooperative, design and implement a climate change monitoring program compatible with, and complimentary to, other state and regional climate change monitoring programs, which will allow for detection of climate change impacts on Refuge resources (e.g., shifts in breeding phenology of target seabird species that may inform management)
Rationale: The Administration Act requires us to ‘‘… monitor the status and trends of fish, wildlife, and plants in each refuge.’’ Surveys will be used primarily to evaluate resource response to assess progress toward achieving Refuge management objectives (under Goals 1–2 in this CCP) derived from the Refuge System mission, Refuge purpose(s), and maintenance of biological integrity, diversity, and environmental health (601 FW 3). Determining resource status and evaluating progress toward achieving objectives is essential to implementing adaptive management on Department of the Interior lands as required by policy (522 DM 1). Specifically, results of surveys will be used to refine management strategies, where necessary, over time in order to achieve resource objectives. Surveys will provide the best available scientific information to promote transparent decision-making processes for resource management over time on Refuge lands.

Objective 3.2 Conduct and facilitate high-priority research projects and scientific assessments at the Refuge to directly support management objectives and guide management decisions.
Conduct high-priority research projects that provide the best science for habitat and wildlife management on- and off-Refuge. Scientific findings gained through these projects will expand

knowledge regarding life-history needs of species and species groups as well as identify or refine habitat and wildlife management actions. Research also will reduce uncertainty regarding wildlife and habitat responses to Refuge management actions in order to achieve desired outcomes reflected in resource management objectives and to facilitate adaptive management (e.g., developing thresholds to better define "minimal human disturbance in areas designated for seabird breeding" in Obj. 1.1).

These research projects have the following attributes:

- Focus wildlife population research on assessments of species-habitat relationships. Develop models that predict wildlife response to management;
- Design and conduct issue-driven research unlikely to be reliably addressed using long-term monitoring. Develop models that predict wildlife response to management;
- Promote Refuge research and science priorities within the broader scientific community. Ensure that cooperative research focuses on meeting information needs identified in biological goals and objectives;
- Adhere to scientifically defensible protocols for data collection (e.g., sample size), where available and applicable, in order to develop the best science for resource management;
- Data collection techniques will have minimal animal mortality or disturbance, minimal habitat destruction, and minimal long-term or cumulative impacts on resources of concern;
- Use proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary, to minimize the potential spread or introduction of pest species and pathogens;
- Present results in peer-reviewed articles in scientific journals and publications or symposia.

Conduct scientific assessments to provide baseline information to expand knowledge regarding the status of Refuge resources to better inform resource management decisions. These scientific assessments will contribute to the development of Refuge resource objectives and they will also be used to facilitate habitat restoration through selection of appropriate habitat management strategies based upon site-specific conditions. These assessments have the following attributes:

- Use accepted standards, where available, for completion of assessment;
- Scale and accuracy of assessments will be appropriate for development and implementation of Refuge habitat and wildlife management actions.

The following is a list of priority research to support resource management decisions on the Refuge:

a. Identify primary predators for each life stage of seabirds

b. Identify effective control methods for primary predators (e.g., cats)

c. With partners, determine feasibility of the Refuge as a potential ʻaʻo and/or ʻuaʻu chick translocation site

d. With partners, evaluate effectiveness of the Pacific Missile Range Facility Bird-Aircraft Strike Hazard Program and Egg Swap Program including feasibility of alternate release sites for mōlī

e. Investigate effects of visitor activities on survival and reproduction of priority bird species

f. Develop survey methods to reliably estimate population size for species of high conservation concern

g. Investigate the relative importance of causes of mortality (e.g., predators, disease, vehicle strikes) for nēnē and seabirds of concern
h. With partners, conduct pollen core studies to reconstruct prehistoric vegetation composition
i. Investigate status and distribution of ʻōpeʻapeʻa; identify management priorities
j. Investigate status and distribution of endemic insects, particularly species of concern
k. With partners, investigate breeding and foraging ecology of nēnē in lowlands
l. Investigate daily and seasonal movements of nēnē
m. Establish partnerships with other agencies, universities, and organizations to pursue collaborative research projects
n. Work with DLNR and other partners to conduct habitat assessments for Makapili Rock and Mokuʻaeʻae Island (both owned by State of Hawaiʻi) which are located within 300 feet offshore of the Refuge
o. Conduct a road and trail assessment and analysis and identify problem areas (e.g., excessive erosion, compaction) and solutions (e.g., water bars, erosion matting, re-vegetation)
Rationale: Research projects on Refuge lands will address a wide range of natural and cultural resource as well as public use management issues. Examples of research projects include habitat use and life-history requirements for specific species/species groups, practical methods for habitat management and restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, modeling of wildlife populations, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, Refuge-specific, or evaluate the relative contribution of the Refuge to larger landscape (ecoregion, region, flyway, national, international) issues and trends. Like monitoring, results of research projects will expand the best available scientific information and potentially reduce uncertainties to promote transparent decision-making processes for resource management over time on the Refuge. In combination with results of surveys, research will promote adaptive management on the Refuge. Scientific publications resulting from research on the Refuge will help increase the visibility of the Refuge System as a leader in the development of the best science for resource conservation and management. In accordance to the policy for implementing adaptive management on refuge lands (522 DM 1), appropriate and applicable environmental assessments are necessary to determine resource status, promote learning, and evaluate progress toward achieving objectives whenever using adaptive management. These assessments will provide fundamental information about biotic (e.g., vegetation data layer) as well as abiotic processes and conditions (e.g., soils, topography) that are necessary to ensure that implementation of on-the-ground resource management achieves resource management objectives identified under Goals 1–2.

2.4.4 Goal 4: Ensure that visitors and kamaʻāina of all ages and abilities feel welcome, enjoy a safe visit, and are provided high-quality opportunities for wildlife-dependent recreation which allows them to connect with, while having limited impacts to, the wildlife, habitats, and cultural and historic richness of the Refuge.

Objective 4.1 Improve visitor access.

Improve visitor access associated with the Refuge with the following attributes:

- Enhance visitor safety and experiences to improve their connection to wildlife and habitats;
- Integrate with other transportation plans and initiatives that share Refuge purposes and goals;
- Promote sustainable transportation practices;
- Minimize human disturbance to biological resources.

Strategies Applied to Achieve Objective:

Strategies specific to the overall Refuge

a. Coordinate transportation network with existing public transport options (e.g., work with the County for a bus stop closer to the Refuge)

b. Continue to integrate Refuge planning efforts with Kīlauea Town planning efforts, including the bypass road and multi-use trail connecting the Refuge to town

c. Develop a data collection plan (e.g., better traffic and parking count, documenting "overage", accident and incident data,) that is updated and reviewed annually to continue to evaluate transportation network efficacy

Strategies specific to the Overlook and current entrance

d. Within the first 5–10 years, implement recommendation from the Transportation Assistance Group (TAG), suggesting testing operational changes to determine their effectiveness in reducing congestion (e.g., change operating hours, charge differential fees, test parking reservation system, test variations of the "one-in, one-out" protocol, arrange transit demonstration service, implement "intelligent technologies" to better inform and manage congestion, work with the County on road easement/acquisition/ cooperative agreement)

e. Improve parking safety and efficiency (e.g., better delineate onsite public parking)

f. Provide bicycle parking at Overlook

g. Explore options for a mandatory shuttle which would prohibit private vehicles from traveling into the Refuge

Strategies specific to the Point

h. Explore options for removing parking currently on Refuge, renovate area for shuttle stop, and explore habitat restoration. Improve pedestrian circulation

i. If a shuttle system is implemented, examine the feasibility of allowing pedestrian and/or bicycle access from the Overlook into the Point

Rationale: The popularity of the Overlook and Point generates operational, access, and safety issues, both at the Refuge and in the nearby Kīlauea Town. Most visitors drive to the Overlook and the Point in a rental car, the main mode of transportation for all visitors on the island. During the peak winter season, visitors arriving during hours of high visitation may find the parking lot full and space limited in the temporary overflow parking area. The capacity of the Refuge's parking lots is the Refuge's limiting factor for visitation. If all parking is full, visitors are turned away.

There are two paved parking areas as well as two unpaved/unmarked gravel areas at the Point; these facilities can accommodate 51 vehicles total. The two paved parking areas are dead-ends and do not

allow for through traffic. The parking in the gravel areas is also unmarked. Large tour buses (25 passenger or larger) are restricted from entering the Refuge. Due to the poor configuration and layout of the parking area, as well as the limited amount of space, Refuge rangers regularly spend a large portion of the peak visitation time of day directing traffic, parking cars, and moving traffic control signage. Intensive staff effort is needed to park and direct traffic in these situations.

Separate areas of grassland habitat are used for parking in overflow conditions and can accommodate approximately 20 vehicles. Refuge staff prefers not to use this area, particularly during the winter rainy season when it becomes very soft and muddy. When visitation exceeds parking capacity, including reasonable overflow limits, Refuge staff institutes a "one-in, one-out" system which generally requires two staff members. Alternately, staff place a sign at the entrance gate to indicate that public entry into the Refuge is temporarily closed, but cannot let them know when they can return.

The current parking situation within the Refuge not only prevents Refuge staff from conducting other key duties (Refuge staff currently spend 2–3 hours a day addressing traffic issues), but also degrades the quality of wildlife habitat by periodically excluding endangered nēnē families from foraging, roosting, and brood-rearing, resulting in movements of goslings to neighboring private properties were they are unprotected and at times unwelcome, contributing to human-wildlife conflicts. The situation also negatively impacts the visitor experience and undermines the Service's ability to provide interpretation and EE (see rationale for Objectives 4.3 and 4.4). For additional discussion of transportation-related management challenges, see Chapter 5, Sections 5.3.3 and 5.3.4.

Several studies have been conducted regarding Refuge-related transportation issues, including the Alternative Transportation Systems (ATS) study in 2006 (Parsons Brinkerhoff Quade and Douglas, Inc. 2006) and interagency TAG study in 2009 (TAG 2009). The ATS study evaluated the feasibility of five conceptual alternatives for dealing with transportation issues and the anticipated rise in island visitor numbers:

- No build, which would keep current status;
- Minor improvements, transportation system management, and transportation demand management, which would include some physical or operational changes to increase effective capacity through improved management of parking resources or would redistribute demand to less busy times;
- Moderate improvements to increase capacity, which would include physical improvements such as additional paring and/or widening roads;
- Voluntary shuttle service with private vehicle access, which would institute a shuttle system from a new offsite welcome and orientation facility while continuing to allow private vehicles onto the Refuge;
- Mandatory shuttle service, which would prohibit public parking beyond the entry gate at Kīlauea Point NWR and require all visitors to use a shuttle system from an offsite welcome and orientation facility.

The TAG study considered the recommendations of the 2006 ATS study and additionally provided a series of non-binding recommendations for the Refuge to consider. In the short- to medium- term, the Refuge will adopt an incremental approach and experiment with small-scale operational and infrastructure improvements based on TAG recommendations. These options, along with other options mentioned above, will be analyzed more thoroughly as part of the TRIP-funded post-CCP transportation implementation study. The study will prioritize initial feasibility analysis of these initiatives. When implemented on an experimental or demonstration basis, the Service will include an evaluation component for these initiatives to determine efficacy and to document a basis for moving

forward or not. These initiatives may be tested individually or in combinations. Over the mid- to long-term, the mandatory shuttle service component will be further analyzed in conjunction with other proposals (e.g., new visitor welcome and orientation center) via SDMPs and/or other planning. As part of the incremental approach, the shuttle may serve various park and ride locations instead of one Refuge welcome and orientation center.

Objective 4.2 Improve visitor information and orientation.

Improve visitor information and orientation associated with the Refuge with the following attributes:

- Visitors are welcomed and are provided a safe experience;
- 75% of visitors can identify Kīlauea Point as a national wildlife refuge;
- Visitors are educated about access options while core staff functions are maintained;
- Human disturbance to biological resources is minimized.

Strategies Applied to Achieve Objective:

Strategies specific to the overall Refuge

a. Develop a Refuge Sign Plan to better direct individuals, enhance orientation, and reduce impacts to wildlife within 3 years

b. Continue working with the Hawai‘i Department of Transportation and County of Kaua‘i on Refuge directional signage for Kūhiō Highway and through Kīlauea Town, and signage to reduce impacts to wildlife (e.g., nēnē crossing)

c. Work with DLNR DOFAW, the County, and others on sign design and placement as well as explore the use of speed calming devices to reduce vehicle strike hazards for wildlife (e.g., nēnē)

d. Identify and develop methods to provide greater information to visitors prior to entering the Refuge (e.g., volunteers at Overlook, cell phone audio tour at Overlook, AM radio station, rangers onboard shuttles to the Refuge, operating hours on highway signage)

e. Every 5 years, evaluate Refuge fees and conduct a visitor survey to evaluate existing programs as well as new programs under development, analyze current and potential Refuge visitor profiles, and explore visitation trends

f. Ensure public use facilities, interpretive materials, and programs are accessible to and usable by persons with various disabilities

Strategies specific to the Overlook and current entrance

g. Explore options for redesigning and enhancing the scenic Overlook at the entrance to the Refuge to provide greater orientation and information and increased interpretation.

h. Explore the establishment of a new offsite visitor welcome and orientation center on lands adjacent to or within 1 mile of the Refuge (~3–4 acres), including within Kīlauea Town, which would include the following: visitor contact, orientation and information, fee collection, restrooms, bookstore/retail, multipurpose room, outdoor spaces, administrative offices, private vehicle and tour bus parking, public bus stop, and shuttle pick up/drop off

Strategies specific to the Point
i. Continue to provide, on an on-call basis, golf carts to transport visitors who may need assistance getting to the VC or Lighthouse
j. Provide for greater site orientation
m. Re-examine the site layout at Kīlauea Point and evaluate non–site-dependent functions currently located there and move as many as are feasible and possible off the Point (e.g., bookstore, administrative and maintenance functions, equipment storage, fee collection, parking) to improve the visitor experience
n. Explore options for remodeling the existing VC for either EE or new interpretive exhibits and displays. Maintain bookstore operations at the new visitor welcome and orientation center, if constructed

Rationale: Directional signage on Kīlauea and Kolo Roads (both County roads) leading to the Refuge is limited with visitors regularly becoming lost in Kīlauea Town. The sign design also varies with green, brown, and even homemade signs directing the way. This signage also directs travelers to the Kīlauea Lighthouse and makes no reference to the Refuge on which the Lighthouse stands. For a majority of visitors, the trip to the Refuge is their first visit to a national wildlife refuge, and their first introduction to the Refuge System. Many visitors incorrectly believe the Refuge to be a national park. Also, while many who live on the island are aware of the Kīlauea Lighthouse, they are not aware of the Refuge.

The configuration of the Overlook at the entrance to the Refuge at the end of Kīlauea Road, together with its constraints, poses challenges to orienting, informing, and guiding visitors clearly down to the Point. The current entrance experience is confusing and potentially unsafe for visitors. There is limited advance directional or orientation/information signs to help visitors understand how to access the Point and see the Lighthouse. Visitors who arrive by car typically park to see the view at the Overlook but are confused about whether or not they are supposed to drive or walk past the gate down into the Refuge. There are signs, however, they are not readily noticed by the visitor. It is also unclear to bicyclists whether or not they are allowed to ride their bicycles past the entrance gate.

After visitors exit their vehicles, there is a lack of information and signage to let them know where they can and cannot go. There are several buildings adjacent to the parking areas; however, the Lighthouse, restrooms, and VC are not visible from the parking lot. Therefore, visitors are often confused about how to get to these facilities, as well as the existing buildings and where they should go.

Implementation of the long-term strategy to develop a new off-Refuge visitor welcome and orientation center could resolve many of these issues. It would serve as the gateway to the Refuge where visitors could park, be provided an orientation to the Refuge, and board their shuttles and/or start their interpretive guided tours and hikes.

Since the siting and construction of a new visitor welcome and orientation center is conceptual and not site-specific, implementation would require additional compliance, involving site-specific effects analysis.

The location of the new visitor welcome and orientation center, as well as other facilities to support Refuge management (see Objectives 4.1 and 6.1), would likely be guided by a number of site selection criteria which may include, but would not be limited to, the following:

- Reasonable cost.

- Availability at the time when the Refuge had adequate funds to move forward on such a large project.
- Within 1 mile of the existing established Refuge boundary.
- Consistency with local land use plans.
- Sufficient in size (at least 3 to 4 acres) to accommodate all needed facilities, including parking, shuttle access, and possibly maintenance building/yard.
- Existing facilities that could be modified to satisfy needs or a readily developable site.
- Good access to existing or planned roads (Kīlauea Road, Kūhiō Highway, or Kīlauea Town Bypass).
- Accessible by bus, bicycle, and walking.
- Existing parking area (including one that could accommodate shuttle buses) that could be shared with others or a site where such parking could be readily developed.
- Existing utilities (e.g., electricity, potable water, high-speed internet, and sewer).
- A relatively level site that would require minimal recontouring to accommodate the proposed facilities.
- A site that was or could readily be made secure.
- Building site would be located in an already developed or disturbed area.
- Co-location with another conservation organization (e.g., the U.S. National Oceanic and Atmospheric Administration's marine sanctuary discovery center on Kaua'i [NOAA 2011]) or another Federal, Hawai'i, or local public agency.
- Views of the Kīlauea Point Lighthouse, ocean, or mountains.
- Construction and management would have negligible negative effects on trust resources (e.g., federally listed species, migratory birds)
- Construction and management would not be anticipated to reduce the quality or quantity or fragment habitat for trust resources.

Through a subsequent planning effort, the Service would explore the benefits, costs, and impacts of each potential site and work with the community to determine the ideal location, considering the needs of the Refuge and the intent of the Kīlauea Town Plan and other plans.

Objective 4.3 Enhance and expand environmental interpretation.

Improve interpretive opportunities associated with the Refuge. The program shall include the following attributes:

- Hawai'i's unique cultural heritage is woven throughout the interpretive experience;
- Visitors are exposed to at least one of the three interpretive themes:
    - *The National Wildlife Refuge System:* The Refuge, part of a legacy of lands, reserved by the people of the United States, where wildlife comes first.
    - *Seabirds & Native Coastal Plants:* The Refuge abounds with seabirds passing through the cycles of life and balancing on the edge of survival, while plant communities thrive in the harsh coastal environment.
    - *Kīlauea Point Light Station:* The Kīlauea Point Light Station has marked the passage of Kaua'i's history . . . it was once a beacon calling to those crossing the vast expanses of the Pacific; now it calls upon all of us to protect the Native Hawaiian ecosystem.
- 90% of visitors understand that Kīlauea Point is part of a system of lands administered and managed by the Service for wildlife and plant conservation;

• 80% of visitors can name at least two seabird species that uses the Refuge during some part of their life history and at least one native plant; • 70% of visitors understand that the Kīlauea Lighthouse played a prominent role in trans-Pacific navigation; • Minimize human disturbance to biological resources.
Strategies Applied to Achieve Objective:
a. Within 5 years, prepare an interpretive chapter of the KNWRC Visitor Service Plan
b. Develop orientation materials and/or train Service staff, volunteers, partners and tour operators to ensure understanding of the significant resources and messages that the interpretive program should be addressing
c. Develop exhibit themes, including interpretive exhibits and associated media at the VC and other visitor contact points, and/or observation viewpoints
d. Explore options to provide greater flexibility in interpretive exhibits and signage to allow for seasonal depictions (e.g., detachable interpretive panels)
e. Expand opportunities to provide limited access to the interior of the Lighthouse
f. Explore possibilities for increasing the frequency of lighting of the Lighthouse (currently once per year)
g. Expand current and new partnerships to maximize effectiveness and efficiency of interpretive programs
h. Continue to evaluate items sold in the bookstore to ensure they reinforce key messages and the mission and goals of the Service. Include interpretive messaging whenever possible
i. Regularly evaluate visitor perceptions of resources and interpretive programming (e.g., informal discussion, observations by staff)
j. Develop methodologies that will be used for future evaluation of existing interpretive programs and new ones under development
k. Every 5–10 years, conduct an analysis of visitation trends and their implications for interpretation
l. Continue to provide guided interpretive activities as staff is available
m. Remodel the VC for interpretative displays (or EE facility, see Objective 4.4)
n. Increase the number of guided interpretive activities to at least 1 per day
o. Remodel the Contact Station (radio beacon building) to provide expanded interpretation and/or scenic view (expand scenic view)
p. Explore the restoration and conversion of one of the former Lighthouse keeper's homes (Quarters #1) to house other functions (living history site, bookstore offsite)
q. Offer a limited number (2 times/week) of guided interpretive hikes to Crater Hill designed (location of trail, timing, group size) to have negligible negative effects on breeding birds yet provide a quality experience for visitors (see Objective 4.5)
r. Work in partnership with local nonprofit organizations and community leaders of Kīlauea to develop environmental, cultural, and historical interpretation materials for Kāhili Quarry.

Rationale: As one of the Service's priority public uses, environmental interpretation is an important management activity for the Refuge. Interpretation is a communication process that forges emotional and intellectual connections by providing opportunities for visitors to make their own connection to the resources. Messages and stories are often delivered through guided interpreters, self-guided interpretive panels, interpretive exhibits, printed materials, interpretive art, and electronic media.

The visitor is first welcomed to the Point at the fee collection booth. The ranger on duty assists in orienting visitors, answering their questions, informing them about wildlife activity that day, and advising the visitor of Refuge services offered at the VC and Contact Station, such as free binoculars for loan while on Refuge and docent interpretive services. Volunteers are the primary means of personal interpretation on the Refuge. Between 2010 and 2013, the number of volunteers ranged from 103–115 annually, providing between 6,410 and 8,523 hours of service per year (USFWS 2014). The majority of these hours were dedicated to the VS program. Volunteers help visitors use the viewing scopes and binoculars, identify species, point out and provide information about wildlife behavior, and provide interpretation about the Lighthouse, the Refuge, and its resources. Under optimum conditions, there are at least two volunteers on duty, with one volunteer operating an on-call golf cart to help visitors who may need assistance getting from the parking lot to the VC or Lighthouse. The Point, as well as the area surrounding the Lighthouse, is staffed almost entirely by volunteers.

The Refuge has a number of interpretive panels around the Point highlighting native and nonnative plants and wildlife. Some of the panels were done at different times, using different styles, approaches and materials. These panels are appealing, of a good size, and are well-placed to be visible but not obtrusive. The most recent panels were completed in 1999. The panels are permanent and are in place year-round. Wildlife at the Refuge is seasonal. For example, whales and albatross are found in the winter months. Thus, this can cause some confusion for the visitor.

In 1987, Congressional funding provided for the design and construction of an EE Center. Today, the main floor of this facility serves as the VC and houses interpretive exhibits, as well as a bookstore operated by KPNHA. When entering the Center, people are often expecting to see exhibits relating to the Kīlauea Point Light Station or the wildlife at the Refuge. However, some of the exhibits are only tangentially related or fully irrelevant to the site. This may prove disorienting to the visitor who may have expectations of finding information regarding the Refuge. In addition, the exhibits are badly worn. They are out of date and interpretive messaging for children is lacking.

Over the years the interpretive exhibits have been expanded upon by the KPNHA bookstore operations and the building has moved away from its primary intended function of education. In a survey conducted by the U.S. Geological Survey, it was noted that visitors did not expect to see a bookstore where they had anticipated interpretive exhibits (Sexton et al. 2011). The VC has become cluttered and is often very crowded. The design of the VC building itself is also out of context with the historic nature of the Kīlauea Point Light Station. The building requires a high level of routine maintenance.

The Contact Station is located at the tip of the Kīlauea Point Peninsula. Currently, the building contains an interpretive display on the history of Kīlauea Lighthouse, a desk staffed by volunteer docents, binoculars for loan, as well as an area to sit and watch a video about the Refuge. It also provides a place for visitors to escape from the rain, wind, or warm tropical sun. The building was originally designed to house radio equipment associated with the Lighthouse so it has a small number of windows, not allowing one to take in the expansive coastal views.

One of the most popular and notable features of the Refuge is the historic Kīlauea Lighthouse, which was list on the National Register of Historic Places in 1979. Since restoration, visits into the Lighthouse are only possible on a guided tour. Since Lighthouse Day (the first Saturday in May) in 2014, the Refuge started offering guided tours weekly, dependent upon staff and volunteers' availability. Guided tours require temporary modifications of the interior and an intensive staff and volunteer effort. Overall, the frequency of opportunities for the public to experience the interior of the Lighthouse on guided tours is variable; tours may in the future occur more frequently or less frequently than once per week depending upon the availability of staff and volunteers.

As a primary host to visitors of Hawai'i, the Refuge has the responsibility to learn about and interpret Hawai'i's unique culture as well as its evolution into modern society. Sharing the ancient beliefs and practices, cultural histories, traditional stories, chants, place names, and geographic divisions, as well as relaying the fact that the Refuge Complex continues to support the perpetuation of traditional cultural practices such as taro farming at Hanalei NWR and access for fishing at Kīlauea (East) Cove, are a few ways that Kīlauea Point NWR is incorporating Hawai'i's culture into our environmental interpretation. Additionally, the Refuge will work with local nonprofit organizations such as the Kīlauea Neighborhood Association, 'Āina Ho'okupu o Kīlauea, KPNHA, and the Kaua'i branch of Hawaiian Islands Land Trust, and community leaders of Kīlauea to develop environmental, cultural, and historical interpretation materials for Kāhili Quarry.

Objective 4.4 Enhance and expand environmental education.

Provide a high-quality EE program associated with the Refuge for at least 2,000 students annually. This program should emphasize the natural and cultural history of the Refuge, as well as the role and importance of national wildlife refuges. The EE program should include the following attributes:

- Focus on students in the pre-kindergarten and elementary grades on the Island of Kaua'i;
- Tier to (or achieves) formal education standards (State, national);
- Incorporate measurable learning objectives and utilizes audience-appropriate curricula;
- Support and complement the Service's mission, as well as the Refuge's purposes and goals;
- Support the Service's "Connecting People with Nature" emphasis;
- Minimize human disturbance to biological resources.

Strategies Applied to Achieve Objective:

a. Utilize interns and volunteers to assist in facilitating the EE program (schedule school groups, develop curriculum, make presentations, conducts visits)

b. Continue to partner with KPNHA to provide support for the Refuge's EE program, including school bus funding

c. Enhance current partnerships and explore new partnerships to maximize the effectiveness and efficiency of the EE program by working with groups of similar interest or with shared goals

d. Increase or enhance the partnerships with local, State and national EE organizations (e.g., Hawai'i Environmental Education Alliance (HEEA), North American Association for Environmental Education (NAAEE). Continue participation in Statewide natural resource interpretation and EE initiatives

e. Annually disseminate current EE program guidelines and activities offered to all educators within the target audience
f. Ensure EE programs are accessible to and usable by children of various abilities. Utilize special teaching approaches, equipment, or care as necessary
g. On a yearly basis, define and measure results of all EE programs and modify current programs as needed to maximize the effectiveness of future efforts
h. Review the Refuge's EE programs on a regular basis with a focus group of those involved with education at the pre-K and elementary level to ensure programs are addressing the identified environmental, educational, and community needs
i. Update curricula and materials as necessary to ensure that programs support and complement the Service's mission and current initiatives, as well as the Refuge's purposes and goals
j. Develop a multifaceted Junior Ranger program to reach all ages of young visitors to the Refuge
k. Design and implement a training program that provides regular training for staff, volunteers, and other presenters or educators to ensure a highly qualified and trained cadre
l. Work with partners to provide teacher training workshops, and explore opportunities to introduce the KNWRC's EE program in pre-service (teacher certification) training at Kaua'i Community College
m. Maintain the KNWRC's Website to promote current educational opportunities, post curricula, and other learning resources
n. Re-examine the site layout of Kīlauea Point to improve the facilitation of EE. Convert an existing structure to a designated facility/facilities for EE (not Quarters #2)
Rationale: As one of the Service's priority public uses, EE is an important management activity for the Refuge. EE plays a key role in encouraging current and future generations to engage in environmentally responsible behavior like supporting the protection of habitat for wildlife through the National Wildlife Refuge System. With the assistance of interns and volunteers, the Refuge conducts EE programs throughout the year with the greatest number of students visiting January–May. Between 2010 and 2013, education participants involved in on- and offsite EE programs ranged from 7,200 to 12,032 (USFWS 2014). Due to the wide variety of age groups which the EE program currently serves (toddlers through college students) and the wide variety of subjects which the Refuge staff is asked to teach, the staff is often responding to individual requests and scrambling to create a new program for each one. By partnering with others to develop and implement a standards-compliant Refuge-based curriculum for all ages and abilities, the Refuge will be able to reach more students and community groups with a goal of developing an aware and environmentally literate citizenry. The Refuge will also conduct trainings and outreach (e.g., through the Website) for staff, volunteers, teachers, and other educators in order to promote the EE program. KPNHA provides funding for bus transportation for schools that visit the Refuge, which is a significant contribution to the EE program and will continue into future. The winding, narrow, and steep Refuge entrance road causes complications for EE programming, as the road cannot safely accommodate a school bus and regular visitor traffic at the same time. Because of this, school groups participating in EE programs generally arrive at the Refuge at 8:30 a.m., before the Refuge opens, which requires accommodation from staff. This way they can easily maneuver the roadway and have adequate room to park. The children also have the Point to themselves and are not distracted by the large number of visitors. However, the grassy areas where buses park is nēnē habitat and when the Refuge receives a heavy rain, these parking areas become muddy and soft. Although most school groups try to leave before 10:00 a.m., they often leave after the Refuge has opened, which

then requires a minimum of two staff to assist in safely getting the children through the busy parking lot to their bus, as well as to stop traffic to allow the bus to exit the Refuge. By departing at 10:00 a.m., this leaves only 1 hour for the EE program given loading, unloading, restroom breaks, etc., which does not lend itself to a high-quality EE program.

Given the small time window during which EE is offered (8:30 a.m. to 10:00 a.m.) many schools on the west, south, and even east side of the island are unable to make it to the Refuge during this timeframe given the time it takes to travel to the Refuge. Only 7 percent of Kaua‘i’s public and charter school students (K-12) are within a 20-minute drive of the Refuge. For a majority, 68 percent, it is at least a 40-minute drive to get to the Refuge and for nearly 30 percent it takes more than an hour. Consequently, the strategies under Objective 4.1 will facilitate EE programming by improving access and logistics.

In 1987, Congressional funding provided for the design and construction of an EE Center. Today, the main floor of this facility serves as the VC and houses the bookstore operated by KPNHA. The bottom floor of the VC has a multi-purpose room. This multi-purpose room also serves as the Refuge’s meeting room, volunteer meetings and trainings, as well as KPNHA staff and board meetings. It is also frequently utilized by KPNHA to receive, sort, tag, and organize their merchandise. The limited amount of large indoor space on the Refuge leads to room conflicts. Also, the size of the multi-purpose room is often insufficient for EE programs. As such, the Contact Station adjacent to the Lighthouse is frequently used for EE, but staff often find they are racing to pack up their EE supplies and reorganize the room as visitors begin arriving at the Refuge. From 1997 to 2007, a portion of the bottom floor also provided office space for the Refuge’s EE Specialist. It currently provides office space for three KPNHA staff members, and storage for KPNHA supplies and merchandise. Converting an existing structure to a designated facility/facilities for EE will alleviate the room conflicts and space issues.

Objective 4.5 Enhance and expand wildlife observation and photography.

Visitors are provided compatible opportunities to participate in wildlife photography and observation with the following attributes:

- Minimum of 75% of visitors identify the Refuge as a place for premier wildlife viewing and photography on Kaua‘i;
- High diversity of native wildlife species (seabirds, nēnē, marine mammals, turtles);
- Minimize human disturbance to biological resources.

Strategies Applied to Achieve Objective:

a. Continue to provide free viewing scopes as well as binoculars for loan, and expand the program to include quality field identification guides for loan

b. Continue to work with KPNHA to provide wildlife viewing tools and books for purchase

c. Continue to work with existing partners and explore new partnership opportunities to provide a variety of quality opportunities for wildlife observation and photography (e.g., photography and wildlife art workshops)

d. Provide current and accurate information online and onsite including wildlife checklists for both avid and casual wildlife watchers, Refuge maps, seasonal highlights, sightings, migration information, and wildlife counts

e. Promote wildlife observation and photography opportunities through brochures, news releases, displays, and special events. Include messages on good wildlife observation and photography practices to minimize disturbance
f. Clearly identify closed areas and direct visitors to comparable alternative sites both on- or off-Refuge
g. Promote the Refuge's designation as an Important Bird Area (IBA) by the Audubon Society and explore further designation of the Refuge as an IBA by the American Bird Conservancy
h. Work with the Hawai‘i Department of Transportation and the County of Kaua‘i to incorporate the international binocular symbol on direction signs to identify the Refuge as a watchable wildlife location
i. Expand program offerings, workshops, activities, and exhibits used to teach and enhance wildlife viewing skills and ethics
j. Increase compatible opportunities for up-close and personal viewing of wildlife (e.g., remote cameras, observation/photo blinds, guided ranger and/or volunteer led hikes)
k. Expand citizen science opportunities (e.g., Christmas Bird Count)
l. Increase staff visibility among wildlife clubs/organizations (e.g., engage at meetings, conferences, and/or events, participate in listservs, host field trips or other events)
m. Offer guided interpretive hikes 2 times/week to Crater Hill designed (location of trail, timing, group size) to have negligible negative effects on breeding birds yet provide a quality experience for visitors. Impacts to Seacliff Plantation residents and their roads will be considered as access options are developed
Rationale: Observation and photography of wildlife and nature promote public understanding and appreciation for the Refuge's natural resources. The Refuge is one of the best accessible locations in the main Hawaiian Islands for viewing and photographing wildlife as it has a high diversity of breeding birds at one location. Six to eight species of seabirds, as well as Hawai‘i's state bird, the nēnē, can readily be seen by the majority of visitors. The sheer number of birds, as well as their proximity, makes for an extremely high-quality viewing and photography experience. The National Oceanic Atmospheric Administration (NOAA) also administers the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) in the waters surrounding the Refuge, and endangered koholā (humpback whales) are readily seen offshore and photographed from December to April. Groups of nai‘a (spinner dolphins), ‘īlio-holo-i-ka-uaua (Hawaiian monk seal), and honu (green sea turtle) can also be seen from the Point. While the best viewing opportunities are on the Kīlauea Point Peninsula, additional opportunities are provided at the Overlook at the entrance to the Refuge, as well as on Crater Hill and Kāhili Quarry. They also provide a different perspective than is provided from the peninsula. As discussed previously, the current configuration of the Overlook together with the site's constraints pose challenges to orienting and informing visitors. The Refuge receives regular inquiries about the reinstitution of Crater Hill hikes from both visitors and the community. Refuge staff recognize the value of Crater Hill for wildlife observation and photography and the unique experience it provides. However, these hikes were suspended in 2003 due to concerns over disturbance to active burrows of breeding ‘ua‘u kani and a colony of nesting ‘ā at levels that likely affected bird survival and reproduction. In addition, the lack of personnel to adequately maintain trails and maintain a state of preparedness for emergency situations was a liability issue for the Refuge. Consequently, the use was at that time deemed incompatible with the Refuge System mission and Refuge purposes.

In the CCP's compatibility determination for wildlife observation and photography (Appendix B), access to trails at Crater Hill for wildlife observation and photography was determined to be compatible when performed under certain stipulations, including a required Refuge staff or trained volunteer guide, minimum age, maximum group size, and limited frequency. With the exception of special, free hikes during National Wildlife Refuge Week, reservations will be required and adults (16 years or older) will be charged a moderate fee to join these hikes. The Service will assess erosion and compaction on trails, and wildlife effects of visitation (e.g., disturbance and crushing of burrows) on Crater Hill and elsewhere, and develop solutions to any problems. If monitoring reveals that levels of use or associated impacts exceed those envisioned in the compatibility determination, the use will be re-evaluated and modified to ensure it remains compatible or terminated if found not compatible.

In the future, in addition to enhancing and expanding opportunities for wildlife observation and photography, the Refuge will seek to better promote the opportunities. Currently, general information about the wildlife is provided on the Refuge's Website; however, it does not include information such as current highlights, sightings, or wildlife counts. A wildlife checklist is offered onsite but is directed at avid wildlife watchers. Viewing scopes are set up in multiple locations around the Point and binoculars are provided for loan in order to enhance wildlife viewing; however, other options such as remote cameras, observation/photo blinds, and guided ranger and/or volunteer-led hikes will be explored to broaden the types of offerings available.

Objective 4.6 Reduce wildlife disturbance, habitat degradation, and user conflict potential while increasing public safety for visitors to Kāhili Quarry.

Visitors at Kāhili Quarry are provided opportunities to participate in wildlife-dependent uses (fishing, wildlife photography, and observation) and have access to adjacent off-Refuge areas (Kāhili Beach, Kīlauea Bay, and the Kīlauea River) for boating and other stream, beach, and ocean uses such as snorkeling, sun bathing, surfing, swimming, and walking, including dog walking, with the following attributes:

- Build community stewardship of the Quarry area;
- Minimize human disturbance to biological resources;
- Enhance visitor safety.

Strategies Applied to Achieve Objective:

a. Work with Kīlauea community to maintain a passable road to the beach and shoreline. The road will be repaired and maintained to a standard approved by both the Service and the County of Kaua‘i (e.g., using crushed coral).

b. Post the jurisdictional boundary, as appropriate, within the Quarry area

c. Explore the possibility of cooperatively managing tidelands with the State

d. Replace the existing fence with a predator-resistant fence in a modified alignment for approximately 600 feet, following the base of vegetation growing down the cliffs defining Mōkōlea Point

e. Install bollards at the northeast end of the Quarry area to protect seabird nesting areas

f. Work in partnership with local nonprofit organizations and community leaders of Kīlauea on promoting community stewardship of the Quarry through habitat protection; monitoring and managing threats to natural and cultural resources; outreach; and environmental, cultural, and historical interpretation
g. Partner with community groups to develop welcome and orientation, educational, and interpretive signage and messaging
h. General public access to Kāhili Beach, Kīlauea Bay, and the Kīlauea River through the Kāhili Quarry area will be allowed 24 hours a day.
i. Allow visitors to bring and use portable stoves or self-contained barbeques (e.g., off-the-ground portable enclosed fires), or fires within a Refuge-designated fire ring, or pit. Refuge-designated fire rings or pits will be sited to minimize the potential spread of uncontrolled fires. Visitors will need to bring charcoal or firewood. Fires must be attended at all times
j. All dogs brought into the Quarry area will be required to be leashed on a short (8-foot maximum) leash and under control at all times and will not be allowed to run free
k. Explore opportunities for an overnight site host program through Special Use Permits to provide resource protection, outreach and interpretation, and compliance monitoring
l. Work with the community stewardship partnership to explore opportunities for providing camping. Stipulations would need to ensure that camping opportunities are compatible
m. Visitors will be allowed to erect temporary shelters (protections from the sun and rain) in the Quarry area during daylight hours only
Rationale: The Kāhili Quarry area, located on the south side of Mōkōlea Point, shows signs of many years of heavy public use, including vehicle use. The area has several fire pits, trash, and abandoned motor vehicles. At the south end of the area, between the unimproved dirt and gravel road and the Kīlauea River, there are cleared areas that have been used for camping and a small boat slide. The area has also been occasionally used by squatters. The Service recognizes the importance of Kāhili Quarry to the community for its natural and cultural resources and its recreational value. We are committed to building trust and relationships to help foster community stewardship of this area which will lead to increased involvement in safeguarding and perpetuating natural resource preservation at the Quarry. A community partnership will also help to leverage the Service's limited resources. In combination with other strategies, adverse impacts to wildlife and habitats will be limited. Public access to off-Refuge areas (Kīlauea River, Kīlauea Bay, and Kāhili Beach) through the Kāhili Quarry area of the Refuge for fishing, boating, and other stream, beach, and ocean uses (e.g., surfing, swimming, sunbathing, snorkeling, and walking, including dog walking) will be allowed 24 hours a day. Fishing on the Refuge occurring in the ocean at Kāhili Quarry and in the estuary of Kīlauea River will continue to be allowed on a 24-hour basis in accordance with State regulations (see also Section 2.3.1). Access to the Kāhili Quarry area is either by motor vehicle, foot, horse, or bicycle down Kāhili Quarry Road, a rough, unimproved dirt and gravel road; by boat from the ocean or across Kīlauea River; or by wading or swimming across Kīlauea River. The Refuge owns a small portion of Kāhili Quarry Road from the Refuge boundary to the end of a parking area near the estuary of Kīlauea River. The Service will continue to work with the Kīlauea community to maintain a passable road to the beach and shoreline. The road will be repaired and maintained to a standard approved by both the Service and the

County of Kauaʻi (e.g., using crushed coral). The Service will post its jurisdictional boundary, as appropriate, within the Quarry area. The Service will also explore the possibility of working with the State to cooperatively manage the tidelands adjoining Kāhili Quarry through interagency cooperative agreement or other mechanisms. Cooperative management of this area would contribute to achieving the Service's mission, Refuge's purposes, and would help meet several of our goals by allowing us to protect wildlife resources through oversight of public use activities and Refuge law enforcement.

A predator-resistant fence constructed to replace the existing fence will be in a modified alignment for approximately 600 feet, following the base of vegetation growing down the cliffs defining Mōkōlea Point. It is hoped that the new fence will reduce the potential for wildlife and habitat impacts from both trespassing humans and nonnative predators, such as free-roaming dogs.

To prevent adverse impacts to habitat due to the potential spread of uncontrolled fires, fires will only be allowed within portable stoves or self-contained barbeques (e.g., off-the-ground portable enclosed fires), or within a Refuge-designated fire ring, or pit. Refuge-designated fire rings or pits will be sited to minimize the risk of spread. Visitors will need to bring charcoal or firewood; harvesting of firewood on the Refuge is prohibited. Fires must be attended at all times.

Dogs will be allowed at Kāhili Quarry; however, all dogs must be on a short leash (8 feet or less) and under control at all times. Free-roaming dogs can harass, injure, or kill wildlife. On Kauaʻi, free-roaming dogs have killed shearwaters and mōlī at nesting colonies, sometimes in large numbers in a single incident (Hawaii Department of Land and Natural Resources 2013a and 2013b).

Other stipulations required to ensure the compatibility of uses at Kāhili Quarry are enumerated in Appendix B, Compatibility Determinations.

There is also a separate but overlapping nonexclusive access easement in favor of Seacliff Plantation (formerly the Pali Moana Corporation) for beach access, parking, and emergency and maintenance operations over and across Kāhili Quarry Road. This access, intended solely for use by the named party in the easement, is subject to reasonable rules and regulations for the protection of wildlife, including those mentioned above.

Objective 4.7 Enhance and expand outreach.

Enhance and expand outreach associated with the Refuge with the following attributes:

- Support the Refuge's goals and foster public awareness of the Service and its mission;
- Convey and reinforce the following message across all Refuge programs: "The Service helps Americans conserve and enjoy the outdoors";
- Incorporate outreach goals, designate target audiences, and identify key messages;
- Provide consistent and timely information to decision makers, community leaders, and the public;
- Focus on improving and building long-term relationships with our partners and the community.

Strategies Applied to Achieve Objective:

a. Identify key themes and messages that support Refuge goals and related local, regional, and national conservation priorities (e.g., ʻaʻo conservation, avian disease, predator threats)
b. Identify target audiences, including community, political, economic and social leaders, conservation groups, resource users, the news media, and other Federal, State, and local agencies
c. Explore various outreach tools, including new media technology, and strategies to reach each of the individual target audiences
d. Invite elected officials and their staff to an annual site visit and face-to-face meeting at the Refuge
e. Provide the news media with accurate and current information which meets their deadline needs
f. Provide media with at least one Refuge related story a year
g. Partner with offsite opportunities (e.g., organizations, initiatives, programs, special events) to maximize outreach effectiveness and efficiency. Incorporate Refuge messages when there is a high potential of reaching target audiences. Meet regularly to discuss common challenges and collaborative opportunities
h. Review current and potential onsite special events. Determine at least two annual events with goals that best reach the target audience, deliver key messages, and strengthen our connection with the community
i. Increase visibility in the community via various outreach tools (e.g., Kīlauea Neighborhood Association established communications efforts, radio segments, evening lectures, workshops, presentations at meetings)
j. Ensure outreach and information programs are accessible to and usable by persons with various disabilities
k. Review all existing and potential publications to determine whether they meet the Service's and the Refuge's communication needs, are effectively distributed, and meet graphic standards. Revise or eliminate as necessary
l. Monitor and evaluate results of outreach by obtaining feedback from the targeted audience to determine whether they comprehend the outreach message. Modify current programs as needed to maximize the effectiveness of future efforts
m. Engage all staff in regular face-to-face visits with organizational opinion leaders and decision-makers
n. Encourage employees to join professional organizations and community organizations to enhance Service professionalism and support
o. On a regular basis, evaluate all outreach products. Keep a detailed list of what products are produced, how many are distributed, and document when and where they are used
p. Provide staff with opportunities for outreach training (e.g., outreach basics, building community support, working with news media, congressional operations)
q. Work in partnership with local nonprofit organizations and community leaders of Kīlauea to develop outreach materials for Kāhili Quarry.
Rationale: The mission of the Service is, "working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people." As reflected in the first three words, the Service acknowledges that it cannot effectively carry out its enormous natural resource management mission single-handedly. Thus, outreach is needed to enlist the support of a wide range of publics by improving communications with them. The fundamental purpose of Service

outreach is to build understanding, trust, and support from a variety of groups by helping the various publics understand who the Service is, what we do, and why we do it.

Most of the Refuge's current outreach efforts have been conducted on an ad hoc basis to meet the needs of an individual event or program. While this has resulted in favorable results in some individual instances, its overall effect has been a "scattershot" approach to communications. Existing resources dedicated to outreach are limited. Refuge staff often notes that the public confuses the Service with State wildlife agencies and the National Park Service. Anecdotal evidence suggests that most are not aware of who the Service is, while an even greater number are not aware of what the Service does or why it does this work. Messages describing how the Service is different from other government agencies, how national wildlife refuges are different from other public lands and why the Service's work is important to people are currently absent.

Studies show that people believe information received from peers and community authority figures (kūpuna, teachers, ministers, etc.) more than they do newspapers and sources outside the community (Rogers 2003). Therefore, as part of improving relations with the community, connections with these individuals need to be maintained. In addition to the community, there are several other key publics, and there are a variety of reasons why they are important to include in outreach. All of the Service publics are constituents of elected officials and good communication with elected officials is essential for the Service to be effective and responsive to the American public.

Conservation groups have a great interest in resource management, and their support or lack of it influences other publics. Businesses, both small and large, can be a source of funding or support through partnerships. Other Federal agencies, as well as State and local governments, can help give momentum to Service initiatives, and their support can enhance a project's likelihood of success. Finally, the news media can directly influence virtually all other publics. Each of these different publics can have a significant bearing on how or whether the Service accomplishes its mission and the Refuge achieve its goals.

Objective 4.8 Enhance and expand volunteer and Friends group opportunities.

Improve volunteer and Friends group opportunities associated with the Refuge with the following attributes:

- Provide effective training and program management;
- Support and complement the Service mission and current initiatives;
- Increase visibility and foster conservation;
- Support a variety of Refuge programs/activities and increase their effectiveness;
- Encourage community involvement and strengthen relationships.

Strategies Applied to Achieve Objective:

a. Develop a general orientation packet and orientation checklist that provides new volunteers, interns, KPNHA staff, and board members with general information on the Service and the Refuge

b. Regularly review and update handbooks and training materials to ensure they are current, and support and complement the Service's current initiatives as well as the Refuge's purposes and goals

c. Expand efforts and explore various tools and strategies to provide effective, up-to-date, and accurate communication to volunteers, interns, and KPNHA staff
d. Regularly recognize volunteers, interns, as well as KPNHA for their contributions
e. Continue coordination with KPNHA through consistent and regular communication and regular attendance at meetings and events
f. Review and amend, as necessary, the KPNHA Cooperative Agreement/Memorandum of Understanding
g. Enhance and expand existing volunteer/intern program (complete needs assessment and create new position descriptions for volunteers and interns, recruit, and train) to a corps of at least 200 volunteers and interns in order to support a greater variety of Refuge programs
h. Develop a volunteer program that combines resource management (e.g., pest control, plant restoration) with interpretation (e.g., guided hike and birding on Crater Hill)
i. Expand current and new partnerships to maximize volunteer/intern recruitment and training efforts, as well as the effectiveness and efficiency of the program
j. Design and implement a training program, including a training manual, that provides regularly scheduled training for volunteers, interns, and KPNHA staff for all Refuge program areas, not just VS
k. Every 5 years, obtain feedback and suggestions from volunteers and interns through a feedback form, survey, or other instrument
l. Provide an orientation for Refuge staff on how to effectively work with volunteers and interns
m. Host at least 2 community work days per year (e.g., National Public Lands Day, Martin Luther King Day of Service, National Volunteer Week) that reach at least 100 people annually
n. Strengthen coordination with KPNHA through an annual whole-day planning meeting to develop an action plan for the upcoming year which includes goals, benchmarks, roles, timelines, implementation strategies, and evaluation needs
o. Strengthen coordination with KPNHA to implement relevant CCP-related goals, objectives, and strategies to ensure a clear, shared vision which meets the Refuge's purpose
Rationale: Staff recognize that the volunteer program is a critical part of the Refuge workforce, and that it benefits all programs and goals and strengthens community relations. This is especially true in times of static or declining budgets. Due to the limited number of staff, the Refuge relies on assistance from Refuge volunteers and its partnership with KPNHA, a Refuge Friends Group, to provide visitor services such as interpretation and environmental education and habitat management (e.g., native plant restoration, banding birds, controlling introduced predators, and monitoring). Annually, volunteers contribute as many hours as more than 4.5 full-time employees. For more information on the volunteer program, see Chapter 5, Section 5.3.2. In the future, successful implementation of Refuge programs will require the use of partnerships, including expanding work with KPNHA and recruiting, training, and retaining more volunteers.

2.4.5 Goal 5: Identify, protect, evaluate, and interpret the cultural (including historic) resources and heritage of the Refuge while consulting with Native Hawaiian organizations and preservation partners and complying with historic preservation legislation.

Objective 5.1 Implement a proactive cultural resource management program that focuses on meeting the requirements of the National Historic Preservation Act and related legislation, including consultation, identification, inventory, evaluation, and protection of cultural resources.
Strategies Applied to Achieve Objective:
a. Comply with Section 106 of the NHPA when conducting ground-disturbing activities. Identify cultural resources that coincide with existing and planned roads, facilities, public use areas, and habitat projects. Consult with Native Hawaiian organizations and interested parties. Evaluate cultural resources for eligibility to the National Register of Historic Places. Avoid or offset impacts as necessary
b. Develop and maintain liaison with Native Hawaiian organizations, historical institutions, and other preservation partners for research, interpretation, and protection of cultural resources
c. Conduct archival research and communication with Native Hawaiian organizations, kūpuna, communities, and institutions to document the stories, occupation, and land use history of the Refuge
d. Prepare a cultural resource overview of the Refuge and SDMP by compiling a library of pertinent cultural resource sites, surveys, historical documents, maps, GIS files, and prepare a report that presents this information within 4 years of CCP completion
e. Conduct a field inventory and evaluation of cultural resources identified and predicted by the archival research and communication program described above in concert with the information provided by the cultural resources overview
f. Establish a Refuge-specific protocol for handling discoveries of human remains, burial objects, sacred objects, and objects of cultural patrimony in accordance with the Native American Graves Protection and Repatriation Act of 1990 and in partnership with Native Hawaiian organizations within 1 year of CCP completion
g. Orient and train staff to recognize and be sensitive to cultural resources
h. Investigate and evaluate nomination of the Refuge as a Traditional Cultural Property (TCP)
i. Re-inventory and re-evaluate for designation to the National Register of Historic Places the Crater Hill radar station (State Historic Site 50-30-04-1810), and Mōkōlea Point sugar loading complex (State Historic Site 50-30-04-1811)
Rationale: Cultural resources are irreplaceable and essential elements of Hawai‘i’s heritage. The National Historic Protection Act of 1966, Archaeological Resource Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990, and related legislation require the Service to implement the kind of program described under this objective. The National Register of Historic Places contains a wide range of historic property types, reflecting the diversity of the Nation’s history and culture. TCP’s provide a "historic property" framework in order to consider intangible resources (places) of a culture, typically without structured or stated boundaries. A TCP can be defined generally as one that is eligible for inclusion in the National Register because of its

association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community (Parker 1998).

Objective 5.2 Create and implement, in cooperation with preservation partners, a program to maintain, restore, reuse, and interpret the Kīlauea Point Light Station.

Strategies Applied to Achieve Objective:

a. Prepare or update historic structure reports for each element of the Kīlauea Point Light Station within 3 years of CCP completion

b. Prepare a historic structure treatment plan that addresses the needs, priorities, costs, and schedule for maintenance, restoration, and reuse of each element of the Kīlauea Point Light Station within 5 years of CCP completion

c. Consult with historical societies, and other preservation partners to identify and prepare interpretive media (e.g., pamphlets, signs, exhibits) that relates the story of the Kīlauea Point Light Station for visitors

d. Develop an outreach program and materials so that cultural resource messages become part of events in the area, including the State's Archaeology Month, National Wildlife Refuge Week, and appropriate local festivals

Rationale: The Kīlauea Point Light Station is nationally significant for its associations with maritime history and U.S. military history as well as for its unique architectural characteristics. The Kīlauea Point Light Station lens is one of only seven second-order classical Fresnel lenses still remaining in its original position in the United States. In addition to the Lighthouse, the station's compound maintains excellent integrity with the three lava rock bungalow-style keepers' cottages, an oil storage building, a landing, and other support facilities such as the derrick at Kīlauea Point.

The Lighthouse station is open to the public and is one of the most visited sites on Kauaʻi, drawing more than an estimated 500,000 visitors a year. The Station is compromised by the corrosive effects of salt water decaying metals, crumbling concrete, and trapped moisture. Current restoration efforts were completed in 2013. The Refuge offers cultural and historic activities related to the Kīlauea Point Light Station.

2.4.6 Goal 6: Ensure that all visitors enjoy safe and well-maintained operations that contribute to a positive visitor experience.

Objective 6.1 Maintain, enhance, and replace visitor, administrative, and maintenance facilities.

To fulfill Executive Order 13514 to reduce greenhouse gas emissions and meet agency reduction targets by 2020, relocate, modify, and replace infrastructure to become energy neutral through utilization of alternative energy sources for vehicles and structures, conserving water, and reducing waste with the following attributes:

- Through its facilities, the Refuge will promote visitor and employee safety, health, and well-being and provide a range of choices to experience the Refuge and its wildlife;
- The design and placement of Refuge facilities will be responsive to Kaua‘i’s setting. They will blend with and be fully integrated into these unique natural and cultural settings. Refuge facilities will be environmentally responsible and should protect wildlife, topographical features, scenic viewsheds, hydrologic systems, and the night sky.

Strategies Applied to Achieve Objective:

a. Prepare a step-down Master Site Plan to evaluate and detail building use and remodeling/maintenance needs

b. Include main administrative offices with new offsite visitor welcome and orientation center, if constructed

c. Develop new maintenance baseyard (storage sheds, bays, pole barns, nursery) off the Refuge. Options include leasing, purchasing, or co-locating with another entity

d. Remodel Quarters #3 for basic administrative and volunteer offices

Rationale: Currently the Refuge has two storage sheds, about 17 by 25 feet, and a native plant nursery, approximately 24 by 30 feet with a perforated and mesh style roof. There is no covered maintenance facility for equipment and vehicles at the Refuge (maintenance baseyard). Due to the coastal marine environment, high humidity, and heavy winds that carry up salt spray from the surf below, degradation of equipment, vehicles, and facilities is accelerated and consistently exceeds normally acceptable mainland standards for maintenance costs and schedules. Vehicle maintenance, in particular, needs constant attention with rust and deterioration occurring within just a few years. In addition, the distance needed to transport supplies and equipment between refuges often substantially adds to the cost of conducting Refuge management activities (heavy equipment used for the Refuge is transported from Hanalei NWR due to lack of covered storage at the Refuge). The historical designation of several buildings prevents modification to the extent needed to serve as office, maintenance, equipment, and vehicle storage spaces. Additionally, given the nesting nēnē and ‘a‘o, acres to build such new structures on the Point are unavailable.

In the future, Refuge facilities will demonstrate models of sustainability in the built environment through cohesive integration of building, site, and landscape. Facilities should be as resistant as possible to hurricanes and salt spray, employ highly efficient electrical and mechanical systems, use environmentally responsible materials, alternative energy sources, and other materials to fit within the community, reduce environmental effects, and reduce long-term-maintenance costs.

Public facility improvements will be designed to connect visitors to the natural habitats and wildlife of the Refuge. Visitor needs will be identified and facilities will follow universal design standards serving a range of cultures, ages, and abilities. Refuge facilities will exhibit lasting value, including a consideration for life-cycle costs to achieve a cost effective, quality built environment. Whole life costing will be applied during the design process considering maintenance, operational, and disposal costs.

Facility design will display a visual character that is recognizable as those of the Service and the Refuge System. Display of wildlife images, the Service shield, and Refuge System’s Blue Goose, and repetition of materials, colors, and design elements will contribute to branding and strengthening the Service’s image.

Construction will also follow designated building guidelines (as identified in the North Shore development plan and Kīlauea Town Plan) such as height requirements (less than 25 feet in height) and use best management practices to prevent adverse impacts to resources including soil and water quality.

Objective 6.2 Enhance law enforcement.
Enhance law enforcement for operational capabilities and public safety with the following attributes: • Compliance on Special Use Permits (SUPs) achieved; • Refuge laws enforced; • Minimize human disturbance to biological resources.
Strategies Applied to Achieve Objective:
a. Continue to work with partners and other law enforcement agencies to protect natural resources, eliminate criminal activity (including trespassing, access by dogs), and disturbance to sensitive areas
b. Explore concurrent jurisdiction with the State of Hawai‘i
c. Ensure the Refuge Sign Plan developed integrates law enforcement signage (boundary/fence markings, public safety, Refuge regulations)
d. Develop a law enforcement monitoring system (including SUPs) that is reviewed and updated annually, at a minimum
e. Develop outreach tools (e.g., brochures, Website) specifically for Refuge protection and safety issues and identify methods for circulation
f. Provide law enforcement expertise at workshops, community/partner meetings, and public talk opportunities
g. Provide annual training to non-law enforcement Refuge staff and volunteers on law enforcement incident reporting, monitoring, and procedures
h. Orient new Refuge staff, including law enforcement officers and refuge managers, and volunteers to the local culture and community
Rationale: Most law enforcement issues at the Refuge revolve around improved education of Refuge users and visitors to reduce impacts on biological resources. Examples include vehicle and nēnē impacts, loose dogs on Refuge lands, proximity to wildlife which can lead to distress or habituation, and trespass. Fish and wildlife law enforcement issues on lands and waters of the Refuge are under the jurisdiction of the Service law enforcement officers. Their roles are to conduct and document law enforcement incidents and coordinate and meet with Refuge staff as well as law enforcement partners. Primary laws and regulations enforced include, but are not limited to: • Administration Act; • Lacey Act; • Archaeological Resource Protection Act; • Endangered Species Act;

- Migratory Bird Treaty Act;
- Marine Mammal Protection Act;
- Code of Federal Regulations.

Zone and Refuge officers are also empowered to enforce laws as authorized. Activities could include issuing traffic citations and warrants for arrest as they relate to drugs, trespass, hunting, fishing, and the taking of wildlife on Federal lands and, in some instances, boating safety related to refuges.

The Refuge will establish a program to monitor compliance with the stipulations enumerated within compatibility determinations (Appendix B). Violation of any of these stipulations could result in temporary or permanent withdrawal of official permission to continue this use on the Refuge by appropriate Refuge personnel. SUPs could be revoked by the Refuge manager with 30-days written notice of noncompliance with these stipulations.

Service officers often partner with other law enforcement agencies such as the Division of Conservation and Resources Enforcement-DLNR and other law enforcement agencies.

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Figure 2-1. Management Direction for Wildlife and Habitat Management.

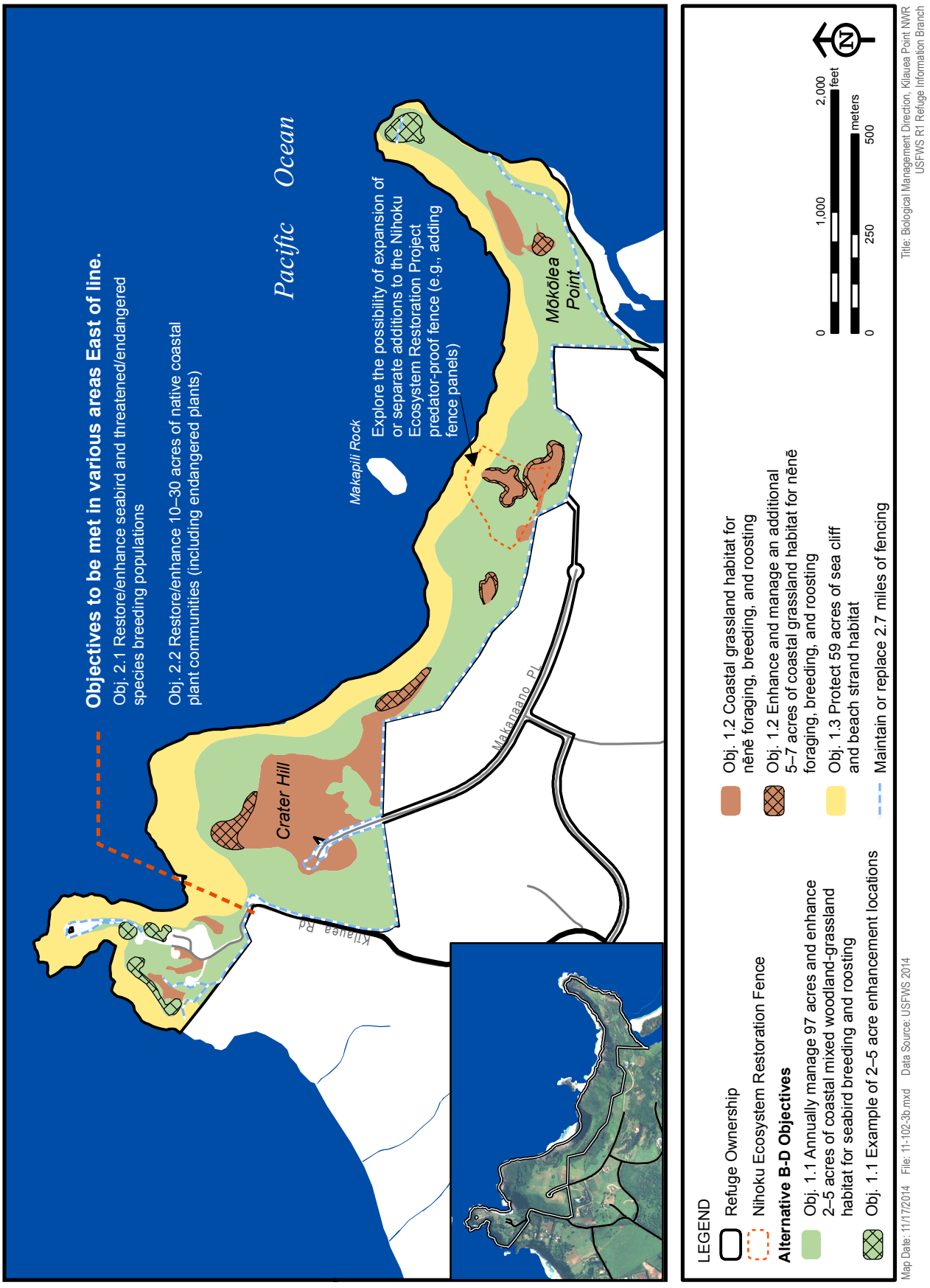

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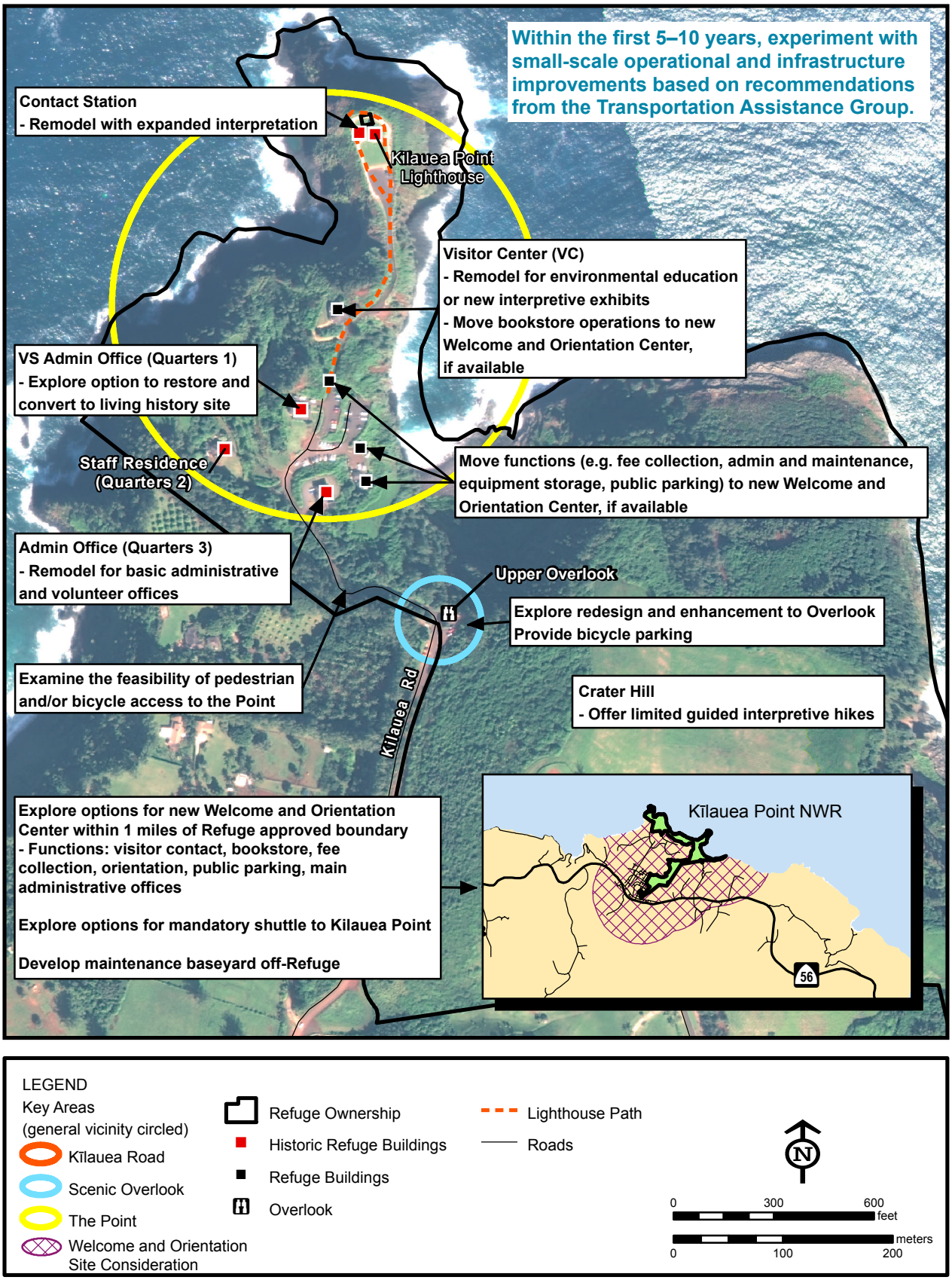
Figure 2-2. Management Direction for Public Use and Maintenance/Facilities.



Map Date: 10/26/2015 File: 11-106-3d.mxd
Data: USFWS 2014, DigitalGlobe 2010

Title: Public Use and Maintenance/Facilities Management Direction
USFWS R1 Refuge Information Branch

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Chapter 3
Physical Environment

Chapter 3. Physical Environment

The Hawaiian Archipelago is the world's most isolated group of islands, lying approximately 2,400 miles southwest of San Francisco, CA. Apart from Niʻihau, the island of Kauaʻi is the oldest and northernmost island of the eight main Hawaiian Islands in the Hawaiian Archipelago. Located 103 miles northwest of Honolulu, Kauaʻi is near the middle of the Pacific Ocean and south of the Tropic of Cancer. Commonly referred to as "The Garden Isle," Kauaʻi Island is characterized by its lush, green environment and high average rainfall. Kauaʻi is approximately 550 square miles and is approximately 30 miles in diameter. A 75-mile coastal state highway circumnavigates nearly the entire island (USFWS 1989). A 2-mile county road (Kīlauea Road) connects the Refuge to the Kuhio Highway, state route 56. The Refuge is situated in the mokuʻaina (district) of Koʻolau near Kīlauea Town (Hawaiʻi Department of Education 2001). The Daniel K. Inouye Kīlauea Point Lighthouse is situated on the northernmost point in the Hawaiian Island chain.

3.1 Climate

3.1.1 General Climate

Climatic conditions on the island of Kauaʻi are dominated by northeasterly tradewinds approximately 70 percent of the year. Tradewinds bring warm, tropical, moisture-laden air to Kauaʻi. As a result of the steep topography, the northern and eastern (windward) sides of Kauaʻi have heavier rainfall than the drier south and west (leeward) sides. Traditionally, only two seasons were recognized in Hawaiʻi: *kau*— the warm season occurring from May to October that is characterized by northeast winds and an overhead sun, and *hoʻoilo*— the cold season, occurring from October to April and characterized by cooler temperatures, rain, variable winds, and a lower sun (Seimers 2009, Juvik and Juvik 1998). Temperatures during the winter months on Kauaʻi range from 65 ºF to 81 ºF. Summer temperatures range from 72 ºF to 88 ºF (USFWS 2007). Average annual air temperature is approximately 73 ºF (Berg et al. 1997).

Prevailing ocean currents surrounding the island influence weather patterns by moderating the surface air temperatures as a result of differential heat absorption and advection of heat. Ocean currents in the Hawaiian Islands are moderated by the North Pacific anticyclone, a clockwise gyre that extends from the tropics to the North Pacific (Juvik and Juvik 1998, Lau and Mink 2006). Storm-generated ocean swells are common throughout the year. The north and west shores are pounded by fierce North Pacific winter storms.

Kīlauea Point NWR is directly exposed to the northeast tradewinds. A variable 10–20 mile-per-hour (mph) tradewind blows across the Refuge during most of the year. During strong wind conditions, which are not uncommon, the winds increase to 20–35 mph (USFWS 1989).

Rainfall in the main Hawaiian Islands averages 75–90 inches a year. Extreme variation in rainfall across the islands is a result of orographic lifting. The wide range of rainfall patterns results in a diversity of environmental settings, ranging from rain forests (more than 100 inches) to mesic forests (50–100 inches) to semiarid deserts (less than 50 inches). As tradewinds drive the warm, moist air up on the windward side of an island, the air is cooled. On Kauaʻi, air is forced up the steep slopes of Mount Waiʻaleʻale and its highest peak, Kawaikini (Blay and Seimers 2004). As air rises and cools, it cannot hold as much moisture and condensation and so it rains.

One of the wettest places on Earth, the plateau of Kauaʻi reaches elevations of 5,148 feet at Waiʻaleʻale and 5,243 feet at Kawaikini and is directly exposed to tradewinds ascending abruptly over precipitous pali (cliffs). Average annual rainfall at Waiʻaleʻale is 444 inches (Juvik and Juvik 1998). Water drains across the Olokele Plateau into the Alakaʻi Swamp. The rain shadow effect is demonstrated by the dry, semi-arid, leeward, west side of the island (Blay and Seimers 2004). On Kauaʻi, about 58 percent of rain typically falls during the 6 months between November and April, the remaining 42 percent between May and October (USFWS 2005). Average rainfall for Waimea Town on Kauaʻi's west side is 12–15 inches per year. In contrast, Kīlauea Town receives an average of 50–60 inches per year (USFWS 2007). Average annual rainfall at Kīlauea Point is 67.4 inches, with the highest rainfall occurring November to March and the least amount of rainfall in the summer months (USFWS 1989). The Kīlauea area historically has experienced periods of exceptional rainfall. The most extreme instance of record occurred in Kīlauea during the storm of January 24–25, 1956. The Kīlauea Sugar Plantation Office recorded over 38 inches of rain in a 24-hour period (NCDC 2001).

There are four classes of disturbances that create major storms: cold fronts, low pressure systems, true tropical storms, and instances of severe weather attributed to low pressure systems in the upper atmosphere (NCDC 2001).

Long periods of rainfall in the winter are a result of Kona storms or low pressure systems from the west (Seimers 2009). Cold fronts associated with low pressure systems move north of the Hawaiian Islands in the prevailing westerly winds between October and April. This results in severe cloud cover, heavy rains, and occasional thunderstorms. Because of its northwesterly location, Kauaʻi receives more cold front storms than the other islands and can receive up to 20 cold fronts per year (NCDC 2001, Juvik and Juvik 1998).

Episodic oceanic and atmospheric events such as the El Niño/Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO) also influence climate in the islands during specific intervals. In El Niño years, average sea surface temperatures in the central and eastern equatorial Pacific Ocean are warmer than average and the easterly trade winds in the tropical Pacific are weakened. La Niña is characterized by the opposite: cooler than average sea surface temperatures and stronger than normal easterly trade winds. These changes in the wind and ocean circulation can have global impacts to weather events. ENSO usually results in light tradewinds and drier conditions in the western Pacific (Duffy 1993). During previous ENSO years in Hawaiʻi, average rainfall has dropped below historical averages (Chu and Chen 2005).

Like ENSO, PDO is characterized by changes in sea surface temperature, sea level pressure, and wind patterns. PDO is described as being in one of two phases: warm (positive) and cool (negative). During a warm phase, sea surface temperatures near the equator and along the coast of North America are warmer, while in the central north Pacific they are cooler. During a cool phase, the patterns are opposite. Within Hawaiʻi, winter rainfall is negatively correlated with PDO (i.e., warm phase PDO winters tend to be warmer and drier than average while cool phase PDO winters tend to be cooler and wetter than average) (Chu and Chen 2005). A single warm or cool PDO phase lasts 20–30 years. The triggering cause of PDO phase shift is not understood.

Hurricanes are not uncommon in the Hawaiian Islands. In 1950, Hurricane Hiki was the first recorded hurricane in Hawaiʻi and passed within 150 miles northeast of Kauaʻi. Kīlauea Lighthouse recorded sustained wind speed of 68 mph. In 1987, Hurricane Nina passed the northern coast of Kauaʻi, and in 1959, Hurricane Dot had the highest wind gust recorded of 103 mph at Kīlauea Lighthouse (Wilson 1980). Two recent hurricanes caused damage to the Refuge. Winds of over 90

mph were registered from Hurricane Iwa in 1982 (USFWS 1989). The eye of Hurricane ʻIniki passed directly over Kauaʻi on September 11, 1992. With 145 mph winds, Hurricane ʻIniki was classified as a Category 4 hurricane on the Saffir-Simpson scale (NCDC 2001). It was the most devastating hurricane recorded in Hawaiʻi's history (Juvik and Juvik 1998). Though no major wildlife losses were recorded (with the exception of some shearwater chicks and young boobies), infrastructure was significantly damaged or destroyed. This included damage to the Kīlauea Lighthouse lens room and Fresnel lens, office building, two residences and detached garages, visitor center, environmental education building, and maintenance buildings. Additionally restored native coastal vegetation on Kīlauea Point was washed or blown away. The Refuge was closed to the general public from 1992 to 1994 as a result.

3.1.2 Climate Change

The terms "climate" and "climate change" are used as defined by the Intergovernmental Panel on Climate Change (IPCC). The term "climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (ibid).

The greenhouse effect is a natural process by which greenhouse gases (GHG) such as water vapor (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and ozone (O_3) absorb infrared radiation emitted by Earth's surface, by the atmosphere itself, and by clouds. These gases also trap heat within the surface-troposphere system (IPCC 2007), heating Earth's surface and the lower atmosphere. CO_2 is produced in the largest quantities, accounting for more than half of the current impact on Earth's climate.

There is consensus in the scientific community that Earth's climate has been rapidly changing and that changes in atmospheric composition are the primary drivers (Bierbaum et al. 2007, USGCRP 2009, EPA 2012). Although climate variations are well documented in Earth's history, even in relatively recent geologic time, the current warming trend differs from shifts earlier in geologic time in two ways. First, this climate change appears to be driven primarily by human economic activities, such as deforestation and the burning of fossil fuels, which results in a higher concentration of atmospheric GHG. Second, atmospheric CO_2 and other GHG, levels of which are strongly correlated with Earth's temperature, are now higher than at any time during the last 800,000 years (USGCRP 2009). Prior to the start of the Industrial Revolution in 1750, the amount of CO_2 in the atmosphere was about 280 parts per million (ppm). As of January 2014, atmospheric CO_2 was approximately 397.8 ppm (NOAA 2014).

Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate, and is "very likely" (defined by the IPCC as 90 percent or higher probability) due to the observed increase in GHG concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (IPCC 2007, Solomon et al. 2007). According to the Fourth Assessment Report by the IPCC, global temperatures on Earth's surface have increased by 1.33 °F over the last 100 years. This warming trend has accelerated within the last 50 years, increasing by 0.23 °F each decade. Global ocean temperatures to a depth of almost 2,300 feet have also increased, rising by 0.18 °F between 1961 and 2003 (Solomon et al. 2007).

Global climate models offer a variety of projections based on different emission scenarios. Projected increases in global average surface temperature range from 1.1 ºF to 7.2 ºF by 2100, relative to 1980–1999 levels (IPCC 2007). However, IPCC is considered to be a relatively conservative source of climate change projections (Watson 2010, Scherer 2012). Pursuant to the assessment of the U.S. Global Climate Research Program, global average temperature is projected to increase 2.0 ºF to 11.5 ºF by 2100.

Climate Change in Hawai‘i

The global climate system affects regional and local-scale climate conditions in the Pacific Islands, including Hawai‘i. Detailed in the following sections, projected impacts to the region encompassing the Refuge include shifting rainfall patterns, changing frequencies and intensities of storms and drought, decreasing baseflow in streams, rising air and ocean temperatures, rising sea levels, and changing ocean chemistry (Leong et al. 2014). Small island groups are particularly vulnerable to climate change, sea level rise (SLR), and extreme events. The following characteristics contribute to this vulnerability: small emergent land area compared to the large expanses of surrounding ocean, limited natural resources, high susceptibility to natural disasters, and inadequate funds to mitigate impacts (IPCC 2007, Mimura et al. 2007). Thus, Hawai‘i is considered to have a limited capacity to adapt to future climate changes.

Atmospheric Events and Precipitation

Precipitation in Hawai‘i, which includes sea level precipitation and the added orographic effects, shows a steady and significant decline of about 15 percent over the last 15–20 years (Diaz et al. 2005, Chu and Chen 2005). These data are also supported by a steady decline in stream flow beginning in the early 1940s (Oki 2004). However, rain intensity (the type of rainfall that contributes to stream overflow and flooding and is not beneficial for aquifer replenishment) has increased by approximately 12 percent from 1958 to 2007 (Fletcher 2010).

The impact of climate change on water resources is dependent on shifts in precipitation amounts, evaporation rates, storms, and atmospheric processes such as ENSO and PDO. Based on the evidence of the history of ENSO and PDO events, it is likely that these cycles will continue far into the future. However, the potential influence of anthropogenic climate change on ENSO and PDO is unknown.

While ENSO events have increased in intensity and frequency over the past decades, some longer-term records have not shown a direct link to climate change and do not predict significant changes in ENSO; however, a majority of climate forecasts do suggest an evolution toward more “El Niño-like” patterns. Most climate projections suggest that this trend is likely to increase rapidly in the next 50 years. Alternatively, other models predict more “La Niña-like” conditions in the Hawaiian Islands (Walther et al. 2002, Buddemeier et al. 2004, Timm 2008).

The exact impact of climate change on water resources is difficult to predict due to spatial variability. On a global scale, mean precipitation is anticipated to increase. Current climate models project that tropical Pacific and high latitude areas will experience increasing precipitation amounts, while precipitation is likely to decrease in most subtropical regions such as Hawai‘i.

Lack of rain could lower the amount of freshwater lens recharge and decrease available water supplies. Reduced rainfall or increased evaporation will cause a corresponding increase in the demand for residential, commercial, and agricultural water (Giambelluca et al. 1996, Solomon et al.

2007, Parry et al. 2007). Global climate modeling projects that net precipitation at sea level near the Hawaiian Islands will decrease in winter by about 4–6 percent, with no significant change during summer (IPCC 2007). Downscaling output from global climate models suggest that wet-season (winter) precipitation will decrease by 5–10 percent, while dry-season (summer) precipitation will increase by about 5 percent by the end of the century under a moderate emissions scenario (Timm and Diaz 2009).

Most climate projections suggest that more intense wind speeds and precipitation amounts will accompany more frequent tropical typhoons/cyclones and increased tropical sea surface temperatures in the next 50 years. The intensity of tropical cyclones is likely to increase by 10–20 percent in the Pacific region when atmospheric levels of CO_2 reach double preindustrial levels (McCarthy et al. 2001). One model projects a doubling of the frequency of rainfall events of 4 inches per day and a 15–18 percent increase in rainfall intensity over large areas of the Pacific.

Rising Temperatures

A study examining temperature trends over an 88-year period (1919–2006) based on measurements from 21 temperature stations within Hawai‘i showed a long-term increase in temperature and an accelerated rate of increase in the last few decades (0.08 °F/decade for the full record versus about 0.3 °F/decade since 1975) (Giambelluca et al. 2008). In general, warming trends are lower for summer (May–October) and higher for winter (November–April), compared with the annual trends. Additionally, as with the annual trends, warming in both seasons has been greater for high elevation (i.e., greater than 0.5 miles or 800 meters above sea level) stations and for the most recent period. Temperature variation appears to have been tightly coupled to PDO, perhaps through regional sea surface temperature (SST) variation; however, since 1975, the air temperature trend has risen at a faster rate than can be explained by PDO and local SST trends.

These temperature fluctuations have the potential to impact precipitation and existing moisture zones which can influence forest structure composition. A change in forest structure could impact how well vegetation collects water from the atmosphere and during rainfalls and how much of this water gets infiltrated through the ground into aquifers and streams.

Sea Level Rise

According to the IPCC, the oceans are now absorbing more than 80 percent of the heat added to Earth’s climate system. This absorption has caused average global ocean temperatures to increase and seawater to expand. Additionally, the transfer of water mass from the land to the ocean from the heating and melting of ice-sheets, ice caps, and alpine glaciers also influences ocean levels. Scientific evidence suggests that the current, accelerated rate of global change began between the mid-1800s and 1900s (Church and White 2006, Jevrejeva et al. 2008, Church and White 2011). Based on satellite altimeter measurements, the rate of globally averaged SLR since the early 1990s has been estimated to be 0.134 ± 0.016 inches per year (Nerem et al. 2010). This is twice the estimated rate for the 20th century as a whole based on tide-gauge reconstructions (reviewed by Bindoff et al. 2007).

Sea-level projections using semi-empirical models based on statistical relationships between observed SLR and global temperature, coupled with projections of future global temperature, yield estimates of global SLR ranging from roughly 3 to 5 feet by 2100 (Rahmstorf 2007, Vermeer and Rahmstorf 2009, Grinsted et al. 2010).

Near Pacific Island ecosystems, local SLR is influenced by the rate and extent of global SLR, as well as changes in episodic events, such as ENSO, PDO, and storm-related conditions (Marra et al. 2012). Topography and exposure to normal swell and storm swell produce localized differences. Furthermore, it is important to note that shoreline sea levels are historically and currently influenced by isostatic tectonic changes as the islands move with the Pacific Plate, which are not due to global changes in sea level. Thus, sea level change in the Pacific is highly variable due to geologic uplift (Michener et al. 1997, Carter et al 2001).

Sea level around the Hawaiian Islands is rising 6 to 14 inches per century (EPA 1998, Giambelluca 2008). The University of Hawai‘i Sea Level Center has estimated that between 1905 and 2006 mean sea level rose about 0.0417 inches per year. A similar estimate was derived from shallow core measurements of a fringing reef crest at Hanauma Bay, which concluded that O‘ahu is subsiding at a rate of 0.0394–0.0787 inches per year. Although most of this rise is due to isostatic sinking of the tectonic plate, global warming induced sea level increases have the potential to intensify this rise (Nakiboglu et al. 1983, Caccamise et al. 2005).

Ecological Responses to Climate Change

Evidence suggests that recent climatic changes have affected a broad range of individual species and populations in both the marine and terrestrial environment. Organisms have responded by changes in phenology (timing of seasonal activities) and physiology, range and distribution, community composition and interaction, and ecosystem structure and dynamics. For example, paleoecological studies have shown that the distribution of vegetation is highly influenced by climate.

The reproductive physiology and population dynamics of amphibians and reptiles are highly influenced by environmental conditions such as temperature and humidity. For example, whether a sea turtle is male or female is determined by the temperature of the nest environment; thus, higher temperatures could result in a higher female-to-male ratio. In addition, increases in atmospheric temperatures during seabird nesting seasons could have an effect on seabirds and waterbirds through increased heat stress leading to mortality or inundation of breeding sites due to SLR or storm surge (Duffy 1993, Walther et al. 2002, Baker et al. 2006, Young et al. 2012).

Warming has caused species to shift toward the poles or higher altitudes and changes in climatic conditions can alter community composition. Increases in CO_2 levels can impact plant photosynthetic rates, reduce water stress, decrease nutrient content, and lower herbivore weights. Climate change can increase the loss of species. Some of the characteristics that make species vulnerable include small population sizes, restricted or patchy ranges, occurrences at either high or low-lying areas, with limited climatic ranges, and narrow or specific habitat requirements—all characteristics of endangered species in Hawai‘i. Although there is uncertainty regarding these trajectories, it is probable that there will be ecological consequences (Vitousek 1994, Walther et al. 2002, Ehleringer et al. 2002).

The Hawaiian Islands were recognized in a report as 1 of 10 places to save for endangered species in light of climate change (ESC 2011). Climate change has the potential to influence two important ecological issues in the State of Hawai‘i: endangered species and pest species. Species decline has resulted from habitat loss, introduced diseases, and impacts from pest species. Changes in climate will add an additional threat to the survival of these species. For example, warmer night temperatures can increase the rate of respiration for native vegetation, resulting in greater competition from pest plants. Furthermore, climate change may enhance existing pest species issues because alterations in

the environment may increase the dispersal ability of flora or fauna. Species response to climate change will depend on the life history, distribution, dispersal ability, and reproduction requirements of the species (DBEDT and DOH 1998, Middleton 2006, Giambelluca 2008).

The Service is supporting regional landscape conservation cooperatives. These cooperatives are public-private partnerships that recognize that conservation challenges transcend political and jurisdictional boundaries and require a more networked approach to conservation—holistic, collaborative, adaptive, and grounded in science to ensure the sustainability of America's land, water, wildlife, and cultural resources. The local version of these landscape conservation cooperatives is the Pacific Islands Climate Change Cooperative (PICCC), headquartered in Honolulu, Hawai'i, and working across the Pacific. The PICCC was established in 2010 to assist those who manage native species, island ecosystems, and key cultural resources in adapting their management to climate change for the continuing benefit of the people of the Pacific Islands. The PICCC steering committee consists of more than 25 Federal, State, private, indigenous, and nongovernmental conservation organizations and academic institutions, forming a cooperative partnership that determines the overall organizational vision, mission, and goals.

At the Refuge, climate change could, among other things, reduce the areal extent of beaches, including the small and secluded beach in the Kīlauea (East) Cove which is used by foraging shorebirds (e.g., 'ulili, 'akekeke, and kōlea), roosting seabirds (e.g., 'iwa and 'ā [brown boobies and red-footed boobies]), and by 'īlio-holo-i-ka-uaua and honu as a haul-out site for resting and potentially for pupping and/or nesting; and, in the Kāhili Quarry area, by Refuge visitors for recreation. There may also be effects on Refuge vegetation communities and the wildlife they support; on the near-shore ocean environment which supports marine life preyed upon by Refuge sea- and shore birds, and enjoyed by Refuge visitors; and on the waterway that drains to the ocean through Kīlauea River and adjacent riparian and wetland habitats. Additionally, high-island refuges like Kīlauea Point could become increasingly important to sea- and shore birds since the areal extent of their breeding, foraging, loafing, and other habitats on low-islands in the mid-Pacific Ocean would be reduced or displaced as a result of SLR (Reynolds et al. 2015).

Additionally, national wildlife refuges will be exploring options for more effective engagement with visitors on this topic. The 2010–2011 National Visitor Survey collected information about visitors' levels of personal involvement in climate change as it relates to fish, wildlife, and their habitats, and the visitors' beliefs regarding this topic (Sexton et al. 2011). Items draw from the "Six Americas" framework for understanding public sentiment toward climate change (Leiserowitz, Maibach, and Roser-Renouf 2008) and from literature on climate change message frames (e.g., Nisbet 2009). Such information provides a baseline for understanding visitor perceptions of climate change within the context of fish and wildlife conservation that can further inform related communication and outreach strategies.

For Kīlauea Point NWR, the majority of visitors believe the following regarding climate change as it relates to fish, wildlife, and their habitats:

- Future generations will benefit if we address climate change effects;
- It is important to consider the economic benefits to local communities when addressing climate change effects; and
- We can improve our quality of life if we address the effects of climate change.

The majority of visitors do *not* believe:

- There has been too much emphasis on the catastrophic effects of climate change.

Forty-two percent of visitors indicated that their experience would be enhanced if Kīlauea Point NWR provided information about how they could help address the effects of climate change on fish, wildlife, and their habitats. Framing the information in a way that resonates most with visitors may result in a more engaged public who will support strategies aimed at alleviating climate change pressures (Sexton et al. 2011).

3.2 Hydrology

The hydrologic processes that occur in the Hawaiian Islands are unique compared to continental landmasses or temperate zones. Drainage basins are typically small and streams are characterized by steep longitudinal profiles and numerous waterfalls (Lau and Mink 2006).

Rainfall contributes roughly 2.88 million gallons per day (mgd) to the water budget of Kauaʻi Island (County of Kauaʻi 2001). This rainwater recharges two vital water resources: groundwater and surface water.

Groundwater, which occurs beneath the surface, is the primary water resource in Hawaiʻi. The major fresh groundwater systems are freshwater-lens or dike-impounded systems, which are below the water tables (USGS 2000). Groundwater can occur as a thin basal lens, as well as high-level aquifers where freshwater does not float on seawater (Juvik and Juvik 1998).

Surface water is water flowing in stream channels, lakes, ponds, or wetlands. This water originates from precipitation (e.g., direct rainfall, fog drip), surface runoff derived from rainfall, and groundwater seepage. Streams are classified as intermittent or perennial based on flow conditions. Perennial streams are streams that have continuous flow all year, whereas intermittent streams are those which normally cease flowing during certain times of the year. The longest flowing stream on Kauaʻi is the Waimea River/Poʻomau Stream, a perennial stream which flows 19.5 miles. Perennial streams, which are generally sustained by groundwater in aquifers, are usually restricted to the windward sides of islands that receive more rain (Juvik and Juvik 1998).

Prior to European settlement, water was controlled by the konohiki (headman) as part of the ahupuaʻa system; an ahupuaʻa is a usually wedge-shaped land division beginning at the top of the mounting and running down to the sea. Water was considered sacred: it was a gift from Kane I ka wai ola (Procreator in the water of life) and delivered by Lono makua (the Rain Provider). The wai (water) was "life" for the farmer as it was necessary for kalo (taro), which was grown in the streams, valleys, and springs.

Today, the use of water resources in the Hawaiian Islands is regulated by the State Water Code, Chapter 174C, and governed by the State Commission on Water Resource Management (CWRM). This agency issues permits to regulate the use of surface and ground water. Between 1988 and 1989, water users in Hawaiʻi were required to register their water sources and declare their water uses to CWRM (CWRM 1992). A water right is a legal entitlement to use a certain amount of water from a particular source for a beneficial use. Outside designated water management areas landowners have the right to "reasonable use" of underlying groundwater and riparian water, providing it does not harm the uses of other users (Miike 2004). Specific water rights for descendants of Native Hawaiians

who inhabited the Hawaiian Islands prior to 1778 are discussed in Section §174C-101 of the State Water Code.

The Refuge is located in the Kīlauea watershed, which is a little over 8,000 acres. There are no hydrological features (e.g., streams, tributaries, ponds, lakes, groundwater) on the fee-owned areas of the Refuge. However, in the non–fee-owned and adjacent areas of the Refuge, there are several streams and freshwater ponds. To the east is Kīlauea River, a perennial stream that is 4 miles long and empties out to Kīlauea Bay via Kāhili Beach (also known as Rock Quarry Beach). It begins as two main streams coming off the Kamoʻokoa Ridge and from Mount Namahana (Halualanai and Puʻu Ka Ele streams) and converges southwest of the Refuge to become Kīlauea River. This river has an average flow of 8.21 cubic feet per second (USFWS 2007).

There are also two waterfalls along the river makai (ocean side) of Kūhiō Highway. Intermittent tributaries run off Kīlauea River and include Kaluamakua and Wailapa. Additional intermittent streams to the east include Kulihaili and Pīlaʻa. To the west of the Refuge, Niu is categorized as a nonperennial stream, while Puʻukumu is a perennial stream and has a stream gage (USGS station number 16097900). Along the northern boundary of the Refuge are coastal waters, which are State-owned and managed. According to the State Department of Health's water quality classification, the coastal waters directly below the Refuge are classified as Marine Waters Class A (EPA 1988):

> It is the objective of this class of waters that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class.

According to the Federal Emergency Management Agency's Flood Insurance Rate Maps, Refuge lands and surrounding areas are zoned X, which is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No based flood elevations or depths are shown within this zone. The Kīlauea River is in both Zones AE and VE; however, the Refuge sits well above this. Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. The 34- to 36-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the flood insurance studies by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone (DLNR 2011).

3.3 Topography and Bathymetry

The Kīlauea River Valley provides drainage for the nearby mountains, mainly Kamoʻokoa ridge. The fee-owned part of the Refuge is higher in elevation, with the highest point on Crater Hill at 568 feet, as indicated by the USGS marker. Kīlauea Town itself is a flat plain.

3.4 Geology and Geomorphology

Kauaʻi, which is approximately 550 square miles, consists of a single great shield volcano that is deeply eroded and partly veneered from much later volcanic activity. The shield volcano was created by the extrusion from 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 Kōloa Volcanic Series. Rocks of the Kōloa 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). Kauaʻi is unique among Hawaiian volcanoes because it lacks an obvious rift zone and also has a large caldera complex with a graben (depressed block of land bordered by parallel faults) (Juvik and Juvik 1998). Kauaʻi is also the oldest of the main Hawaiian Islands, with substrates aging from 3.8 to 5.6 million years.

Kīlauea Point is a volcanic cone complex that was formed later, during the vents of Kōloa volcanics (3.65–0.52 million years ago). It is the remnant of the former Kīlauea volcanic vent that last erupted about 500,000 years ago. Two islands, both formerly portions of this volcanic crater, lie off the coast (Mokuʻaeʻae and Makapili). Crater Hill is the highest peak, rising 568 feet from sea level. Due to coastal erosion, only about one-third of the Kīlauea volcano complex still exists, but at one time probably had a diameter of at least 1.2 miles (Blay and Siemers 2004). The east (Mōkōlea Point) and west flanks drop away approximately 200 feet. Slopes range from 10–70 percent (USFWS 1989).

According to the Kauaʻi County General Plan, the Refuge is also considered an important land form according to its heritage resources map.

3.5 Soils

The soils of Kīlauea Point and the adjoining Crater Hill consist primarily of Līhuʻe Silty Clay. Mōkōlea Point, Makapilli Rock, and the ocean cliff surrounding Kīlauea Point are exposed bedrock consisting of basalt and andesite. The soil types (Līhuʻe-Puhi association) are deep, nearly level to steep, well-drained soils that have a fine textured or moderately fine textured subsoil (Foote 1972). Adjacent areas to the Refuge are composed primarily of oxisols (Līhuʻe-Puhi association, which make up about 12 percent of the island), which contain no more than 10 percent weatherable minerals, and low cation exchange capacity. Oxisols are always a red or yellowish color, due to the high concentration of iron (III) and aluminum oxides and hydroxides. In addition, they also contain quartz and kaolin, plus small amounts of other clay minerals and organic matter (Hue et al. 2010).

The elevation of the Līhuʻe-Puhi soil association ranges from near sea level to 800 feet. Areas along the coast as well as bordering Kīlauea River are categorized as rough mountainous land, rough broken land, rock outcrop association (which makes up 50 percent of the island). Such soils are well-drained to excessively drained, very steep to precipitous lands of mountains and gulches. The elevation of this soil association ranges from near sea level to 5,170 feet (Foote 1972).

Kīlauea town and the surrounding area have a history of agriculture (e.g., ranching, sugar plantation). These uses may have impacted present day soils (e.g., chemicals, soil composition). For instance, in the 1920s, Kīlauea Sugar Company planted ironwood to prevent wind erosion and stop the salt air from abrading cultivated crops. Introduction of this new vegetation type to the area may or may not have affected soils (USFWS 1989).

3.6 Fire

Unlike the continental United States, where fire can play a large role in ecosystem function and species adaptations, fire is a relatively infrequent disturbance regime in Hawaiian ecosystems. The two primary sources of natural fires are lava flows and lightning strikes (Mueller-Dombois and Lamoureux 1967, Mueller-Dombois 1981, Smith and Tunison 1992). Most ecologists agree that natural fire has not played a significant ecological or evolutionary role in most Hawaiian ecosystems. Most native vegetation is not conducive to fire spread, producing low fuel loads and/or litter of relatively low flammability. When fires did occur, they probably did not spread quickly or extensively due to the patchiness inherent in native habitats. While fires certainly occurred, they were not a formative force in the distribution or type of vegetation found in native Hawaiian habitats.

However, early Polynesians used fire to clear much of the native forests of Hawai‘i for agricultural purposes. In the past 200 years, a vast array of nonnative plants and animals have been imported and released into the Hawaiian landscape. The contemporary fire regime in the alien dry grasslands is one of moderate intensity, high frequency (less than 35 years) stand replacement fires that perpetuate the dominant grasses. Under this fire regime, burns are typically complete with little patchiness except under low fire intensity weather conditions, where rock outcrops limit fuel loading, or where fires burn into mixed fuels or another vegetation type. With very few exceptions, fires in these systems benefit alien species and exclude natives. No native species has ever been shown to successfully compete with alien grasses after successive fires.

Most of the vegetation at KPNWR is degraded coastal woodlands (scrub, shrub, and forest) with large open areas of grass. Due to the mild climate, the vegetation on and adjacent to the Refuge experiences a year-round growing season. The exposed nature and strong winds of many areas on the Refuge increase chances of wildfire onsite.

A Cooperative Fire Protection Agreement between the Kaua‘i County Fire Department and KNWRC was established for initial attack, suppression, and mop-up of wildfires within Refuge lands on Kaua‘i. No prescribed burning has occurred on the Refuge; only small piles of vegetation debris have been burned.

KNWRC has a Wildland Fire Management Plan that was completed in 2004. Small-scale prescribed burns might be occasionally necessary as a method of disposal of woody debris. Prescribed burns would also require individual burn prescriptions. A Hawai‘i State Department of Health (HDOH) burn permit may also be necessary for each prescribed burn to minimize effects on air quality. The prescribed fire season is expected to be from September to February. Conditions for the permit would exclude specified time periods (“no-burn” days) as broadcast by the National Weather Service.

3.7 Environmental Contaminants

In 2011, a contaminants assessment was conducted for the Refuge, and it concluded that no major contaminant issues existed at that time (USFWS 2011). Historically, however, contaminants did exist on the Refuge. Built in 1913 as a navigational aid for commercial shipping between Hawai‘i and Asia, Kīlauea Lighthouse guided ships and boats safely along Kaua’i’s rugged north shore for 62 years. The lighthouse contains a unique Fresnel lens that weighs about 4.5 tons and was designed to “float” on mercury and pressurized air. In 1998 a mercury leak was discovered by a maintenance worker while chipping rust off the ceiling between the second and third floors. In October 1998 the

mercury was cleaned by a hazmat team and properly disposed of. A follow up inspection showed that mercury was no longer present in the clean-up zone or surrounding areas (Paglinawan 1998).

A Formerly Used Defense Site (FUDS) exists on the Refuge but should no longer be a source of contaminants. Previous records, studies, and interviews indicate the Kīlauea Radar Station was constructed by the U.S. Army Corps of Engineers shortly after the outbreak of World War II between 1941and 1942. Records indicate that the station was one of three radar installations located on the island of Kauaʻi. The station was constructed on the highest point of the Crater Hill parcel and included two tunnels (one for radio and one for radio operations), an electrical generation plant, and a 200-foot radar tower. Records indicate that after the war, former landowner Kīlauea Plantation used one of the tunnels as a storage area for explosives. An underground tank used to hold petroleum products was removed from the site (Dept. of the Army 1991).

An internal Service environmental compliance audit report was performed in August 2010 for Kīlauea Point NWR. The purpose of the audit was to assess compliance status with Federal, State, and local environmental regulations. This also included compliance with all DOI and Service policies, Executive orders, and any other applicable requirements. Eight findings related to some management categories (hazardous, toxic, pesticide, petroleum/oil/lubricants) were identified for corrective action (mostly related to improving storage, labeling, and training).

3.8 Air Quality

Due to the tradewinds experienced year-round on Kauaʻi, as well as the low population and development on the island, air quality is not considered a problem. However, due to an active volcano on the island of Hawaiʻi, air quality is periodically affected by vog (volcanic smog) depending on the eruption and prevailing winds, although Kauaʻi is the least impacted, being farthest away from Hawaiʻi Island. HDOH, which began monitoring activities in 1957, manages several air quality monitoring stations found on Oʻahu, Maui, and Hawaiʻi Islands. These stations monitor pollutants to assess air quality compliance with State and Federal standards (standards can be found at http://hawaii.gov/health/environmental/air/cab/index.html, link "Federal and State Ambient Air Quality Standards).

Air quality regulations in the U.S. are based on a set of air quality standards, which are the National Ambient Air Quality Standards. These standards are set to protect the public health and welfare and determine if areas are in attainment or nonattainment. HDOH monitors carbon monoxide, hydrogen sulfide, nitrogen dioxide, ozone, fine particulate matter (10 and 2.5 micrometers), lead, and sulfur dioxide. Only Oʻahu, Maui, and Hawaiʻi Islands are monitored for these pollutants. There is a monitoring station on Kauaʻi, but it is a special purpose monitoring station, located at Niumalu, that monitors specifically for cruise ship emissions. This station was made operational in 2010. A previous monitoring station was also located in Līhuʻe which monitored only for particulate matter 10 and was closed in 2007 (Kihara pers. comm. 2011).

Air quality concerns on Kauaʻi focus on the west side, where a major power generation facility and most of the large-scale agriculture and military facilities are found. The Air Quality Index (based on measuring ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide) for Hawaiʻi is considered to be satisfactory with air pollution posing little to no risk. In 2009, the State was in attainment of all National Ambient Air Quality Standards (excluding exceedances due to volcanic activity). A 5-year trend analysis of

ambient air quality shows that, with the exception of particulate matter 10 (due to fireworks and construction activities), recorded pollutants are well below both State and Federal standards (DOH 2010).

Additional air quality-related emissions involve GHG. In 2007, it was estimated that approximately 24,270,000 metric tons of GHG emissions were produced in Hawai‘i, with transportation and electric power comprising 88 percent of the total emissions. Kaua‘i contributed 3 percent to the total State emissions, with a majority of this 3 percent composed of the transportation and electric power sectors (DBEDT 2008). These estimates do not include fuels that were exported, used on international aircraft or ship operations, or used by the military in the State. Additionally, Hawai‘i is developing means to reduce its GHG emissions. In 2007, the State of Hawai‘i enacted Act 234, which set a goal to reduce GHG emissions to 1990 levels by 2020.

An internal Service environmental compliance audit report was performed in August 2010 for Kīlauea Point NWR. The purpose of the audit was to assess compliance status with respect to Federal, State, and local environmental regulations. This included compliance with all DOI and Service policies, Executive orders, and any other applicable requirements. The August 2010 audit showed no major findings of violations of air emissions management.

3.9 Water Quality

On Refuge-owned lands, there are no hydrological features, so water quality is not assessed. However, Kīlauea River (which runs through the boundary of the Refuge on non-Refuge owned lands) is listed on the EPA 303(d) List of Impaired Waters for turbidity (HDOH 2008).

Heavy rainfalls are a factor for water quality because during such floods and storms, debris and sediments are washed downriver.

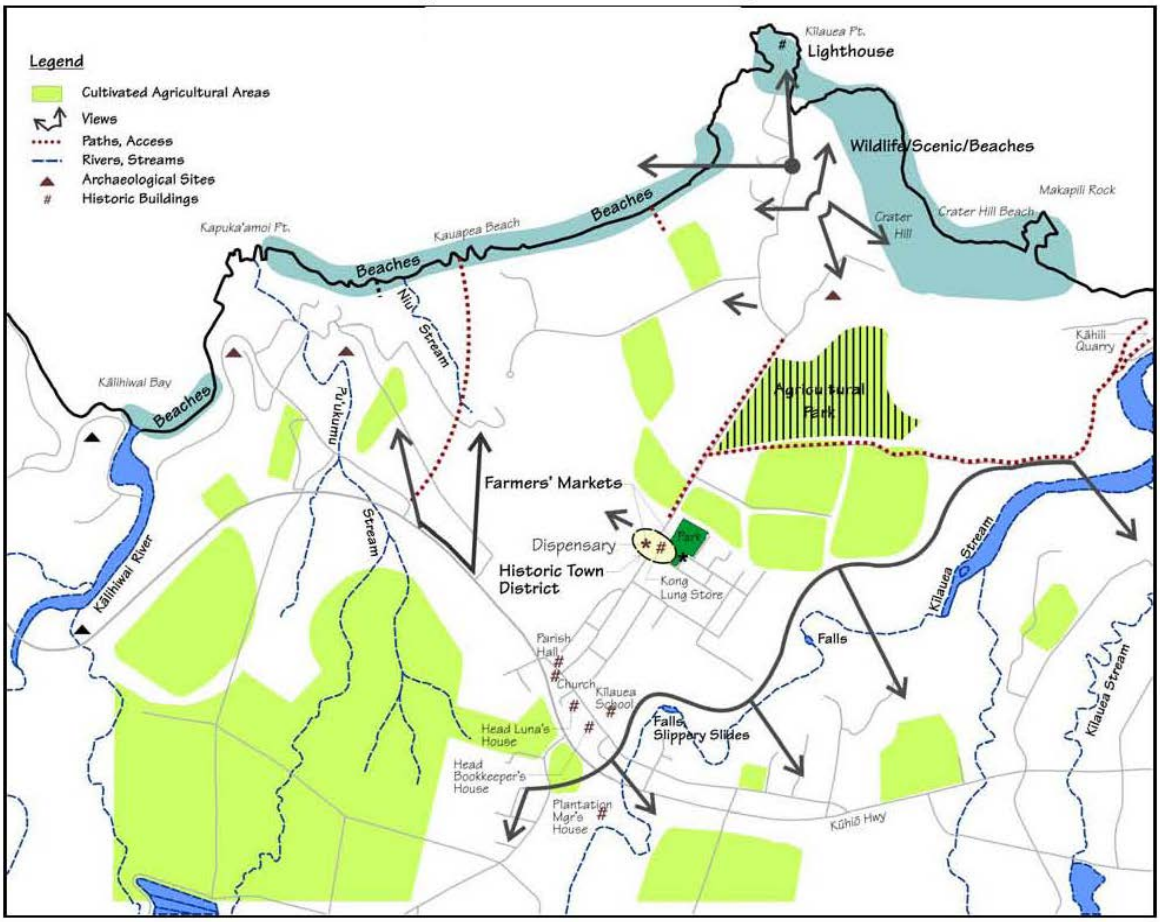
An internal Service environmental compliance audit report was performed in August 2010 for Kīlauea Point NWR. The purpose of the audit was to assess compliance status with respect to Federal, State, and local environmental regulations. This also included compliance with all DOI and Service policies, Executive orders, and any other applicable requirements. The August 2010 audit showed no major findings of violations of water quality management.

3.10 Visual Quality

The dramatic views of the coastline from the areas open to the public on the Refuge are commonly photographed by visitors. The lighthouse and the peninsula on which it stands are also commonly photographed sites (both from the ground and aerially) with images often used for tourism and sight-seeing/attractions related purposes.

The Kīlauea town plan also identifies views as part of Kīlauea’s assets (Figure 3-1) and a desire to retain Kīlauea’s rural charm and scenic landscapes.

Figure 3-1. Kīlauea Assets Map (County of Kaua'i 2006).



3.11 Surrounding Land Uses

Under the State Land Use Law (Act 187), Hawai'i Revised Statute Chapter 205, all lands in the State are classified into four districts: Agriculture, Rural, Conservation, and Urban. Conservation Districts, under the jurisdiction of the Hawai'i Department of Land and Natural Resources, are further divided into five subzones: Protective, Limited, Resource, General, and Special (Hawai'i Administration Rules, Title 13, Chapter 5). The other three districts are under the jurisdiction of the counties.

Most of the land in the Kīlauea area is private property, with some county (about 95 acres) and few State (a little over 4 acres) properties. Lands to the south of the Refuge are part of Kīlauea town, which includes residential areas, schools, a county park, and commercial properties (e.g., stores, restaurants, markets). Areas of Kīlauea (lands west, south, and east of the Refuge) include high-end properties with large residential estates priced in the millions. Most of Kīlauea is zoned as agriculture with Kīlauea town proper (or commercial core) zoned Urban. Within the larger Kīlauea area are orchard operations to small farms specializing in organic produce (County of Kaua'i 2006). Most of the Kīlauea area is identified as prime agricultural land under the State's agricultural lands of importance.

Areas directly along the coast are zoned Conservation. Areas on and adjacent to the Refuge are also zoned as special management areas under the Coastal Zone Management Program (see figures in Chapter 1 for location maps and Chapter 5 for further information on towns). The Kauaʻi Public Land Trust (which is now part of the Hawaiian Islands Land Trust) also owns lands, for the purpose of conservation, within the approved Refuge boundary.

Within the approved Refuge boundary, adjacent waterways (e.g., Kīlauea River) provide recreation (e.g., fishing, kayaking) and a beach area (Kāhili) that is used for picnicking, swimming, surfing, etc. The Hawaiʻi Department of Land and Natural Resources manages the fisheries and aquatic resources in the Kīlauea River.

The coastal waters around the Refuge are also part of the Humpback Whale National Marine Sanctuary which is jointly administered by the State and NOAA. Directly north and to the west of Mokuʻaeʻae Rock/Sea Stack is a State marine managed area (bottomfish restricted fishing area).

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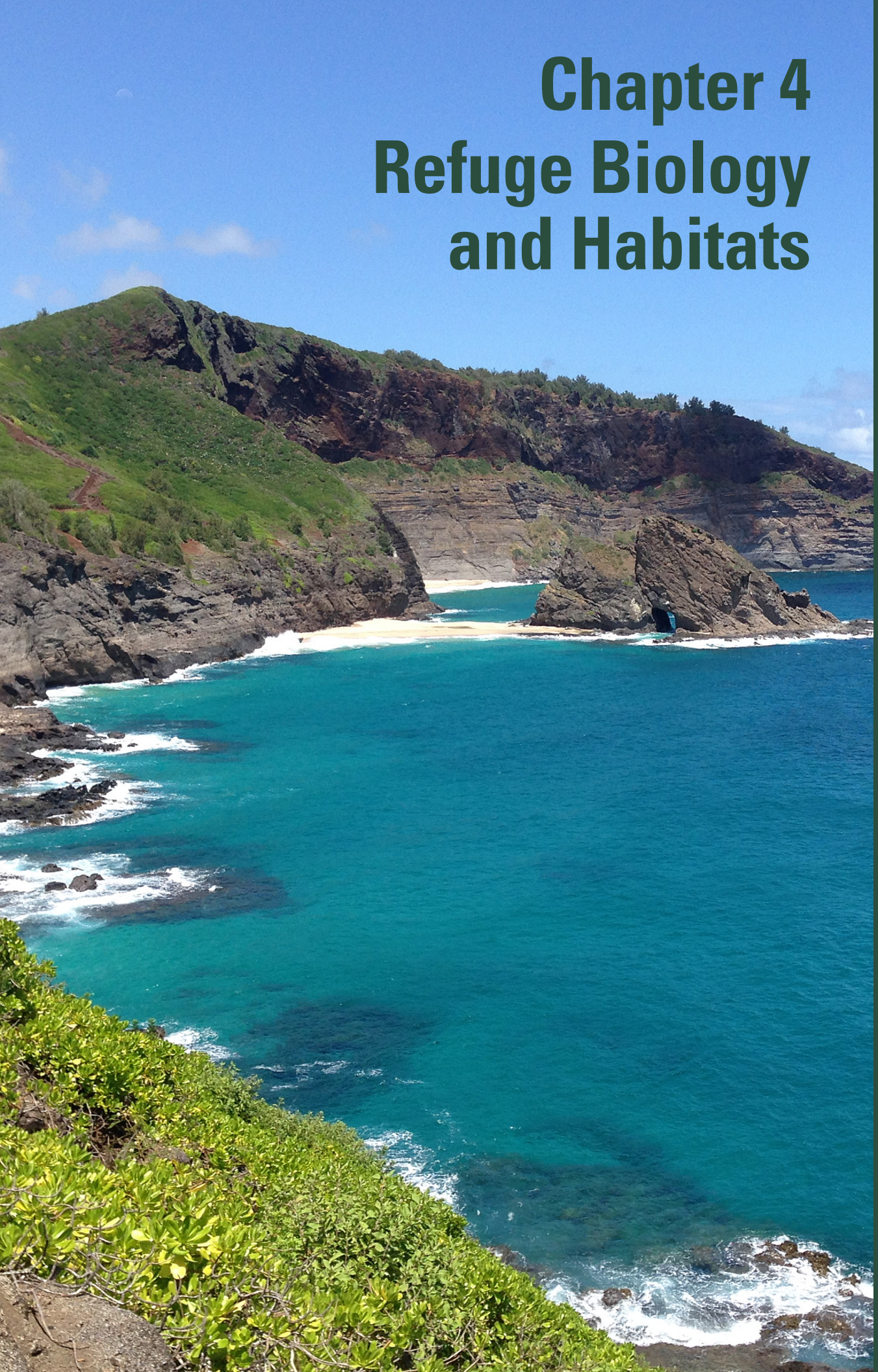
Chapter 4
Refuge Biology and Habitats



Chapter 4. Refuge Biology and Habitats

This chapter addresses the biological resources and habitats of Kīlauea Point NWR; however, it is not an exhaustive overview of all species and habitats occurring within the Refuge. The chapter begins with a discussion of biological integrity; we then focus on the presentation of pertinent background information for the priority resources of concern and other benefitting species designated under the CCP. Background information includes descriptions, locations, conditions, trends, key ecological attributes, and threats (stresses and sources of stress) to the habitats and/or associated resources of concern. The information presented was used to develop goals and objectives for the CCP (see Chapter 2).

4.1 Biological Integrity, Diversity, and Environmental Health

The Improvement Act directs the Service to ensure that the biological integrity, diversity, and environmental health (BIDEH) of the Refuge System is maintained for the benefit of present and future generations of Americans. The Service's policy on BIDEH (601 FW 3) also provides guidance for consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems that represent BIDEH on each refuge. The Refuge Administration Act, as amended by the Improvement Act, clearly establishes that wildlife conservation is the singular Refuge System mission. House Report 105-106 accompanying the Improvement Act states "…the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first." BIDEH is a critical component of wildlife conservation.

BIDEH policy defines *biological integrity* as "the biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities." *Biological diversity* is defined as "the variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which they occur." *Environmental health* is defined as the "composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment." In simplistic terms, elements of BIDEH are represented by native fish, wildlife, plants, and their habitats, as well as those ecological processes that support them.

Biological integrity lies along a continuum from a completely natural system to a biological system extensively altered by considerable human impacts to the landscape. No modern landscape retains complete BIDEH. However, we strive to prevent the further loss of natural biological features and processes. Maintaining or restoring biological integrity is not the same as maximizing biological diversity. Maintaining biological integrity may entail managing for a single species or community at some refuges and combinations of species or communities at other refuges. Maintaining critical habitat for a specific endangered species, even though it may reduce biological diversity at the refuge scale, helps maintain biological integrity and diversity at the ecosystem or national landscape scale.

Historically, migratory and nonmigratory native birds and native coastal plant communities may have thrived in the Kīlauea Point area in some or most years and on multiple islands on much larger landscapes. This is supported by fossil and subfossil records of species in lowlands, previously thought to be restricted to higher elevations or other islands, including, ʻaʻo, ʻuaʻu, and nēnē (Burney et al. 2001). Native coastal ecosystems are among the most threatened ecosystems in the Hawaiian Islands due to the long-term presence of humans and the negative effects of their actions—

specifically, development, agriculture, fire, and the introduction of invasive species. Therefore, to conserve native plant and animal populations at larger landscape scales to support long-term regional conservation goals, we may manage habitats at the Refuge to maintain higher densities of native species than those that may have occurred historically at the Refuge level because of loss and degradation of surrounding habitat.

On refuges, we typically focus our evaluations of biological diversity at the refuge scale; however, these refuge evaluations can contribute to assessments at larger landscape scales. We strive to maintain populations of breeding individuals that are genetically viable and functional. Evaluations of biological diversity begin with population surveys and studies of flora and fauna. The Refuge System's focus is on native species and natural communities such as those found under historical conditions.

We evaluate environmental health by examining the extent to which environmental composition, structure, and function have been altered from historic conditions. Environmental composition refers to abiotic components, such as air, water, and soils, all of which are generally interwoven with biotic components (e.g., decomposers live in soils). Environmental structure refers to the organization of abiotic components, such as atmospheric layering, aquifer structure, and topography. Environmental function refers to the processes undergone by abiotic components, such as wind, tidal regimes, evaporation, and erosion. A diversity of abiotic composition, structure, and function tends to support a diversity of biological composition, structure, and function.

We strive to manage in a holistic manner the combination of BIDEH. We balance all three by considering refuge purposes, Refuge System mission, and landscape scales. Where practical, we support the return of extirpated native species in the context of surrounding landscapes. The elements of BIDEH for Kīlauea Point NWR are summarized in Table 4-1 below.

Table 4-1. Biological Integrity, Diversity, and Environmental Health.

Habitats	Historic habitat attributes	Historic natural processes responsible for these conditions	Current limiting factors
Coastal mixed woodland-grassland	Native-dominated coastal dry-mesic shrubland, mixed shrub and grassland, and mixed shrubland and forest communities with <45° slope. *Potential conservation species: nēnē, pueo, seabirds including mōlī, ka‘upu, ‘a‘o, and rare native coastal plant communities*	Shallow, well-drained, highly erodible, saline, phosphorus-rich soils (e.g., guano); wind and water erosion; low annual precipitation; and grazing (geese).	Invasive species: ironwood, Christmasberry, lantana, haole koa, introduced mammalian and avian predators and scavengers and insect pests; ungulate rooting and grazing; climate change; human development; vehicular and human traffic.

Habitats	Historic habitat attributes	Historic natural processes responsible for these conditions	Current limiting factors
	supporting threatened and endangered plants and endemic insects.		
Sea cliff	Native-dominated coastal dry-mesic shrubland, mixed shrub and grassland, and mixed shrubland and forest communities with >45° slope. *Potential conservation species: seabirds including ʻiwa, ʻā, ʻuaʻu kani, koaʻe kea and rare native coastal plant communities supporting threatened and endangered plants and endemic insects.*	Shallow, well-drained, highly erodible, saline, phosphorus-rich soils; wind, wave, and water erosion; and low annual precipitation.	Invasive species: ironwood, Christmasberry, lantana, haole koa, introduced mammalian and avian predators and scavengers and insect pests; climate change; human development; human trespass
Beach strand	Bare sand, gravel, or rock within or just above the tidal zone; sparsely vegetated by native- dominated coastal dry herbland and mixed communities. *Potential conservation species: ʻilio-holo-i-ka-uaua, honu, migratory shorebirds, ʻiwa, ʻā, and rare native coastal plant communities.*	Well-drained, sandy to rocky substrates; wind and water erosion; wave inundation; saline environment; low annual precipitation.	Invasive species: ironwood, Christmasberry, lantana, haole koa, introduced mammalian and avian predators and scavengers and insect pests; climate change; human trespass

4.2 Priority Resources of Concern

4.2.1 Analysis of Resources of Concern

In identifying resources of concern (ROCs), the team followed the process outlined in the Service's *Identifying Refuge Resources of Concern and Management Priorities: A Handbook* (USFWS 2010). As defined in the Service's Policy on Habitat Management Plans (620 FW 1), ROCs are:

> "all plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, state, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect 'migrating waterfowl and shorebirds.' Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts (620 FW 1.4G)"

Habitats or plant communities are ROCs when they are specifically identified in refuge purposes, when they support species or species groups identified in refuge purposes, when they support Refuge System ROCs, and/or when they are important in the maintenance or restoration of BIDEH.

As a result of this information gathering and review process, a comprehensive list of potential resources of concern was developed (Appendix E).

4.2.2 Selection of Priority Resources of Concern

Early in the planning process, the planning team cooperatively identified ROCs for the Refuge. Negative features of the landscape, such as invasive plants, may demand a large part of the Refuge management effort but are not designated as ROCs. The step-by-step process to prioritize ROCs and management priorities for a refuge are displayed in Figure 4-1. The team then selected priority ROCs from the ROC list. The main criteria for selecting priority ROCs included the following requirements:

- The resource must be reflective of the Refuge's establishing purposes and the Refuge System mission;
- The resource must include the main natural habitat types found at the Refuge;
- The resource must be recommended as a conservation priority in the Wildlife and Habitat Management Review; or
- The resource must be federally or State-listed, a candidate for listing, or a species of concern.

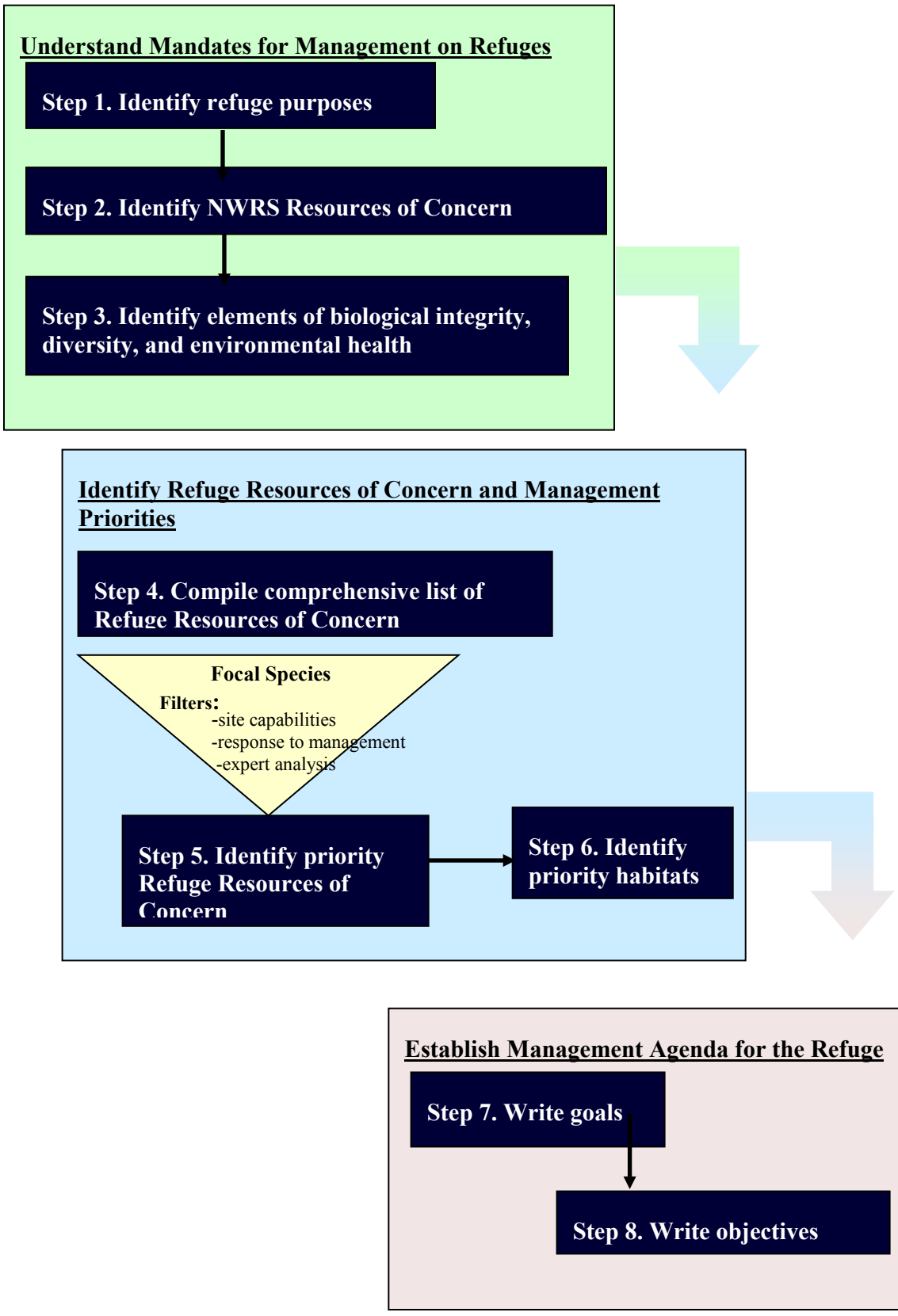
Other criteria that were considered in the selection of priority ROCs included the following:

- Species groups and/or Refuge features of special management concern;
- Species contributing to the BIDEH of the ecosystem;
- Species where it is feasible to estimate abundance and distribution (needed for future monitoring and adaptive management).

In developing its listing of priority ROCs, the planning team selected not only species mentioned in establishing documents for the Refuge, but also species that captured the ecological attributes of habitats required by larger suites of species. The ecological attributes of habitats should meet the life

history requirements of ROCs, and are therefore important to sustain the long-term viability of the priority ROC and other benefitting species. Ecological attributes of habitats include vegetation structure, species composition, age class, patch size, and contiguity with other habitats; hydrologic regime; and disturbance events. These provide measurable indicators that strongly correlate with the ability of a habitat to support a given species. Tables listing the desired conditions for habitat types found on the Refuge incorporate "desired" conditions that were based on scientific literature review and team members' professional judgment. These desired conditions for specific ecological attributes were then used to help design habitat goals and objectives, as presented in Chapter 2. However, not all ecological attributes or indicators were deemed ultimately feasible or necessary to design an objective around. Other factors, such as the Refuge's ability to reasonably influence or measure certain indicators, played a role in determining the ultimate parameters chosen for each habitat objective. Thus, ecological attributes should be viewed as a step in the planning process.

Figure 4-1. Overview of the process to prioritize resources of concern and management priorities for a refuge (USFWS 2010)



Limiting factors were also considered in developing objectives. A limiting factor is a threat to, or an impairment or degradation of, the natural processes responsible for creating and maintaining plant and animal communities. In developing objectives and strategies, the team gave priority to mitigating or abating limiting factors that presented high risk to ROCs. In many cases, limiting factors occur on a regional or landscape scale and are beyond the control of individual refuges. Therefore, objectives and strategies may seek to mimic, rather than restore, natural processes. For example, mowing may be used to maintain a desirable vegetation structure, when restoring native grassland communities may be impractical. Through the consideration of BIDEH, the Refuge will provide for or maintain all appropriate native habitats and species. Refuge management priorities may change over time, and because the CCP is designed to be a living, flexible document, changes will be made at appropriate times.

In the following sections, information is provided on the ecological processes of formation and maintenance, regional distribution, condition and threats, key species supported, and management activities for each priority ROC. A similar analysis is presented for focal resources following the analysis for Priority ROCs.

Tables describing focal resources associated with a particular habitat type are included at the end of each Priority ROC section in this chapter. Definitions for the column headings are as follows:

- **Focal Resources:** Species or species groups selected as representatives or indicators for the overall condition of the priority ROC. In situations where the conservation target may include a broad variety of habitat structures and plant associations, several different conservation focal resources may be listed. In addition, species with specific "niche" ecological requirements may be listed as a focal resource. Management will be focused on attaining conditions required by the focal resource. Other species utilizing the associated habitat type will generally be expected to benefit as a result of management for the focal resource.

- **Habitat Type:** The priority resource of concern utilized by the focal resource.

- **Desired Habitat Characteristics:** The specific and measurable habitat attributes considered feasible on the Refuge and necessary to support the focal resource.

- **Life History Requirement:** The general season of use for the focal resource.

- **Other Benefiting Species:** Other species that are expected to benefit from management for the selected focal resource. The list is not comprehensive.

Table 4-2 identifies the priority resources of concern for Kīlauea Point NWR. As native species are referenced by their Hawaiian names, Appendix J contains a list of all scientific, English, and Hawaiian names.

Table 4-2. Priority Resources of Concern

Focal Resources	Habitat Type	Habitat Structure	Life History Requirements	Other Benefiting Species
Mōlī/kaʻupu (albatrosses)	Coastal mixed woodland-grassland	Variable. Large windward sandy, grassy, or shrubby areas with open runways for take-off and landing.	Breeding, prospecting	ʻUaʻu kani, nēnē, koaʻe ʻula, ʻā, ʻiwa, kōlea and other shorebirds, associated native plant and insect communities
ʻAʻo/ʻuaʻu kani (shearwaters)	Coastal mixed woodland-grassland and sea cliff	Substrates with good soil or root structure, or sub-canopy layer for burrowing, rock and root crevices, with open flight corridors.	Breeding, prospecting	Nēnē, koaʻe ʻula, koaʻe kea, ʻa, ʻiwa, ʻou, associated native plant and insect communities
ʻĀ/ʻiwa (red-footed booby and frigatebird)	Coastal mixed woodland-grassland, sea cliff, and beach strand	Variable. Woody vegetation >1.5–3 ft tall	Breeding, roosting, prospecting	Koaʻe ʻula, koaʻe kea, ʻa, ʻiwa, ʻou, ʻaʻo, ʻuaʻu kani, associated native plant and insect communities
Nēnē/pueo	Coastal mixed woodland-grassland, sea cliff	Sward-forming grass-legume mix with high moisture content, managed <6 inches tall. Shrublands with an open understory, forage value, adjacent to grasslands.	Breeding, roosting, foraging	ʻUaʻu kani, koaʻe ʻula, mōlī, kaʻupu, kōlea, kioea, and other shorebirds, associated native plant and insect communities

Focal Resources	Habitat Type	Habitat Structure	Life History Requirements	Other Benefiting Species
‘Ilio-holo-i-ka-uaua/ honu	Beach strand	Protected, un-vegetated, or sparsely vegetated beaches with little to no human activity.	Hauling out and nursing (‘ilio-holo-i-ka-uaua), basking and nesting (honu)	Migratory shorebirds, ‘iwa, ‘ā, and rare native coastal plant communities.

4.3 Primary Habitats

Plants that grow in the coastal zone and low elevation forests are rare in Hawai‘i as a result of development, agriculture, fire, and the introduction of pest species. Only 11 percent of lowland mesic and dry native plant communities remain intact on Kaua‘i, compared to 22 percent for all of the Hawaiian Islands combined.

Coastal habitats are designated as lands between sea level and 1,500 feet in elevation that are typically vegetated with salt-tolerant species and dispersed by wind, currents, and waves, but less capable of terrestrial migration. Strand species are highly influenced by the sea due to their location on the shoreline and adjacent areas. Strand environments can be harsh due to salt spray, constant wind, low rainfall, intense sunlight, high evaporation, high temperatures, and unstable sands. As a result, strand plants have developed a variety of adaptations to deal with these conditions, including moist stems, prostrate growth forms, thick cuticles, and small leaves that are succulent, hairy, or rosette. Because of these harsh conditions, species diversity is usually low in this habitat (Char and Balakrishna 1979, Tabata 1980, Wagner et al. 1999).

The Refuge consists of three primary habitats: coastal mixed woodland-grassland, sea cliff, and beach strand (Figure 4-2). Threats to these habitats include introduced mammalian predators and insect pests, invasive plants, ungulate rooting and grazing, climate change, human development, unregulated vehicular and human traffic, and trespassers.

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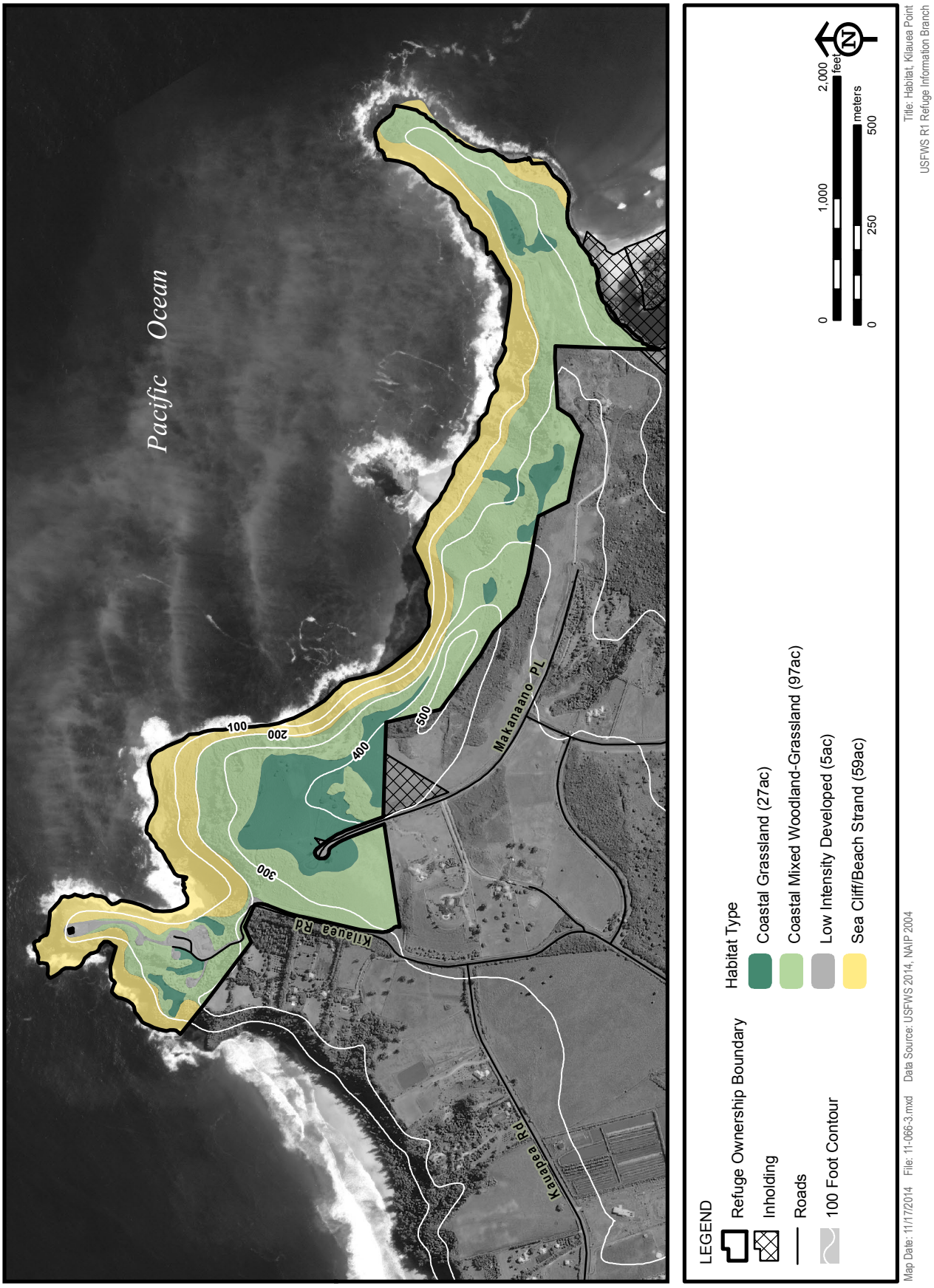
Figure 4-2. Habitat, Kīlauea Point NWR.



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4.3.1 Coastal Mixed Woodland-Grassland

The coastal mixed woodland-grassland habitat consists of flats and bluffs with a <45° slope dominated by low-growing trees and shrubs and perennial herbs adapted for salt, wind, and low precipitation. The area contains shallow, well-drained, highly erodible, saline, phosphorus-rich soils. This habitat type is found along the entire length of the Refuge. Historically, this habitat probably consisted of native-dominated coast, dry-mesic shrubland, mixed shrub and grassland, and mixed shrubland and forest communities. Currently, this area is important breeding habitat for all six species of breeding seabirds on the Refuge (mōlī, ʻuaʻu kani, ʻaʻo, koaʻe ʻula, koaʻe kea, ʻā), breeding and flocking habitat for endangered nēnē, wintering or stopover habitat for migratory shorebirds, and probably foraging and breeding habitat for pueo. Woody vegetation is dominated by ironwood, Christmasberry, and haole koa intermixed with patches of hala, naupaka kahakai, ʻakoko, ʻilima, pōhinahina, and pāʻūohiʻiaka. Grasslands are dominated by introduced species such as Kikuyu grass, Guinea grass, and lantana. These are areas that were historically grazed by livestock and now serve as managed grasslands for nēnē. The coastal mixed woodland-grassland habitat has the greatest potential to be stabilized, restored, and managed to benefit native plant and animal communities, including threatened and endangered species.

4.3.2 Cliff

Sea cliff habitat is characterized by vertical or nearly vertical cliff faces with >45° slope and rocky, shallow, highly erodible substrates exposed to wind, rain, and sea. This habitat type is found along the coastline of the Refuge. Historically, this habitat probably consisted of native-dominated coastal dry-mesic shrubland, mixed shrub and grassland, and mixed shrubland and forest communities. Given the vertical topography and substrate of these areas, access is difficult to hazardous. Because of its steep topography, the area appears to provide a refugium for seabirds and other native species from large mammalian predators and human disturbance. Currently, this area is important breeding habitat for ʻuaʻu kani, koaʻe ʻula, koaʻe kea, and ʻā, and roosting habitat for ʻiwa, ʻā (brown boobies and red-footed boobies), and endangered nēnē. The sea cliffs are sparsely vegetated with ironwood, Christmasberry, and lantana with patches of hala, naupaka kahakai, ʻakoko, ʻilima, and pōhinahina.

4.3.3 Beach Strand

Beach strand habitat, consisting of small areas of sand, gravel, or rock within or just above the tidal zone, provides protected basking habitat for the critically endangered ʻīlio-holo-i-kauaua and potentially the threatened honu, foraging habitat for migratory shorebirds such as ʻūlili, akekeke, kōlea, and marine fauna, and roosting habitat for ʻiwa and ʻā (brown boobies and red-footed boobies). Beach strand communities are strongly influenced by the marine environment including wind and water erosion, wave inundation, and salt spray. Historically, this habitat probably consisted of native-dominated coastal dry herbland and mixed communities. Currently, vegetation is sparse, but consists of low shrubs and perennial herbs, such as naupaka kahakai, ʻilima, and other prostrate native vegetation such as pōhinahina. Invasive species found in this environment include ironwood, Christmasberry, lantana, and haole koa. This habitat type is most vulnerable to climate change because of its low elevation.

4.4 Threatened and Endangered and Other Native Wildlife

4.4.1 ʻAʻo (*Puffinus auricularis newelli*) or Newell's Shearwater

ʻAʻo is a threatened endemic subspecies of the nominate species, the Townsend's shearwater of the eastern Pacific. It is a medium-sized shearwater, dark, sooty black above with a white belly, throat, and underwings. When compared to ʻuaʻu kani, it has shorter, broader wings and a shorter body and tail. Its flight pattern is distinctive with rapid stiff wing beats interspersed with glides versus the banking and gliding of ʻuaʻu kani. ʻAʻo is a pelagic bird that forages over deep waters east and south of Hawaiʻi following predatory fish, particularly yellowfin tuna that chase squid and other prey to the ocean surface (Joyce et al. 2010). The total population of ʻaʻo is estimated to be 84,000 birds, including 14,600 breeding pairs (Ainley et al. 1997). From 1983 to 2008, there has been an alarming 75 percent decline in population indices (Day et al. 2003). Probable causes of the decline include predation by introduced predators, habitat loss and degradation, urbanization including collisions with powerlines, and attraction to urban lights and subsequent disorientation and fallout, and natural catastrophes (Ainley et al. 1997).

At least 90 percent of the subspecies breeds from April to November on Kauaʻi (Ainley et al. 1997), with the remainder breeding on Hawaiʻi, Maui, and Molokaʻi. Age at first breeding is 6 years old. A single egg is laid in a burrow or on the ground in most years. The incubation and chick-rearing periods are 62 and 92 days, respectively. Most ʻaʻo breed in steep mountainsides of Kauaʻi in ʻōhiʻa forest with an uluhe fern-thicket understory. However, between 1978 and 1980, 65 and 25 ʻaʻo eggs were translocated to Kīlauea Point and Mokuʻaeʻae Island, respectively, and cross-fostered by ʻuaʻu kani pairs. Seventy-nine percent of these eggs hatched and 94 percent of the chicks fledged (Byrd et al. 1984). The current breeding habitat at Kīlauea Point is characterized by open-canopy hala forest with a naupaka understory, which supports at least 11 breeding or prospecting pairs, some presumably the fledglings of the translocated eggs or their progeny. Between 2002 and 2012, two to five chicks probably fledged each year from the Refuge. Three chicks hatched and banded on-Refuge in 1997, 2006, and 2009 have returned as successful breeders or prospectors.

4.4.2 Nēnē (*Branta sandvicensis*) or Hawaiian Goose

The endangered nēnē is a member of the waterfowl family (Anatidae) and closely related to the Canada goose. Though similar in appearance, the gander is usually slightly larger than the goose. It is light gray-brown with a mostly black head, cream-colored neck with distinctive dark furrows, and black tail and feet. Nēnē are browsing grazers, eating the leaves, seeds, fruits, and flowers of grasses, sedges, forbs, and shrubs (Banko et al. 1999). In the 1950s, the nēnē population declined to about 30 birds on Hawaiʻi because of introduced predators, overhunting, and habitat loss. In 2011, there were an estimated 2,457–2,547 nēnē on four islands, including growing numbers on Kauaʻi, which supports 1,421–1,511 birds, or 59 percent of the State population (USFWS unpubl.).

Nearly all birds are the result of an aggressive captive propagation-and-release program which was initiated by the Territorial government in 1949. This program is credited with bringing nēnē back from the brink of extinction; however, despite a comeback, nēnē still face major obstacles on the road to recovery. Current threats include depredation by introduced predators, inadequate nutrition, lack of suitable lowland habitat, human-related disturbance and mortality, behavioral problems, lack of genetic diversity, and disease (USFWS 2004).

Habitat types frequently used by nēnē at Kīlauea Point NWR include grasslands dominated by introduced species (e.g., saltgrass, Kikuyu grass), open-understory shrublands (e.g., naupaka, haole koa), and sea cliffs. Nēnē build nests on the ground usually under woody and herbaceous plants with an open canopy. Nesting habitats range widely but generally are associated with woody vegetation. Species composition varies by availability; for instance, in highlands native shrubs (e.g., ʻaʻaliʻi, ʻōhelo, pūkiawe, small ʻōhiʻa) predominate, but in lowlands on Kauaʻi both native (e.g., naupaka, pōhinahina) and nonnative (e.g., lantana, Christmasberry, koa haole, Guinea grass) plants are used.

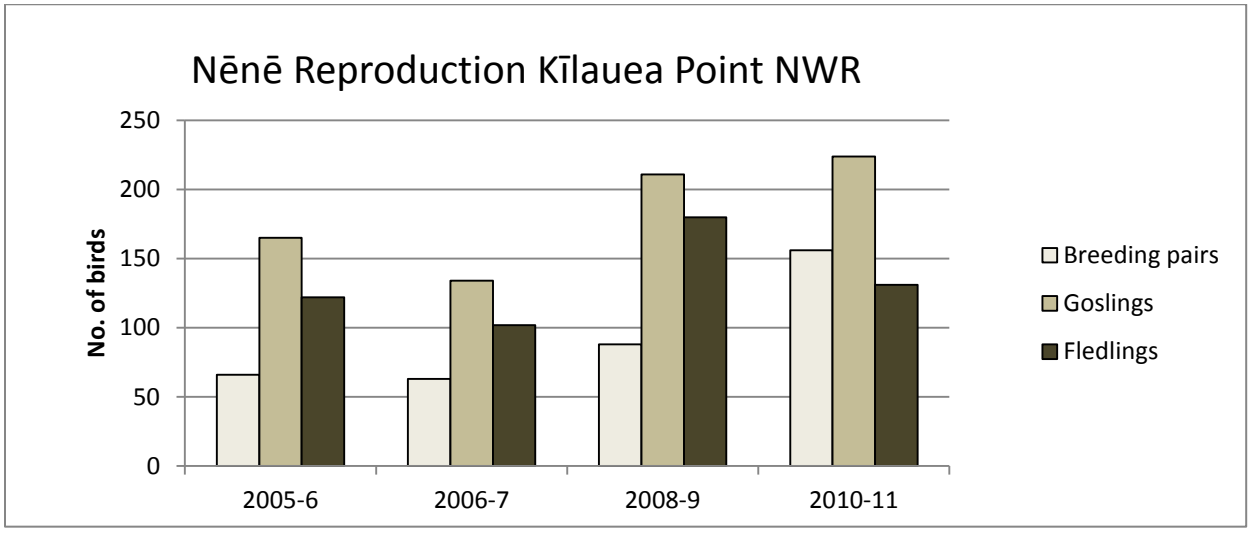
Nēnē mate for life. The average clutch size is three eggs (range 1–6), incubation is usually 30 days (range 29–32), and goslings fledge at 10–14 weeks (Banko et al. 1999). Breeding occurs mainly October to March and molting March to June, which is when adults become flightless for 4 to 6 weeks while they grow new flight feathers. During this period, they become secretive and are extremely vulnerable to attacks by introduced predators. During the rest of the year, from June to September, nēnē disperse or flock with other family groups in nonbreeding areas where young nēnē have opportunities to find mates. Historically, nēnē are believed to have bred and molted in the lowlands during the winter and to have moved to higher elevations in the summer. Today, birds move daily between feeding and roosting areas and seasonally between breeding and nonbreeding areas, but altitudinal patterns are less apparent (USFWS 2004).

Nēnē are browsing grazers, eating the leaves, seeds, fruits, and flowers of grasses, sedges, forbs, and shrubs (Banko et al. 1999), and they occasionally climb into or perch in bushes to reach berries (e.g., naupaka, māmaki). In many areas nēnē feed on cultivated grasses. In mid-elevation Hawaiʻi, birds select forage with high water and protein content such as the young shoots of a Kikuyu grass–Spanish clover grassland. They prefer sward-forming (turf-like growth) over bunch grasses and short (2–4 inches) over tall grasses and use grasslands less during drought (Woog and Black 2001).

In partnership with the DLNR and USFWS Ecological Service, 38 nēnē were reintroduced to Crater Hill on the Refuge between 1991 and 1994. By 2002, the population was estimated to be 238 birds (USFWS 2004). In 2011, the population estimate for Hanalei, Princeville, and Kīlauea Point was 791–811 birds.

In 2010, the average number of nēnē during the breeding season (Oct–May) and flocking season (Jun–Sep) was 82 and 158, respectively, with a high count of 214 birds in July. During the 2010–2011 breeding season, the Refuge supported a minimum of 156 nēnē breeding pairs, 224 goslings, and 131 fledglings. Of 105 located nests, 85 (81 percent) hatched at least 1 egg. Of 298 eggs of located nests, 215 (72.2 percent) hatched. Of these 215 goslings, 91 (42.3 percent) fledged. However, the fledging rate is biased low because of the difficulty in collecting reliable gosling data on unhabituated, more secretive birds at Crater Hill and Mōkōlea Point.

Figure 4-3. Nēnē reproduction at Kīlauea Point NWR, 2005–2011.



4.4.3 ʻŌpeʻapeʻa (*Lasiurus cinereus semotus*) or Hawaiian Hoary Bat

ʻŌpeʻapeʻa is a medium-sized member of the vesper bat family (Vespertillionidae) which consists of nocturnal, mostly insect-eating bats. It is an endemic and endangered subspecies of the North American hoary bat, a solitary tree-rooster. The ʻōpeʻapeʻa is Hawaiʻi's only native terrestrial mammal. Males and females have a wingspan of about 1 foot, and females are typically larger than males. Both sexes have brown and gray fur. Individual hairs are tipped or frosted with white; "hoary" means frosted. The Hawaiian name refers to a half taro leaf or canoe sail shape which are similar to the shape of the bat. Fur color, frosted or reddish, may be related to location or age.

Theʻōpeʻapeʻa is a major predator of night-flying insects such as moths, beetles, and termites. Bats forage in open and wooded landscapes and linear habitats such windbreaks and riparian zones, and roost in trees with dense foliage and with open access for launching into flight. Females are believed to give birth to twins May to August and rear pups May to September. Pups fledge from about July to September, which is a critical time in the reproductive cycle (Menard 2001, Bonaccorso et al. 2008). The population size is unknown. Resident populations occur on Kauaʻi, Maui, and Hawaiʻi, and possibly other main islands, with the highest abundance on Kauaʻi and Hawaiʻi.

Threats are largely unknown but may include roost disturbance, introduced predators, obstacles to flight (e.g., barbed wire fences, vehicles), and pesticides (USFWS 1998). In fall of 2010, a single ʻōpeʻapeʻa was sighted flying over Crater Hill at sunset on a calm evening (USFWS unpubl.). Occurrence frequency is unknown; however, forested edges near Kāhili Beach and Kīlauea River mouth likely provide suitable habitat (C. Pinzari pers. comm. USGS, 2010).

4.4.4 ʻIlio-holo-i-ka-uaua (*Monachus schauinslandi*) or Hawaiian Monk Seal

The ʻilio-holo-i-ka-uaua or Hawaiian monk seal is among the most critically endangered mammals in the world. Approximately 1,200 seals remain today with the majority in the Northwestern Hawaiian Islands (NWHI), but there is a small and potentially growing population of seals in the main Hawaiian Islands (MHI) where a 2005 survey documented 76 individuals. Its Hawaiian name means "the dog that runs in the rough seas." Seals frequently haul out on shorelines to rest and molt and

females may haul out on shore for up to 7 weeks to give birth and nurse their pups. Pups and moms stay ashore until weaned. Gestation is approximately 1 year and pupping occurs in late winter and spring.

ʻIlio-holo-i-ka-uaua can live up to 25 years. They feed on reef fishes, heʻe (octopus), squid, and lobsters down to depths of 1,000 feet. Food seems to be a limiting factor for population growth. ʻIlio-holo-i-ka-uaua are usually solitary except when on preferred beaches when they may be close together and interact. Populations have been decreasing recently in the NWHI, possibly due to sea levels rising above some islands, competition for food resources, and predation on pups. Terrestrial habitat is used about one-third of the time and requirements include haul-out areas for pupping, nursing, and resting, primarily on sandy beaches, but virtually all substrates are used. Beachside vegetation is used for protection from wind and rain. ʻIlio-holo-i-ka-uaua are particularly vulnerable to climate change because of their limited global range and breeding distributions which are restricted primarily to the low-lying NWHI (Reynolds et al. 2012).

Conflicts and interactions with a variety of ocean and beach users are becoming more frequent and significant in the MHI. Dogs have attacked ʻilio-holo-i-ka-uaua, and they carry diseases that are potentially lethal to the critically endangered seal, such as canine distemper virus. Human disturbance, especially of mothers with pups, may be a threat. Guidelines recommend people remain 50 yards from ʻilio-holo-i-ka-uaua and other marine mammals. ʻIlio-holo-i-ka-uaua can be observed during most months of the year at the Refuge, most often in the cove below the Kīlauea Road Overlook.

4.4.5 Pueo (*Asio flammeus sandwichensis*) or Hawaiian Short-eared Owl

The pueo is an endemic subspecies of the short-eared owl. The adult is brown and buffy white and ventrally streaked with darker brown. The eyes are yellow and the bill is black. Unlike most owls, pueo are diurnal, though nocturnal or crepuscular activity has been documented. Pueo are commonly seen hovering or soaring over open areas. It is listed by the State of Hawaiʻi as an endangered species on the island of Oʻahu.

The pueo is found on all the MHI from sea level to 8,000 feet elevation. There have been no surveys to estimate the pueo population. The species was widespread at the end of the 19th century but is thought to be declining (Mostello 1996, Mitchell et al. 2005). Pueo occupy a variety of habitats, including wet and dry forests, but are most common in open habitats such as grasslands, shrublands, and montane parklands, including urban areas and those actively managed for conservation (Mitchell et al. 2005). Their relatively recent establishment on Hawaiʻi (<1,200 years) may have been tied to the rats that Polynesians brought to the islands. In Hawaiʻi, pellet analyses indicate that rodents, birds, and insects are their most common prey. Birds depredated by pueo have included passerines, seabirds, and shorebirds.

Little is known about the breeding biology of the ground-nesting pueo, but nests have been found throughout the year. Nests are constructed by females and are composed of simple scrapes in the ground lined with grasses and feather down. Females also perform all incubating and brooding, while males feed females and defend nests. The young may fledge from nests on foot before they are able to fly, and they depend on their parents for approximately 2 months (Mitchell et al. 2005). Pueo can be sighted roosting on and soaring over Crater Hill and Mōkōlea Point. Little is known about Hawaiʻi's only native owl.

Similar to other native Hawaiian birds, loss and degradation of habitat, predation by mammals, and disease threaten pueo. Pueo appear particularly sensitive to habitat loss and fragmentation, as they require relatively large tracts of grassland and are ground-nesters. Ground-nesters are more susceptible to the increased predation pressure that is typical within fragmented habitats and near rural developments (Wiggins et al. 2006). These nesting habits make them increasingly vulnerable to predation by rats, cats, and Indian mongooses (Mostello 1996, Mitchell et al. 2005).

Mortality of pueo on Kaua‘i has been attributed to “sick owl syndrome,” which may be related to pesticide poisoning or food shortages. They may be vulnerable to the ingestion of poisoned rodents. However, in the one study conducted, there was no evidence that organochlorine, organophosphorus, or carbamate pesticides caused mortality in pueo. Other causes of death on Maui, O‘ahu, and Kaua‘i have been attributed to trauma (apparently vehicular collisions), emaciation, and infectious disease (pasteurellosis; Work and Hale 1996). However, their persistence in lowland, nonnative, and rangeland habitats suggests that they may be less vulnerable to extinction than other native birds, especially because they may be resistant to avian malaria and avian pox (Mitchell et al. 2005).

4.4.6 Honu (*Chelonia mydas*) or Green Turtle

Honu, also known as the green turtle, is a large sea turtle of the family Cheloniidae. Honu may be seen in waters adjacent to the Refuge. Mature males are distinguished from females by their longer, thicker tails.

Honu live and forage around all the Hawaiian Islands. They are most often found in shallow, protected, or semi-protected water around coral reefs and coastal areas. These habitats contain critical foraging areas consisting of sea grasses and algae, and they provide some shelter from predators such as tiger sharks. However, although nesting occurs on all islands, 90 percent occurs on French Frigate Shoals of the NWHI. Evidence shows that Hawaiian turtles migrate only throughout the 1,500-mile expanse of the Hawaiian Archipelago, and so make up a discrete population. Post-hatchlings and juveniles live in pelagic waters, but little is known of their specific distribution.

Little information exists on the feeding behavior of post-hatchlings and juveniles living in pelagic habitats, but most likely they are exclusively carnivorous (e.g., soft-bodied invertebrates, jellyfish, and fish eggs). Subadult and adult turtles residing in nearshore benthic environments are almost completely herbivorous, feeding primarily on select macroalgae and sea grasses. The common name “green sea turtle” is derived from the color of their body fat, which is green from the limu (algae) they eat. Adult honu can weigh up to 500 pounds and are often found living near coral reefs and rocky shorelines where limu is plentiful. Hawaiian honu display slow growth rates, even compared to other populations, with an average annual growth rate of approximately ½ to 2 inches per year. Turtles often reach sexual maturity at 35–40 years (Mitchell et al. 2005).

Threats to honu include the tumor disease Fibropapilloma; alien seaweeds that displace important foraging, resting, and cleaning habitats of the turtles; indirect take of adult and juvenile turtles as fisheries bycatch; predation, particularly of hatchlings in the open ocean; impacts from snorkeling and other human recreational activities; marine debris that entangles turtles or is ingested by them; and the loss or degradation of foraging habitats along coastal areas due to development, sedimentation, soil erosion, or sewage; nest predation; and boat collisions. Honu can be observed offshore during most months of the year at the Refuge.

4.5 Breeding Seabirds

4.5.1 Mōlī (*Phoebastria immutabilis*) or Laysan Albatross

The mōlī or Laysan albatross is a large seabird (Family: Diomedeidae) whose breeding range is centered in the NWHI. Adults are sexually monomorphic and mostly white with black wings and tail; the upperwings are entirely dark, and the underwings are mostly white with variable amounts of black especially along leading and trailing edges. The bill is pink with a gray, hooked tip; legs and feet are light pink. Mōlī are accomplished fliers using dynamic soaring to cover great distances; they mainly feed at night and often far from their breeding colony (1,100 miles; 1,770 km). In Hawai‘i, their diet consists primarily of squid, deep-water crustaceans, fish, and flying fish eggs (Awkerman et al. 2009).

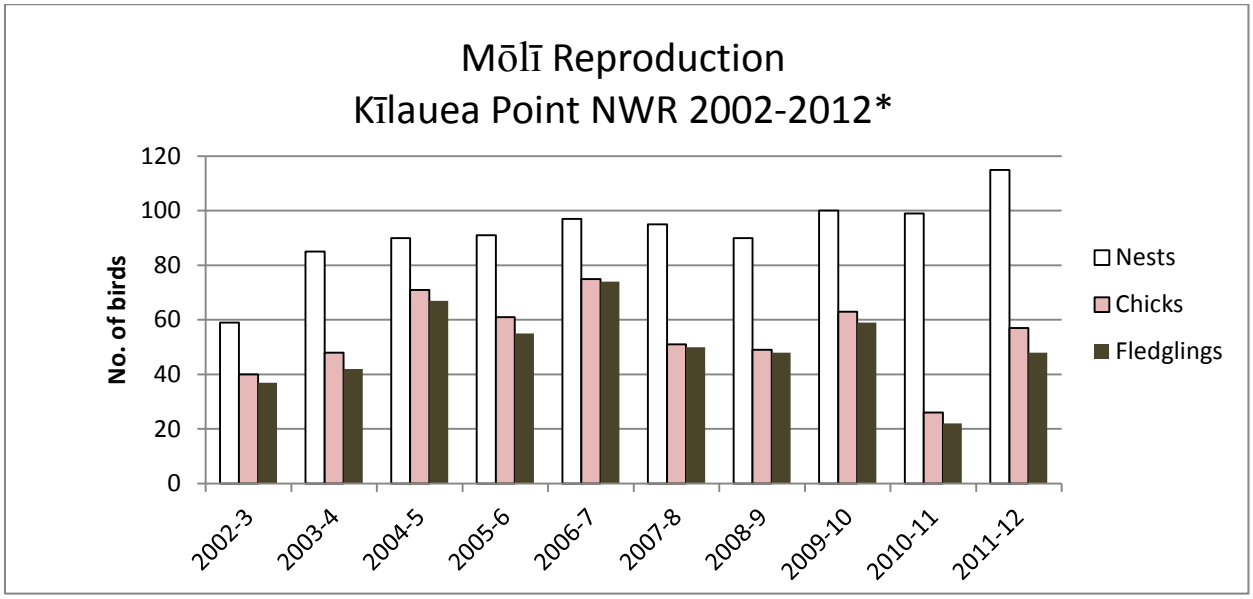
Like most seabirds, mōlī breed in colonies, have long-term pair bonds and high nest site fidelity, lay only one egg per season, and both parents participate in all aspects of raising young. Pairs engage in long, noisy, ritualized courtship dances. Typically they select nest sites close to vegetation and nests vary from a scrape to a ring-like structure composed of sand, vegetation, and debris. Eggs are laid in November and December and chicks fledge in June and July; no post-fledgling care is provided by parents. Young birds generally do not return to land until about their third year after fledging. These birds do not breed, but prospect for mates. Generally, mōlī first breed between 8 and 9 years old, and the oldest known individual is at least 63 years old (Awkerman et al. 2009; USFWS unpubl.).

Mōlī breed throughout the NWHI and on the MHI of Kaua‘i and O‘ahu and Lehua Island off Ni‘ihau. Outside of Hawai‘i, mōlī breed on islands off Japan and Mexico. Outside the breeding season, mōlī disperse widely throughout the North Pacific (Young et al. 2009a). In the Hawaiian Archipelago, the population is estimated at more than 590,000 pairs with largest colonies occurring on Midway Atoll (441,000 pairs) and Laysan (145,000 pairs). Total population of all MHI colonies is less than 500 pairs; worldwide population is estimated at 630,000 breeding pairs (Arata et al. 2009).

Historical threats include feather and egg harvesting and military operations on Midway Atoll in the NWHI. Current threats to mōlī include bycatch in fisheries operations, contaminants ingestion, sea level rise in the NWHI, and predation on breeding colonies in the MHI. Mōlī are vulnerable to climate change because of their limited global range and breeding distributions which are predominantly located in the low-lying NWHI (Reynolds et al. 2012).

The first three mōlī chicks fledged from Mōlī Hill on the Refuge in 1986 (KPNHA 1986). Currently, mōlī are found in the densest concentrations on Mōlī Hill (55 breeding pairs in 2011–2012 season), and the rest are distributed on the eastern third of the Refuge towards Mōkōlea Point for a total of 115 pairs in the 2011–2012 season. From 2002 to 2012 the number of breeding pairs appears to be steadily increasing each year as a result of predator control, natural recruitment, and immigration from other breeding sites; the number of chicks and fledglings appears to be stable or slightly decreasing. Over the past decade, the Refuge has fledged 50 mōlī per year on average.

Figure 4-4. Mōlī reproduction at Kīlauea Point NWR, 2002–2012.



*Includes supplemental eggs. The Pacific Range Missile Facility's BASH program, 2005-2012.

4.5.2 ʻUaʻu kani (*Puffinus pacificus*) or Wedge-tailed Shearwater

The ʻuaʻu kani or wedge-tailed shearwater is a large, abundant seabird (Family: Procellaridae) that produces a variety of wails and moans that inspired this bird's Hawaiian name, which means "calling or moaning petrel." Individuals have long, sleek wings, a wedge-shaped tail, and a hooked bill. ʻUaʻu kani are polymorphic, having two color phases, dark or light, and sexes are similar; approximately 90 percent of the birds breeding in Hawaiʻi are light-phase. Light-phase adults are grayish brown above with white underparts except for dark trailing edges of wings and tail. Dark-phase adults are uniformly sooty brown. Flight is similar to that of albatross but wings flap with greater frequency (Whittow 1997).

ʻUaʻu kani often forage in large, mixed species flocks associated with schools of large predatory fishes (such as ahi and mahi mahi) which drive smaller prey species to the surface. ʻUaʻu kani use a variety of foraging techniques; most frequently they plunge their heads into water while on the wing. They also seize prey while sitting on the water, and they often follow fishing vessels. In Hawaiʻi, their diet primarily consists of larval goatfish, flyingfish, squirrelfish, and flying squid. Like most seabirds, ʻuaʻu kani breed in their natal colonies, form long-term pair bonds, have high site fidelity, lay only one egg per season, and both parents participate in all aspects of raising young. ʻUaʻu kani nest in excavated burrows, rock crevices, or under vegetation.

In Hawaiʻi, breeding is synchronous, and most eggs are laid in June with most young fledging in November. Birds first breed at 4 years, and the oldest known individual was 29 years old (Whittow 1997). At the Refuge, ʻuaʻu kani typically arrive in late February and early March. The first eggs are laid in early June, with peak laying in mid-June, and most egg laying completed by the end of June. Hatching begins in late July with most chicks hatched by mid-August. Fledging begins in early November, peaking in mid- to late November. The average incubation period onsite is 53 days, and nestling period is 103–115 days (Byrd et al. 1983).

ʻUaʻu kani breed on low, flat islands and sand spits with little or no vegetation, but also excavate burrows on the slopes of extinct volcanoes and in old volcanic craters. Burrows require firm soil or plant roots to stabilize loose soil; generally nesting habitat is devoid of tall woody plants. In locations where nest sites are scarce or the ground is too hard to excavate burrows, individuals will nest in rock crevices or above ground. ʻUaʻu kani breed throughout the NHWI and on offshore islets of most of the MHI. Outside Hawaiʻi, ʻuaʻu kani breed on islands throughout the tropical and subtropical Indian and Pacific oceans.

Outside the breeding season, ʻuaʻu kani migrate to the eastern Pacific. In Hawaiʻi, population is estimated at 270,000 breeding pairs, with approximately 210,000 of those occurring in the NWHI. The population in the MHI is estimated at between 40,000 and 60,000 breeding pairs with the largest colonies occurring on the offshore islands of Mānana (10,000–20,000 pairs), Moku Loa (10,000–20,000 pairs), Lehua (23,000 pairs), Kīlauea Point NWR (ca. 10,000 pairs), and Kaʻula (1,500–2,500 pairs). Smaller populations occur on Moku Manu, Mokuʻauia, Kāpapa, Molokini, Mōkapu Peninsula, and Kaʻena Point Natural Area Reserve on Oʻahu. Worldwide population is estimated at over one million breeding pairs (USFWS 2005b).

Threats to ʻuaʻu kani include food reduction through overfishing of the large predatory fishes (ahi) that bring their prey to the surface, depredation by introduced predators in MHI breeding colonies, light attraction, and human disturbance. A pilot study on stress hormone levels and chick sizes in relation to their proximity to the Refuge's lighthouse trail suggested ʻuaʻu kani chicks near the trail (e.g., <12 feet) may be exposed to higher chronic levels stress from visitation (Kitaysky et al. 2004). In 2010 at the Refuge, more than 75 adult ʻuaʻu kani were found preyed upon by owls (compared with about 5 in 2009), and carcass recoveries subsided after removal of 4 introduced barn owls (USFWS unpubl.). From 2011–2014, native bird carcass recoveries with owl kill signs were 4.2, averaged over the four years. Ongoing losses from depredation could affect local populations because adult survival is an important factor regulating seabird populations.

ʻUaʻu kani is the most abundant bird species on the Refuge with dense concentrations on Mōlī Hill, near the lighthouse, Crater Hill, and Mōkōlea Point, where habitat is suitable. Byrd et al. (1983) estimated that between 1978 and 1981, 520 fledglings from 700 breeding pairs fledged annually from the accessible 10–45 degree slopes of Kīlauea Point peninsula. In 2004, average hatching success of 10 plots was 73 percent (range 20–100 percent) and nest density was 0.36 nests per square yard (range 0.09–0.86) (Zaun 2004). Although the number of breeders and prospectors is unknown, the Refuge probably supports roughly 8,000–15,000 breeding pairs.

4.5.3 Koaʻe kea (*Phaethon lepturus*) or White-tailed Tropicbird

Koaʻe kea are mostly white birds with a pair of narrow, elongated inner tail feathers. Male and female birds are similar in appearance. The adult is 29 inches long from bill to end of tail, and the tail is about half that length. Its wingspan is 37 inches, and the bird weighs 11 ounces. The feathers are mostly white with black markings on the upper wings and a black eye-stripe. It has a long white tail with a black stripe on top and a decurved bill that is usually yellow. Variations in bill color include yellowish-green, orange, and red-orange. It has short legs and its feet are webbed. Since legs of the tropicbird are set far back on its body, it is a good swimmer, but awkward on land (Lee and Walsh-McGehee 1998).

Koaʻe kea usually forage alone, but occasionally with conspecifics, most often far from land and will often follow ships. Koaʻe kea captures prey by plunge-diving from 50–65 feet above the water. Their

diet is poorly known, but includes flyingfish and is likely similar to koaʻe ula. Koaʻe kea breed in colonies, and pairs remain together for years. At the beginning of the breeding season, pairs engage in complex aerial displays. Nests are placed in hard to reach locations on cliffs, as well as in caves and tree hollows; nests have little if any material. In Hawaiʻi, breeding occurs March through October and a single egg is laid per season. Both parents incubate the egg, and brood and feed the chick. No post-fledging care is provided. Based on few data, age at first breeding is likely after the fourth year; no data on longevity has been collected (Lee and Walsh-McGehee 1998).

In Hawaiʻi, the population is estimated at 1,800 breeding pairs with most occurring in the MHI. The worldwide population is estimated at less than 200,000 breeding pairs. Threats to koaʻe kea are primarily predation on the breeding colonies (USFWS 2005b).

Koaʻe kea can be observed at the Refuge year-round, but appear to be less common in the winter. Nesting appears to be year-round, but peaks occur from March to October. In 2005, four nests were monitored on the Refuge; all four were in rock crevices on steep-sided cliff faces, and only one was accessible. Chicks successfully fledged from two nests and the outcome of the other two was unknown (Zaun 2005).

4.5.4 Koaʻe ʻula (*Phaethon rubricauda*) or Red-tailed Tropicbird

The koaʻe ʻula or red-tailed tropicbird is a showy, white seabird (Family: Phaethontidae) related to boobies and frigatebirds. Adult males and females are mostly white, although they develop a pale pinkish wash when breeding, except for a partial black eye ring and short eye line, black flanks, and black shafts of outer primaries; both sexes have long, narrow tail feathers with red shafts. Koaʻe ʻula have large red bills; their legs and feet are very small. Flight is characterized by strong flapping interspersed with gliding, and koaʻe ʻula are capable of flying long distances. Koaʻe ʻula usually forage alone, but occasionally with other species, most often far from land and will often follow ships. Koaʻe ʻula capture prey by plunge-diving. In Hawaiʻi, their diet is mainly composed of flying fish, but also includes squid, mackerel scads, dolphinfish, truncated sunfish, and balloonfish (Schreiber and Schreiber 1993).

Koaʻe ʻula breed mainly on oceanic islands and coral atolls with shrubs, including naupaka and beach heliotrope (*Tournefortia argentea*). Koaʻe ʻula nest on the ground, generally in inconspicuous places, such as under vegetation or in cliff crevices. Koaʻe ʻula breed in colonies and pairs remain together for years. At the beginning of the breeding season, pairs engage in complex aerial displays. Nests are placed on the ground, and generally are a simple scrape lined with some vegetation. In Hawaiʻi, breeding can occur throughout the year, but most breeding occurs between February and June. A single egg is laid per season, and both parents incubate the egg, and brood and feed the chick. The incubation period is 39–51 days, and the nestling period is 73–123 days. No post-fledgling care is provided. Age at first breeding is between 2 and 4 years, and the oldest known individual was 23 years old (Schreiber and Schreiber 1993).

Koaʻe ʻula breed throughout the NWHI and at a limited number of sites on MHI, mostly on offshore islets. Outside of Hawaiʻi, koaʻe ʻula breed on oceanic islands in the Indian and Pacific oceans. Outside the breeding season, adults are solitary and pelagic, and their range is poorly known. In Hawaiʻi, population is estimated at between 9,000 and 12,000 breeding pairs, with the largest populations occurring on Midway Atoll and Laysan Island. The worldwide population is estimated at 17,000 to 21,000 breeding pairs, with the majority residing in the Pacific Ocean. Primary threats include predation on the breeding colonies (USFWS 2005b).

Koa‘e ‘ula can be observed at the Refuge year-round, but are more common February to September. Nesting generally occurs from March to August, and birds nest in rock crevices and on benches on steep cliff faces and windswept slopes and under woody vegetation such as naupaka. In 2005, 191 nests were monitored on the Refuge; of these, 145 nests were accessible on flats and slopes of Kīlauea Point, Crater Hill, and Mōkōlea Point. The dates for egg-laying spanned approximately March 8 to August 18. The dates for chick fledging ranged from July 9 to November 13. Hatching success and fledging success was 77 percent and 81 percent, respectively. Mate fidelity and nest-site fidelity for the years 2004–2005 was 85 percent and 76 percent, respectively (Zaun 2005).

4.5.5 ‘Ā (*Sula sula*) or Red-footed Booby

The ‘ā or red-footed booby is the smallest booby (Family: Sulidae), and has a pantropical distribution. Individuals have long, pointed wings and a relatively long, wedge-shaped tail. Several color phases exist, ranging from all brown to all white; almost all Hawaiian birds are white. Adult male and females are overall white, except for brownish black primary and secondary wing feathers; females are larger than males. Feet and legs are orange to red, bill bluish except for the base of the lower mandible, which is pinkish, and facial skin around the bill ranges from pink to red and blue. Flight is characterized by strong flapping interspersed with gliding, and they may glide for long distances depending on wind conditions (Schreiber et al. 1996).

‘Ā forage alone or in mixed species feeding flocks, generally feeding farther from land than their congeners. ‘Ā capture prey by plunge-diving generally from 13 to 26 feet over the water. In Hawai‘i, their diet is mainly composed of flying fish and squid, but also includes mackerel, scads, saury, and anchovies (Schreiber et al. 1996).

‘Ā breed on small islands or islets, both on low-lying coralline sand islands and high volcanic islands. They tend to nest in bushes or trees, including beach naupaka and beach heliotrope. They will occasionally nest on deserted man-made structures, on bare ground, or on low piles of vegetation. ‘Ā build nests of twigs, grass, and other vegetation. ‘Ā breed in colonies ranging from 10 to 10,000 pairs, and pairs generally retain mates throughout several breeding seasons. In Hawai‘i, breeding season is synchronous, but can occur throughout the year. Egg laying peaks in February through April, and most young fledge by September. Both parents incubate the egg, and brood and feed the chick. Adults continue to feed young up to 4 months after fledging. Birds first breed at 3 to 4 years of age and the oldest known individual was 22 years old (Schreiber et al. 1996).

‘Ā breed throughout the NWHI and at a limited number of sites on MHI, including Kīlauea Point NWR, the cliffs of Ulupa‘u Head at the Kāne‘ohe Bay Marine Corps Base on O‘ahu, and offshore islets including Moku Manu and Lehua. Outside of Hawai‘i, ‘ā breed on islands in the tropical waters of the Pacific, Indian, and Atlantic oceans, Caribbean Sea, and seas north of Australia. Little is known about the movements of the ‘ā outside nesting season, but birds in Hawai‘i appear to disperse eastward and move between islands (USFWS 2005b).

Threats include poaching of eggs, chicks, and adults for food; degradation of habitat from human development of coastal zones and introduced sheep, goats, and pigs; and disturbance at nest sites. ‘Ā have been described as sensitive to human activities, including eco-tourism (Burger and Gochfeld 1993). This species may tolerate short-term, infrequent human disturbance, but typically does not breed in proximity to humans (Schreiber et al. 1996). Up until the mid-1960s, hundreds of ‘ā nested around Kīlauea Point peninsula (by the lighthouse), and it is suspected that the colony shifted to its current Crater Hill location because of threats from large mammalian predators (G. Smith, pers.

comm). Kīlauea Point peninsula has been free of large mammalian predator for about two decades; however, the ʻā have not returned to nest there.

In Hawaiʻi, the population is estimated between 7,000 and 10,500 breeding pairs. The worldwide population is estimated at less than 300,000 breeding pairs, with the majority residing in the eastern Pacific (USFWS 2005b). ʻĀ occur year-round at the Refuge, but breeding has been documented only between the months of February and October. Breeding occurs only on the windward slopes of Crater Hill where birds build nests in ironwood and Christmasberry trees. Between 2004 and 2008, the Refuge supported an annual average of 1,882 breeding pairs of ʻā.

Table 4-3. Spring surveys of ʻā breeding pairs, Kīlauea Point NWR (USFWS files)

Survey date	Crater Hill			Total
	West	Central	East	
5/07/2004	1214	350	250	1814
5/18/2005	1422	209	133	1764
5/24/2006	1866	360	310	2536
5/22/2008	1243	65	107	1415
Average (SD)				1882 (470.6)

4.6 Other Seabirds

Other nonbreeding seabirds that use the Refuge for roosting and prospecting include kaʻupu (black-footed albatross, *Phoebastria nigripes*), ʻā (brown booby, *Sula leucogaster*) and ʻiwa (great frigatebird, *Fregata minor*).

Kaʻupu are closely related to mōlī, and are approximately the same size, but with a dark chocolate brown coloring throughout the body, and small amounts of white around the bill, eye, and around the tail. The species has a Federal status as a "bird of conservation concern" and State of Hawaiʻi status of threatened, and was recently petitioned but declined for Federal listing. The world breeding population is estimated at 61,700 pairs, with a trend that is stable in the long-term and declining in

ʻĀ at the Refuge in 1964 adjacent to the lighthouse. Gary Smith

vulnerable to climate change because of their limited global range and breeding distributions which are restricted primarily to the low-lying NWHI (Reynolds et al. 2012). They primarily visit the Refuge in February where they can be seen flying offshore or landing on Mokuʻaeʻae.

Similarly, ʻā (brown booby), are also closely related to ʻā (red-footed booby) and are occasionally spotted roosting on the Refuge, and they frequently fly by. These ʻā are all brown on top and on their

breasts, and have contrasting white coloration underneath and yellow feet. Unlike red-footed boobies though, brown boobies nest on the ground on relatively flat surfaces. This species is very susceptible to human disturbance and will flush from their nests easily.

‘Iwa are large, graceful seabirds related to tropicbirds and boobies that are almost entirely black with varying amounts of white underneath on females and juveniles. Males have a large, red gular pouch which they inflate for courtship displays. ‘Iwa can be recognized from other seabirds on the Refuge by their large size, deeply forked tail, long bill, and tendency to harass and chase both species of ‘ā in an attempt to steal their food. They can be found roosting along the sea cliffs of Crater Hill and Mōkōlea Point in addition to being frequent aerial visitors of the Refuge.

4.7 Migratory Waterfowl and Shorebirds

For hundreds of thousands of years, migratory waterfowl, shorebirds, and other waterbirds have wintered on the Hawaiian Islands from September to May. Of the nearly 30 species of migratory ducks and geese using the islands, the most common winter migrants observed on the Refuge include cackling geese, snow geese, and white-fronted geese. Of the approximately 50 species of migratory shorebirds that have been recorded in the Hawaiian Islands (Pyle and Pyle 2009), the most common shorebirds on the Refuge are kōlea (Pacific golden-plovers), ‘akekeke (ruddy turnstones), and ‘ulili (wandering tattlers), and occasionally hunakai (sanderlings) and kioea (bristle-thighed curlews).

Shorebirds primarily utilize wetlands and tidal flats; however, estuaries and uplands are also important habitats. Golf courses on O‘ahu support an estimated 1,900 kōlea during the winter, and this species has even been observed roosting on urban rooftops (Engilis and Naughton 2004). On the Refuge, short-grass habitat and shorelines are used by shorebirds, with kōlea being the most abundant.

The Pacific Islands region functions as an essential migratory habitat for maintaining global shorebird populations. The Service developed the U.S. Pacific Islands Regional Shorebird Conservation Plan over concerns of declining shorebird populations and loss of habitat. Threats to shorebirds in the Pacific Islands include habitat loss, nonnative plants, nonnative animals (e.g., predation, disease, competition), human disturbance, and environmental contaminants. Population estimates and conservation status for shorebirds are provided in Table 4-4. The kōlea is the most common shorebird in the Pacific Islands region, with Hawai‘i supporting a substantial portion of the Alaskan breeding population during winter. The kioea is the only migratory species that exclusively winters in the Pacific. Thus, the Pacific Islands region is considered to be a critical area for supporting hemispheric populations of both these species (Engilis and Naughton 2004).

Table 4-4. Shorebirds of primary conservation importance in the Pacific islands region (Engilis and Naughton 2004).

Species	Hawai‘i Winter Population	Regional Trend	Conservation Category
Kōlea	15,000–20,000	Unknown	High Concern

Species	Hawai‘i Winter Population	Regional Trend	Conservation Category
Ae‘o	1,200–1,600	Unknown	Highly Imperiled
Kioea	800	Unknown	High Concern
‘Ulili	1,000	Unknown	Moderate Concern
‘Akekeke	5,000–7,000	Unknown	Low Concern

4.8 Threatened and Endangered Plants

With nearly 300 species of plants listed as threatened or endangered, nearly one-third of Hawai‘i’s remaining native flora is threatened with extinction. Over 100 species of plants now listed as threatened or endangered occur, or historically occurred, on the island of Kaua‘i; 49 species are found only on Kaua‘i. Plants that grow in coastal shrublands and low elevation forests are particularly rare due to the long-term presence of humans and the negative effects of their actions, specifically, development, agriculture, fire, and the introduction of pest species. Only 11 percent of lowland mesic and dry native plant communities remain intact on Kaua‘i, compared to 22 percent for all of the Hawaiian Islands combined (The Nature Conservancy 1998).

Small numbers of the following listed species have been introduced on the Refuge.

4.8.1 Pokulakalaka (*Munroidendron racemosum*)

Munroidendron racemosum, commonly known as pokulakalaka, is a monotypic genus and an extremely rare flowering plant in the Araliaceae or ginseng family. It is endemic to Kaua‘i, and occurs in coastal mesic and mixed mesic forests from 390 to 1,300 feet, typically on exposed cliffs and ridges. It is primarily found in three locations on Kaua‘i: Nounou Mountain, Napali cliffs, and Ha‘upu Ridge near Nawilili Bay. Pokulakalaka is a 25-foot tall tree with a straight trunk and spreading branches. It has smooth, gray bark. The 12-inch long leaves are made up of many oval leaflets, each of which is over 3 inches long. These trees drop most of their leaves during their summer blooming season. The small, pale yellow flowers hang in long, loose bunches (Wagner et al. 1999). Flowering season for pokulakalaka is variable, having been observed in both spring and fall, and fruits mature in about 75 days. Self-pollination is assumed to occur since isolated individuals have produced viable seeds. Pollinators have not been observed, but insect pollination is likely. Dispersal mechanisms are unknown (USFWS 1995).

Threats to pokulakalaka include competition with pest plant species, such as kukui, guava, lantana, and koa haole. Other threats include habitat degradation by feral goats, fire, and fruit depredation by rats. Because each naturally occurring population of this species contains only a small number of individuals, the species is also under threat of extinction from catastrophic events, such as landslides or hurricanes.

4.8.2 Alula (*Brighamia insignis*)

Brighamia insignis, commonly known as ʻōlulu or alula in Hawaiian, or colloquially as cabbage on a stick, is a critically endangered species of Hawaiian lobelioid in the bellflower family, Campanulaceae. It is native to the islands of Kauaʻi and Niʻihau and is found on sea cliffs on the Napali Coast and Haʻupu Ridge. This short-lived perennial species is a member of a unique endemic Hawaiian genus with only one other species. In 1994, the Service reported 5 populations totaling 45 to 65 individuals, and listed the plant as an endangered species.

Alula is a potentially branched plant with a succulent stem that is bulbous at the bottom and tapers toward the top, ending in a compact rosette of fleshy leaves. The stem is usually 3.3–6.6 feet in height, but can reach 16 feet. The plant blooms from September through November. It has clusters of fragrant yellow flowers in groups of three to eight in the leaf axils and the fruit is a capsule 0.51 to 0.75 inches long containing numerous seeds.

Alula is found at elevations from sea level to 1,570 feet in mesic shrublands and dry forests that receive less than 67 inches of annual rainfall. It grows on rocky ledges with little soil and steep sea cliffs. Its only pollinator was a now-extinct sphingid moth. This has made it all but impossible for alula to reproduce on its own. Therefore, individuals only produce seed when artificially pollinated by humans who go to great lengths (e.g., rappelling over steep cliff edges) to exchange pollen among plants and to collect seeds that can be grown and stored in botanical gardens and seed banks. Despite its rarity in the wild, it is not hard to cultivate in a nursery, and it has come into use as a novel ornamental plant.

4.8.3 Dwarf Naupaka (*Scaevola coriacea*)

Scaevola coriacea, the dwarf naupaka, is a species of flowering plant in the Goodenia family, Goodeniaceae, that is endemic to Hawaiʻi. It is a low, flat-lying perennial herb. Its older stems are somewhat woody, and the succulent leaves are oval-shaped, relatively far apart, and smooth or somewhat scaly with rounded tips. Flowers occur in branched inflorescences from the point of leaf attachment in groups of one to three.

Dwarf naupaka usually occurs in relatively hot dry coastal sites on low, consolidated sand dunes near sea level (Wagner et al. 1999). This species is salt-tolerant, relatively long-lived, and flowers year-round. Currently, dwarf naupaka exists naturally only on Maui and two offshore islets. Historically, it could be found on six islands and has since been outplanted on several other main islands. The total population is less than 300 plants, making dwarf naupaka an endangered species. Threats to dwarf naupaka include human development, livestock grazing, and pest plants.

4.8.4 Loʻulu (*Pritchardia aylmer-robinsonii*)

Pritchardia aylmer-robinsonii is a fan-leaved tree about 23–50 feet tall with a trunk approximately 8–12 inches in diameter. The upper and lower leaf surfaces are green and hairless, and leaf segments are rather thin and drooping. The lower surfaces of the petiole and the leaf ribs are covered with dense, tan wool. The branched, hairless flower clusters are located among the leaves and are no longer than the petioles. Each flower is composed of a cup-shaped, three-lobed calyx, three petals, six stamens, and a three-lobed stigma. The spherical, hard, black fruit is 0.7–0.8 inches in diameter. This species is distinguished from others of the genus by the thin leaf texture and drooping leaf segments, the tan woolly hairs on the underside of the petiole and the leaf blade base, the stout

hairless flower clusters that do not extend beyond the fan-shaped leaves, and the smaller spherical fruit (Read and Hodel 1990).

Historically, this species of lo‘ulu was found at three sites in the eastern and central portions of the island of Ni‘ihau. Trees were found on Kaali Cliff and in Mokouia and Haao Valleys at elevations between 230 and 890 feet. The most recent observations indicate two plants still remain on Kaali Cliff. Originally a component of the Coastal Dry Forest, this species now occurs only in a rugged and steep area where it receives some protection from grazing animals (Read and Hodel 1990).

Hawaiian land practices prior to European contact probably destroyed most of the forest on Ni‘ihau. Grazing animals were introduced to the island beginning in the 1700s. Cattle, goats, sheep, and pigs have decreased available habitat for Lo’ulu as well as directly damaging trees, seedlings, and seeds (Wagner et al. 1999).

Although approximately 200 immature individuals have been cultivated on Ni‘ihau and Kaua’i, extinction from naturally occurring events or reduced reproductive vigor due to the small number of reproductive plants are major threats. Because palms take many years to mature, it is not known whether the immature plants now in cultivation are capable of reproducing and sustaining a viable population. Roof rats are a threat to this species since they eat the seeds of some lo‘ulu species (Wagner et al. 1999).

4.8.5 Lo‘ulu (*P. napaliensis*)

Pritchardia napaliensis,or lo’ulu (the common name for all plants in this genus) is a species of palm tree that is endemic to the island of Kaua‘i. It inhabits gulch slopes in coastal mesic forests on the Nā Pali coastline, especially in the vicinity of Ho‘oluu Valley. *P. napaliensis* reaches a height of 13–20 feet and has a trunk diameter of 7.1–7.9 inches. As with *P. aylmer-robinsonii*, feral ungulate browsing, seed depredation by rats, erosion, and habitat destruction are all threats.

4.9 Native Plant Communities

Native Hawaiian plants arrived to the archipelago via natural means such as wind, water, or birds. According to Wagner et al. (1999), the native Hawaiian flora is composed of roughly 956 species within 87 families. Approximately 89 percent of these species are endemic (found only in Hawai‘i), while the remainder are indigenous (naturally found in Hawai‘i and elsewhere). Since their establishment, native Hawaiian plant communities have greatly declined since humans arrived in the islands. Few native plants have escaped the impacts of urbanization and agriculture on the coastal and lowland habitats. As a result, recent surveys conclude that 75 percent of the native plant communities in these habitats are considered to be rare. Coastal alterations, such as agriculture, residential developments, recreational parks, military installations, golf courses, and roads have permanently displaced much of the native flora.

Over 30 native coastal and lowland plant species are appropriate for re-establishment at the Refuge, in addition to those already existing. Of these species, approximately one-third could be established as dominant members of the communities, while the remaining two-thirds could be integrated as sub-dominants and associated species. Populations of eight species of endangered plants could be established within these restored habitats, thereby contributing to their statewide recovery. Beginning in 1980, approximately 13 acres on the Point and portions of Crater Hill’s west slope were restored

with hala, ʻakoko, ʻilima, naupaka kahakai, ʻāweoweo, and pōhinahina, which are now the dominant native plant communities on the Refuge.

4.9.1 Naupaka Kahakai (*Scaevola sericea)* or Beach Naupaka

Naupaka is an indigenous shrub that grows from 3 to10 feet tall along coasts throughout the tropical Pacific and Indian oceans. It has bright green succulent leaves and fragrant white flowers that appear to have split in half with five petals remaining on one side. As a dominant member of the coastal mixed woodland-grassland habitat, naupaka provides cover and nesting substrate for native birds, most notably as nesting sites for two listed species: nēnē and ʻaʻo. It is abundant and naturally occurring on the Refuge. It has also been outplanted on the Refuge. This species is the only nonendemic naupaka, and the only one to produce white fruit in the Hawaiian Islands. The pulpy marble-sized fruits tolerate salt water and float on the ocean currents for dispersal to other islands and are a food source for nēnē. Mixed with salt, the fruit or root bark of naupaka kahakai was used for cuts, skin diseases, and wounds.

4.9.2 ʻIlima (*Sida fallax*) or Yellow Ilima

A common native species found in Hawaiian coastal areas, ʻilima have yellow-orange flowers with five petals. The ground-hugging plant has heart-shaped, one-inch-long, slivery-green leaves. Individual plants of this species vary greatly in height, density of hairs, leaf size and shape, and flower color and size. The Refuge anticipates expansion of the species into additional areas of the Refuge as projects to remove pest plants for habitat restoration are implemented.

The yellow ʻilima is the official flower of the island of Oʻahu; about 1,000 blooms are used to create a single lei. Hawaiians also used the plant for medicinal properties. Pregnant women consumed its juice and flowers prior to giving birth. The root bark mixed with the plant's blooms was used as an asthma remedy (Walther 2004).

4.9.3 Hala (*Pandanus tectorius*) or Screw Pine

Hala is a small tree growing 20–30 feet in height and from 15–35 feet in diameter. The trunk is stout and the branches grow at wide angles to it. It has distinctive long, blade-like leaves (lau hala) about 2 inches wide and over 2 feet long. Most varieties have spines along the edges and on the midribs of the leaves. The leaves are spirally arranged toward the ends of the branches and leave a spiral pattern on the trunk when they fall. These trees develop aerial prop roots (ule hala) at the base of the trunk and sometimes along the branches. It occurs in coastal sites and on the low elevation slopes of mesic valleys further inland to 2,000 feet elevation. Hala has been identified as a potential roosting site for ʻōpeʻapeʻa. On the Refuge, hala leaf litter and debris immediately under mature trees serve as nesting sites for ʻaʻo.

Female hala produce a large, segmented fruit somewhat resembling a pineapple. Male trees produce large clusters of tiny, fragrant flowers surrounded by white to cream-colored bracts. There are four types of hala based on color of fruit: common hala is yellow, hala ʻula is orange, hala lihilihi ʻula is red fading to yellow, and hala pia is small and pale yellow. Men from Kahuku were identified by lei of the orange hala fruit which they wore by order of their chief when they left their ahupuaʻa (Wilcox 1975, Hensley et al. 1997, Wagner et al. 1999).

4.9.4 ʻAkoko (*Chamaesyce celastroides*)

Chamaesyce celastroides is by far the most variable and widespread of all Hawaiian ʻakoko and is separated into eight varieties (Wagner et al. 1999), two of which occur on the Refuge. It grows as a shrub or small tree that has compact lateral branches and grows in coastal dry shrublands on windward talus slopes at an elevation of 30 to 2,100 feet. Its flowers can be found tucked close or in the leaf axis. It has been observed flowering and fruiting throughout the year, probably in response to precipitation. Fruits mature in 3 to 4 weeks and plants live from 5 to 10 years.

The varieties found on the Refuge exist on windswept cliffs and ledges above the ocean on Niʻihau, Kaʻula Islet, Kauaʻi (Kīlauea Point), Molokaʻi, and Kahoʻolawe. Threats to this plant include competition with alien plants, fire, and negative effects of recreational activities. ʻAkoko is common throughout the Refuge and can be found in all habitat types.

4.9.5 Pōhinahina (*Vitex rotundifolia*)

Pōhinahina is a sprawling shrub that is 8 feet in diameter and 6 inches to 2 feet tall, but reaching 4 feet in height and 12 feet in width when protected from wind and salt spray. The round leaves are gray-green to silvery and 1–2 inches long and have a sage-like aroma when crushed. The 1-inch flowers are bluish purple and are produced in small clusters at the ends of the branches throughout the year. The round fruits are about one-fourth inch in diameter and bluish purple to black when ripe.

Pōhinahina is a widespread strand plant; its natural range spans from China, Taiwan, and Japan south to Malaysia, India, Sri Lanka, Mauritius, Australia, Pacific Islands, and Hawaiʻi. In Hawaiʻi, pōhinahina grows along the coast on sandy beaches, dunes, and rocky shorelines. It occurs naturally up to elevations of 50 feet on all the main islands except Kahoʻolawe, but it can grow at higher elevations. It is drought and salt spray tolerant and spreads by runners, and as a result, it is a popular ornamental plant in Hawaiʻi.

4.10 Invasive Species

For the purpose of this CCP, "invasive" is a subset of nonnative species. An invasive species is defined as a species whose migration and growth within a new range causes detrimental effects on the native biota in that range. Mammals, amphibians, invertebrates, and plants can all be considered invasive. These species become invasive because their population and growth are no longer balanced by natural predators or biological processes that kept them in balance in their native ecosystems. In the absence of these restraints, invasive species have the potential to compete with native species for limited resources, alter or destroy habitats, shift ecological relationships, and transmit diseases.

Invasive species are one of the most serious problems in conserving and managing natural resources. In particular, the ecological integrity of Pacific Island environments is greatly threatened by invasive species. Hawaiʻi, which existed in isolation for millions of years, is an exceptionally ideal environment for invasive species. Most native species lost their natural defense mechanisms and are more vulnerable to introduced species (Meffe and Carroll 1997, National Invasive Species Council 2008).

4.10.1 Mammals

Rat (*Rattus* spp.)

Three nonnative rat species are found throughout the Hawaiian Islands. Polynesian rats arrived from the central Pacific approximately 1,500 years ago with the Polynesians who settled Hawai‘i; Norway rats reached the Hawaiian Islands after the arrival of Captain Cook in the 1770s; and black or roof rats most likely arrived in the 1870s. It is estimated that these three species have populated nearly 82 percent of the major islands and island chains throughout the globe. Black and Polynesian rats have a large distribution and can be found from sea level to 10,000 feet. Norway rats are restricted to areas below 6,000 feet. Polynesian rats and Norway rats nest exclusively in terrestrial habitats, while black rats are arboreal nesters. This nesting difference may contribute to a larger population of black rats in Hawai‘i due to the presence of nonarboreal mongoose predators (Tomich 1986, Tobin and Sugihara 1992, Hays and Conant 2007).

Globally, introduced *Rattus* species have caused the decline, extirpation, or extinction of numerous insular bird species. In the main Hawaiian Islands, Atkinson (1977) suggested that black rats caused the accelerated decline or extinction of many native forest birds between 1870 and 1930. Polynesian rats are speculated to have been a contributing factor in the large-scale extinctions of Hawaiian bird species during Polynesian settlement prior to European contact. Rats continue to be a major threat to waterbirds, seabirds, and forest birds in the Hawaiian Islands. All three species of introduced rats in Hawai‘i are known predators of eggs, nestlings, young, and occasionally adults of endangered waterbirds, seabirds, migratory shorebirds, and forest birds. Ground- and burrow-nesting seabirds are particularly vulnerable to rat predation, even by the arboreal black rat. Rats also consume plants, insects, mollusks, herpetofauna, and other invertebrates. Because these species are also eaten by birds, a reduction in these populations may indirectly affect avian populations (Olson and James 1982, USFWS 2004, 2005a, 2005b, Mitchell et al. 2005).

The use of snap traps and ground-based application of diphacinone rodenticide to control rats in the main Hawaiian Islands has shown a positive effect in native bird survival (VanderWerf 2008). Using these two treatments, rodent abundance dropped 58–90 percent within one month of treatments for 3 years in a row at Hakalau Forest NWR on the island of Hawai‘i. The estimated cost for a 247-acre (1 km^2) grid was $7,000 in year one and $2,000 per year in years two and three (Nelson et al. 2002). At the Refuge, rats are controlled year-round through the use of live-trapping and rodenticides approved for conservation of endangered species (e.g., 0.005 percent diphacinone) in tamper-proof bait stations concentrated in key management areas, such as high density nesting habitat for endangered birds. There are 40–80 bait stations on the Refuge, bait stations are replenished every 2 weeks, and the amount of bait used is recorded and reported. Applicators of rodenticides operate under the State Department of Agriculture’s Pesticide Applicator Certification Program.

Cat (*Felis catus*)

Cats in the United States kill more than one million birds per day on average (Dauphine and Cooper 2011) and are recognized by the Union for Conservation of Nature as one of the “world’s worst” invasive species (Lowe et al. 2000). Cats have a universally damaging effect on island forest birds, breeding seabirds, resident waterbirds, and migratory shorebirds and waterfowl (Smucker et al. 2000, USFWS 2004, 2005a, 2005b, Mitchell et al. 2005). Cats are found on all the main Hawaiian Islands from sea level to 10,000 feet. Food habits of feral cats in Hawai‘i include insects, centipedes, marine crustaceans, lizards, mice, rats, bird eggs, birds (young and adults), ‘ōpe‘ape‘a, grasses, and seeds.

Cats have a universally damaging effect on insular forest birds and nesting seabirds. In Hawai‘i, cats can prey on waterbirds, migratory shorebirds, nesting seabirds, and forest birds (Smucker et al. 2000, USFWS 2004, USFWS 2005a, Mitchell et al. 2005).

On remote lands of Mauna Kea on the island of Hawai‘i, feral cats prey on about 11 percent of endangered palila nests (finch-billed Hawaiian honeycreeper) annually, and radio-collared male cats can range up to 8 square miles. Cats are most active at night when birds are roosting or incubating eggs and more vulnerable to predation (Hess 2011). In addition, cats are reservoirs of diseases that can be transmitted to birds and other mammals, including humans. Felids including feral and domestic cats are the definitive hosts for an infectious parasite called *Toxoplasmosis gondii*, which reproduces in cat intestines and is shed in cat feces. ***T. gondii*** has been linked to deaths of ‘ā (red-footed booby), endangered nēnē, critically endangered ‘alalā (Hawaiian crow) (Work et al. 2000, 2002), and critically endangered ‘īlio-holo-i-kauaua on the coast of Kaua‘i (Honnold et al. 2005).

There are many “managed” feral cat colonies on O‘ahu, with 19,786 feral cats sterilized and released between 1993 and 2002. Cat colonies near seabird colonies have been very detrimental to nesting birds with the loss of adult and chicks of ‘ua‘u kani on Maui and O‘ahu (Smith et al. 2002, Young et al. 2009b). There is ongoing evidence of cats threatening and/or killing mōlī, ‘ua‘u kani, threatened ‘a‘o, and endangered nēnē. In 2009, a cat was captured on video attacking a nēnē nest (USFWS unpubl.). There is an ongoing influx of feral cats, particularly from Kāhili Beach southeast of the Refuge. Due to the threats adjacent to the Refuge and the presence of free-roaming cats across Kaua‘i, cat control is conducted year-round.

Cats captured with collars and domesticated behavior are transported to the Kaua‘i Humane Society. Feral cats are controlled using live-trapping and euthanasia or shooting. Trap cycles last from 2 to 7 days with 15–25 traps active on a bi-monthly basis. In addition, cats are trapped opportunistically when there are fresh carcasses of endangered or migratory birds showing evidence of cat depredation or there are other detections of cats in the area. Shooting follows protocols for humane dispatch (AVMA 2007) and is only performed by highly skilled personnel trained and federally certified in the safe use of firearms. Trapping success varies widely depending on many factors (e.g., cat’s condition, food availability, methods, techniques). From November 2006 to July 2007, 16 cats (2,419 trap nights) were removed from KNWRC. From December 2007 to April 2008, 11 cats (79 trap nights) were removed from Kīlauea Point NWR. From 2007 to 2010, 129 feral cats were removed from KNWRC, with a high of 81 feral cats removed in 2008 (USFWS unpubl.).

Dog (*Canis lupus familiaris*)

The dog is a domesticated form of the gray wolf, a member of the Canidae family of the order Carnivora. Abandoned, escaped, or pet dogs allowed to run loose can cause great harm to native species and ecosystems. Dogs have caused terrible damage to native ground-nesting seabird colonies. In 2008, almost 90 ‘ua‘u kani birds were killed by a pack of dogs at the Kahuku Golf Course and in 2006, dogs killed nearly 180 ‘ua‘u kani chicks at Ka‘ena Point, both sites on O‘ahu. Dogs typically attack a large number of birds in a single incident by grabbing and shaking the birds around with their mouths and leaving them for dead before heading to another nest or burrow. Dog entry through the perimeter hogwire fence surrounding portions of the Refuge may occur through holes from vandalism or degradation, allowing sporadic and random dog presence within the Refuge. In 2010, dogs entering the Refuge at the unfenced end of Mōkōlea Point killed at least nine adult ‘ua‘u kani on the Refuge. In 2014, 26 mōlī were killed by dogs on unfenced private lands on Kauai’s North Shore.

Small Indian Mongoose (*Herpestes javanicus*)

The Indian mongoose was intentionally introduced to numerous island ecosystems during the 1800s and 1900s and has since expanded to large portions of Asia, Africa, Europe, Oceania, and the Americas. In 1883, the species was introduced to the main Hawaiian Islands as a biocontrol agent against rats in sugarcane fields. The mongoose inhabits all habitat types from sea level to nearly 10,000 feet on the islands of Hawai‘i, Maui, O‘ahu, and Moloka‘i. In other areas of the world, mongooses appear to avoid wet areas; however, in Hawai‘i, dense populations of mongooses are concentrated in wet habitats. The mean home range of a female in Hawai‘i is approximately 3.5 acres, and the main reproductive period occurs February through August. The high density of mongooses in the Hawaiian Islands is due to abundant food and the lack of natural predators (Tomich 1986, Hays and Conant 2007).

Mongooses are voracious omnivores, consuming insects, reptiles, mammals, amphibians, crabs, plants, and birds. In Hawai‘i, mongooses are diurnal predators that primarily eat invertebrates and small mammals, as well as plants, birds, reptiles, and amphibians. They are a major threat to any ground-dwelling and -nesting species in Hawai‘i. These mammals are known to eat eggs, young, and adults of endangered Hawaiian birds, various seabirds, and migratory shorebirds. In addition, mongooses are known to consume young sea turtles (Mitchell et al. 2005, Hays and Conant 2007).

Until recent years, Kaua‘i was thought to be mongoose-free. On May 23 and June 29, 2012, two live mongooses were captured in Līhue and Nāwiwili Port, confirming the presence of mongooses on Kaua‘i. Previously, the only hard evidence of mongooses on the island was a Kalaheo roadkill in 1976 of a lactating female. Other evidence included 160 credible sightings including more than 70 within the last 10 years with sightings concentrated near Nāwiwili Port and Port Allen. Credible mongoose sightings occurred in 2012–2013 all over Kaua‘i, from Polihale to Lihu‘e to Kīlauea, indicating that mongooses could eventually be detected within the Refuge.

Mongooses have been detrimental to native ground-nesting birds on other Hawaiian Islands, and the effects are expected to be even more detrimental on Kaua‘i, as the island is the last stronghold for several endangered species. The Refuge will continue to work in partnership with the Kaua‘i Invasive Species Committee and DLNR to gain information on the status and control and, if possible, eradicate or contain mongooses.

Feral Pig (*Sus scrofa*)

Feral pigs that occur in Hawai‘i are likely to be hybrids descended from two ancestral types introduced on separate occasions. Polynesians first brought pigs to the islands as a food source around 1,500 years ago. Captain Cook subsequently brought European pigs to the islands in 1778 (Tomich 1986). Pigs descended from European strains were generally larger, more fecund, and more nomadic than their Polynesian counterparts (Van Driesche and Van Driesche 2000). Although pigs have been eradicated from numerous islands worldwide, these animals remain highly abundant in Hawaiian island ecosystems (Courchamp et al. 2003, Cruz et al. 2005) and occupy every main island in the Hawaiian archipelago (Tomich 1986). Pigs are long and narrow in shape and predominately black in color and are generally hairy. They measure 3.5–4.5 feet in length and average 2 feet in height. Pigs are elusive animals. They have been reported to be highly active in the early morning and late afternoon in tropical climates (Diong 1982). The reproductive potential of pigs contributes to their invasive potential. These animals are polyestrous meaning that adult females have more than one estrus cycle (21 days) in a breeding season. Pregnancy can occur year-round with peaks between

January and March. The average sow in Hawai‘i has 1.1 litters per year (Caley 1997). Reproductive rates peak between 2 and 4 years, but breeding has occurred by 10-month-old sows (Hess et al. 2006).

Pigs are an omnivorous species that consume fruits, seeds, plant material, invertebrates, and opportunistically, the eggs and young of ground-nesting birds. In Hawai‘i, pigs consume and damage plant material in both wet and dry habitats and in agricultural and natural areas. They root and trample native vegetation, digging up the soil for earthworms, as well as underground plant parts such as rhizomes and tubers. Pigs act as vectors for invasive plant species, dispersing alien plants such as strawberry guava and banana poka (LaRosa 1992, Stone et al. 1992). Other ecosystem effects can be attributed to pig activity. Rooting and compaction can deplete the soil of needed oxygen (Van Driesche and Van Driesche 2000). The behavior of pigs causes erosion of cliff and stream banks. As a result, the quality of both fresh and brackish water system can be degraded. Since the Refuge is fenced, it is usually free of pigs. However, breaches in the aging perimeter fences may result in the need for periodic pig trapping.

4.10.2 Birds

Cattle Egret (*Bubulcus ibis*)

Cattle egrets were introduced to Hawai‘i from Florida in 1959. The release was sponsored by local ranchers and the Hawai‘i State Board of Agriculture to control pasture insects. Nearly 150 birds were released on all the main islands except Kaho‘olawe. After 1 year, successful breeding was recorded on O‘ahu, where egrets were quick to establish. On Kaua‘i, egret numbers remained low until 1975, when the population exploded. By 1982, Kaua‘i had 3 active roost sites totaling approximately 8,000 birds, including a rookery of 4,000 birds at Crater Hill in Kīlauea. By the mid-1980s cattle egrets were well-established on five of the main islands.

Cattle egrets are highly adaptable, and generally found foraging in grasslands and shallow wetlands, but will also feed in roadside ditches and landfills. Roosts in the Hawaiian Islands are usually on level lowland areas near water bodies, often in trees less than 30 feet high. It is the only species in the family Ardeidae (Herons) that can breed at 1 year. Reproduction in the Hawaiian Islands occurs year-round. Clutch size averages three eggs (range 2–6); (Paton et al. 1986); chicks, known as “branchers,” begin wandering on branches at 14–21 days and fledge at 25–30 days. Some birds in Hawai‘i may breed twice per year (Telfair 2006).

Cattle egrets are opportunistic feeders. In addition to pest insects, they consume a variety of native and nonnative invertebrates and small vertebrates such as fishes, skinks, frogs, beneficial insects, and seabird and endangered Hawaiian waterbird chicks (USFWS 2005a). Cattle egrets are the subject of localized control at airports to avert bird strikes and at wildlife sanctuaries to protect endangered species (Paton et al. 1986). From 2007 to 2010, 291 cattle egrets were removed from KNWRC, an average of about 100 individuals per year (USFWS unpubl.). Techniques for cattle egret removal including shooting and hazing and are regulated under the Migratory Bird Treaty Act and Migratory Bird Depredation permits.

Barn Owl (*Tyto alba*)

The barn owl native to North America is found throughout the main Hawaiian Islands, including offshore islets such as Lehua near Kaua‘i, where they were introduced in 1958 for rodent control.

They have light grey underparts with numerous fine dark lines and scattered pale spots on the feathers. There are buff markings on wings and back. Feathering on the lower legs may be sparse. The heart-shaped facial disc is white with a brownish edge, with brown marks at the front of the eyes, which have a black iris. Its beak is off-white and the feet are yellowish-white to brownish. Males and females are similar in size and color; females and juveniles are generally more densely spotted. Barn owls can be distinguished from pueo by their primarily nocturnal habits, rounder faces, and lighter coloring.

In their native environment, barn owls specialize in hunting small ground mammals, and the vast majority of their food consists of small rodents. However, in the Hawaiian Islands they are known to be serious predators of seabirds, including the endangered ʻaʻo, in addition to other seabird species, such as ʻuaʻu kani. On the Refuge, barn owls have been documented killing ʻaʻo, ʻuaʻu, and large numbers of ʻuaʻu kani. Because barn owls will breed at any time during the year, and depending on food supply, they can reproduce up to 2 times per year, they are able to increase rapidly in a relatively short period of time. Barn owls likely compete with the native pueo for introduced rats and mice and could potentially be limiting their population. Techniques for barn owl removal including trapping and shooting and are regulated under the Migratory Bird Treaty Act and Migratory Bird Depredation permits.

4.10.3 Amphibians

Nonnative amphibians also have a negative effect on native Hawaiian species. Recent radio transmitter studies at James Campbell NWR on Oʻahu (Eizenga USFWS unpubl.) provide conclusive evidence that introduced bullfrogs (*Rana catesbeiana*) are key predators of Hawaiian waterbird chicks. While evidence of native bird depredation by cane toads has not been documented, it is possible given the species behavior that they do on occasion eat native ground-nesting birds or their chicks.

Cane Toad (*Bufo marinus*)

Cane toads, or Pacific giant toads, which are native to Latin America, have a broad geographic range that includes a majority of the Pacific region. The toads were brought to the Hawaiian Islands in 1932 to control insect pests. The adults require only water for breeding, which results in thousands of eggs per mating occurrence. Cane toads are active at night and primarily feed on cockroaches, crickets, grasshoppers, grubs, earthworms, slugs, spiders, centipedes, and snails. In addition, these highly invasive amphibians could be a potential predator of eggs and young of ground-nesting birds (Yamamoto and Tagawa 2000, Kishinami 2001).

Coqui (*Eleutherodactylus coqui*)

Coqui frogs, which are native to Puerto Rico, were accidentally introduced to the Hawaiian Islands in the late 1980s through eggs or frogs in nursery plants. They are small, nocturnally active, brown frogs approximately 1 inch in length. Their habitat includes moist leaf bases of foliage and leaf litter from the coastal zone to 4,000 feet elevation or higher. Coqui are a human health and quality of life nuisance because of the male's loud, high-pitched, two-note call "co-kee," heard primarily at night. They eat large number of small insects, in native and nonnative habitats, posing a threat to native insects and insectivores (Kishinami 2001). Coqui have occurred on five of the main Hawaiian Islands including the Island of Kauaʻi. In 2001, a breeding population was discovered in Lawai, but after extensive eradication efforts by the Kauaʻi Invasive Species Committee (KISC) and partners, Kauaʻi

was declared "coqui-free" in June 2012. Coqui are not known to occur on the Refuge. However, in May 2014 KISC responded to a report of coqui on the northshore of Kaua'i (KISC 2014).

4.10.4 Invertebrates

Although the Hawaiian Islands support a large number of native invertebrates, a wide array of nonnative invertebrates have invaded Hawaiian ecosystems. While numerous species exist on the Refuge, the only group documented to be a threat to native wildlife is ants.

Ants

Hawai'i is one of the few places on Earth believed to lack any native ant species. Today, at least 47 ant species in 7 subfamilies and 24 genera have become established. Ants are a growing concern since they can have negative effects on native and endangered plants and animals. Ants are also implicated in having negative effects on native and endangered plants by farming scales and other insect pests. Ants are known to attack, injure, or kill young birds. The Service is currently studying the efficacy of various baits and approved toxins on pest ants on O'ahu and Johnston Atoll.

On offshore islets on O'ahu and on Kure Atoll, several species of ants have been documented to harass and potentially kill nesting seabird chicks, primarily 'ua'u kani chicks, by attacking their mucus membranes, removing their down, eating the webbing off their feet, and irritating the chicks so much that they leave their burrows and become separated from their parents (Plentovich et al. 2009).

At the Refuge, long-legged ants (*Anoplolepis gracilipes*) have been observed on koa'e 'ula adults with watery, irritated, swollen eyes. Long-legged ants subdue their prey by spraying formic acid. Ants have also been observed attacking koa'e 'ula chicks to the point where they lose their down and part of the webbing on their feet. Chick foot injuries are typical of those caused by big-headed ants (*Pheidole megacephala*) (Zaun 2005).

4.10.5 Plants

Invasive species are recognized as a major threat to native ecosystems and to the survival of threatened and endangered species. At the ecosystem level, invasive plants have been shown to be capable of changing fire regimes, altering nutrient cycling patterns, and modifying the surface runoff of water. Invasive plants can physically displace native species, and/or supersede them by competition for water, nutrients, or other limited resources. Nonnative plants can also be vectors and hosts for introduced pests and diseases to which the native species lack natural defenses. Furthermore, compared to native plants, nonnative plants lack their natural enemies in the introduced range, which again gives them a competitive edge over native species. Invasive plants are also reported to be faster growing and can therefore easily and quickly colonize, establish, and displace native species (Vitousek 1990, D'Antonio and Vitousek 1992, Blossey and Notzold 1995).

Almost half the flora of the Hawaiian Islands is composed of approximately 1,100 species of naturalized nonnative plants. Invasive plants are successful in island ecosystems due to a multitude of traits. According to Staples et al. (2000), invasive plants in Hawai'i share the following biological and reproductive characteristics:

- Adaptable to and capable of thriving in different habitats
- Tolerant of variable conditions (such as light, temperature, moisture)

- Fast-growing
- Tolerant of disturbance
- Easily dispersible to new localities by seeds, fruits, spores, or vegetative parts
- Produce small seeds/spores early in life
- Long reproductive periods
- Dispersed by animals and with no special germination requirements

The control and eradication of pest plants has been the top priority of natural resource managers in Hawai‘i. In the wetland habitats of the Refuge, invasive plant species can drastically reduce the value of wetland habitat to native species. Nonnative species out-compete more desirable plant species here, as well as smother open water and mudflat habitats. In addition, the high biomass characteristic of invasive grasses produces a high amount of fuel for fire and become threats to nearby residential, commercial, and military land uses. In Hawai‘i, plants grow year-round; thus, the Service has a full-time task of maintaining the habitat by nonnative plant control. At Kīlauea Point NWR, a combination of control techniques are employed for invasive plant removal including chemical, mechanical (hand and tractor), and water level manipulations.

California Grass (*Urochloa mutica*)

California grass (Family–Poaceae) is a sprawling perennial with culms up to 20 feet long and rooting at the nodes. Stolons and leaf sheaths are densely hairy. It occurs pantropically as a pasture grass and its native range is unknown, although it is suspected to have originated in sub-Saharan Africa. California grass occurs in aquatic environments such as the openings of wet forests, marshes, and other open water areas. It is also known to invade drier, disturbed areas. It is reported to be well-adapted to a wide range of soil conditions (sandy to clay) and tolerates moderate shade but prefers full sun (Wagner et al. 1999).

In Hawai‘i, California grass occurs between sea level and 3,445 feet on the five main Hawaiian Islands. The grass can form monotypic stands reaching 5 feet in height, with rooting runners up to 18 feet in length. Throughout the state it has been reported to grow in a wide range of moisture conditions. It grows prolifically in wet swampy habitats, but it can also withstand severe drought. The Hawai‘i-Pacific Weed Risk Assessment is a research project conducted by University of Hawai‘i and the USDA Forest Service (USFS) to identify plants that pose a high risk in Hawai‘i and other Pacific Islands. The assessment score of 12 for California grass reflects its invasion potential. It also designates the species as H (Hawai‘i), meaning the species is “documented to cause significant ecological or economic harm in Hawai‘i” (Motooka et al. 2003). Techniques used to control California grass on the Refuges include an integrated system of mowing, disking, tilling, hand-pulling, and application of herbicides.

***Pluchea* spp**

Pluchea spp. (Family–Asteraceae) is comprised of two shrub species in Hawai‘i—Indian fleabane (*P. indica*) and sourbush (*P. carolinensis*)—and a hybrid species. *Pluchea indica* readily hybridizes with *P. carolinensis* to form the intermediate plant *P.* x *fosbergii*. The leaves of this hybrid species are usually more similar to *P. indica*, while the inflorescence more closely resembles *P. carolinensis*. *P.* x *fosbergii* can be found where the two species occur together (Wagner et al. 1999).

P. carolinensis is an erect, aromatic shrub native to parts of North and South America. The species has naturalized in Hawai‘i, Guam, Taiwan, Africa, and other tropical and Pacific areas. It can grow in

poor soil conditions; however, it cannot withstand shade or severe competition from brush and grass. In dry habitats, the fast-growing shrub can form thickets. In Hawai‘i, *P. carolinensis* has spread to all the main islands since its arrival in the 1930s. This shrub is able to grow in a wide array of habitats, ranging in distribution from dry coastal areas to open forests at 2,953 feet elevation. The plant seeds prolifically and the seeds are easily dispersed by wind (Mueller-Dombois and Fosberg 1998, Wagner et al. 1999).

Pluchea will out-compete native plants on the Refuge, reducing forage and nesting habitats for birds. *Pluchea* tend to harbor huge nests of paper wasps, which are a hazard to Refuge staff and the public. Techniques used to control *Pluchea* spp. on the Refuges include an integrated system of manual removal and application of herbicides.

Christmasberry (*Schinus terebinthifolius)*

Christmasberry is an aggressive, rapidly spreading plant native to Argentina, Brazil, and Paraguay. It can grow as a tree or shrub up to 23 feet in height. Christmasberry has become naturalized in mesic, disturbed, and coastal areas throughout the Hawaiian Islands where it can form dense thickets on steep slopes (Wagner et al. 1999).

Christmasberry is considered a pioneer species because it quickly colonizes disturbed areas. The invasive attributes of Christmasberry include a large number of fruits, bird dispersal, and a tolerance to shade, fire, and drought. Furthermore, the species is believed to have allelopathic properties, which increases its competitive ability with neighboring plants (Hight et al. 2003). Due to these characteristics, this species is recognized as a noxious weed by the Hawai‘i Department of Agriculture.

Three biocontrol insects have been released in the Hawaiian Islands to control this species. This includes a seed-feeding beetle in 1960, a leaf-rolling moth in 1954–1956, and a stem-galling moth in 1961–1962 (Hight et al. 2003). An accidentally introduced seed-feeding wasp has also been found attacking seeds of Christmasberry. A foliage-feeding sawfly was tested as a potential biological control agent for Christmasberry; however, this species was not introduced due to its risk to the native ‘ohe kukuluae‘o (*Reynoldsia sandwicensis*) (Hight et al. 2003).

Kikuyu Grass (*Pennisetum clandestinum*)

Kikuyu grass is a fast-growing grass species that forms mats and spreads by rhizomes and stolons. It was introduced to Hawai’i for cattle forage. Kikuyu grass is native to eastern Africa, but has spread throughout the tropics and subtropics (Holm et al. 1972). It occurs primarily in cool fertile areas (Scowcroft and Jeffrey 1999) between sea level and 6,600 feet elevation. It propagates vegetatively because the small, inflorescences rarely produce seeds (Holm et al. 1972). It is shade-tolerant, and the root morphology may also be altered in shaded areas (USFWS 1996).

Kikuyu grass is a particular management concern in many habitats because the species forms dense mats, preventing the establishment of native seedlings. It competes with native seedlings for nutrients, light, and water (Scowcroft 1992), it increases the frequency and intensity of fire (Smith and Tunison 1992), and has been reported to possess allelopathic substances (Smith 1985). For these reasons, it is a federally listed noxious weed, and according to the USFS and DOFAW it is considered a high-risk weed species for creating ecological and economic harm in Hawai’i.

Although Kikuyu grass is considered an aggressive pest, the species appears to be less aggressive in the coastal zone and provides valuable forage habitat for nēnē on the Refuge. Currently, there are no known native grasslands that could be restored to provide the same nutrition as Kikuyu-legume grasslands. Approximately 27 acres of Kikuyu grasslands are managed for nēnē at Crater Hill year-round.

Ironwood (*Casuarina equisetifolia)*

Ironwood is native to the tropical and subtropical seacoasts from Malaysia to Australia, Micronesia, Melanesia, the Philippine Islands, and Polynesia, but is not native to the Hawaiian Islands. The common name refers to any of a number of closely related species that have also been called "she-oak," or "beefwood." The tree reaches heights of 80 to 100 feet and diameters up to 18 inches. The wood is dark brown, very tough and dense, and grows rapidly.

Ironwood was introduced on the island of on Kauaʻi in 1882. More than 70,000 trees were planted on the forest reserves of the island, and many others were planted on private lands for windbreaks and in depleted soils or sandy areas requiring salt-tolerant trees. Since that time, ironwood has not only spread to all the main Hawaiian Islands, but has also established on some of the small atolls in the NWHI.

At the Refuge, it is a common weed and poses a threat to native plants and seabirds. For example, rapid growth of ironwood trees at the base of Mōlī Hill creates obstacles within primary mōlī flight corridors. In 2010, a mōlī fledgling taking its first flight crashed into an ironwood tree and was grounded cliff-side for a day, an annual occurrence if ironwoods are not maintained. As a result, ironwood is controlled on the Refuge in key areas using chainsaws, handsaws, herbicides and, rarely, heavy equipment.

Haole Koa (*Leucaena leucocephala*)

Koa haole, haole koa (foreign koa), or leucaena, is a vigorous shrub or small tree native to southeastern Mexico. This naturalized deciduous species is characterized by twice pinnate leaves with numerous small, gray-green leaflets, many flowers in whitish round balls ¾ –1 inch across the spreading threadlike stamens, and many clustered dark brown flat pods. It is a rapidly growing small tree 20–30 feet tall and 4 inches in trunk diameter

This species was unknown in Hawaiʻi in 1864, but reported as frequent 20 years later. It is reported that seeds were broadcast from airplanes to provide a charcoal source. It is now an abundant weed in the dry lowlands throughout Hawaiʻi and will form dense thickets in lowlands and lower mountain slopes to 2,500 feet altitude.

Haole koa is common throughout the Refuge, and is found in highest concentration in Crater Hill and Mōkōlea Point where it can crowd out nesting seabirds. As a result, haole koa is controlled on the Refuge in key areas using power or hand tools and herbicides.

Lantana (*Lantana camara)*

Lantana is a perennial, erect or prostrate shrub growing to 6 feet or more in height. Leaves are ovate in shape, oppositely arranged, commonly 6 inches long and 2.5 inches wide. Lantana reproduces

vegetatively and via seed; flowers are produced year-round and are able to self- and cross-pollinate. Lantana is an extremely prolific seed producer with approximately 12,000 fruits per plant.

Lantana is a thorny shrub and noxious weed native to the West Indies that was brought to Hawai'i as an ornamental plant for gardens. It can form an impenetrable thicket which crowds out other plants and is dispersed by pest and frugivorous birds. It is capable of surviving all but the hottest fires, regenerating from basal shoots. Allelopathic substances are produced by shoots and roots. Lantana is found up to 1,970 feet on all islands, principally in dry areas, but it has also infested both mesic and wet habitats. Lantana is found throughout the Refuge. It is controlled using power or hand tools and herbicides.

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Chapter 5 Social and Economic Environment

Chapter 5. Social and Economic Environment

5.1 Cultural Resources

5.1.1 Introduction

Archaeological and other cultural resources are important components of our Nation's heritage. The Service is committed to protecting valuable evidence of plant, animal, and human interactions with each other and the landscape over time. These may include previously recorded or yet undocumented historic, cultural, archaeological, and paleontological resources as well as traditional cultural properties and the historic built environment. Protection of cultural resources is legally mandated under numerous Federal laws and regulations. Foremost among these are the National Historic Preservation Act (NHPA) of 1966 as amended, the Antiquities Act, the Archaeological Resources Protection Act (ARPA) as amended, and the Native American Graves Protection and Repatriation Act (NAGPRA).

Permanent settlements of the Hawaiian Islands by Polynesians are recorded as early as the 7th century Common Era (C.E.); however, initial discovery and colonization may have occurred even three to four centuries earlier. Testaments to these settlements include remnants of heiau (temple sites), burial sites, terraces which supported agriculture (e.g., irrigated cultivation of kalo), stone-lined water ditches (ʻauwai), and stone-walled fish ponds (loko kuapā). It is estimated that prior to the arrival of British explorer Captain James Cook in 1778, the Native Hawaiian population numbered from 250,000–1,000,000, with most settlements established below 3,000 feet.

Hawaiian pre-contact history is divided into four main periods: the Colonization Period (300–600 C.E.), the Developmental Period (600–1100), the Expansion Period (1100–1650), and the Proto-Historic Period (1650–1795). The latter two periods are when Native Hawaiian culture is thought to have developed with the ahupuaʻa system of land divisions as well as hierarchical social structures where chiefs (aliʻi) and commoners and kapu (taboo) systems were instituted.

After the arrival of Cook, changes in Native Hawaiian culture and society occurred with increased Western contact through trade, leading to the depletion of sandalwood, diseases such as cholera and syphilis which decimated Native Hawaiian populations, and acquisition of firearms, which helped King Kamehameha unite the Hawaiian Islands. Between 1795 and 1893, there was a transition where Native Hawaiian monarchies governed and ruled the islands; the religious and kapu systems continued until 1819. Other changes during this period include the arrival of missionaries in 1820, which lead to the conversion of many Native Hawaiians to Christianity; the building of churches; banning traditional art forms, such as hula; and displacement of traditional religious and kapu systems. The growth of whaling also lead to an influx of migrant workers; trade; agricultural commodities such as cattle and chickens; and local cultivation of potatoes, onions, beans, and other vegetables and fruits. Other countries, such as Russia and England, were also present during this period.

One of the greatest changes during this time was the transformation of the land tenure system from a traditional, communal system to that of a Western system under the Māhele of 1848. Title to lands in Hawaiʻi were divided between the konohiki (Konohiki (chief) Lands—1,619,000 acres), King Kamehameha III (Crown Lands—984,000 acres), and the Hawaiian government (Government Lands—1,523,000 acres). All these lands, however, were subject to the rights of native tenants, an

effort to continue the traditional Hawaiian land tenure system. Native tenants, under the Kuleana Act of 1850, could petition the Land Commission for fee simple title to these lands if they could prove they had occupied and improved it (Garovoy 2005). However, few Native Hawaiians claimed their kuleana. This, along with a sale of government lands between 1850 and1860, resulted in Native Hawaiians losing much of their lands to foreigners, who could now hold land in fee. The Native Hawaiian monarchy was changed to a constitutional monarchy in which a partly elected legislature and set of ministers carried out government business. This resulted in a shift of government from Native Hawaiian to Euro-American control. However, during King David Kalākaua's reign (1874–1891), there was a brief resurgence of Native Hawaiian culture with a Hawaiian language newspaper created, the hula and its music brought back and performed in public, as well as the building of ʻIolani Palace.

As whaling declined in the 1860s, sugar became the dominant industry, leading to a large influx of Asian immigrants and further displacement of Native Hawaiians, who had been employed as plantation workers. The first major sugar plantation was established on Kauaʻi in 1835. Princeville Plantation was established in the late 1860s. Large-scale systematic growing of coffee on Kauaʻi also began from 1835 to 1845. The economics and dominance of the sugar industry lead to political discord and eventual overthrow of the Native Hawaiian monarchy.

In 1898, Hawaiʻi became a U.S. territory, partly for its strategic location with respect to Asia. Hawaiʻi continued to be a plantation society, along with some ranching, up until World War II (WWII), with pineapple joining sugar as a plantation commodity. During this time, the government and economy were ruled mainly by five major business corporations. The early 1900s also saw the building up of military in Hawaiʻi. After the bombing of Pearl Harbor in 1941 and U.S. entry into WWII, changes in Hawaiʻi resulted in Japanese-Americans entering politics, the rise of the labor unions, and a shift in government from the Republican Party to the Democratic Party. When Hawaiʻi became a state in 1959, the Admissions Act required the 1921 Hawaiian Homes Act, which set aside 200,000 acres that once belonged to the Hawaiian kingdom to lease land to Native Hawaiians, be included in the State Constitution. Since statehood, the local economy has been dominated by tourism, military, and a waning agricultural sector; the sugar and pineapple plantations began their declines in the 1950s–60s.

The late 1960s saw a revival of Native Hawaiian culture with the return of traditional hula and music. The creation and launching of the Polynesian voyaging canoe Hōkūleʻa was another major milestone in this revival of Native Hawaiian culture. The 1980s saw an increase of Native Hawaiian organizations and calls for sovereignty with the establishment of Native Hawaiian language-focused schools and the Office of Hawaiian Affairs (Juvik and Juvik 1998).

5.1.2 Kīlauea Point NWR

Kīlauea has a history steeped in the plantation days of old Hawaiʻi and WWII. It is also an area rich with stories of Pele (the volcano goddess), who had fallen in love with Lohiʻau, a chief of Hāʻena. She came to the area to find a home for them, but encountered her sisters. One variation of the story has her meeting them on Kīlauea Crater and turning them into stones out of jealously of their beauty. There is also a story related to the Menehune and Mokuʻaeʻae Island in which a bridge between the island and the mainland was never completed because they were unable to finish laying rocks in the channel in one night (Wichman 1998).

Native Hawaiians consider biological resources also as cultural resources. Many of the native species found in Hawai‘i are linked with traditional stories, sayings, and chants dating back to the creation chant Kumulipo. One example of this is the ‘iwa, which is known for its beauty, resourcefulness, and ability to soar high. This trait makes it also a symbol of vigilance. Praise for a graceful person is often compared to that of an ‘iwa’s flight. Additionally, many native wildlife species are also linked with deities and family genealogies.

The Hawaiian name Kīlauea means “rising vapor clouds,” which describes the clouds of sea mist along the north coast. The Refuge lies in the ahupua‘a of Kīlauea and Kāhili. The surrounding ahupua‘a include Namahana, Kalihiwai, Kalihikai, Waiakalua, and Pīla‘a. During the talk story session for Kīlauea in November 2009, families with cultural ties to the area who were historically konohiki for fishing in the Kalihiwai ahupua‘a, told of fishermen who would look from Crater Hill to spot fish and to plan for their fishing. Families with cultural ties still practice traditional Native Hawaiian fishing at Kīlauea Point. The lighthouse was also used by community members to find bearing from both the ocean and mountains for safe return.

During the mid- to late 1400s, Kīlauea, under Mano-ka-lani-pō (an ali‘i nui or high chief), was opened up for agriculture. He created the ahupua‘a for the island (the Refuge is in the moku‘aina of Ko‘olau). By the time of the Māhele in 1848, feral cattle, which had been introduced to Kaua‘i by Captain George Vancouver in 1791, had multiplied and were causing much damage (Wichman 1998). In the late 1870s, Kīlauea Sugar Plantation Company was started and Kīlauea Town grew to support many of its functions. Though small compared to other sugar plantations, at its peak it employed 400 people and brought a mix of European, American, and Asian people into the community (in contrast, an 1847 census identified the area’s resident population at 240 (Aiken 1988)). The plantation was innovative, being one of the earliest to experiment with using trains to transport sugarcane. Tracks went to a landing on the Kīlauea Bay side of Mōkōlea Point and were used until 1942, using gasoline tractors instead of steam plows, and utilizing machines to clean sugarcane. A rock quarry was also established at Mōkōlea for road building and construction (used until 1979).

The company came to an end in the early 1970s and with this came an era of real estate development. However, opposition from the Kaua‘i County government and residents left land owner C. Brewer (who acquired controlling interest of the company in 1948) with no sales of its land surrounding Kīlauea Town until the passage in 1973 of the Comprehensive Zoning Ordinance (Kaua‘i General Plan) which clarified criteria for land sales. The zoning tried to encourage resident farmers by combining agricultural and housing use and discourage resort development and urban sprawl. However, gentleman estates still developed. Many of the former employees of the sugar plantation company were provided opportunities to buy their houses or land and gained employment through other agricultural ventures that emerged. The rise of Princeville also provided opportunities (Wilcox 1981). Several buildings in Kīlauea related to the sugar company are listed on the National Register of Historic Places and include the Kīlauea Plantation Bookkeeper’s House, Kīlauea Plantation Head Luna’s House, Kīlauea Plantation Manager’s House, and the Kong Lung Store. Kīlauea School is also registered.

With the coming of WWII, Kīlauea’s history moved from agriculture to military occupation. The current Christ Memorial Church’s Parish Hall (used as a community hall) was occupied by the U.S. Army (Wilcox 1981). The U.S. Army Corps of Engineers constructed Kīlauea Radar Station between 1941 and 1942, and the U.S. Army managed the station until the end of the war. It was considered a top secret site during the war and was one of three radar installations located on the island of Kaua‘i

that helped detect planes and submarines. The radar station was constructed on the highest point of Crater Hill and included two tunnels (one for radio and one for radio operations), an electrical generation plant, and a 200-foot radar tower (Dept. of the Army 1991). After its closure, the land was transferred to the Kīlauea Sugar Plantation Company (which used one of the tunnels to store explosives). The Crater Hill area provided pasture land for cattle and grazing until the early 1980s; a slaughter house and dairy had even been constructed at the base of the hill (operations continued until WWII). It was sold to Seacliff Plantation, which then sold it to the Refuge. Today, via SUPs, the site has telecommunication antennas for the County of Kauaʻi Civil Defense and Police Department, State of Hawaiʻi Department of Transportation and Health, and a radio station. In 1988, the Refuge sought designation of this radar station as a National Historic Landmark; however, no designation has been made (Department of the Army 1991).

In January 1863, a former American whaler named Charles Titcomb purchased the entire ahupuaʻa of Kīlauea, amounting to approximately 3,016 acres, under Royal Patent 2896 (signed by Kamehameha IV) for $2,500. This land grant included the present Refuge. Titcomb founded the Kīlauea Sugar Plantation Company and cleared these lands for sugarcane. He also had a ranching operation. The Kīlauea River Valley was not planted with sugarcane (only relatively flat areas were under cultivation); however, stone walls found in the valley indicate that kalo and possibly rice were grown there in earlier times (Aiken 1988). Landings were constructed at Kāhili (or Rock Quarry) to assist with transportation of goods and people. A nearby quarry was also developed for use by the company.

Kīlauea Point (31 acres) was purchased from C. Brewer and Company by the U.S. Coast Guard to build a lighthouse as a navigational aide for the growing commercial maritime trade between Hawaiʻi and Asia. Given that the Point is the northernmost tip of the main Hawaiian Island, this lighthouse could be seen for miles. Construction began in 1912 on the lighthouse and keeper's quarters. On May 1, 1913, the 56-foot tall lighthouse officially started its use (celebrated with a lūʻau and shark shoot). Local visitors were welcomed to the site to view the technological wonder of the lighthouse. The former keepers estimated that 20 people per week visited the Point, but after Statehood, visitation increased with hotel and airline development. The lighthouse gained national recognition in June 1927 when it aided the first trans-Pacific flight from California to Hawaiʻi by the U.S. Army, thereby encouraging development of commercial trans-oceanic airline service and military flights to remote regions. In 1976, the Service reached an agreement with the U.S. Coast Guard which allowed use of the 33-acre light station site for Service administrative facilities. Lighthouse use continued until 1976, at which point the U.S. Coast Guard installed an automated electronic beacon. Visitation at this time was recorded at 84,000 people annually.

In 1974, the lighthouse was placed on the Hawaiʻi Register of Historic Places, and then in 1979 placed on the National Register of Historic Places. It is also listed in Kauaʻi County's historic resources inventory. The National Register was later amended to include additional primary structures as part of the Kīlauea Point Light Station (e.g., keeper's quarters, two assistant keeper's quarters, oil house, landing station, derrick site, engine room, volcanic stone retaining wall, and stone stairway/moorings), three cisterns, water storage tank, storage shed/garage (Northwest Heritage Consultants 2006). The lighthouse's second-order Fresnel lens, made in France, is one of 22 believed to exist in the U.S (and one of only seven that remain in lighthouses). The Light Station is also considered a historic district. The lighthouse itself is one of only eight surviving reinforced concrete lighthouse towers in the U.S. before 1916 concrete standards were published.

In 1985 the land was transferred to the Service and became a national wildlife refuge. Through the years, several of these structures have undergone restoration and renovation, including the radio beacon building, keeper's quarters, and lighthouse (particularly after Hurricane Iniki in 1992). From 2010–2013, the lighthouse underwent restoration work which included repairs to the unique cast iron roof and lantern assembly; removal of interior and exterior coatings; repairs to the concrete tower, removal of concrete blocks from where windows were formerly located; installation of new windows, corbels, and doors; and repair of the Fresnel lens; and the inclusion of additional safety measures. This restoration work, at a little over $2 million dollars, was supported mostly by grants and fundraising done by Kīlauea Point Natural History Association (KPNHA) as well as congressionally appropriated funding. On May 4, 2013, the lighthouse was renamed the Daniel K. Inouye Kīlauea Point Lighthouse to honor the late U.S. Senator from Hawai‘i who had championed and provided funds for the restoration work.

Previous archaeological research

In 1987, William K. Kikuchi surveyed the present grounds of the Refuge and areas of proposed extension. Considering the significance to Native Hawaiians of seabird nesting colonies found within the Refuge, Kikuchi extended the limits of his survey to search for associated cultural features or material. Surface remains of historic structures associated with Kīlauea Lighthouse are described, and limited subsurface testing was performed, but Kikuchi found no evidence of remains related to Native Hawaiian culture (Kikuchi 1987).

Xamanek Researches (Fredericksen and Fredericksen 1989) surveyed areas including Crater Hill and Mōkōlea Point. Land use and history of tenure is documented well, followed by detailed descriptions of historic structural remains related to the transport and loading of sugar at Mōkōlea Point, a WWII-era radar installation on Crater Hill, and Kīlauea Lighthouse. Although archaeological evidence of Native Hawaiian exploitation of seabird colonies was one object of the survey, no such remains were observed.

As part of the environmental assessment done for the Refuge's boundary expansion (USFWS 2007), a records search was conducted in May 2005 at the State of Hawai‘i Historic Preservation Office in Honolulu. 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 showed that four cultural resource surveys (1996, 1997, 2000, 2001) had been completed, resulting in the recordation of nine cultural resources and notation of three sites recorded in 1928 and 1929. Of the 12 cultural resource sites, one site, a possible burial, was located within the expansion area. Three sites that are in closest proximity to, but outside the expansion area, included a historic burial site and agricultural complexes.

Previously recorded sites in closest proximity to the 2007 boundary expansion area included 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 Kīlauea River in Kāhili section." It was described by Thrum as "A large heiau of some 300 by over 100 feet in size, paved, walls 5 feet high, standing in cane field in partial ruins." Since that time, stones have been removed. This site is located outside 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 but in proximity to the expansion area. These sites include:

- A large pre-contact and early post-contact dryland agricultural site located on the slopes above Kīlauea 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 expansion area. A site visit was conducted with the SHPO on May 11, 2005, on Parcel 3, a 162-acre parcel known as "Kīlauea Falls Ranch." 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 loʻi kalo 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 loʻi 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 (USFWS 2007). Maps identifying these parcels and related cultural resources can be found in the 2007 Land Conservation Plan and Environmental Assessment (USFWS 2007).

Cultural Surveys Hawaiʻi, Inc., carried out studies for Kīlauea Falls Ranch on the west side of Kīlauea River (also known as Kāhili Stream) (Shideler et al. 2007 and 2008). The studies identified a total of 62 features within of 5 sites. Four of these five sites are primarily or exclusively agricultural terraces. The only exception at these four sites was interpreted as a temporary habitation related to the agricultural terraces. The inventory survey (Shideler et al. 2008) concluded that the approximately 60–70 inches of annual rainfall within that project area made cultivation possible without irrigation. While Shideler et al. concluded that there may well have been pre-contact ponded field (loʻi) taro cultivation along the flood plain, the vagaries of hurricane, tsunami, and flood may have made such planting down by the river precarious. It was suggested that cultivation up on the steep slope may have been more secure. The propensity of the Kīlauea/Kāhili Stream to flood may have encouraged development on the steep slope. Particularly relevant in the Kīlauea Falls Ranch study was the documentation of a dense cluster of 55 archaeological features including 53 soil-retaining terraces and two possible habitation areas.

In 2013, a systematic pedestrian survey was completed within the approximately 6.67-acre Nihoku Ecosystem Restoration project area at Crater Hill. No surface cultural resources were observed during the survey (Hammatt and Shideler 2013).

The 1980 North Shore Development Plan Update (which includes Kīlauea) identified additional historic and scenic features:

- Kauapea Beach;
- Crater Hill;
- Kīlauea River Estuary and Bay;
- Kīlauea Slippery Slides;
- Kīlauea Episcopal Church;
- Kīlauea Language School;
- Old Hospital Building and Dispensary;
- Old Plantation Office Building;
- Plantation stone houses;
- Kapinao Heiau;
- Mountains behind Kīlauea.

5.2 Refuge Facilities

Facilities described are those that support visitor services, law enforcement, administration, maintenance, and biological management at the Refuge. Historic structures and facilities managed by the Refuge are described in the previous section.

Located 23 miles north of Līhu‘e and 2 miles north of the town of Kīlauea, the Refuge lies at the end of Kīlauea Road, a narrow County Road that ends in a cul-de-sac (turnaround). This area (hereafter also referred to as the Overlook) has six paved, painted parking stalls as well as information displays about the native wildlife and plants that can be seen in the area. Approximately 20 additional vehicles can be accommodated along a dirt/gravel section of Kīlauea Road that visitors often use as impromptu parking (Figure 5-1).

The entrance to the public portion of the Refuge is controlled by a large, metal automatic gate. During a 1-year trial period starting February 2014, Kīlauea Point proper (hereafter also referred to as the Point) is open to the general public 5 days a week, from Tuesday to Saturday, with an entrance fee of $5.00 per person. After the trial period is completed, the visitation days will be reassessed to see if it is possible to reopen on a 6- or 7-day a week schedule. Upon entering the Refuge, vehicles (no pedestrians allowed) descend a steep, narrow (16 feet in width), curving, paved road (0.21 miles) that leads directly to two paved parking lots and two gravel areas, which can accommodate up to 51 vehicles and 15-passenger vans. Large tour buses (25 passenger or larger) are restricted from entering the Refuge. Visitors then walk up to the main area of the Point, where a paved walkway leads them to a fee booth, a visitor center built in 1988 (which houses limited interpretive and educational displays as well as a bookstore, meeting room, minimal storage, and restrooms), and out to the Point, with the historic lighthouse and oil shed, and radio beacon building which has been converted to an interpretive site with informational displays and video. Associated with the radio beacon building, there is a garage (nonhistorical) that stores golf carts used to transport people with disabilities and supplies. Throughout this area, viewing scopes for the public to enjoy views of the seabirds, whales, and coastline and interpretive panels are available.

Two of the historic keeper’s quarters are used as administrative offices for staff. The associated garages are used as storage for supplies. The third quarter, which also has an attached garage (nonhistorical), is currently used as staff residence to provide onsite presence when the Refuge is

closed. There is limited parking for staff and volunteers and limited covered areas to protect these and Refuge vehicles from the harsh sea salt and winds.

There is also a small nursery (24 by 30 feet) used for growing native plants used in outplanting and restoration projects. Another storage shed, built after Hurricane Iniki, is also used to protect an electric vehicle, as a workshop, and maintenance storage.

Exposure on the cliff, northeasterly trade winds, and sea spray from heavy wave action (especially in the winter months) create an extremely corrosive environment for maintenance facilities. This salty environment makes most exposed metals rust at an accelerated pace. Vehicles, heavy equipment, tractor implements, outdoor fixtures on buildings, and other equipment with exposed metal do not remain functioning for more than a few years without extensive rust buildup, making repairs expensive and time consuming.

Though the two existing small maintenance facilities provide limited maintenance capability and provide cover for small equipment including grounds maintenance and other small tools, they are insufficient for larger Refuge equipment needed for Refuge management. Examples include vehicles, tractors, and tractor implements (mower decks, boom axe, grinder heads, herbicide sprayers, etc.). The lack of this equipment onsite greatly hampers the effectiveness of Refuge operations.

The Refuge maintains 2.7 miles of boundary, protective, and guard rail fencing. There are also gates that are tied into some of the fencing. At least 35 percent of this fencing is in need of replacement due to rotting posts, rusting mesh, and falling gates. Fifty percent of the fence also needs to be surveyed with the remaining 15 percent relocated for firebreak purposes and to deter trespass. Fence maintenance and assessments are critical because fences serve as the main deterrent against wildlife threats, such as predators and trespass. Regular maintenance ensures the fence is intact and any issues discovered addressed quickly (e.g., holes cut in the fence, birds which might inadvertently get caught).

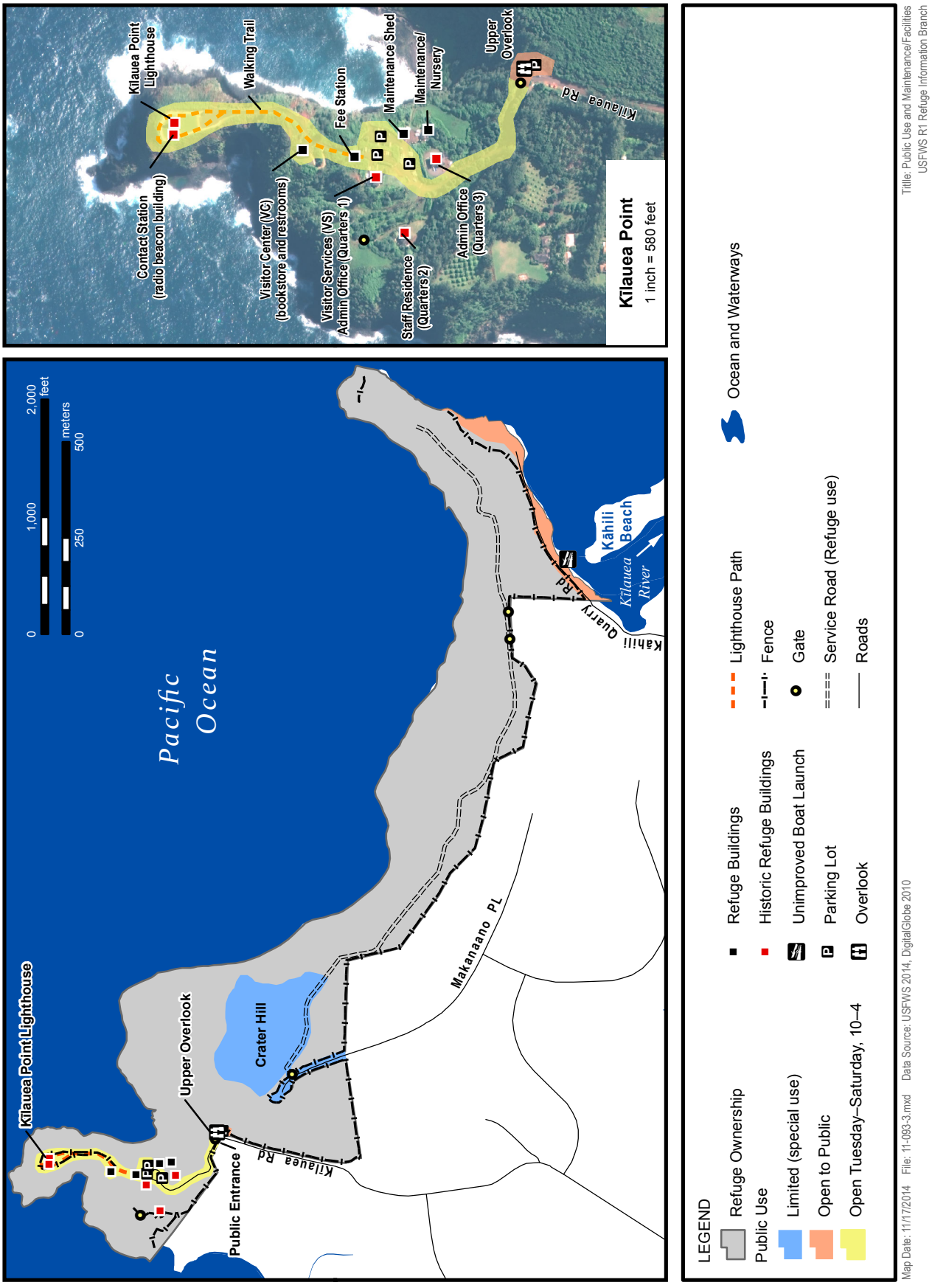
Additionally, in collaboration with several partners including the American Bird Conservancy, Kauaʻi Endangered Seabird Recovery Project (a Hawaiʻi Division of Forestry and Wildlife and Pacific Cooperative Studies Unit effort), National Fish and Wildlife Foundation, and others, an approximately 2,400-foot-long predator-proof fence around 7 acres of the Refuge slightly east of Crater Hill was constructed in summer 2014.

From Crater Hill to Mōkōlea Point, there are partially cemented or dirt roads used for management in areas that are closed to the general public. The Refuge owns a portion of Kāhili Quarry Road, which open to the public.

The majority of the visitor services-related signage is located at the Point and Overlook. There are also boundary signs which mark the Refuge boundary.

Other infrastructure which supports Refuge facilities and management includes water storage tanks and distribution systems, septic systems, and power distribution lines/systems.

Figure 5-1. Public Use and Maintenance and Facilities, Kīlauea Point NWR.



The back sides of maps are blank to improve readability.

5.3 Public Use Overview

5.3.1 Visitation Trends

The Refuge is one of the most visited in the Refuge System. The Refuge is often prominently featured in visitor guidebooks and publications geared toward tourism (e.g., drive guides, visitor maps, airline in-flight guide videos, rental car agency videos). It is estimated that one-third of visitors to Kauaʻi go to the Refuge (PB 2004), and it is it the 8th most visited attraction in the state. Between 2007 and 2013, total Refuge visitation ranged from 388,000 to 500,600 with a peak of 500,600 in 2010. These numbers account for visitors who pay the entrance fee for accessing the Point, special event visitors, outreach interpretive program visitors, environmental education program participants, fishing visitors, visitor who may stop at the Refuge Overlook, and other recreational visitors.

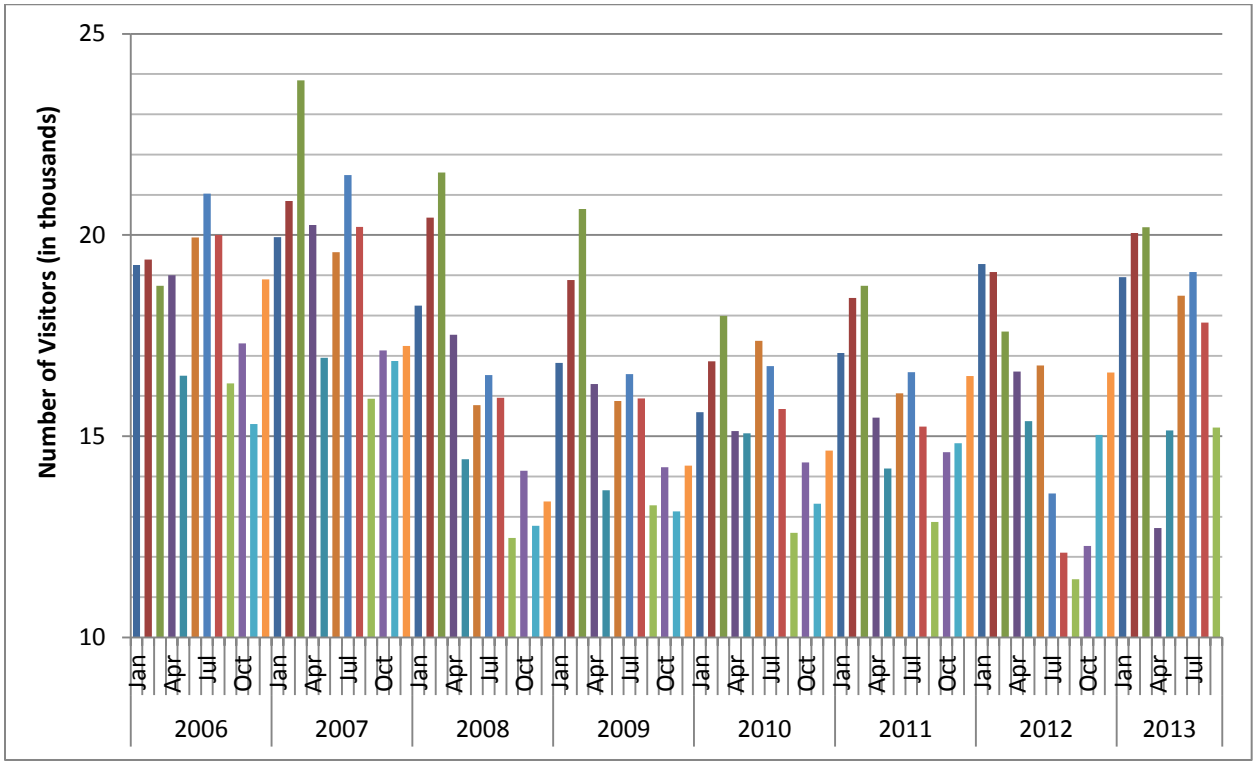
In addition to the Point itself (which is less than 10 acres), right outside the entrance gate is the Overlook, which is open to the general public at all times and is a popular scenic stop for visitors to the island. The area to the north of the lauhala tree to the coast is owned by the Refuge, while the area heading south up Kīlauea Road is owned by the County.

Areas not open to the general public include Crater Hill and Mōkōlea Point. Access to these areas is limited in order to protect breeding populations of endangered and migratory birds and other sensitive natural resources as well as for safety reasons. Access to these areas is by SUP or through special events such as those held during National Wildlife Refuge week.

Visitation to Kīlauea Point NWR is related to total visitation to the island of Kauaʻi. Tourism on the island is sensitive to global macro-economic conditions and natural disaster events. For example, as a result of the global economic downturn beginning in 2008, annual visitor arrivals to the island decreased by 20.6 percent from about 1.3 million arrivals in 2007 to about 1.0 million arrivals in 2008 (UHERO-Kauaʻi Interactive Database 2015). Correspondingly, annual visitation to Kīlauea Point fell by 16.1 percent from 230,300 visits in 2007 to 193,200 visits in 2008.

Refuge visitation is also subject to seasonal fluctuations. Figure 5-2 shows monthly visitation to Kīlauea Point NWR for the period beginning October 2005 and ending September 2013. With the exception of 2006, when June, July, and August were peak visitation months, the peak season at the Refuge is generally January to March.

Figure 5-2. Monthly visitation to Kaua‘i and Kīlauea Point NWR (USFWS unpublished data).



According to a traffic, visitor, and parking study (TVP study) done in 2004, peak times for utilization of the Refuge were between 10 a.m. and 2 p.m. daily, with the parking overflowing between 11 a.m. and 1 p.m. The estimated daily number of vehicles coming down to the Point parking area was 225 during peak visitation. This number is projected to increase to 260 by 2015 and 300 by 2025 under a mid-range growth rate scenario. The Overlook experiences its busiest times at 9:30–10 a.m. and 4–4:30 p.m. (the average visitor spends only 7 minutes at the Overlook (PB 2004)). Visitation seems to increase when cruise ships dock at Līhu‘e, and vehicle occupancy is higher in the summer than the spring. However, seasonal variability in visitation is not large compared to similar destinations on the mainland, with visitation peaking in winter, spring, and summer, and declining 17 percent in the fall (PB 2004). There is only parking capacity for 51 vehicles on the Point. From 2010 to 2013, the visitor center averaged about 189,963 visitors per year (USFWS 2014).

Due to flat and declining budgets, starting in February 2014, the Service reduced the days that Kīlauea Point proper is opened to the general public from 7 to 5 days a week. The Refuge is closed Sundays and Mondays. Visitors are able to visit the Refuge from 10 a.m. to 4 p.m. on Tuesday–Saturday, except on Federal holidays, with an entrance fee of $5.00 per person. After a trial period of 1 year, the visitation days will be reassessed to see if it would be possible to reopen on a 6 or 7 day a week schedule. The visitation trend from data collected from February through May 2014 shows that Tuesday is the highest visitation day, followed by Thursday and Wednesday.

With the passage of the Emergency Wetlands Resources Act of 1986, entrance fees were charged for the first time at the Refuge in 1987 at a rate of $2.00 when the Refuge was opened Monday–Friday from 10 a.m. to 4 p.m. Previously, entrance was free. A fee booth was constructed and three rangers recruited and trained to manage the fee program. In the first year of the program, close to 300,000

people visited the Refuge and $143,762 was collected (some people had free entry through the various passports program).

The Federal Lands Recreation Enhancement Act (FLREA) authorizes the Service fee authority to collect entrance fees, expanded amenity recreation fees, and special recreation permit fees through the Act's sunset date (currently September 30, 2016). Per the act, not less than 80 percent of the recreation fees and site-specific agency pass revenues collected at a specific unit or area of Federal land management agency shall remain available for expenditure, without further appropriation, until expended at that unit or area. Use of fee revenues at a specific site or area can only be used for (1) repair, maintenance, and facility enhancement related directly to visitor enjoyment, visitor access, and health and safety; (2) interpretation, visitor information, visitor service, visitor needs assessments, and signs; (3) habitat restoration directly related to wildlife-dependent recreation that is limited to hunting, fishing, wildlife observation, or photography; (4) law enforcement related to public use and recreation; (5) direct operating or capital costs associated with the recreation fee program; and (6) a fee management agreement or a visitor reservation service. No fees can be used for biological monitoring on threatened and endangered species.

In Fiscal Year 2013, $647,735 in fee revenues were collected at the fee booth with 201,571 visitors. These fees are used to help support visitor services management of the Refuge and include repairs of interpretive exhibits and signage, maintenance of facilities, safety repairs, publication of brochures, and restoration of historic structures.

5.3.2 Volunteer Program

Due to the limited number of staff, the Refuge relies on assistance from Refuge volunteers and partnership with KPNHA, the Refuge Friends Group, to provide visitor services such as interpretation and environmental education and habitat management (e.g., native plant restoration, banding birds, controlling introduced predators, and monitoring).

The volunteer program at Kīlauea Point began in 1984, a year prior to the site's designation as a national wildlife refuge. Staff recognizes that the volunteer program is a critical part of the Refuge workforce and that it benefits all programs and goals and strengthens community relations. Between 2010 and 2013, the number of volunteers ranged from 103 to 115, providing between 6,410 and 8,523 hours of service (USFWS 2014). In 1988, it should be noted that 21,923 volunteer hours were recorded.

In the Refuge's early years, volunteers were heavily involved in the habitat restoration effort, participated in biological studies, conducted most of the environmental education (EE) programs, and staffed the KPNHA bookstore before salespeople were hired. A volunteer letter-writing campaign was influential in having Crater Hill acreage donated to the Refuge in 1988, and the volunteer program received "Take Pride in America" awards in 1987, 1989, and 1992. The Point, as well as the area surrounding the Lighthouse, is staffed almost entirely by volunteers.

From 1984 to 1989, volunteers who interacted with the public were required to attend an annual 8- to 10-week training. Volunteers would gather once a week for sessions conducted by Service personnel and local experts. Sessions were pertinent to the Refuge and included such topics as orientation to the Service, Hawaiian seabirds, wildlife of the surrounding ocean, and the historic Kīlauea Lighthouse. Between 1989 and 2002 (excluding 1993 and 1994 when the Refuge was due to the 1992 Hurricane 'Iniki), only two similar, formal volunteer training courses were conducted. The 1997 sessions were

taped, resulting in a collection of training videos in the Refuge library. The annual training was initiated again in 2003.

The majority of Refuge volunteers are retired persons who live on Kauaʻi's North Shore. Most possess college degrees and professional skills. Approximately 50 percent of volunteers live on the island year round, while the other 50 percent live on the island for several weeks or months out of the year. Therefore, there is a definite seasonal availability of Refuge volunteers. January to March sees the greatest number of volunteers, with plentiful "snowbird" volunteers. Summer attracts the fewest number of volunteers as the "snowbirds" have not yet returned and student volunteers go back to school. With 50 percent of volunteers arriving and departing the island at different times, this presents challenges in getting all volunteers back "up to speed" and causes scheduling to be time consuming. Filling gaps in volunteer coverage fall to Refuge staff and/or interns.

In 2001, a volunteer/EE coordinator position was created, with 40 percent of the position's time devoted to volunteer management and coordination. Prior to this, volunteer coordination duties were assumed as collateral responsibilities by various Refuge staff members. In 2004, the additional responsibilities of overseeing the daily operations of the Refuge's VS and fee programs, as well as supervising the Refuge ranger staff, were added to the position, leaving even less time for management and coordination of the volunteer program and its 140+ volunteers. The volunteer handbook needs to be overhauled. There is no training manual, and regular volunteer meetings and training have been impacted by the limited amount of staffing currently devoted to daily and ever changing volunteer management and coordination.

Refuge Friends organizations are private, independent, nonprofits formed primarily by private citizen volunteers. The Friends organization affiliated with the Refuge is KPNHA, which was established in 1984 to meet the Refuge's commitment to volunteers. The Friends organization was the first in the Service's Pacific Region. The initial step was to recruit a board with an interest in the Service's conservation objectives, and with expertise and organizational ability.

A second objective was to find board members who reflected the ethnic diversity of the islands. The Service was very fortunate in assembling the first board which eventually carried the initial ideas into fruition. The board was composed of the dean of Kauaʻi Community College, principal of Kīlauea and Hanalei Elementary Schools, Kauaʻi Prosecuting Attorney, editor of the Garden Island Newspaper, a member of the County of Kauaʻi Department of Economic Development, general manager of the Sheraton Coconut Beach Hotel and a Refuge volunteer, formerly with the Denver Zoo. The board worked to develop suitable by-laws for the organization which they named Kīlauea Point Natural History Association. Once the by-laws were drawn up the organization petitioned the State of Hawaiʻi for recognition as a nonprofit corporation. Once confirmed, the organization petitioned the Internal Revenue Service for status as a 501(c)(3), Non-Profit Educational Corporation. After attaining this status, the organization entered into agreement with the Service for use of a portion (approximately one-third or 300 square feet) of the current Contact Station for retail sales. The decision was made to try and develop a volunteer group which would assist with start of the sales outlet.

The most fortunate aspect of this plan was the volunteer program, which to this day contributes significantly to Refuge programs. To raise additional capital, a membership program was initiated. A portion of the Contact Station was remodeled. Due to the limitation of space and the board's desire to keep the inventory simple, post cards, natural history publications, and a map were the first items

carried. A year later, t-shirts were added. The first day's sales were $30.00. Fiscal year 1984 sales indicated a gross volume of $10,958. By 1987, it had reached $42,791.

Early KPNHA projects included publishing of a quarterly newsletter, *Kīlauea Pointers*, supplying binoculars and spotting scopes for visitors, hosting an annual Christmas Sale, developing and publishing three to four issues of *Hawai'i Nature Focus* (a publication for school-aged children) per year, and hosting the annual volunteer awards picnic. In 1988, the Association published a 114-page book commemorating the 75th anniversary of the Kīlauea Lighthouse. In 1994, retail operations moved into the VC and over the years continued to expand. KPNHA hired its first business manager in 1996. The title changed to executive director in 2006. A bookstore manager was hired in 1997.

Today, KPNHA has two full-time employees and a variable number of part-time employees (typically at least three). The bottom floor of the VC provides office space for three of KPNHA's eight staff members, and storage for KPNHA supplies and merchandise. Recent accomplishments include leading a $1 million capital campaign to fully restore the nearly 100-year-old Kīlauea Lighthouse. KPNHA averages 90 members a year. Although the number of members in FY10 dropped to 52, dues and donations received from these members to KPNHA's general fund are the highest in the organization's history. The reduction in membership can be explained by some individuals donating instead to the Lighthouse restoration. Bookstore sales reached a high of $508,000 in 2008, but have dropped in recent years due to the economic decline.

5.3.3 Visitation and Visitor Experience

Two visitor surveys conducted in 2003–2004 and in 2010–2011 at Kīlauea Point NWR provide a detailed overview of visitor demographics, trip characteristics, experience, and opinions about Refuge services, facilities, and recreational opportunities. The first study (Sexton et al. 2005) was conducted in support of an Alternative Transportation Study (ATS) conducted for the Refuge (Parsons Brinckerhoff 2006). The objectives of this survey were to better understand visitor trip characteristics and experience, visitor perceptions on access and transportation options, and visitor valuation of the Refuge and services provided.

The second study (USGS Data Series 643) was conducted as part of the National Wildlife Refuge Visitor Survey (Sexton et al. 2011). This standardized survey was conducted on 53 refuges across the country in order to provide refuge managers, planners, and visitor services specialists with reliable baseline data about refuge visitors and their experiences. The survey was conducted to provide information both at a national level *and* at a field station level to more effectively manage visitor services and facilities across the Refuge System, as well as to inform site-specific management and planning decisions such as CCPs, visitor services step-down plans, and transportation plans. Detail on sampling design, response rates, and sample sizes for each survey can be found in the respective reports.

Nearly all visitors to Kīlauea Point NWR are nonlocal (i.e., not from the island of Kaua'i), from the United States, and most were families. The 2003–2004 study showed that the majority of visitors to Kīlauea Point NWR spend their time at visitor attractions on the North Shore on the day they visit the Refuge. The next most frequent trip pattern includes stops on the North Shore and East Side (south of Kīlauea Point NWR to Līhu'e). About half of visitors went to three or fewer attractions on the island on the day they visited the Refuge. Nearly all visited Kīlauea Point NWR first, second, or third, with half visiting the Refuge first. Other popular stops included Hanalei Bay, Kē 'ē Beach State Park, and Hā'ena Beach State Park.

The largest incidence of travel mode used by visitors while on Kauaʻi is rental vehicle only, followed by a combination of walking and rental vehicle, or a combination of walking, boat, and rental vehicle. Nearly all visitors drive a private vehicle (rental car) to the Refuge (though private tours and taxis are also utilized). There is no public transit option available. Currently there is one fixed route from Līhuʻe to Hanalei serving Kīlauea town on approximately 1 hour headways, from 5:30 a.m. to 10:30 p.m., Monday thru Friday, and 2-hour headways on Saturdays and holidays. The last stop in Kīlauea is in the downtown, commercial shop area, about 1.5 miles from the Kīlauea Point NWR Overlook. The buses do accommodate bicycles. Kauaʻi Bus does not currently have specific plans to expand service beyond downtown Kīlauea. However, in previous Kīlauea Town planning efforts, Kauaʻi Bus has indicated consideration of installing a transit center or more permanent bus stop infrastructure within the downtown area.

Visitors first learned about the Refuge from signs on the highway and friends and relatives. Specific information sources most used to learn about the Refuge include travel guidebooks and visitor brochures. Key information sources used by visitors to find their way to Kīlauea Point NWR include signs on the highway, a road atlas or highway map, or previous knowledge.

Visitors are a nearly equal mix of male and female with an average age around 57 for males and 53 for females. Visitors have, on average, four years of college or technical school. The median level of income is $100,000–$149,000/year. Most are first-time visitors to Kīlauea Point NWR and typically their visit is incidental or one of other equal reasons for visiting Kauaʻi. Visitors spend an average of 2 hours at the Refuge, with the largest number of visitors spending 1 hour (compared to 26 minutes in 1988). About half of visitors to Kīlauea Point NWR have been to at least one other national wildlife refuge in the past year. Visitors participate in a variety of activities at the Refuge; the top three activities are photography, bird watching, and wildlife observation. The scenic overlooks, viewing the historic lighthouse, and viewing native seabirds and whales are important to their decision to visit. Nearly all visitors stop by the KPNHA bookstore and view the exhibits during their visit.

> *I absolutely love the Kīlauea Point National Wildlife Refuge. We go there every time we go to Kauaʻi (3 times to date). The views and the birds and whale-watching are spectacular in any kind of weather…I want to thank the volunteers and the U.S. Fish and Wildlife [Service] and National Wildlife Refuge System for making this all possible. Places like Kīlauea Point Refuge are our nation's treasures and it is so critical we nurture and honor them.*
>
> -Survey comment from visitor to Kīlauea Point NWR

Visitors' overall satisfaction with the services, facilities, and recreational opportunities provided at Kīlauea Point NWR is high, with 86 percent satisfied with the recreational activities and opportunities; 92 percent satisfied with the information and education about the Refuge and its resources; 95 percent satisfied with the services provided by employees or volunteers, and 93 percent satisfied with the Refuge's job of conserving fish, wildlife, and their habitats. When asked about specific Refuge attributes, visitors reported the following regarding the importance of and their satisfaction with these attributes. All services and facilities provided at Kīlauea Point NWR received high importance and satisfaction ratings, including available, knowledgeable, and courteous employees and volunteers; convenient hours and days of operation; and information kiosks/displays and exhibits about the Refuge. Recreation opportunities provided on the Refuge also received high marks, in particular opportunities for photography and bird and other wildlife viewing. High

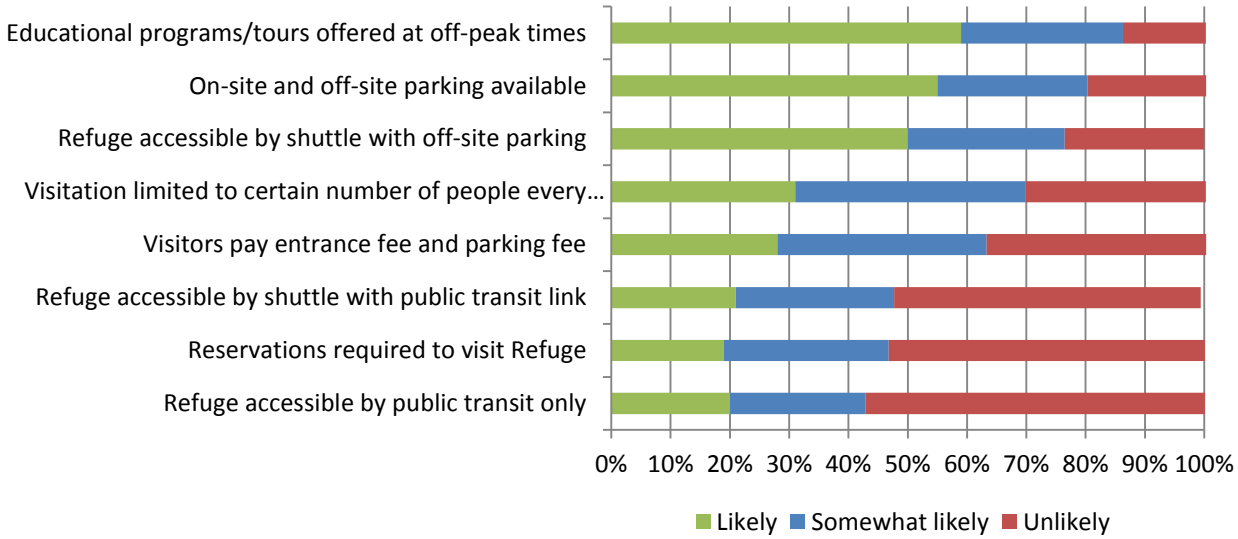
importance and satisfaction ratings indicates "keep up the good work" regarding management. Of the 79 percent of visitors who indicated that they paid a fee to enter the Refuge in 2010–2011, three-quarters agreed that the opportunities and services were at least equal to the fee they paid and nearly all felt the fee was about right, whereas 19 percent felt that the fee was too high (8 percent) or too low (11 percent).

Three-quarters or more of visitors indicated they would spend more time on the Refuge and the surrounding area if the following were offered: a self-guided hike through restored native forest for a scenic view of the lighthouse, Kīlauea Town, ocean, and surrounding mountains (at no cost); an introduction to the Refuge by Refuge staff or volunteers (at no cost). About half of visitors indicated they would spend more time for a guided hike to the summit of an extinct volcano crater to view native seabirds, other wildlife, and World War II bunkers (for a fee); and a guided history tour of Kīlauea Town (for a fee).

As part of the 2006 ATS study and the supporting 2003–2004 survey, visitors to Kīlauea Point NWR were asked about their perceptions of crowding and their preferences for access and transportation options (including a shuttle specifically). These questions were asked in an effort to address methods for improving access and transportation needs in light of identified traffic congestion and parking problems occurring in Kīlauea Town and on the Refuge. In context, visitors to Kīlauea Point NWR were familiar with using a shuttle or bus at another park, forest, or other public facility, though most indicated they did not use alternative transportation in their daily lives.

The majority of visitors did not perceive crowding to be a problem on the Refuge and there seemed to be no association between parking capacity and visitor perceptions of crowding (though winter visitors did perceive some crowding in parking areas when parking capacity was exceeded and overflow parking occurred). When asked about specific transportation-related aspects at Kīlauea Point NWR, all attributes received high marks, including safety of driving conditions, directional signs on highways, safety of Refuge entrance, directional signs on Refuge, and condition of trails/boardwalks. Visitors were asked about options for managing visitation, ranging from a reservation system and fees to off-peak hour offerings to encourage different visitation patterns. Over half of visitors indicated they were likely to visit if educational programs or guided tours were offered at off-peak times. They were also supportive of a choice of on- and offsite parking where offsite parking with a shuttle to the Refuge would cost less than parking onsite. Lastly, they were likely to visit if the Refuge were accessible only by shuttle from offsite parking. Most visitors were *not* likely to visit if the Refuge were only accessible by public transportation, if reservations were required to visit the Refuge, or if the Refuge were only accessible by a shuttle that had a public transit link to other visitor attractions on Kaua‘i (Figure 5-3).

Figure 5-3. Likelihood of visiting Kīlauea Point NWR versus management options (Parsons Brinckerhoff 2006).



Regarding a shuttle specifically, visitors indicated they would be willing to wait about 20 minutes to enter the Refuge by shuttle. Key factors that would affect visitors' decision to visit the Refuge by shuttle were reliable and on-time service, the cost of the shuttle fare and offsite parking that is easy to find and near the Refuge. Visitors were willing to pay higher amounts for a Refuge entrance fee that included a shuttle and guide.

Though alternative transportation was explored more generically in the 2010–2011 survey, only a small percentage of 2010–2011 visitors felt alternative transportation at Kīlauea Point NWR would enhance their experience. However, over half of these visitors indicated that on national wildlife refuges in general, they might be likely to use several alternative transportation options, including offsite parking with trail access, a boat that goes to different points on Refuge waterways, a bus or shuttle that provides a guided tour of the Refuge, or a bus or shuttle that takes passengers to different points on the Refuge.

Bicycle and pedestrian access along the east shore of Kauaʻi between Līhuʻe and Kīlauea Point NWR is mostly limited to shared-use roadway along Highway 56 and through Kīlauea Town. There are also several local residents who access the Crater Hill area on foot or bicycle via a gated community located up Kīlauea Road, about one mile from the Overlook. There are plans for a separate bicycle and pedestrian path to go from Nāwiliwilli to Anahola along the east shore. Portions of this path, known as the Ke Ala Hele Makalae trail, are built, but even when complete, a visitor on bicycle or foot would still be over 10 miles from Kīlauea Point NWR.

5.3.4 Visitor Services Management Challenges

High visitation to the Refuge poses several transportation, signage, and access-related challenges for staff. Visitors to the Refuge arrive using State Highway 56 (Kūhiō Highway), turning onto Kolo County Road and then onto the 2-mile Kīlauea County Road which passes through the heart of Kīlauea Town and leads to the Refuge. Residences, as well as commercial sites, line the sides of the

road on this first half-mile stretch. After passing through the center of Kīlauea, the remaining 1.5 miles of Kīlauea Road contains a few residences and open space, and then terminates at the Refuge Overlook. Hawai‘i Department of Transportation traffic counts conducted in 2009 on Kīlauea Road found a two-way average daily traffic load of 4,600 cars in the first half-mile and 1,300 cars in the remaining area between downtown Kīlauea and the Kīlauea Point NWR Overlook. From these counts it is estimated that 25 percent of all traffic on Kīlauea Road is headed to the Refuge, either the Point or the Overlook.

There is little-to-no signage properly directing traffic from the main highway down the County roads to the Refuge. There is also no intelligent transportation system (ITS) that conveys real-time information about parking availability at the Refuge (a comment was made on this issue on one of the visitor surveys). At this time the Refuge is being considered to take part in a Service ITS demonstration project. This demonstration would most likely involve the use of vehicle detection counts at the Refuge to relay parking availability and operation status of the Refuge to visitors out on Kūhiō/State Route 56 Highway via electronic messages. Some further planning, design, public involvement, and compliance would still need to occur before this technology could be tested.

The entrance road from the Overlook to the parking area has a number of issues. At the Overlook, pedestrians do not have a designated path by which to navigate from where they parked to the actual Overlook. They sometimes must weave between cars entering and exiting the Refuge. Although signs indicate that pedestrian use of the access road beyond the entrance gate is not allowed, a number of individuals disregard or do not see the signage and walk down the access road. Traffic congestion also occurs at the Overlook due to its cul-de-sac configuration when there is a queue to enter the Refuge or people are waiting for parking spots at the Overlook.

There is limited advance directional or orientation/information signs to help visitors understand how to access the Point and see the Lighthouse, or what their options are. Visitors who arrive by car typically park to see the view at the Overlook but are confused about whether or not they are supposed to drive or walk past the gate down into the Refuge. There are signs, however, they are not readily noticed by the visitor. It is also unclear to bicyclists whether they are allowed to ride their bicycles past the entrance gate. Residents expressed concern about the impact of tourists on transportation infrastructure and they did not want to see overbuilding of the Refuge’s circle infrastructure to accommodate more visitors (Parsons Brinckerhoff 2006).

The winding, narrow, steep road leading into the Refuge makes for dangerous conditions. Larger vehicles, such as tour buses, have no access because of the road conditions and limited parking facilities. School groups that use school buses are accommodated outside of the hours for the general public. However, the groups often leave after the Refuge has opened, which requires a minimum of two staff to stop traffic to allow the bus to use the access road, as well as a staff member to work in the entrance booth. Bicycle use of the access road is also an issue for many of the same reasons cited for pedestrians.

Parking is often insufficient at the Refuge, especially during peak visitation periods (comments were made on this issue in the visitor surveys). At such times, Service staff must be stationed to direct traffic and promote safety when the parking lot is congested. When visitation exceeds parking capacity, including reasonable overflow limits, Service staff place a sign at the entrance gate to indicate that public entry into the Refuge is temporarily closed. During these times, a staff member is stationed at the entrance gate to facilitate a one-car-in, one-car-out operation. Such overflow conditions not only prevent Refuge staff from conducting other key duties such as providing talks

and interpretive opportunities, but also degrade the quality of wildlife habitat, negatively impact the visitor experience, and undermine the Service's ability to fulfill its goals for wildlife-dependent uses.

Traffic flow through the existing parking lot is also an issue as shown by visitor survey comments about the steep climb from the lot to the booth, limited parking, and the tightness of the parking area. There are two paved parking areas, the upper and lower lots, which include 32 designated stalls, oriented at 90 degrees to the parking access lanes. The upper lot has one designated ADA- accessible parking stall and access aisle located near the existing fee booth and Point Area Pedestrian Pathway entrance. The two lots are connected on the north side by a paved asphalt pedestrian access ramp which has steep slopes of up to 18 percent. Bollards block vehicular access to this ramp at the north end of each lot. The current parking lot traffic flow in these lots is U-shaped; vehicles must pull-in and pull-out the same direction they came from (no through traffic). Drivers are unable to determine the availability of parking until after entering each respective lot. If parking is unavailable, drivers must back up out of the parking lot in order to turn around and look for parking in other locations.

Vehicles must also avoid pedestrians walking to the entrance fee booth. Grass areas are used for parking during overflow conditions. However, wet grass or slippery conditions can be hazardous and have resulted in accidents. They are also endangered nēnē foraging, roosting, and brood-rearing areas. Traffic cones are used to direct traffic when possible. However, the effort involved for Refuge staff to install and move cones creates additional staffing issues. Through the use of Public Lands Highway Discretionary program funds, the Refuge is planning to undertake minor construction to improve the traffic flow situation in these lots. Included in this work would be improvements and stabilization to the administrative and graveled parking areas and stabilization of the retaining wall below the pedestrian walkway.

After the visitors exit their parked vehicles, there is a lack of information and signage to let them know where they can and cannot go, leading to confusion. There are several buildings adjacent to the parking areas; however, the Lighthouse, restrooms, and VC are not visible from the parking lot. Therefore, visitors are often confused about how to get to these facilities, as well as the existing buildings and where they should go. In the visitor surveys conducted, several comments about needing better signage were recorded.

The transportation, signage, and access issues also pose a danger to native wildlife. There is threatened ʻaʻo or ʻuaʻu kani habitat on the side of the narrow, curving road leading into the Refuge, which makes regrading or expanding this road problematic. Nēnē also nest and rear young along this road and have been killed or injured, despite the wildlife and slow down signs posted and speed bumps.

As a result of these issues and staff desire to provide quality visitor services experiences (versus increasing visitation numbers), several studies were conducted to provide solutions. Alternative transportation systems (ATS) were evaluated, including a traffic, visitor, and parking study; visitor and community survey; and Refuge visitor projection report. The 2006 ATS study provided five alternatives for consideration to deal with current transportation issues and anticipated rise in island visitor numbers:

- No improvements, which would keep current status;
- Minor improvements, transportation system management, and transportation demand management. These would include physical or operational changes to increase effective capacity through improved management of parking resources, or they would redistribute

demand to less busy times;
- Moderate improvements to increase capacity, which would include physical improvements such as additional parking and/or widening roads;
- Voluntary shuttle service with private vehicle access, which would institute a shuttle system from a new offsite hub facility while continuing to allow private vehicles onto the Refuge;
- Mandatory shuttle service, which would prohibit public parking beyond the entry gate at Kīlauea Point NWR and require all visitors to use a shuttle system from an offsite hub facility.

It should be noted that in the Kīlauea Town Plan planning process, the shuttle bus for visitors was heavily discussed in the public workshop discussions (County of Kaua'i 2006). The Kīlauea community's interest was to manage visitor demand at Kīlauea Point NWR by using entry fees and other measures and to make only modest changes to parking and transportation rather than take steps that may promote increased visitation to the Refuge.

The report also looked at cost feasibility as well as modeled several different case scenarios related to visitor numbers and anticipated use. Several of the recommendations and analyses were integrated into the actions described in Chapter 2 of the CCP, as well as the effects analysis in Chapter 6 of the draft CCP/EA. This study can be found at http://www.cflhd.gov/lrtp/documents/projects/KPNWR_ATS_FINAL.pdf.

In addition to the 2006 ATS report, a Transportation Assistance Group (TAG) was convened in 2009 to assist the Service in further refining data and recommendations to pursue regarding transportation, especially as it relates to the CCP. In addition to the problems already identified, additional issues identified by TAG included:

- Transit viability concerns due to visitation patterns;
- Fee collection location creates circulation problems, does not capture visitors at the Overlook, and the flat rate does not encourage the use of alternative transportation;
- Constrained footprint in which to expand or support transportation infrastructure;
- Visitation is expected to grow and to remain diverse.

TAG provided a series of recommendations for the Refuge to consider. Most focused on incorporating transportation goals and planning into the CCP process. The recommendations were:

- Revisit previous approach of pursuing NEPA analysis funds for 2006 ATS Study; integrate transportation planning with CCP and town planning;
- Consider proposals for additional funding from other sources;
- Develop transportation goals and objectives, and an assessment of needs;
- Continue productive stakeholder partnerships; play a leadership role;
- Adopt an incremental approach; move away from planning and toward implementation; experiment with operational changes, such as:
  - Change operating hours–e.g., closing once per week, opening 1 hour later or earlier on particular days–to attempt to address anticipated traffic/parking problems, and/or to offer new services (such as sunrise hikes) that might smooth out demand over the course of the day, reducing the need to increase parking capacity;
  - Charge differential fees (subject to the Refuge's fee authority), depending on the level of crowding by time of day;

  - Work with cruise operators to coordinate transit from cruise ships docking at Kauaʻi;
  - Install temporary traffic humps in town to determine how effective they could be at slowing traffic;
  - Test a parking reservation system to enable advance planning for managing visitor traffic and parking;
  - Test variations on the one-on, one-off protocol for managing visitor car access;
  - Require staff to park offsite, providing transit or carpooling, in order to free up additional parking spaces for Refuge visitors;
  - Arrange a transit demonstration service;
- Pursue small-scale infrastructure improvements;
- Identify data needs and collect data to fill gaps;
- Scope other planning efforts.

In March 2011, another workshop, the CCP Visitor Services and Alternative Transportation Workshop, was conducted to assist in incorporating TAG and other transportation-related study recommendations into the CCP. Refuge and Service regional staff, along with technical advisors from Federal Highway Administration-Central Federal Lands Division, U.S. Department Of Transportation, Volpe Center, U.S. Geological Survey, Hawaiʻi Department of Transportation, Kauaʻi Bus, and Kauaʻi County participated in this workshop. The group examined CCP goals and identified how transportation related to achieving these goals. These transportation objectives and goals were broadly folded into the alternatives discussed in Chapter 2 in the CCP (e.g., adopting an incremental approach at first to include demonstration projects and small, incremental changes for infrastructure and operations).

More specific transportation planning and implementation will take place via SDMPs that take their direction from the CCP. The Refuge has received funding from the Federal Transit Administration's Paul S. Sarbanes Transit in Parks Program to assist in planning for the implementation of the transportation components that emerge from the CCP. The study will provide recommendations on how to implement components, such as data collection; coordination with other entities; and additional planning required to implement elements.

5.4 Wildlife-Dependent Public Uses

The Improvement Act identified hunting, fishing, wildlife observation and photography, and environmental education and interpretation as wildlife-dependent, priority public uses for the Refuge System.

5.4.1 Hunting

The Refuge is not open for hunting. However, there are other lands (e.g., state forest reserves) on the island where public hunting is offered.

5.4.2 Fishing

The Refuge is open for recreational fishing. From 2010 to 2013, the number of participants per year ranged from 18 to 104 (USFWS 2014). Fishing occurs at Kāhili Quarry (sea) and the Kīlauea River (estuary). In addition, cultural Native Hawaiian fishing access is granted to the East Cove of Kīlauea

Point. Participants must sign a waiver as well as receive an orientation on sensitive areas. For additional information please refer to Appendix B.

5.4.3 Wildlife Observation and Photography

Most of the wildlife viewing and photography occurs on the Point or at the Overlook. The Refuge offers exceptional opportunities for wildlife observation and photography and is one of the best accessible locations in the main Hawaiian Islands for viewing wildlife as it has a high diversity of breeding birds at one location. Six to eight species of seabirds, as well as Hawai‘i’s State bird, the endangered nēnē, can readily be seen by the majority of visitors. The sheer number of birds, as well as their proximity, makes for a high-quality viewing and photography experience.

The National Oceanic Atmospheric Administration (NOAA) also administers the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) in the waters surrounding the Refuge, and endangered koholā (humpback whales) are readily seen offshore and photographed from December to April. Groups of nai‘a (spinner dolphins), ‘īlio-holo-i-ka-uaua (Hawaiian monk seal), and honu (green sea turtle) can also be seen from the Point. In addition, due to climate change and associated sea level rise, protected areas like the Refuge will become increasingly important for the persistence of seabird populations in the main Hawaiian Islands.

General information about the wildlife is provided on the Refuge’s website; however, it does not include information such as current highlights, sightings, or wildlife counts. A wildlife checklist is offered onsite, but is directed at avid wildlife watchers. Viewing scopes are set up in multiple locations around the Point and binoculars are provided for loan in order to enhance wildlife viewing. Volunteers help visitors use the scopes and binoculars, identify species, point out and provide information about wildlife behavior, and provide interpretation about the Refuge and its resources. In the past, the Refuge utilized a remote camera focused on a nesting mōlī or ‘ā (red-footed booby), which then sent a live video feed to the visitor Contact Station. Staff and volunteers regularly receive requests to re-institute these cameras. Currently, wildlife observation and photography programs, workshops, and activities are not provided on a consistent basis and could be expanded or enhanced.

While the best viewing opportunities are on the Kīlauea Point Peninsula, additional opportunities are provided at the overlook at the entrance to the Refuge, as well as on Crater Hill (offered in the past but discontinued in 2003). They also provide a different perspective than is provided from the peninsula.

Between 2010 and 2013, total wildlife observation visits annually ranged from 366,890 to 376,937 and photography ranged from 290,000 to 300,100 (USFWS 2014). Many of the 2010–2011 visitor survey comments reflected visitor enjoyment of seeing the wildlife and habitats and identified these resources as making the Refuge unique.

5.4.4 Environmental Education

Environmental education occurs mostly on the Point. School groups participating in EE programs generally arrive at the Refuge at around 8:30 a.m., before the Refuge opens. This way, school buses can easily maneuver the roadway and have adequate room to park without the complication of regular visitor traffic. The children also have the Point to themselves and are not distracted by the large number of visitors. Although most school groups try to leave before 10:00 a.m., they often leave after the Refuge has opened, which then requires a minimum of two staff to assist in safely

getting the children through the busy parking lot to their bus, as well as to stop traffic to allow the bus to exit the Refuge. By departing at 10:00 a.m., this leaves only one hour for the EE program given loading, unloading, restroom breaks, etc., which does not lend itself to a high-quality EE program. The small window during which EE is offered (8:30 to 10:00 a.m.) means many schools on the west, south, and east sides of the island are unable to participate because of the travel. Only seven percent of Kauaʻi's public and charter school students (K–12) are within a 20-minute drive of the Refuge. For 68 percent of the students, it is at least a 40-minute drive to get to the Refuge, and for nearly 30 percent it takes more than an hour.

In 1987, Congressional funding provided for the design and construction of an EE Center. Today, the main floor of this facility serves as the VC and houses the bookstore operated by KPNHA (the bookstore was originally located in the Contact Station adjacent to the Lighthouse). The bottom floor of the VC has a multi-purpose room. The size of the multi-purpose room is often insufficient for EE programs. As such, the Contact Station adjacent to the Lighthouse is frequently used for EE, but staff often find they are racing to pack up their EE supplies and reorganize the room as visitors begin arriving at the Refuge. From 1997 to 2007, a portion of the bottom floor also provided office space for the Refuge's EE Specialist. It currently provides office space for three KPNHA staff members, and storage for KPNHA supplies and merchandise.

Beginning in 1985, when the Refuge was established, a dedicated cadre of volunteers and KPNHA developed EE materials. During the summers of 1986 and 1987, an intern developed additional EE materials for teachers, and a teacher's manual was later completed as part of an intern-led effort. In 1988, over 3,000 students participated in EE programs at the Refuge. In 1997, the Refuge hired a full-time EE specialist and more materials such as field trip leader packets and a traveling trunk about Refuge seabirds were created. In 1999, through a partnership with a university, a website was established to allow classes to follow the flights of foraging mōlī. In 2001, the Jason Project brought the Refuge's wildlife to schoolchildren via satellite. From 2000 to 2001 the EE specialist position was vacant and the position was later replaced with a Volunteer/EE coordinator position, with 40 percent of the time devoted to EE. In 2004, the additional responsibilities of overseeing the daily operations of the Refuge's VS program and the fee program, as well as supervising the Refuge ranger staff, were added to the position, leaving even less time for management of the EE program. In 2009, a junior ranger program was instituted.

During the summer months, the Refuge can receive over 100 visitors under the age of 16 per day. Due to Lighthouse restoration during the 2010–2011 school year, the Refuge was able to accommodate only a limited number of school visits onsite. In turn, staff developed a program whereby 12 North Shore second grade classes followed the life history of the mōlī throughout the school year. The program included five visits by a Refuge AmeriCorps member or ranger to each class, along with a culminating field trip to the Refuge.

Since budget sequestration in 2013 and the resulting loss of staff, with the exception of the Albatross Life Cycle program managed by one volunteer, the Refuge has not been able to conduct onsite EE programs. Instead, the EE program has been adapted to allow elementary classes access to the Refuge via a "short" bus (which carries 25 passengers—and is paid for by KPNHA) during public hours. They are offered a program that they can lead, or they can choose to utilize onsite interpretive signs. A ranger-led program is no longer available, as was traditionally done. Although offered in the past, the Refuge does not currently conduct teacher trainings.

The Refuge conducts EE programs throughout the year with the greatest number of students visiting from January through May.

Between 2010 and 2013, education participants involved in on- and offsite EE programs ranged from 7,200 to 12,032 per year (USFWS 2014). In 1988, 3,000 students participated in EE (USFWS 1989). KPNHA provides funding for bus transportation for schools that visit the Refuge, which is a significant contribution to the EE program.

5.4.5 Interpretation/Outreach

Interpretation and outreach occur mostly at the Point and Overlook. Visitors are first welcomed to the Refuge at the fee collection booth. The staff on duty assists in orienting visitors, answering their questions, informing them about wildlife activity that day and advising them of Refuge services offered at the VC and Contact Station (Radio Beacon Building), such as free binoculars for loan and docent interpretive services. Volunteers help visitors use the viewing scopes and binoculars, identify species, point out and provide information about wildlife behavior, and provide interpretation about the Lighthouse, the Refuge, and its resources. Volunteers are the primary means of personal interpretation on the Refuge. The majority of volunteer hours were dedicated to the VS program.

Under optimum conditions, there are at least two volunteers on duty, with one volunteer operating an on-call golf cart to help visitors who may need assistance getting from the parking lot to the VC or Lighthouse. The Contact Station, as well as the area surrounding the Lighthouse, is almost entirely staffed by volunteers. The Refuge is extremely fortunate to have volunteers to provide this person-to-person service as opposed to resorting to self-guided interpretation.

The Refuge has a number of interpretive panels around the Point highlighting native and nonnative plants and wildlife. Some of the panels were done at different times, using different styles, approaches, and materials. These panels are appealing, of a good size, and are well-placed to be visible but not obtrusive. The most recent panels were completed in 1999. The panels are permanent and are in place year-round. Wildlife at the Refuge is seasonal. For example, whales and albatrosses are found in the winter months. Thus, this can cause some confusion for the visitor.

When entering the VC, people often expect to see exhibits relating to the Kīlauea Point Light Station or the wildlife at the Refuge. However, some of the exhibits are only tangentially related or are fully irrelevant to the site. This may prove disorienting to the visitor who may have expectations of finding information regarding the Refuge. In addition, due to the 1.5 million plus visitors who have passed through the VC since it reopened after Hurricane ʻIniki in 1994, as well as the open air conditions of the building, the exhibits are badly worn. They are out of date and interpretive messaging for children is lacking (some comments from the 2010–2011 visitor surveys indicated the desire for more updated displays). In the past, visitors viewed a video presentation based on refuges in their home state. However, due to maintenance issues having to do with electronics in the salty, open-air environment, they were removed.

In 1989, the Contact Station was remodeled and new interpretive displays were added. The building contains an interpretive display on the history of Kīlauea Lighthouse, a desk staffed by volunteer docents, binoculars for loan, as well as an area to sit and watch a video about the Refuge.

One of the most popular and notable features of the Refuge is the historic Kīlauea Lighthouse. Since restoration, visits into the Lighthouse are only possible on a guided tour. Since Lighthouse Day (the

first Saturday in May) in 2014, the Refuge started offering guided tours weekly, dependent upon staff and volunteer availability. Guided tours require temporary modifications of the interior and an intensive staff and volunteer effort. Free tour tickets are issued 60 minutes prior to the start of the tour and each tour can accommodate 15 people, every hour on the half hour beginning at 10:30 a.m. with the last tour at 2:30 p.m. (except on Lighthouse Day, when the Lighthouse is open until 7 p.m.).

The tours take 30 minutes given the time it takes to get everyone up the narrow staircase to the top of the Lighthouse, provide opportunities for visitors to look around and take photographs in the small area, and then make their way back down. Both the community and visitors regularly express a strong desire to have greater access to the interior of the Lighthouse and to see it lit. Overall, the frequency of opportunities for the public to experience the interior of the Lighthouse on guided tours is variable; tours may in the future occur more or less frequently than once per week depending upon the availability of staff and volunteers.

Most of the Refuge's current outreach efforts have been conducted on an ad hoc basis to meet the needs of an individual event or program. While this has resulted in favorable results in some individual instances, its overall effect has been a scattershot approach to communications. Existing resources dedicated to outreach are limited. Refuge staff often note that the public confuses the Service with State wildlife agencies and the National Park Service. Anecdotal evidence suggests that most are not aware of who the Service is, while an even greater number are not aware of what the Service does or why it does this work. Messages describing how the Service is different from other government agencies, how national wildlife refuges are different from other public lands, and why the Service's work is important to people are currently absent.

Between 2010 and 2013, participants engaged in on an offsite talks and programs ranged from 160,600 to 210,528 per year (USFWS 2014).

5.4.6 Cultural Resources Interpretation

Interpretation of historic structures such as the lighthouse occurs daily. Additional cultural resources interpretation is available during National Wildlife Refuge Week with a special tour highlighting the Native Hawaiian and plantation cultural resources on the Refuge.

5.5 Other Refuge Uses

Between 2010 and 2013, participants in other recreational activities ranged from 21,840–22,000 per year (USFWS 2014). The majority includes secondary public uses involving access through the Refuge at Kāhili Quarry or near the mouth of Kīlauea River (aka Kāhili Stream) for boating, including launching and loading of canoes, kayaks, paddle boards, and surfboards; and for stream, beach, and ocean uses (such as snorkeling, sun bathing, surfing, swimming, and walking). Horseback riding is allowed along an approved easement.

5.6 Illegal Uses

According to annual law enforcement Refuge System reports between 2008 and 2010, illegal uses included trespass, violation of liquor laws, drug possession, illegal hunting, off-roading, vandalism, drunkenness, theft, weapons possession, disorderly conduct, and presence of suspicious persons. Incidences reported ranged from 19–29 per year. Most illegal uses occur during evening hours at the

overlook (e.g., late night drinking) or unintentional trespass by fishermen along the Refuge's coastline or at Kāhili (or Rock Quarry) Beach.

The Service law enforcement issues on lands and waters of the Refuge are under the jurisdiction of the Service Zone Officer based in Honolulu and the KNWRC law enforcement officer on Kauaʻi. The role of both is to enforce laws and document law enforcement incidents. They also coordinate and meet with Refuge staff and law enforcement partners. Primary laws and regulations enforced include the:

- Administration Act;
- Lacey Act;
- ARPA;
- ESA;
- MBTA;
- Marine Mammal Protection Act;
- Code of Federal Regulations.

Zone and Refuge officers are also empowered to enforce all criminal laws. Activities could include issuing traffic citations and warrants for arrest as they relate to drugs, trespass, hunting, fishing, and the taking of wildlife on Federal lands and, in some instances, boating safety related to refuges. The KNWRC officer will also be responsible for enforcing SUPs. Service officers often partner with other law enforcement agencies, such as the Division of Conservation and Resources Enforcement-DLNR and other Federal law enforcement agencies.

5.7 Area Outdoor Recreational Opportunities and Trends

This section provides an overview of outdoor recreational opportunities and trends on Kauaʻi.

5.7.1 Nearby Recreational Opportunities

The island of Kauaʻi provides myriad recreation opportunities on a variety of public and private lands and waters. Kauaʻi is home to 3 national wildlife refuges (including Kīlauea Point NWR); 23 State parks and boating facilities; 68 County parks; and 13 private parks, camps, and gardens (Hawaiʻi DLNR 2009). The Hawaiʻi State Parks Survey (OmniTrak Group Inc. 2007) conducted in 2003 and 2007 found that millions of people visit State parks annually. Four of the top ten most visited State parks are on Kauaʻi: Wailua River State Park, Hāʻena State Park, Waimea Canyon State Park, and Nā Pali Coast State Wilderness Park.

Preliminary results from the 2011 Kauaʻi Parks and Recreation Master Plan Public Input Survey indicate that Kauaʻi residents visiting County parks most commonly engaged in walking/ jogging/running, swimming/surfing/paddling, and picnicking (County of Kauaʻi 2013). Hunting is not allowed in County parks, but more than a third of the residents surveyed indicated they had fished in county parks (Miller pers. comm 2011)

Table 5-1 provides an overview of recreation activities and the number of areas providing these activities on Kauaʻi. Though not listed, wildlife viewing is a component of many of the activities and also is an activity in its own right. Kauaʻi is home to many indigenous, migratory, and introduced

bird species, including a number of endangered or threatened species. Additionally, the island provides opportunities to see marine life such as whales, dolphins, sea turtles, and saltwater fish through activities such as boat tours, swimming, snorkeling, SCUBA diving, and scenic lookouts.

Table 5-1. Number of areas providing specific recreation activities on Kaua‘i[1].

Recreation Activity	Number of Areas Providing Activity
Fishing (shore or boat)	39
Picnicking	23
Beach activities (including snorkeling, SCUBA diving, swimming, and surfing)	22
Boating (motorized, sailing, kayaking, and canoeing)	19
Camping (established sites and wilderness)	18
Education/interpretative display[2]	13
Hiking[2]	10
Scenic lookouts[2]	7
Historic/cultural sites[2]	7
Botanic gardens/nature parks	6
Hunting	3
Bicycling	1

[1]Data from Hawai‘i Department of Land and Natural Resources, 2009.
[2]Activities which Kīlauea Point NWR offers.

Near the Refuge is Kāhili Beach where surfing, fishing, picnicking, diving, camping, and other recreation occurs; about 10–200 persons use the area daily (USFWS 1989). Access to Kīlauea Falls is no longer available and access to Slippery Slide has been closed for at least a decade. Both are at the upper (mauka) part of the Kīlauea River.

5.7.2 Outdoor Recreation Rates and Trends

Wildlife-Related Recreation Rates and Trends

According to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USFWS and U.S. Census Bureau 1993, 1998, 2003, 2008), thousands of people participate in wildlife-related recreation each year in Hawai‘i (Table 5-2). A large decline in numbers for away-from-home wildlife watching and fishing occurred from 1996 to 2001 and was driven primarily by declines in the numbers of nonresidents participating in these activities. These declines mirror the drop in overall visitation to Hawai‘i in 2001 as a result of the events of September 11, 2001 (HDBEDT 2001). For example, in 1996, 130,000 anglers were nonresidents; in 2001, that number had dropped to 41,000. In contrast, the number of Hawai‘i residents participating in wildlife watching actually increased from 1996 to 2001. Numbers increased from 2001 to 2006 for all types of wildlife-related recreation overall, though not all groups increased. For instance, the number of nonresident anglers increased to 65,000 from 41,000 while the number of resident anglers decreased to 92,000 from 109,000.

Table 5-2. Number of people participating in wildlife-related recreation in Hawai‘i over time.[1]

Activity	1991	1996	2001	2006
Wildlife watching	N/A	325,000	220,000	262,000
Away-from-home	321,000	255,000	141,000	154,000
Around-the-home	217,000	111,000	120,000	145,000
Fishing	202,000	260,000	150,000	157,000
Hunting	18,000	23,000	17,000	18,000

[1]Data from USFWS and U.S. Census Bureau, 1991, 1996, 2001, and 2006.

Non-Wildlife-Related Recreation Rates and Trends

Visitors to Kaua‘i tend to participate in the same recreation activities consistently over time, according to the Visitor Satisfaction and Activity Report produced by the Hawai‘i Tourism Authority (2002–2009). Figures 5-4 through 5-6 show the activities over time of visitors from the western U.S., eastern U.S., and Japan. The majority of visitors from the U.S participated in self-guided sightseeing and beach activities such as swimming and sunbathing. Among U.S. visitors, there appears to be a decreasing trend in participation in sightseeing in general including sightseeing by self-guided tour, boat, aircraft, and tour bus over this time period. Participation in activities such as swimming, snorkeling, hiking, surfing, and jet skiing remained relatively constant. Cultural activities such as visiting historic sites, arts and crafts fairs, and museums and art galleries also seemed to be declining, while visiting parks and gardens was increasing.

The majority of visitors from Japan participated in sightseeing via tour bus and they were less likely to participate in outdoor recreation and cultural activities than U.S. visitors. Participation in most activities seems to have remained constant among Japanese visitors over this time period. It does appear that tour bus sightseeing decreased in 2008 and 2009 while self-guided sightseeing increased.

The Hawai‘i State Parks Survey (OmniTrak Group Inc. 2007) found that most of the visitors to State parks on Kaua‘i in 2007 were nonresidents (86 percent), which was not the case on Maui (69 percent), Hawai‘i Island (57 percent), and O‘ahu (53 percent). The most common activities participated in while visiting the parks on Kaua‘i in 2007 were observing scenic views or taking photographs (83 percent), hiking or walking (35 percent), recreating in the ocean or other water bodies (29 percent), seeing park flora and/or fauna (28 percent), picnicking or having an outing (23 percent), and visiting historical or cultural sites (16 percent). Nonresidents were more likely to observe scenic views or take photographs, hike or walk, and see park flora and fauna than nonresidents, while residents were more likely to fish or hunt and camp than non-residents.

Figure 5-4. Percentage of visitors from the western U.S. participating in certain recreation activities on Kaua‘i over time.[1]

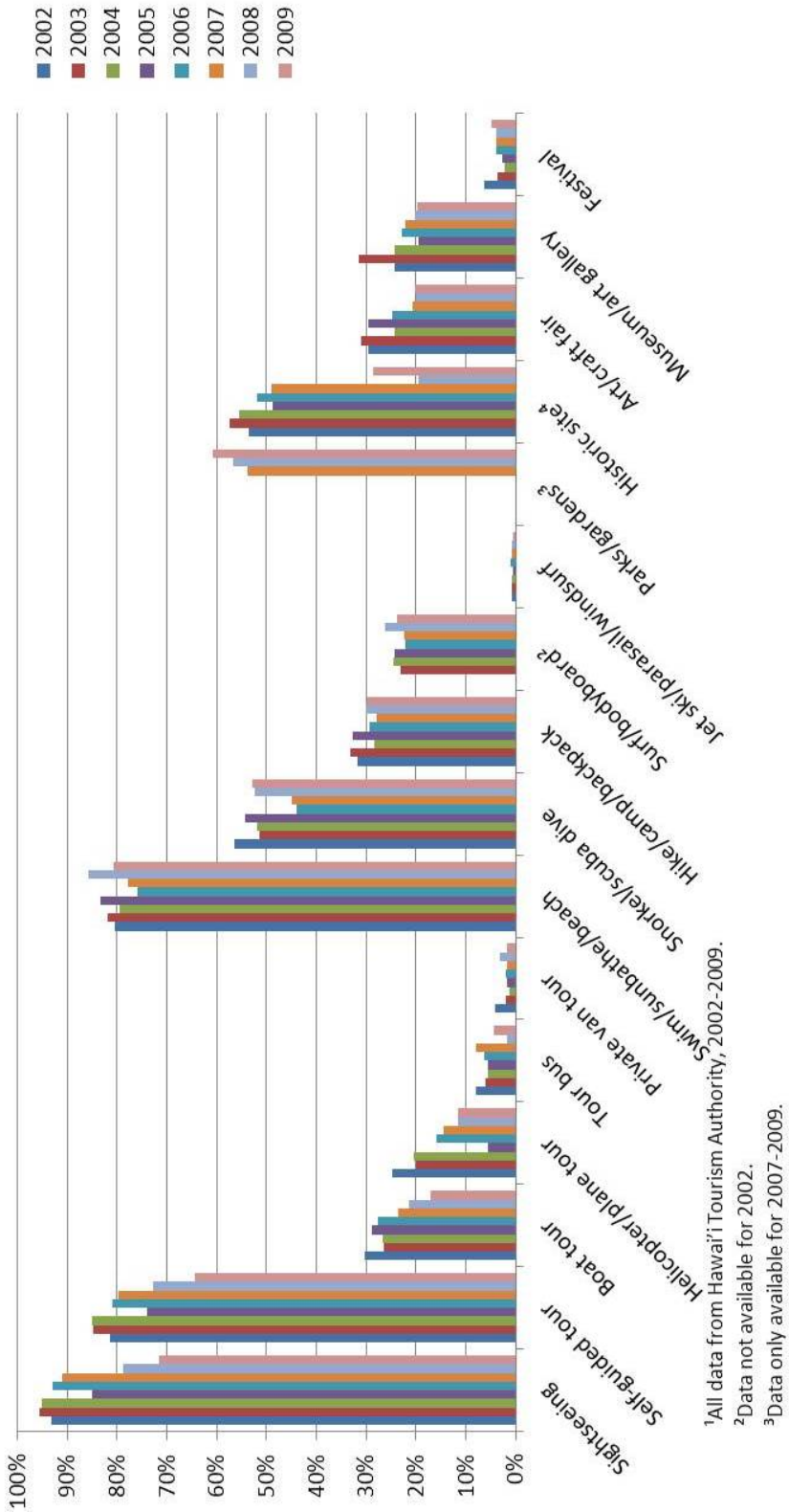


Figure 5-5. Percentage of visitors from the eastern United States participating in certain recreation activities on Kaua‘i over time.[1]

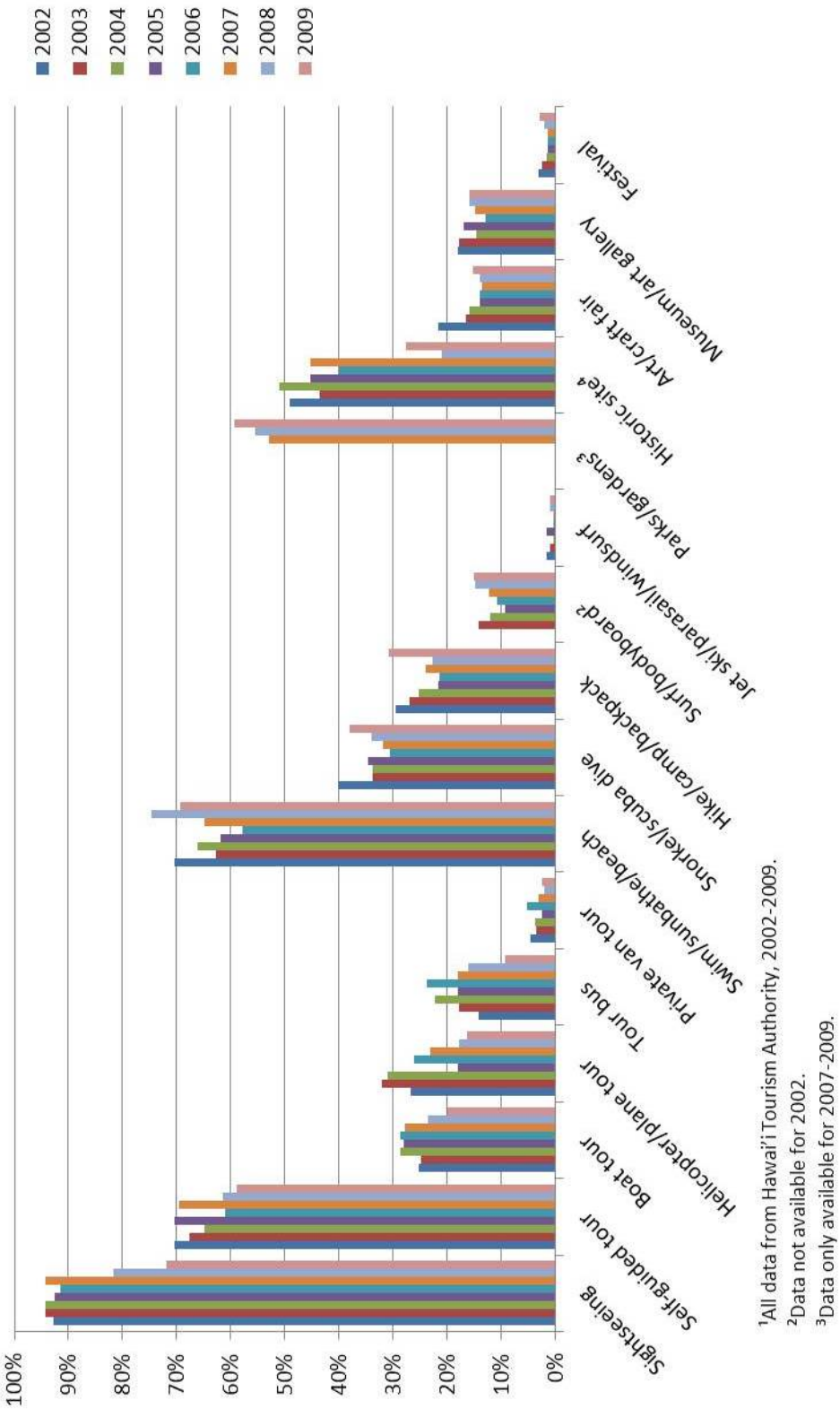
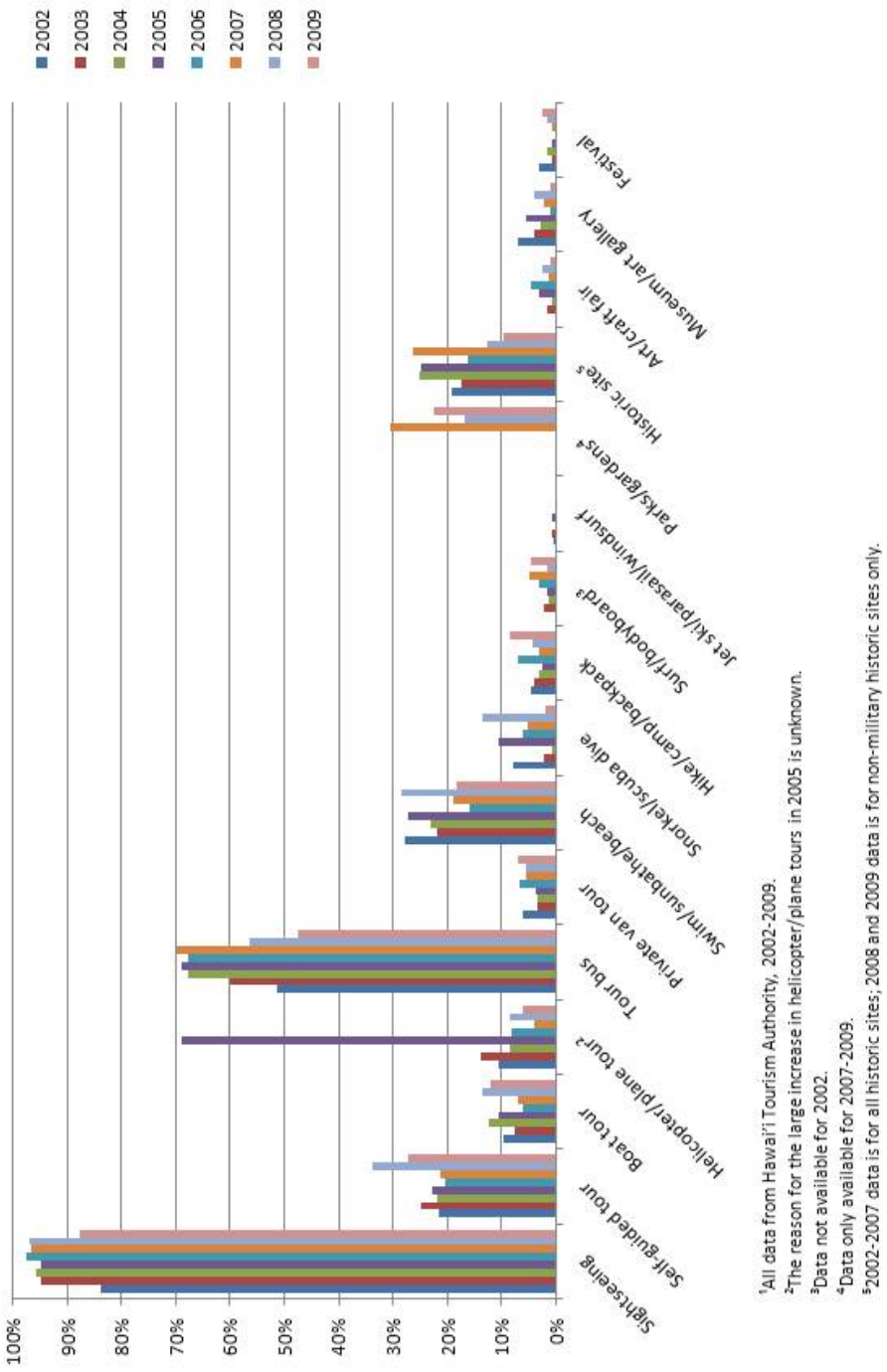


Figure 5-6. Percentage of visitors from Japan participating in certain recreation activities on Kaua‘i over time.[1]



[1]All data from Hawai'i Tourism Authority, 2002-2009.
[2]The reason for the large increase in helicopter/plane tours in 2005 is unknown.
[3]Data not available for 2002.
[4]Data only available for 2007-2009.
[5]2002-2007 data is for all historic sites; 2008 and 2009 data is for non-military historic sites only.

5.8 Social/Economic Environment

A regional economic analysis provides a means of estimating how current management and proposed management activities affect the local economy. This type of analysis provides two critical pieces of information: it illustrates the Refuge's contribution to the local community and it can help determine whether economic effects are a real concern in choosing among management alternatives.

In order to assess the economic contributions and impacts to the local economy of visitation and management at Kīlauea Point NWR, an appropriate local region must be defined. For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30–60 mile radius of the impact area. Only spending that takes place within this regional area is included as stimulating changes in economic activity. The size of the region influences both the amount of spending captured in the local region and the economic multiplier effects that capture the circulation of money within the local economy. Kīlauea Point NWR is located in the County of Kauaʻi. As an island economy, most of the economic activity related to the Refuge occurs within the island. Therefore, the economic impact region for the Refuge is defined as the County of Kauaʻi.

The management activities of economic concern for this analysis are:

- Refuge purchases of goods and services within the local community;
- Refuge personnel salary spending;
- Revenues generated from Refuge Revenue Sharing;
- Spending in the local community by Refuge visitors.

The next sections describe the socioeconomic characteristics and trends in Kauaʻi, and highlight key Refuge activities that affect the local economy.

Communities near Kīlauea Point National Wildlife Refuge

Kīlauea Town is the gateway to Kīlauea Point NWR. The town covers about 1.5 square miles, and had a population of 3,072 residents in 2010 (U.S. Census Bureau 2011b). As a former sugar plantation town, Kīlauea has a rural quality, and residents feel a strong connection to the agricultural heritage of the area (County of Kauaʻi 2006). Visitors travel to Kīlauea mainly to visit the Refuge; however, some also enjoy hiking in the area (Go Hawaiʻi 2011). The town offers several restaurants, specialty gift stores, and one of only two gas stations on Kauaʻi's North Shore. In 2005, 13.7 percent of visitors surveyed at Kīlauea Point NWR reported Kīlauea as the primary town in which their local purchases were made (Sexton et al. 2005).

In addition to the visitor survey conducted in 2003–2004, a survey of residents of Kīlauea Town was also conducted (Sexton et al. 2005) in support of the Alternative Transportation Study conducted for the Refuge (Parsons Brinckerhoff 2006). The objectives of this resident survey were to better understand residents' use and experience of the Refuge, community/Refuge relations, community quality of life, and community preferences for alternative transportation options as they might affect Kīlauea Town and its residents.

The survey found that community visitation to the Refuge is somewhat limited. Most had been five or fewer times in the past 5 years. About one-third had attended special events held at the Refuge. Overall, residents who visit the Refuge participate in activities similarly to other visitors (though they

tended to rank viewing native wildlife and being in a natural area higher than visitors) and are satisfied with activities and services provided by the Refuge. Residents are supportive of increased environmental education, guided hikes, and increased access (though in the 2003–2004 survey they did not want the Refuge to become too crowded and another "all-American amusement park").

In terms of quality of life, residents of Kīlauea Town were satisfied with community living and felt things were going well for them at the time of the survey. They felt community issues most needing to be addressed were slowing growth and development and improving local land use planning. Community attributes that residents felt needed concentrated efforts (they were rated as high importance and low satisfaction) included parks and open space, walkways/bike paths, number of stores and shops, affordable housing, and reliable and convenient public transit. These findings also reflect what is in the Kīlauea Town Plan.

Having the Refuge nearby is important to residents (now and for future generations), even though many do not regularly spend time there. The biggest benefits to being a neighbor of the Refuge are preservation of the land and available access to the area. The majority of residents indicated they trust and have confidence in Kīlauea Point NWR staff and decisions made by the Service.

Residents cited reliable public transit, walkways, and bike paths as important features when selecting a community in which to live. Residents indicated there were some impacts to the community from visitors to the Refuge. Traffic congestion in town, traffic safety, and traffic noise were perceived as at least a small problem (especially if visitor numbers increased). However, residents generally did not feel their personal privacy or disruption of daily activities were a problem.

Most residents considered pedestrian and/or bike access to the Refuge and the completion of the Kīlauea Road walking path to be desirable Refuge access/transportation options. Residents were more evenly split in the desirability of a North Shore shuttle that would link to Kīlauea and the Refuge as a Refuge transit option. When asked what factors may be important in encouraging residents to support a shuttle system, community respondents ranked the reduction of traffic congestion on Kīlauea Road, the preservation of homeowner privacy, offsite parking for a shuttle near the highway, and a shuttle system that benefits the local economy as the top factors. Community members were less willing to pay a Refuge fee that included a shuttle and guide compared to just an entrance fee (as opposed to visitors). Residents indicated a desire for self-guided hikes to scenic views, guided hikes to Crater Hill, and environmental programs for school and community groups.

Other issues tied into the Kīlauea community are recent discussions about development of a supermarket and other stores where the post office is located. This has prompted renewed interest by the Kīlauea Town residents about a bypass road (identified in the Kīlauea Town plan) that would link Kūhiō Highway to this development area, thereby directing traffic from the highway away from the main part of town. Given that an estimated 25 percent of the traffic on Kīlauea Road is attributable to visitors to the Refuge (Parsons Brinckerhoff 2006), the Refuge is engaged with the Kīlauea Neighborhood Association and other groups in these discussions and how it may impact Refuge visitation and community concerns about traffic.

In 1992, prior to Hurricane Iniki, there was less local traffic and more visitor traffic through Kīlauea than in 1998. Although current visitor traffic on Kīlauea Road is lower than in 1992, local traffic has increased due to land use changes, such as the construction of a new subdivision in Kīlauea and the relocation of the post office (Parsons Brinckerhoff 2006). The Kīlauea Town Plan also calls for looking at transit centers (either on Kūhiō highway or Kīlauea Town) to manage traffic.

Other communities near the Refuge include Princeville, Kapaʻa, and Līhuʻe. Princeville is located on the North Shore of Kauaʻi in proximity to Kīlauea Point NWR and Hanalei NWR. A scenic overlook that provides visitors with views of the Hanalei Valley is located just past the Princeville turnoff on Kūhiō Highway. The overlook provides panoramic views of the loʻi kalo on Hanalei NWR and the Waiʻoli Huiʻia Mountains. Princeville was home to 2,066 residents in 2010 (U.S. Census Bureau 2011b). Visitors are drawn to Princeville by its remarkable resort features, with golf courses overlooking the Pacific Ocean, as well as outdoor recreation opportunities on public lands and waters (Princeville at Hanalei 2011).

Kapaʻa is one of the larger towns on the island of Kauaʻi with 10,060 residents in 2010, or 16 percent of the island's population (U.S. Census Bureau 2011b). Covering almost 10 square miles, Kapaʻa has a local population density of 971 persons per square mile. The town is located about 17 miles southeast of Kīlauea Point NWR. Kapaʻa's economy is centered around tourism and features a large number of hotels, shopping centers, gift shops, and restaurants. In 2005, 20.8 percent of visitors surveyed at Kīlauea Point NWR reported that Kapaʻa was the primary town in which their local purchases were made (Sexton et al. 2005).

Līhuʻe is also one of the larger towns on Kauaʻi with 7,387 residents in 2010, or 10 percent of the island's population (U.S. Census Bureau 2011b). The town is home to Kauaʻi County's government and is the commercial center of the island. Līhuʻe houses the island's main airport and serves as its major shipping center and cruise ship port (Go Hawaiʻi 2011). Located about 25 miles south of Kīlauea Point NWR, 19.5 percent of visitors surveyed at Kīlauea Point NWR in 2005 reported that Līhuʻe was the primary town in which their local purchases were made (Sexton et al. 2005).

5.8.1 Population, Housing, and Income

Table 5-3 summarizes the population characteristics of Hawaiʻi and the County of Kauaʻi. As of 2010, the total population of Kauaʻi was 67,091 residents, or 5 percent of Hawaiʻi's total population. Kaua'i's population grew by 14.8 percent from 2000 to 2010, outpacing the 12.3 percent growth rate for the state as a whole. Over the same period, the island's population density increased from 104 persons per square mile to 119 persons per square mile; meanwhile, Hawaiʻi's population density increased from 189 to 212 persons per square mile (U.S. Census Bureau 2000, U.S. Census Bureau, 2010). The Hawaiʻi Department of Business, Economic Development, and Tourism predicts that the population of Kaua'i will continue to grow at an annual rate close to 1 percent through 2040, resulting in an estimated 2040 population of 93,000 (DBEDT 2012). Kauaʻi is proud of its rural feel, and residents of the island value its lush vegetation, agricultural lands with wide open vistas, and communities where people know each other (County of Kauaʻi 1999).

Table 5-3. County and state population estimates.

	Population in 2010		Percent Population Change
	Residents	**Persons per Square Mile**	**2000–2010**
Hawai‘i	1,360,301	212	12.3%
Kaua‘i	67,091	119	14.8%

Sources: U.S. Census Bureau 2000, U.S. Census Bureau 2010

As of 2011, white persons (33.5 percent) and persons of Asian descent (31.8 percent) together comprised nearly two-thirds of the population of Kaua’i. Persons of Hispanic or Latino origin represented the next largest group (9.7 percent), followed by Native Hawaiians and other Pacific Islander persons (9.2 percent) (U.S. Census Bureau 2011a). Kīlauea Town consists of 21.3 percent Asians, 54.9 percent Caucasians, 4.9 percent Native Hawaiian or other Pacific Islander, 1.5 percent persons of some other race, 0.3 percent American Indian or Alaska Natives, and 0.5 percent black or African Americans (U.S. Census Bureau 2011b). In Kaua‘i County, approximately 28 percent of residents age 25 or older have earned a bachelor’s degree or higher, compared with 29.1 percent for the state of Hawai‘i (U.S. Census Bureau 2011b).

At the beginning of the 2010–2011 school year, there were 1,610 elementary-aged students enrolled in kindergarten through 5th grade in the region (Hawai‘i Department of Education 2011). For Kīlauea Town, 578 students were enrolled from kindergarten through high school (U.S. Census Bureau 2011b).

Table 5-4 summarizes median household income, unemployment, and percentage of persons below the poverty level. As of 2011, median household income for Kaua’i County was higher than that for Hawai‘i ($67,116 compared to $64,422) (U.S. Census Bureau 2011c). In 2011, the percent of the Kaua’i County population living below the poverty line was on par with the state average and below the national average (10.0 percent compared to 10.2 percent and 15.9 percent). Similarly, the unemployment rate for residents aged 16 and older for Kaua’i was slightly below that of Hawai‘i and well below the national average (7.2 percent compared to 7.7 percent and 10.3 percent) (U.S. Census Bureau 2011c). Kīlauea Town’s median household income is $69,688, with unemployment at 5.1 percent (or 123 individuals), with only 7.1 percent of individuals below the poverty line (U.S. Census Bureau 2011b).

Although the median income in Kaua‘i is above the national median, the cost of living on the island is very high. As of the year 2011, Kaua’i’s median gross rent (MGR) recorded was much higher than the national average ($1,335 compared to $871). Median gross rent as a percentage of household income, however, was lower than both the Hawaiian and national averages (31.2 percent compared to 34.4 percent and 31.9 percent) (U.S. Census Bureau 2011c). Food prices also tend to be higher than prices on the mainland. The transportation cost of food to Hawai‘i is 66 percent higher than that for the mainland (Alternative Hawai‘i 2007). With the influx of warehouse clubs like Sam’s Club and

Costco, food prices are beginning to fall in line with those of the mainland (Alternative Hawai‘i 2007).

Table 5-4. State and county income, unemployment, and poverty statistics, 2011.

	Median Household Income (2011)	Percentage of Individuals below Poverty (2011)	Percentage Unemployed (2011)
Hawaii	$64,422	10.2	7.7
Kaua’i	$67,116	10.0	7.2

Source: U.S. Census Bureau 2011c

5.8.2 Employment and Business

Kaua‘i’s modern economy was founded on its agricultural industry, which produced crops such as sugarcane and wetland kalo. Although agriculture is still an important industry on the island, tourism has far surpassed agriculture as the County’s leading industry. The tourism industry in Kaua‘i has grown tremendously over the past 50 years and has become a key foundation of the island’s economy (Go Hawai‘i 2011, HDBEDT- Research and Economic Analysis Division 2009).

Kaua‘i’s economy is sensitive to visitor arrivals. In 2010, there were 963,520 visitor arrivals on Kaua‘i Island. Since 2000, visitor arrivals have closely followed world events such as the 2001 terrorist attacks, as well as the recent recession. Kaua‘i was hit particularly hard by the 2008 recession as tourism and recreation are an integral piece of its economy. In 2007, Kaua‘i saw almost 1.3 million visitors arrive, followed by a 20.6 percent reduction the following year (UHERO- Kaua‘i Interactive Database 2015). As tourism declined from 2007 to 2008, unemployment for the State rose from 2.7 percent to 4 percent (U.S. Department of Labor, Bureau of Labor Statistics 2011). Tourism continued to decline by almost 10 percent from 2008 to 2009, while unemployment rose from 4 percent to 6.8 percent (U.S. Department of Labor, Bureau of Labor Statistics 2011, UHERO- Kaua‘i Interactive Database 2015). From 2009 to 2010, visitor arrivals increased by 3.8 percent and unemployment fell from 6.8 percent to 6.6 percent (U.S. Department of Labor, Bureau of Statistics 2011, UHERO- Kaua‘i Interactive Database 2015). Visitor spending in Kaua‘i has followed the same trend. From 2007 to 2008, visitor spending fell by 13.3 percent, and fell another 12.6 percent from 2008 to 2009 before growing by 12.4 percent from 2009 to 2010 (UHERO- Kaua‘i Interactive Database 2015).

Table 5-5 summarizes full-time employment by industry for Kaua’i County in 2011. The travel and tourism sector is particularly important to the Kaua’i economy, with 23.1 percent of the County’s jobs in arts, entertainment, recreation, accommodation, and food, compared to 16.1 percent for Hawai‘i and 9.0 percent nationally (U.S. Census Bureau 2012). Employment in all travel and tourism sectors–including retail trade, passenger transportation, arts, entertainment and recreation, and accommodation and food–constitutes 40.3 percent of total private employment in Kaua’i County, compared to 27.8 percent statewide and 15.2 percent nationally. Average annual wages among Kaua’i residents employed in the travel and tourism industry are higher than Hawai‘i and U.S.

averages ($33,676 compared to $28,372 and $21,495) ($2012) (Bureau of Economic Analysis 2012). Other industries that employ a large percentage of Kaua'i residents include education, health care, and social assistance (16.1 percent), and retail trade (12.6 percent) (U.S. Census Bureau 2012). Government jobs at the Federal, State, and local levels comprise 12.4 percent of all County part-time and full-time employment (Bureau of Economic Analysis 2012).

Table 5-5. Full-time employment by sector, 2011, Kaua‘i County.

Industry	Number	Percent of Total
Total civilian employed population > 16 years	32,372	
Agriculture, forestry, fishing & hunting, mining	995	3.1%
Construction	2,976	9.2%
Manufacturing	681	2.1%
Wholesale trade	558	1.7%
Retail trade	4,074	12.6%
Transportation, warehousing, and utilities	1,679	5.2%
Information	574	1.8%
Finance and insurance, and real estate	1,777	5.5%
Prof., scientific, mgmt., admin., & waste mgmt.	3,048	9.4%
Education, health care, & social assistance	5,215	16.1%
Arts, entertain., rec., accommodation, & food	7,490	23.1%
Other services, except public administration	1,311	4.0%
Public administration	1,994	6.2%

Source: U.S. Census Bureau 2012

For Kīlauea Town, about 71.6 percent of the town’s population is in the labor force. The bulk of this workforce is involved in arts, entertainment, and recreation, accommodation, and food services (23.6 percent); retail trade (13.1 percent); construction (11.9 percent); and professional, scientific, management, administrative, and waste management services (11.7 percent) (U.S. Census Bureau 2011b).

5.8.3 Refuge Impact on Local Economies

Recreational spending near national wildlife refuges generates economic activity for local economies. These expenditures can include food, lodging, transportation, and other purchases from local businesses while engaging in refuge uses. More than 34.8 million visits were made to national wildlife refuges nationwide in fiscal year 2006, with visitor expenditures equating to an estimated $1.7 billion ($2006) in sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife refuge visitors generated nearly 27 thousand jobs, and over $542.8 million ($2006) in employment income (Carver and Caudill 2007).

Refuges also contribute money to the local economy through the Refuge Revenue Sharing Act of 1978 (16 U.S.C. 715s). Under this act, the Service makes payments to counties where refuge lands are located. Payments are in lieu of taxes and the revenue is used by the counties for any government purpose. In 2012, $11,490 for Kīlauea Point NWR, $9,691 for Hanalei NWR, and $2,343 for Hulēʻia NWR was paid to Kauaʻi County through Refuge Revenue Sharing.

Tourism and Recreation

Visitors travel from all over the world to see Hawaiʻi. With opportunities from relaxing beach getaways to hiking mountains and surfing the waves, there is no shortage of activities to stimulate the economy. From 2003 to 2010, the average annual expenditure by visitors arriving by air totaled over $11.1 billion, or 18.5 percent of the State's gross domestic product (U.S. Department of Commerce, Bureau of Economic Analysis 2011). In 2007, Kauaʻi accounted for 9.8 percent of Statewide visitor expenditures and is projected to maintain that ratio through 2035 (HDBEDT 2009).

Wildlife Viewing

Wildlife viewing opportunities are abundant throughout the State of Hawaiʻi. Wildlife viewing can include the activities of observing, identifying, or photographing wildlife. In 2011, the number of people that reported participating in wildlife viewing as a primary form of recreation totaled 358,000 in Hawaiʻi. Spending associated with wildlife viewing in Hawaiʻi totaled $669 million, of which 94 percent ($628 million) was trip-related expenditures and $41 million was spent on other expenses such as equipment (USFWS 2012).

5.8.4 Additional Economic Contributions

It is important to note that the economic value of the Refuge encompasses more than just the impacts on the regional economy. The Refuge also provides substantial nonmarket values (values for items not exchanged in established markets) such as maintaining endangered species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Carver and Caudill 2007). According to a recent report, the total value of ecosystem services provided by natural habitats in the Refuge System in the contiguous states totaled $32.3 billion/year, or $2,900 thousand/acre/year (Southwick Associates 2011). Wetlands were found to provide the most services at $27.5 billion/year, or $10,600/acre/year. If these figures had been extrapolated to include Alaska and Hawaiʻi NWRs, the total amount would exceed $2 trillion per year (likely more since the study only looked at terrestrial systems). The same report also identified that the loss of 9.9 million acres of wetlands in the U.S. over the last 50 years has resulted in more than $81 billion of economic loss linked to the ecosystems services wetlands provide.

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Appendices A-K

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Appendix A. Appropriate Use Findings

A.1 Introduction

The Appropriate Refuge Uses policy (603 FW 1) outlines the process that the Service uses to determine when general public uses on refuges may be considered. Priority public uses previously defined as wildlife-dependent uses (hunting, fishing, wildlife observation and photography and environmental education and interpretation) under the National Wildlife Refuge System Improvement Act of 1997 are generally exempt from appropriate use review. Other exempt uses include those situations where the Service does not have adequate jurisdiction to control the activity and refuge management activities. In essence, the Appropriate Refuge Uses policy provides refuge managers with a consistent procedure to first screen and then document decisions concerning a nonpriority public use. When a use is determined to be appropriate, a refuge manager must then decide if the use is compatible before allowing it on a refuge. For purposes of this CCP an "appropriate use" must meet at least one of the following three conditions:

- The use is a wildlife-dependent recreational use as identified in the Refuge Improvement Act.
- The use involves the take of fish and wildlife under State regulations.
- The use has been found to be appropriate as specified in Section 1.11 of the policy and documented on FWS Form 3-2319.

During the CCP process, the refuge manager evaluated all existing and proposed uses for Kīlauea Point National Wildlife Refuge (Refuge) that are associated with the selected alternative (Alternative D in the draft CCP). Documentation of appropriateness findings for wildlife-dependent uses is not included in this appendix because wildlife-dependent uses are appropriate by definition. They are, however, evaluated for compatibility in Appendix B, Compatibility Determinations. All other Refuge uses were evaluated using the criteria described in policy and listed on FWS Form 3-2319. The table below shows the uses evaluated and appropriateness findings made by the Refuge manager. Additional documentation is included in this appendix as appropriate.

Table A-1. Summary of Appropriate Use Findings

Refuge Use	Appropriate?
Camping (Kāhili Quarry)	No
Dog Walking (Kāhili Quarry)	Yes
Bicycling, Horseback Riding, Motorcycling, and Off-Road Vehicle Use on Trails	No
Collecting Plant Materials and Other Natural Resources	No
Commercial Wildlife and Landscape Filming and Photography	Yes
Commercial Tours	Yes
General Access for Off-Refuge Stream, Beach, and Ocean Uses (Kāhili Quarry)	Yes
Research and Scientific Collections	Yes
Traditional Cultural Practices	Yes

Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: Camping (Kāhili Quarry)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes _X_ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_X_ Appropriate_____

Acting
Refuge Manager: _____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor: _____ Date _____

A compatibility determination is required before the use may be allowed.

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Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: Camping (Kāhili Quarry)

Summary: The uses evaluated herein for appropriateness address camping on the Refuge at Kāhili Quarry, which may be defined as sleeping overnight onsite, sometimes for multiple nights, and may include erecting a tent or other shelter.

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(a) Do we have jurisdiction over the use?
The area for this use lies within Kīlauea Point National Wildlife Refuge (NWR or Refuge). The U.S. Fish and Wildlife Service (Service) owns and administers the Refuge and, consistent with Title 50 of the Code of Federal Regulations ("Wildlife and Fisheries"), has jurisdiction over public uses of the Refuge.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?
Service policy on Appropriate Refuge Uses (603 FW 1) states, "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Camping commonly involves sleeping overnight onsite, sometimes for multiple nights, possibly erecting a tent or other shelter. Camping has many effects on the environment, habitat, and wildlife. These include soil compaction, reduction in the surface organic (humus) layer, erosion, vegetation trampling, other damage, and removal and reduction in natural regeneration (Hammitt and Cole 1998). These effects vary based on the frequency of use and the durability of soils and vegetation at campsites (Cole 1995). As occurs with other visitors, the mere presence of campers in a wildlife area can cause stress and disturbance to wildlife, and can frighten birds off nests, affecting their reproductive success (Ream 1976). Camping can also alter the species composition of local plant and animal communities (favoring plants that can tolerate more abuse, and animals, often generalists, that are more tolerant of human disturbance) and a reduction in species richness (Hammitt and Cole 1998).

Any campfires or nighttime lighting (e.g. lanterns) used by campers could cause petrels returning from foraging all day at sea to become disoriented and unable to find their burrows and young. Fledglings could similarly become disoriented in their initial flights to the sea and circle such lights until exhausted or crash into obstacles.

Unless conducted in a manner to avoid or reduce adverse impacts on native habitats and wildlife and the potential for conflicts with visitors that are engaged in wildlife-dependent uses (e.g., fishing, wildlife observation and photography), camping would be inconsistent with goals 1, 2, 4, and 6 in the CCP. Under the CCP, the Refuge will work with the community stewardship partnership to explore opportunities for providing camping at Kāhili Quarry; however, resources would need to be available to manage this use and stipulations would need to ensure that camping opportunities would be appropriate and compatible.

(g) Is the use manageable within available budget and staff? and (h) Will this be manageable in the future within existing resources?
Kāhili Quarry has no designated parking, campsites, picnic tables, fire rings, potable water, toilets, or recycling or garbage cans. This area has been heavily impacted by many years of public use. Soils are compacted, the area is sparsely vegetated, and it has several fire pits, trash, and abandoned motor vehicles. Resources needed to manage an overnight camping program that adequately provides for public and employee sanitation and safety, without disturbing or harming focal wildlife species, would divert existing and future resources from accomplishing priority Refuge tasks, including serving visitors participating in priority, wildlife-dependent public uses. As mentioned above, under the CCP, the Refuge will work with the community stewardship partnership to explore future opportunities for providing camping at Kāhili Quarry; however, resources would need to be available to manage this use and stipulations would need to ensure that any future camping opportunities would be appropriate and compatible.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources? and (j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?
Visitors engaged in camping could gain an enhanced understanding and appreciation for the Refuge's natural and cultural resources.

At Kāhili Quarry, camping could potentially be accommodated without impairing existing wildlife-dependent uses or without reducing the ability to provide quality, compatible, wildlife-dependent recreation into the future.

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Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: Dog Walking (Kāhili Quarry)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes __X__ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ Appropriate__X__

Refuge Manager: Acting _____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor: Barry W. _____ Date: 9/10/15

A compatibility determination is required before the use may be allowed.

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Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: Dog Walking (Kāhili Quarry)

Summary: The use evaluated herein for appropriateness addresses leashed dogs in association with wildlife-dependent (e.g., fishing, wildlife observation, and photography) and non-wildlife-dependent uses at Kāhili Quarry (e.g., access to off-Refuge areas [Kīlauea River, Kīlauea Bay, and Kāhili Beach]). This use is considered appropriate, with stipulations to reduce wildlife disturbance and ensure public safety.

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(d) Is the use consistent with public safety?
Dogs would only be permitted within designated areas at Kāhili Quarry (Quarry) in association with wildlife-dependent uses (fishing, wildlife observation, and photography) and access to off-Refuge areas [Kīlauea River, Kīlauea Bay, and Kāhili Beach]). Dogs would be required to be on a short leash (no longer than 8 feet per Section 22, Article 2 of the Kauaʻi County Code) and under direct control at all times. Westgarth et al. (2010) found that negative interactions between people and dogs are reduced when dogs are leashed. By maintaining control of dogs, public safety risks would be reduced. Feces would diminish the quality of other visitors' experiences and could potentially spread disease to wildlife. Therefore it must be removed from the Refuge and disposed of properly. The Refuge does not provide receptacles for animal waste. Restrictions on dog walking would be clearly posted at the Quarry entrance and other locations and on the Refuge website.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?
Kāhili Quarry is an important buffer area for wildlife resources on Mōkōlea Point and Crater Hill, including breeding sites for nēnē, mōlī, ʻuaʻu kani, koaʻe ʻula, as well as roosting or foraging sites for pueo and ʻiwa. Because of the potential for adverse impacts on native habitats and wildlife on the Refuge (especially species that nest on or in the ground or in low vegetation, and those that evolved in the absence of terrestrial mammalian predators), dogs must always be on-leash and under direct control at all times and remain within the designated public use area located within the Quarry area along the water, below the cliffs at Mōkōlea Point. Through these stipulations, the potential for and severity of impacts from dogs can be reduced, mitigating the overall effect on Refuge wildlife.

The Refuge is aware that some visitors already disregard Refuge and Kauaʻi County regulations requiring dogs to be on-leash and the requirement of dog owners to remove and dispose of their pets' feces from public property. Compliance with stipulations related to this use would be monitored on an ongoing basis. If monitoring indicates routine noncompliance or compatibility conflicts, the Service will evaluate limiting or prohibiting this use.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?
It is expected that visitors either bring their dogs in conjunction with the wildlife-dependent uses of wildlife observation, photography, and fishing, or else enjoy some wildlife observation and photography ancillary to walking dogs. The Refuge would use this opportunity to reach out to dog owners, educate them about how to minimize the effects of dogs on wildlife, and encourage them to observe wildlife and to learn about the National Wildlife Refuge System.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?
Since dogs would be required to be on a short leash, under control at all times, and allowed only within the designated public use area at the Quarry, this use would not be expected to impair the Refuge's existing wildlife-dependent recreational uses (including fishing) or reduce the potential to provide quality, compatible, wildlife-dependent recreation into the future.

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Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: Bicycling, Horseback Riding, Motorcycling, and Off-Road Vehicle Use on Trails

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		X
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes _X_ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_X_ Appropriate_____

Acting
Refuge Manager: _____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor: _____ Date: _____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: Bicycling, Horseback Riding, Motorcycling, and Off-Road Vehicle Use on Trails

Summary: The uses evaluated herein for appropriateness include the following when they would occur on a pedestrian or other Refuge trail: riding a bicycle, including use of a mountain bike; riding or using a horse, donkey, burro, llama, or other pack animal; motorcycling, including use of a dirt bike, motor scooter, or other motorized bike, whether street legal or not; and use of a 3-wheeled, 4-wheeled, tracked, or other off-road vehicle (a.k.a. off-highway vehicle and all-terrain vehicle), whether street legal or not. For ease of reference, all of these uses are referred to herein as bicycling, horseback riding, motorcycling, and use of off-road vehicles.

Excluded from this evaluation are bicycling, horseback riding, and use of street-legal motorcycles on legitimate roads and parking areas that are open to the public where there would not be safety or wildlife conflicts (e.g., the cul-de-sac at the end of Kīlauea Road, Kāhili Quarry Road). Also excluded is limited horseback riding along a designated route in the Crater Hill area by owners of homesites and lots in Seacliff Plantation. This access and use was specifically and legally reserved; however, per terms of the easement, the U.S. Fish and Wildlife Service will be able to "do all things deemed necessary and appropriate… to provide for the management, operation, and maintenance of a bird and wildlife sanctuary, including, but not by way of limitation, the right to erect fences, regulate entrance, and enforce all laws rules and regulation related to the management of the Bird & Wildlife Sanctuary."

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)? There are no laws or regulations that specifically prohibit bicycling or horseback riding on refuges. However, Federal regulations at 50 CFR 27.31 (“General provisions regarding vehicles”) prohibit, “Travel in or use of any motorized or other vehicles, including those used on air, water, ice, snow…on national wildlife refuges except on designated routes of travel….” The regulation goes on to say, “The operation of a vehicle which does not bear valid license plates and is not properly certified, registered, or inspected in accordance with applicable State laws is prohibited.” For purposes of this evaluation, these provisions would apply to motorcycling and use of off-road vehicles.

Bicycles, horses, motorcycles, and off-road vehicles all provide transportation and are alternatives to cars, trucks, and similar vehicles. These alternative transport modes differ from conventional passenger cars and trucks in that they can more easily navigate rough terrain and trails. However, when traveling off-pavement, gravel, or other hardened surfaces, these alternative modes of transport can have a variety of effects. These include soil compaction, reduction in the surface organic (humus) layer, and erosion; trampling and other damage to vegetation, reduction in natural regeneration, and introduction and spread of nonnative plants and plant pathogens; and wildlife disturbance, including flushing and crushing of burrows (Pickering et al. 2010, Wimpey 2010, Switalski and Jones 2010, Snetsinger and White 2009, Landsberg et al. 2001, Jordan 2000, Hammitt and Cole 1998, Vandeman

1997, Wilson and Seney 1994, Weaver and Dale 1978). Because of their speed, bicycles, horses, motorcycles, and off-road vehicles can also cover more distance in the same amount of time as a pedestrian, thereby more quickly extending the areal extent of their environmental effects.

Mountain bicyclists are known to ride off-trail and create new (informal) trails, extending the impact zone of this use (Pickering et al. 2010, Wimpey 2010).

Because of their concentration of greater weight in smaller areas (their hooves), horses and riders can cause more damage to soils and vegetation and increase the potential for erosion when compared with impacts of some other trail users, including pedestrians (Hammitt and Cole 1998, Wilson and Seney 1994). Horses can also graze trailside vegetation and alter species composition by discouraging certain species through selective grazing, and can transport nonnative seeds into wildlife habitat (Jordan 2000, Hammitt and Cole 1998).

Motorcycling and use of off-road vehicles have similar environmental effects. Their weight and the spinning of vehicle tires can readily dislodge soil and vegetation and encourage erosion (Hammitt and Cole 1998). Also, motorcyclists and off-road vehicle users often seek out steeper, unstable slopes where their activities increase the potential for erosion (Hammitt and Cole 1998). These vehicles commonly generate considerable noise. Loud noise can stress wildlife, make them irritable, alter their natural behavior, and cause them to flush (Schubert and Smith 2000, Bowles 1995). Because of their size and speed, motorcycles and off-road vehicles can also kill wildlife directly through collision (Switalski and Jones 2010).

For these reasons, allowing these uses would run counter to Refuge purposes and violate requirements of the National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd-668ee). The Administration Act prohibits uses on a refuge that would materially interfere with or detract from refuge purposes (i.e., allowed uses must be compatible).

(c) Is the use consistent with applicable Executive orders and Department and Service policies?
There are no Executive orders or Department or Service policies that specifically prohibit bicycling and horseback riding on national wildlife refuges. However, Executive Order 11644 of Feb 8, 1972 ("Use of off-road vehicles on the public lands"), as amended by EO 11989 of May 24, 1977, states in part that in determining whether to open areas and trails to off-road vehicles, agencies should consider, "…damage to soil, watershed, vegetation… harassment of wildlife or significant disruption of wildlife habitats…[and]…conflicts between off-road vehicle use and other existing or proposed recreational uses." Additionally, when an agency determines that, "…the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources…," the EO requires agencies to, "…immediately close such areas or trails to the type of off-road vehicles causing such effects…."

Implementation of EO 11644 is guided by Department policy ("Use of Off-Road Vehicles," 616 DM 1) and National Wildlife Refuge System (Refuge System) policy ("Off-Road Vehicles," 8 RM 7). Refuge System policy states in part that, "All lands within the National Wildlife Refuge System are closed to off-the-road use of vehicles by the general public, unless specifically designated as open to the use of off-road vehicles." Opening off-road areas or trails to off-road vehicle use requires a study of potential effects on Refuge resources, a positive compatibility determination, and compliance with requirements of the National Environmental Policy Act.

For the reasons discussed earlier, allowing motorcycling and use of off-road vehicles on the Refuge would violate requirements of EO 11644 and the Refuge System's "Off-Road Vehicles" policy. Allowing any of these uses on the Refuge would violate the Service's "Compatibility" (603 FW 2) policy.

(d) Is the use consistent with public safety?
Because of their speed of travel, the narrowness of some Refuge trails, and the number of other Refuge visitors who use these trails, allowing these uses could generate safety problems for riders and other visitors (Thurston and Reader 2001).

(e) Is the use consistent with goals and objectives in an approved management plan or other document?
Because of the adverse impacts these uses could cause for native habitats and wildlife, and conflicts with other visitors on the Refuge, they would be inconsistent with Refuge goals 1, 2, 4, and 6.

(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?
In 1994, the Service completed a compatibility determination for reserved access rights by owners of homesites and lots in Seacliff Plantation. These rights include limited horseback riding along a designated route in the Crater Hill area. However, the 1994 document did not address bicycling, motorcycling, use of off-road vehicles, or horseback riding on pedestrian or other trails on the Refuge. This is the first time these uses have been proposed and analyzed.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?
Because of the nature of these uses, it is unlikely or incidental that visitors engaged in bicycling, horseback riding, motorcycling, and use of off-road vehicles would gain an enhanced understanding and appreciation for the Refuge's natural and cultural resources. For the reasons discussed earlier, these uses would not be beneficial to the Refuge's natural resources and they would be expected to have no benefits for cultural resources. These uses do not require the presence of wildlife. There are many other areas on Kauaʻi, including the North Shore, where these uses could occur and are allowed.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?
These uses can conflict with satisfaction by others who visit a natural area to observe or photograph wildlife or enjoy nature appreciation. These other visitors usually enjoy a higher quality experience in an uncrowded and relatively quiet setting, and the noise from motorized vehicles can be disruptive. Because of their speed, bicycles, motorcycles, and off-road vehicles can also alarm other visitors when they suddenly appear on the same trail. This is a special concern with bicycles because they move so quietly yet quickly (Thurston and Reader 2001, Vandeman 1997). Due to their large size and especially on narrow trails, horses can intimidate pedestrians and few people enjoy walking on paths where horse manure is common (Landsberg et al. 2001, Hammitt and Cole 1998). Because of such conflicts among these user groups, some parks and recreation areas design, construct, and maintain separate trail systems for these uses. Bicyclists, horseback riders, motorcyclists, and off-road vehicle riders would also compete with other visitors for use of the limited parking areas and

other visitor amenities onsite. Disturbance to wildlife could alter wildlife behavior or flush wildlife and these effects would diminish the quality of experience for other visitors.

For these reasons, bicycling, horseback riding, motorcycling, and use of off-road vehicles on trails would impair the Refuge's ability to provide quality, wildlife-dependent public use opportunities (including wildlife observation and photography, and environmental education and interpretation), and reduce the potential to provide quality, compatible, wildlife-dependent recreation into the future.

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Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: Collecting Plant Materials and Other Natural Resources

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		X
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes _X_ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_X_ Appropriate_____

Acting
Refuge Manager:_____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

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Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: Collecting Plant Materials and Other Natural Resources

Summary: The uses evaluated herein for appropriateness are collecting plant materials (either living or nonliving) and other natural resources (for example, shells, feathers, bone) on Kīlauea Point National Wildlife Refuge (NWR or Refuge). As used herein, natural resource collecting involves such collections by members of the general public and does not include collecting as an element of traditional cultural practices. Also see the appropriate use finding and compatibility determination for "Traditional Cultural Practices."

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)? and (c) Is the use consistent with applicable executive orders and Department and Service policies?
In the absence of specific authorization, regulations prohibit collecting plant materials and other natural resources on refuges ("Disturbing, injuring, and damaging plants and animals," 50 CFR 27.51).

(e) Is the use consistent with goals and objectives in an approved management plan or other document?
The effects associated with collection of plants, feathers, and potentially other natural resources would depend on whether collections were made from live organisms, whether they were native versus nonnative species, the volume of materials collected, and the areas in which and times of day and year during which the collections occurred. If collected from live organisms, the survival of those individuals could be impacted. Collecting dropped or broken-off plant materials or detached bird feathers could affect forage for herbivores and detritivores, cover and nesting materials for wildlife, and eventually impact replenishment of soil nutrients. Collecting could also cause disturbance and impact wildlife foraging, roosting, loafing, or nesting.

Three species of birds, including two listed species, construct burrows or nests on or within forest/shrubland duff (decaying leaf litter and branches on the ground, including hala and naupaka). The Refuge has substantial populations of burrow-nesting seabirds, and collectors walking through nesting colonies could easily crush burrows, destroy nests and eggs, and kill young or adult seabirds. Collectors could also trample native plants, accelerate erosion, and potentially introduce or spread nonnative species, including invertebrates, plants, and invasive species. These impacts could adversely affect native fish, wildlife, plants, and their habitats, and would be of special concern in Refuge areas struggling with re-establishment of native plant communities.

Because of the adverse impacts these uses could cause for native habitats and wildlife, and conflicts with other visitors on the Refuge, this use would be inconsistent with CCP goals 1, 2, and 4.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?

In Hawai‘i, many natural resources are also culturally important. Potentially, visitors engaged in collecting of plant materials and other natural resources could gain an enhanced understanding and appreciation for the Refuge's natural and cultural resources. For the reasons discussed earlier, these uses could be detrimental to the Refuge's natural resources but could be beneficial as cultural resources. Therefore, collection of plants and natural resources must be carefully limited to cultural practitioners for traditional cultural purposes only and be conducted in such a way as to eliminate or minimize negative impacts on natural resources (see the appropriate use finding and compatibility determination for "Traditional Cultural Practices" for more information). It is important to note that this use does not require the presence of wildlife or, with the exception of collecting selected natural resources, wildlands. Additionally, there are many other areas on Kaua‘i, including the North Shore, where this use is allowed.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?

If collection of plants, feathers, and potentially other natural resources were to occur outside of the primary public use areas on Kīlauea Point/Peninsula, it would likely have few direct impacts on wildlife-dependent public uses. However, these outside areas are typically of high habitat value and greater wildlife impacts would be expected in these areas. Additionally, if other visitors saw people outside the designated public use zones collecting plants, feathers, and potentially other natural resources, they might be inclined to also stray and imitate these activities. This would create unwanted law enforcement issues, expose visitors to potentially dangerous situations, and increase the likelihood of wildlife and habitat impacts.

Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: Commercial Wildlife and Landscape Filming and Photography

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate X

Refuge Manager: Acting _____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor: _____ Date: 9/10/15

A compatibility determination is required before the use may be allowed.

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Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: Commercial Wildlife and Landscape Filming and Photography

Summary: The use evaluated herein for appropriateness is more fully described and evaluated in the compatibility determination (CD) for this use and the documents referenced in that CD. This use includes still and motion pictures, photographs captured using film and digital media, and audio recordings.

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?
This use would comply with applicable laws and regulations, including 50 CFR 29.1 (May we allow economic uses on national wildlife refuges?). Through distribution of images or other recordings of native sea- and shorebirds, threatened and endangered species of plants and animals, and the Refuge's cultural heritage, commercial photography, filming, and audio recording have the potential to share Kīlauea Point's valuable natural and cultural resources with a larger audience over a greater geographic area. This could enhance public understanding, appreciation, and support for native fish, wildlife, plants, their habitats, conservation, Kīlauea Point NWR, and the Refuge System. Where appropriately regulated to reduce or eliminate adverse effects, this would contribute to achievement of Refuge purposes and the Refuge System mission.

Permittees would be required to secure and maintain the currency of all necessary local and State licenses, permits, and approvals.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?
This use would be consistent with applicable Executive orders and Department and Service policies. If found appropriate and determined compatible, commercial photography and videography would be authorized through issuance of a special use permit and permittees would be charged an appropriate fee. Fees would be charged, if necessary, following 43 CFR 5 (Commercial filming and similar projects and still photography on certain areas under department jurisdiction).

This use is also consistent with Service policy on Audio-Visual Productions (8 RM 16). That policy states that such productions can increase public understanding of America's wildlife and of the Service's role in managing and protecting natural resources through the Refuge System.

(d) Is the use consistent with public safety?
Some areas of the Refuge outside Kīlauea Point/Peninsula (where almost all of the public use currently occurs) contain natural safety hazards. Sites for photo/video shoots would need to be submitted in advance and approved by the Refuge manager. Permittees would be required to limit their use of the Refuge to specifically designated areas and access routes. With these conditions, this use would be consistent with public safety.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?
The effects of this use upon biological resources would likely be associated with disturbance (e.g., sensitive wildlife and vegetation areas) or degradation (e.g., soil compaction). Stipulations necessary to ensure compatibility would be enforced to minimize impacts. This use may be denied or would be limited in space, time, or other manners such that effects on biological resources were avoided or greatly reduced. For example, areas that are open to this use would be evaluated on an annual, seasonal, and sometimes daily basis and would be influenced by wildlife use and habitat conditions.

It is expected that commercial recordings of Refuge sights and sounds would generate products that potentially would be broadly distributed through the market. To the extent that these images and recordings enhance public understanding and appreciation for the Refuge, Refuge System, native fish, wildlife, plants, their habitats, cultural resources, and conservation, this use would support Refuge goals 4 and 5. This use would not be inconsistent with any Refuge goals and objectives.

(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?
Business and commercial photography have previously been evaluated for compatibility and were determined compatible.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?
As discussed earlier, commercial photography, filming, and audio recording have the potential to share the Refuge's valuable natural and cultural resources, and the conservation story with a larger audience over a greater geographic area. This could enhance public understanding and appreciation for the Refuge's natural and cultural resources. This would be beneficial to those resources if it resulted in support for conservation of the Refuge's native fish, wildlife, plants, habitats and cultural heritage.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?
It is expected that the number of commercial photographers and videographers would not be large and their visits to the Refuge would not be frequent. Therefore, it is not expected that this use would impair existing wildlife-dependent recreation or reduce the potential for such uses into the future.

However, this use could adversely affect quality wildlife-dependent recreational and educational experiences by other visitors in some instances. For example, such effects could occur if a production company wished to film at the Refuge and that involved a large crew, and a substantial amount of time and equipment, or commercial photographers and videographers wanted to visit during Refuge special events, or they wished to conduct their activities in areas or at times closed to public use, but in full view of other visitors. In such cases, this use may be denied or would be limited in space, time, or other manners such that effects on other Refuge visitors were avoided or greatly reduced.

Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: Commercial Tours

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes _X_ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate_X_

Acting
Refuge Manager:_____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor: Barry W. Date: 9/10/15

A compatibility determination is required before the use may be allowed.

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Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: Commercial tours

Summary: The use evaluated herein for appropriateness is more fully described and evaluated in the compatibility determination (CD) for this use and the documents referenced in that CD.

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?
This use would comply with applicable laws and regulations, including 50 CFR 29.1 (May we allow economic uses on national wildlife refuges?). The Refuge currently experiences a significant amount of public use, a large proportion which occurs on Kīlauea Point/Peninsula. Commercial tours provide another opportunity for members of the public to enjoy the Refuge, perhaps as part of a larger birding, nature, cultural, or historic tour program that also visited areas elsewhere on Kaua‘i. During these tours, it is expected that the public would benefit from high-quality environmental and cultural interpretation and enjoy opportunities for wildlife observation and photography. These activities would provide good field opportunities to increase public understanding and appreciation for the Refuge System, Kīlauea Point NWR, sea- and shorebirds, endangered species, cultural resources, and the value of conservation. Where appropriately regulated to reduce or eliminate adverse effects, these activities would contribute to achievement of the Refuge's purposes and the Refuge System mission.

Permittees would be required to secure and maintain the currency of all necessary local and State licenses, permits, and approvals.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?
This use would be consistent with applicable Executive orders and Department and Service policies. If found appropriate and determined compatible, commercial tours would be authorized through issuance of special use permits.

(d) Is the use consistent with public safety?
Due to the narrow road leading to Kīlauea Point/Peninsula and small parking area with limited spaces, use of full-sized buses to bring large groups of visitors to the Refuge could create traffic and safety conflicts with other Refuge visitors. Permit conditions would limit permittees to use of medium-sized vans or smaller vehicles to transport their clients to the Refuge.

Permittees would also be required to limit their use of the Refuge to specifically designated areas and access routes, and understand and review with their clients Refuge rules and regulations and any hazardous conditions. A Refuge law enforcement monitoring program would help ensure compliance with these and other permit requirements. With these conditions, this use would be consistent with public safety.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?
This use would not be inconsistent with any Refuge goals, and could potentially support goal numbers 4, 5, and 6 that address wildlife observation and photography, and environmental and cultural interpretation.

(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?
This use (guided tours) has previously been evaluated for compatibility and was determined compatible.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?
As discussed earlier, commercial tours at the Refuge would provide the public with high-quality environmental and cultural interpretation and opportunities for wildlife observation and photography. This would contribute to the public's understanding and appreciation for the Refuge's natural and cultural resources and provide the building blocks of support for Refuge resources and management programs.

Surf schools currently using Kāhili Quarry would not be allowed on the Refuge in the future. This use does not enhance the Refuge visitor's knowledge and enjoyment of the key natural resources, or support the mission of the Refuge and the Service, or other uses otherwise determined appropriate and compatible with the purposes for Refuge establishment.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?
Kīlauea Point/Peninsula area and existing facilities (e.g., parking area, visitor center, and contact station) are relatively small for the visitation the Refuge experiences (from 2010 to 2013, the visitor center averaged 189,963 visitors per year). The number of vehicles that can be safely accommodated on the access road and in the parking area, and the number of visitors who can enjoy a high-quality, wildlife-dependent educational or recreational experience onsite, are limited. As long as permit conditions limited group sizes, it would not be expected that commercially guided tours would impair existing wildlife-dependent recreation or reduce the potential for such uses into the future. If necessary, the frequency of commercial tours could also be limited in the future and such operations could be prohibited during Refuge special events. Additionally, new visitor facilities could address current capacity limitations.

Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: General Access for Off-Refuge Stream, Beach, and Ocean Uses (Kāhili Quarry)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes _X_ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate_X_

Refuge Manager: Acting _____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor: Barry W. _____ Date: 9/10/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: General Access for Off-Refuge Stream, Beach, and Ocean Uses (Kāhili Quarry)

Summary: The uses evaluated herein for appropriateness are use of the Refuge at Kāhili Quarry/Mōkōlea Point to access off-Refuge opportunities for boating, fishing, surfing, swimming, snorkeling, sunbathing, and other stream, beach, and ocean uses at Kāhili Beach, Kīlauea Bay, and Kīlauea River. General access through Kāhili Quarry/Mōkōlea Point may include driving vehicles through, parking vehicles on, and launching boats from Refuge property. Collectively, these uses are a popular, historic use of the area. These uses are more fully described and evaluated in the compatibility determination (CD) and the documents referenced in that CD.

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?
This is the first time that use of the Refuge to access off-Refuge lands and waters for boating and beach uses has been evaluated. Public access to the Quarry area for swimming and surfing along the eastside shoreline of Mōkōlea Point was evaluated for compatibility in 1994 and was determined to be compatible.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?
These uses would not directly contribute to their understanding and appreciation of the Refuge's natural and cultural resources. However, it is likely that visitors participating in these uses would observe and enjoy wildlife ancillary to their primary recreational activities.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?
People have used Kāhili Quarry and Quarry Road for access to Kāhili Beach, Kīlauea River, and Kīlauea Bay for many years. Some individuals park vehicles on the Refuge. Given the limited area available for parking, it is possible that this use could interfere with Refuge visitors who participate in wildlife-dependent recreation such as fishing at Kāhili Quarry. It is expected that allowing continued access and use through the Kāhili Quarry, with stipulations to ensure compatibility, would not impair existing wildlife-dependent recreational uses or reduce the potential to provide quality, compatible, wildlife-dependent recreation into the future.

Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: Research and Scientific Collecting

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes _X_ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate__X___

Acting
Refuge Manager:_____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor: Barry W. Stieglitz Date: 9/10/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: Research and Scientific Collections

Summary: The Refuge receives requests to conduct scientific research on Refuge lands. Research applicants must submit a proposal that outlines (1) objectives of the study; (2) justification for the study; (3) detailed methodology and schedule; (4) potential impacts to Refuge wildlife and/or habitat, including disturbance (short- and long-term), injury, or mortality; (5) personnel required; (6) costs to the Refuge, if any; and (7) end products expected (i.e., reports, publications). Research proposals would be reviewed by Refuge staff and others as appropriate prior to the Refuge issuing a special use permit (SUP). Projects will not be open-ended, and at a minimum, will be reviewed annually. The use evaluated herein for appropriateness is more fully described and evaluated in the compatibility determination (CD) for this use and the documents referenced in that CD.

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(a) Do we have jurisdiction over the use?
Some or all of the activities would take place within Refuge boundaries. The Refuge has jurisdiction over those research projects that are sited within Refuge boundaries.

(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?
Any research activities would comply with all applicable laws and regulations and any restrictions or qualifications that are required to comply with laws and regulations would be specified in the SUP.

(c) Is the use consistent with applicable executive orders and Department and Service policies?
Through the review of individual projects, the Refuge would ensure that they are consistent with applicable policies, especially the Research on Service Lands Policy (803 FW 1).

(d) Is the use consistent with public safety?
Through individual project review, the Refuge will ensure that each project is consistent with public safety. If necessary, stipulations to ensure public safety will be included in the project's SUP. Permittees would be required to limit their use of the Refuge to specifically designated areas and access routes, and review and understand Refuge rules and regulations, including any hazardous conditions.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?
Research activities are approved in instances where they can provide meaningful data that may contribute to Refuge management and public appreciation of natural resources. Research activities would be consistent with the research priorities described in approved management plans (e.g., Goal 3 of Chapter 2, Gather scientific information to support adaptive management decisions).

(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?
A number of research projects have been approved or denied in earlier analyses.

(g) Is the use manageable within available budget and staff?
The Refuge regularly receives requests for this activity, and it is manageable with available budget and staff.

(h) Will this be manageable in the future within existing resources?
The activity at current levels would be manageable in the future with the existing resources.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?
The use is beneficial to the Refuge's natural and cultural resources because the types of research projects approved are those that have the distinct likelihood of helping achieve Refuge purposes by providing information useful for the management of trust resources and contributing to the public's understanding and appreciation of natural and cultural resources. This is beneficial because it enhances our appreciation for and often our ability to properly manage these resources. Research projects that did not result in these benefits would not be a priority for the Refuge and would likely not be authorized.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?
The Refuge would ensure that the research activities do not impair existing or future wildlife-dependent recreational use of the Refuge during individual project review, prior to issuing the SUP for the project. With the exception of research aimed at evaluating effects of public uses on priority resources of concern (Chapter 2, Goal 3), general and project-specific stipulations and conditions of the research would not significantly impair existing public uses or reduce the potential to provide quality, compatible wildlife-dependent recreation into the future.

Finding of Appropriateness of a Refuge Use

Refuge Name: Kīlauea Point National Wildlife Refuge

Use: Traditional Cultural Practices

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see 603 FW 1, section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes _X_ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate_X_

Acting
Refuge Manager: _____ Date: 9/9/15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge and Monument Supervisor: Barry W. _____ Date: 9/10/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Finding of Appropriateness of a Refuge Use

Supplement to FWS Form 3-2319

Further Explanation of Answers Provided for the Decision Criteria:

Project: Traditional Cultural Practices

Summary: The use evaluated herein for appropriateness involves participation in traditional Hawaiian cultural practices on Kīlauea Point National Wildlife Refuge. Such practices include fishing with hook and line, throw net, spear, or shellfish-gathering at Kīlauea (East) Cove and collection of plant materials, feathers, and possibly other natural resources (e.g., stone, shells, bone) from areas of the Refuge that are open to public use. Participants use these resources for subsistence, ceremonial, decorative, medicinal, or other purposes. Traditional cultural practices may also include site-specific ceremonial access.

The use is more fully described and evaluated in the compatibility determination (CD) for this use, titled "Traditional Cultural Practices" and the documents referenced in that CD.

For the findings listed on FWS Form 3-2319 and if deemed necessary, a justification has been provided below:

(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?
This use would comply with applicable laws and regulations.

Anglers would be required to secure and have with them relevant State fishing licenses and any other permits needed to fish in the ocean from the Refuge, and to abide by Hawai'i fishing regulations. Unless accompanied by official Refuge personnel, each participant will be issued and need to sign an annual special use permit (SUP).

Federal regulations prohibit collecting plant materials and other natural resources on refuges in the absence of specific authorization ("Disturbing, injuring, and damaging plants and animals," 50 CFR 27.51). Official authorization to access the Refuge for natural resource collection as part of traditional cultural practices will occur through issuance of a SUP, unless accompanied by official Refuge personnel.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?
This use would be consistent with applicable Executive orders and Department and Service policies, including the policy on "Administration of Specialized Uses" (5 RM 17). If found appropriate and determined compatible, traditional cultural practices would be authorized by the Refuge manager.

(d) Is the use consistent with public safety?
Access to Kīlauea (East) Cove (Cove) for fishing requires anglers to traverse the face of the Cove's steep cliffs along a narrow trail. The Cove is a traditional native Hawaiian fishing site that has been in use for many years. Existing and proposed use of this trail is by individuals who have personal knowledge and a lengthy family history of using this traditional Hawaiian fishing site, are aware of the safety risks, and are required to sign a liability release ("Release From Injury" form). Currently, anglers pull aside a short section of safety fence to access the trail. Other Refuge visitors could see

anglers crossing through the fence and attempt to do so themselves, potentially creating new safety issues.

To ensure this use remained safe into the future, access to the Cove for this traditional cultural practice would be limited to a small number of individuals who have personal or family knowledge of the access trail (i.e., individuals and families of native Hawaiian heritage who have genealogical ties to the local community, that is, the Kīlauea and Kāhili Ahupua‘a or surrounding ahupua‘a including Namahana, Kalihiwai, Kalihikai, Waiakalua, and Pīla‘a [Wilson and Jay 2010]). Additionally, access through the fence would need to be better secured.

It is not expected that a limited amount of resource collection would generate any public safety issues.

(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?
Fishing at Kīlauea (East) Cove has previously been evaluated for compatibility and was determined compatible. This is the first time that resource collection has been evaluated.

(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?
Allowing traditional cultural practices would contribute to the understanding and appreciation of the Refuge's natural and cultural resources by those individuals who participated. Additionally, others who indirectly benefitted from these practices would also be expected to have an enhanced understanding and appreciation for the Refuge's natural and cultural resources. Such beneficiaries could include family, friends, and other community members who got to enjoy some of the harvested fish or shellfish, or individuals who benefitted from the ceremonial, decorative, medicinal, or other purposes for which resource collections were made.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?
As noted above, anglers crossing through the fence to access the Cove for fishing could encourage other Refuge visitors to also cross through the fence to access the Cove trail. This could create new safety issues. If resource collecting occurred in areas readily seen by other Refuge visitors, these other visitors could easily become confused regarding what activities are and are not allowed on the Refuge, and this could increase the amount of unauthorized collections that occurred. The fence issue could be addressed by better securing the access point and the second issue could be addressed with additional visitor information, interpretation, or law enforcement, as necessary.

It is expected that participation in these uses would be limited; therefore, these issues would be expected to be minor and not impair existing wildlife-dependent recreational uses or reduce the potential to provide quality, compatible, wildlife-dependent recreation into the future.

Literature Cited
Wilson, J. and J. Jay. 2010. Moku & Ahupuaa of Kaua‘i Island Aha Kiole Advisory Committee. Mapping by IslandBreath. http://www.islandbreath.org/2010Year/04/100415kauaimokupuni.png.

Appendix B. Compatibility Determinations

B.1 Introduction

The compatibility determinations (CD) we developed during the CCP planning process evaluate uses as projected to occur under Alternative D, the Preferred Alternative in the draft CCP/EA, for the Kīlauea Point National Wildlife Refuge (Refuge or NWR) (USFWS 2015), which was carried forward as the management direction for the Refuge in this CCP. The evaluation of funds needed for management and implementation of each use is described in Appendix C, Implementation. Chapter 6 of the draft CCP/EA also contained analysis of the impacts of public uses to wildlife and habitats. That document is incorporated through reference into this set of CDs.

B.1.1 Uses Evaluated At This Time

The following section includes full CDs for all uses at Kīlauea Point NWR that are required to be evaluated at this time. According to Service policy, CDs are to be completed for all uses proposed under a CCP that have been determined to be appropriate. Existing wildlife-dependent recreational uses must also be re-evaluated and new CDs prepared during development of a CCP. According to the Service's compatibility policy, uses other than wildlife-dependent recreational uses are not explicitly required to be re-evaluated in concert with preparation of a CCP, unless conditions of the use have changed or unless significant new information relative to the use and its effects have become available or the existing CDs are more than 10 years old. However, Service planning policy recommends preparing CDs for all individual uses, specific use programs, or groups of related uses associated with the proposed action. Accordingly, the following CDs are included in this document for public review.

Table B-1. Summary of Compatibility Determinations.

Refuge Use	Compatible?	Year Due for Reevaluation
Commercial Wildlife and Landscape Filming and Photography	Yes	2025
Commercial Tours	Yes	2025
Environmental Education	Yes	2030
Fishing and Shellfishing	Yes	2030
General Access for Off-Refuge Stream, Beach, and Ocean Uses (Kāhili Quarry)	Yes	2025
Research and Scientific Collections	Yes	2025
Traditional Cultural Practices (Natural Resource Collecting)	Yes	2025
Wildlife Observation, Photography, and Interpretation	Yes	2030
Dog Walking (Kāhili Quarry)	Yes	2025

B.1.2 Compatibility–Legal and Historical Context

Compatibility is a tool refuge managers use to ensure that recreational and other uses do not interfere with wildlife conservation, the primary focus of national wildlife refuges. Compatibility is not new to the Refuge System and dates back to 1918 as a concept. As policy, it has been used since 1962. The Refuge Recreation Act of 1962 directed the Secretary of the Interior to allow only those public uses of refuge lands that were "compatible with the primary purposes for which the area was established."

Legally, national wildlife refuges are closed to all public uses until officially opened through a CD. Regulations require that adequate funds be available for administration and protection of refuges before opening them to any public uses. However, wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, environmental education and interpretation) are to receive enhanced consideration and cannot be rejected simply for lack of funding resources unless the refuge has made a concerted effort to seek out funds from all potential partners. Once found compatible, wildlife-dependent recreational uses are deemed the priority public uses at the refuge. If a proposed use is found not compatible, the refuge manager is legally precluded from approving it. Economic uses that are conducted by or authorized by the refuge also require CDs.

Under the compatibility policy, uses are defined as recreational, economic/commercial, or management use of a refuge by the public or a non-Refuge System entity. Uses generally providing an economic return (even if conducted for the purposes of habitat management) are also subject to CDs. The Service does not prepare CDs for uses when the Service does not have jurisdiction. For example, the Service may have limited jurisdiction over refuge areas where property rights are vested by others, where legally binding agreements exist, or where there are treaty rights held by tribes. In addition, aircraft overflights, emergency actions, some activities on navigable waters, and activities by other Federal agencies on "overlay refuges" are exempt from the compatibility review process.

New compatibility regulations, required by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), were adopted by the Service in October 2000 (http://refuges.fws.gov/policymakers/nwrpolicies.html). The regulations require that a use must be compatible with both the mission of the Refuge System and the purpose(s) of the individual refuge. This standard helps to ensure consistency in application across the Refuge System. The Improvement Act also requires that CDs be in writing and that the public have an opportunity to comment on most use evaluations.

The Refuge System mission emphasizes that the needs of fish, wildlife, and plants must be of primary consideration. The Improvement Act defined a compatible use as one that ". . . in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the Refuge." Sound professional judgment is defined under the Improvement Act as ". . . a finding, determination, or decision, that is consistent with principles of sound fish and wildlife management and administration, available science and resources . . ." Compatibility for priority wildlife-dependent uses may depend on the level or extent of a use.

Court interpretations of the compatibility standard have found that compatibility is a biological standard and cannot be used to balance or weigh economic, political, or recreational interests against the primary purpose of the refuge (Defenders of Wildlife v. Andrus (Ruby Lake Refuge)). The Service recognizes that CDs are complex. For this reason, refuge managers are required to consider "principles of sound fish and wildlife management" and "best available science" in making these determinations (House of Representatives Report 105-106). Evaluations of the existing uses on the Kīlauea Point National Wildlife Refuge are based on the professional judgment of Refuge and planning personnel, including observations of Refuge uses and reviews of relevant scientific literature.

In July 2006, the Service published its Appropriate Refuge Uses policy (603 FW 1). Under this policy, most proposed uses must also undergo a review prior to compatibility. Uses excepted from the policy include priority wildlife-dependent recreational uses, and uses under reserved rights—see policy for more detail. Appropriate Refuge Uses Findings are in Appendix A.

B.2 References

Defenders of Wildlife v. Andrus (Ruby Lake Refuge I). 11 Envtl. Rptr. Case 2098 (D.D.C. 1978), p. 873.

U.S. Fish and Wildlife Service (USFWS). 2015. Kīlauea Point National Wildlife Refuge draft Comprehensive Conservation Plan and Environmental Assessment. U.S. Department of the Interior, Fish and Wildlife Service, Region 1, Portland, OR. 646 pp.

Compatibility Determination

Use: Commercial Wildlife and Landscape Filming and Photography (photography, video, filming, or audio recording—commercial)

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kauaʻi, Hawaiʻi

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):
The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

According to the Code of Federal Regulations (CFR), Title 43, Subpart A, Section 5.12 (last updated by Federal Register dated August 22, 2013), commercial filming is defined as "the film, electronic, magnetic, digital, or other recording of a moving image by a person, business, or other entity for a

market audience with the intent of generating income. Examples include, but are not limited to, feature film, videography, television broadcast, or documentary, or other similar projects. Commercial filming activities may include the advertisement of a product or service, or the use of actors, models, sets, or props." The Commercial Filming Act of 2000 (16 U.S.C. 460l–6d) defines commercial filming to include specific activities, such as filming activity that consumes more than a single day, and includes a film crew and special equipment, still photography that occurs in places where members of the public are generally not allowed, and still photography that uses models or props that are not part of the site's natural or cultural resources or administrative facilities. Service policy defines commercial photography to mean, "…a visual recording (motion or still) by firms or individuals (other than news media representatives) who intend to distribute their photographic content for money or other consideration. This includes the creation of educational, entertainment, or commercial enterprises as well as advertising audio-visuals for the purpose of paid product or services, publicity, and commercially oriented photo contests" (Wildlife Photography, 605 FW 5).

For purposes of this compatibility determination (CD), commercial wildlife and landscape filming and photography include recording sights or sounds for commercial purposes. This includes still and motion pictures, photographs captured using film and digital media, and audio recordings. The use typically involves filming scenes for a movie, television show, public education program, or commercial; taking still photographs; or recording natural sounds for commercial purposes. The final creation would be produced for sale as a commercial product. This use is regulated by Refuge Manual (RM) Part 8, Chapter 16, and 43 CFR 5 This does not include image and audio recordings of a noncommercial nature. Official authorization to access the Refuge for commercial photography and videography will occur through issuance of a special use permit (SUP).

This use will occur in areas of the Refuge specified in the SUP. The use could occur at many locations on the Refuge, including areas open to the general public and closed areas. Areas open to general public use include Kīlauea Point (Point), the cul-de-sac (turnaround) at the end of Kīlauea Road (Overlook), Kāhili Quarry area, and a trail on Crater Hill during guided interpretive hikes.

Availability of Resources:

Permit-holders for commercial filming and photography are required to pay a location fee and reimburse the Refuge for expenses incurred, according to 43 CFR 5. Location fees will be assessed in accordance with a fee schedule published in the Federal Register. The fee schedule may be adjusted annually. The location fee charged will be in lieu of any entrance or other special use fee; however the location fee is in addition to any cost recovery amount (i.e., actual costs incurred in processing and administering the permit; see below).

The Administration of Specialized Uses (5 RM 17) policy requires that a refuge seek to recover its costs associated with administration of such a use and/or charge a fee equal to the fair market value of the benefit received by the user. Benefits provided to the Service by a refuge use are considered in establishing appropriate fees. Direct and indirect costs to administer this use on the Refuge include the following:

- Costs associated with construction, repair, operation, and maintenance of associated facilities;
- Salaries and associated employee expenses related to evaluation of the proposed use (including appropriateness finding, CD, and compliance with applicable laws, regulations, and policies such as the National Environmental Policy Act, Endangered Species Act, and

National Historic Preservation Act) and development of the SUP;
- Salaries and associated employee expenses related to monitoring of this use to ensure that permit requirements are followed and that the use remains compatible. This includes evaluation of effects of this use on the Refuge's natural and cultural resources, and compatible, especially wildlife-dependent, public use;
- Use-related supplies, equipment, and travel; and
- An applicable portion of Refuge overhead costs.

Following is an estimate of costs associated with administering this use on the Refuge:

Tasks	Estimated Costs per Year[1]
1. Permit administration and oversight by GS-13 Project Leader (approximately 20 hours/year).	$1,200
2. Permit administration and oversight by GS-12 Deputy Project Leader (approximately 20 hours/year).	$1,000
3. Permit administration and oversight by GS-9 Supervisory Park Ranger (approximately 40 hours/year).	$1,400
4. Permit administration by GS-4 Budget Clerk (approximately 20 hours/year)	$400
5. Law enforcement by GL-9 Law Enforcement Officer (approximately 40 hours/year).	$1,500
6. Permit monitoring by GS-11 Biologist (approximately 20 hours/year).	$900
7. Refuge overhead costs associated with the above-listed work.[2]	$1,300
Total Costs	$7,700

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.
[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

Fee revenues collected from commercial uses of this nature are not retained by the Refuge. Instead, these monies are deposited into the U.S. Treasury Department's National Wildlife Refuge Fund. Monies from this fund are used for redistribution to refuges to help offset the costs of administering specialized uses (Expenses for Sales) and for payments in lieu of taxes to counties or other local governments under the Refuge Revenue Sharing Act.

Commercial image and audio recording has the potential to share the Refuge's valuable natural and cultural resources with a larger audience over a greater geographic area. This could enhance public understanding, appreciation, and support for native fish, wildlife, plants, their habitats, the Refuge's cultural heritage, conservation, and the Refuge System. To the extent that this occurred, it will be a benefit to the Refuge. Permit fees could be adjusted to acknowledge such a benefit.

The Refuge currently has adequate budget and staff to support limited commercial use of this nature.

Anticipated Impacts of the Use(s):

It is expected that commercial recording of Refuge sights and sounds will generate products that potentially will be broadly distributed through the market. To the extent that these images and recordings enhanced the public's connection with wildlife, habitats, and cultural and historic richness

of the Refuge, and helped interpret the Refuge's cultural resources, this use supports Refuge goals 4 and 5. To the extent that these images and recordings enhanced public understanding and appreciation for conservation or the Refuge System, this use also supports the Refuge System mission.

The effects of commercial photography and videography upon wildlife will likely be associated with disturbance. Human disturbance has differential effects on wildlife and is dependent upon, among other variables, the species involved and its age; the time of year; the breeding cycle stage (if applicable); the surrounding environment; whether the activity involves vehicles; the intensity, speed, noise, nature, and frequency of the disturbing activity; and the directness of approach to an animal (Blanc et al. 2006, Holmes et al. 2005, Hammitt and Cole 1998, Knight and Cole 1995a, Knight and Cole 1995b). Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, change in food habits, physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990, Knight and Cole 1995a, Knight and Swaddle 2007, Miller et al. 1998, Miller and Hobbs 2000, Morton et al. 1989, Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Kitaysky et al. (2003) found levels of corticosterone (a major stress hormone) in ʻuaʻu kani (wedge-tailed shearwaters, *Puffinus pacificus*) at the Refuge to be higher in chicks occupying burrows within 13 feet of visitor-use areas. Holmes et al. (2005) found that, even at the recommended minimum approach distance (~16 feet), a single wildlife observer in a royal penguin (*Eudyptes schlegeli*) colony on Macquarie Island, Australia, triggered vigilance behavior and an increased heart rate in the birds. In another study, Holmes et al. (2007) found that vigilance behavior of gentoo penguins (*Pygoscelis papua*) increased as the numbers of observers increased. Additional studies in penguin colonies revealed that a slow approach that ended with a visitor sitting quietly and closely observing a bird had little effect on the bird's heart rate, yet a rapid approach that ended with a visitor remaining standing and closely observing a bird resulted in an elevated heart rate (Nimon et al. 1995).

A variety of factors affect flushing distances among waterbirds, including the species involved; the activity the birds are engaged in (e.g., foraging versus nesting); and the type, speed, and noise of disturbance (e.g., approaching birds by walking versus in a motorized boat) (Rodgers and Smith 1997, Rodgers 1991). Flushing of birds or even raising their alert levels (which usually occurs at a greater distance than that for flushing) creates stress and requires animals to expend energy that otherwise would be invested in essential life history activities such as foraging, mating, nesting, brood-rearing, and predator avoidance.

Breeding birds are especially sensitive to human disturbance (Trulio 2005, Hammitt and Cole 1998). A study of visitors to a colony of kittiwakes (*Rissa tridactyla*) and guillemots (*Uria aalge*) revealed that nesting success was influenced by the distance of observers from the birds (positively correlated) and the number of observers involved (negatively correlated) (Beale and Monaghan 2004).
Studies have had mixed results regarding potential habituation of birds and some other taxa to human disturbance. Wildlife are often less disturbed by routine human activities that repeatedly occur along defined routes (e.g., trails, roads, or water channels), especially frequent disturbance that does not involve direct contact or other threats, compared with those activities that occur irregularly and outside predictable paths/channels (Blanc et al. 2006, Holmes et al. 2007, Knight and Cole 1995b).

In studies of breeding yellow-eyed penguins (*Megadyptes antipodes*), a timid and secretive species, Ratz and Thompson (1999) found that the birds appeared to have habituated to the presence of guided tourists who approached the colony through trenches and closely observed or photographed birds from camouflaged blinds. Jungius and Hirsch (1979) studied seabird colonies and found that birds that were believed to have habituated to tourists and revealed no outward behavioral changes in their presence, nonetheless exhibited stress (as reflected in elevated heartbeat frequencies) when approached by visitors. The scientists speculated that the stress could have a negative effect on breeding. Habituation to some types and levels (intensity and frequency) of human disturbance appears to vary among species, within species, between resident and migratory populations, and potentially between inexperienced and experienced breeders. This makes it difficult to forecast habituation in actual field situations.

ʻĪlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*) numbers are increasing in the main Hawaiian Islands, especially on and around Niʻihau and Kauaʻi (NMFS 2007, Baker and Johanos 2003). Critically endangered ʻīlio-holo-i-ka-uaua are very sensitive to human disturbance (NMFS 2007) and disturbance of female adults with pups is of special concern (Gilmartin 2003). Seals may also injure people. Seals haul out on land to rest, molt, or pup. Approaching photographers could force hauled-out seals to move back into the water and seek a new haul-out site, causing them to expend energy and increasing their exposure to predators. Repeated disturbance over time can cause seals to abandon preferred haul-out sites (Gilmartin 2003). It is generally recommended that individuals viewing or photographing seals and sea turtles maintain a distance of at least 50 yards from the animals and limit their viewing/photographing time to no more than 30 minutes (NOAA undated, NOAA Fisheries et al. undated; "Hawaiʻi Viewing Guidelines: Overview, Marine Mammal & Sea Turtle Viewing 'Code of Conduct'" at http://www.nmfs.noaa.gov/pr/education/Hawaiʻi/).

Wildlife disturbance can be a special concern with wildlife observation and photography (Cline et al. 2007, DeLong 2002, Knight and Cole 1995a). Observers and photographers often want to enhance their view or photograph by encroaching closer and closer to their subject. This can cause increased stress in wildlife and eventually lead to flushing. If a bird is nesting or brood-rearing, disturbance can cause temporary or permanent nest desertion. Even if only temporary, eggs and nestlings can face survival challenges associated with temperature extremes and predation.

Commercial photography and videography could also cause trampling of native plants, erosion, and introduction or spread of nonnative species, including invertebrates, plants, and invasive species. All of these impacts will adversely affect native fish, wildlife, plants, their habitats, and are of special concern in Refuge areas struggling with re-establishment of native plant communities. The degree of actual effects upon reproduction, survival of individuals, and diversity and abundance of native species (community health) will depend on specific circumstances. Except with special permission, commercial photographers will be required to behave like other visitors, including remaining behind the perimeter fencing on the Point, not crossing fences elsewhere on the Refuge, and otherwise abiding by closed area signage. These and other stipulations associated with this use have been designed to greatly reduce the likelihood and magnitude of potential effects by commercial photography and videography on biological resources, including roosting, foraging, and breeding birds.

The Refuge has substantial and, in some areas, dense populations of burrow-nesting seabirds. Although some burrows lie on the Point adjacent to the area heavily used by Refuge visitors, the vast majority of the burrows are elsewhere, in less disturbed areas of the Refuge, such as Crater Hill.

Humans casually walking through nesting colonies could easily crush burrows, destroy nests and eggs, and kill young or adult seabirds.

Crater Hill grasslands are primarily composed of nonnative species such as Kikuyu grass (*Pennisetum clandestinum*); however, these areas provide actual and potential habitat for roosting, foraging, and breeding activities by nēnē (Hawaiian goose, *Branta sandvicensis*), mōlī (Laysan albatross**,** *Phoebastria immutabilis*), and shorebirds. Additionally, major efforts have been undertaken to reintroduce native plants to this area. Areas on the Point and the core of the Kāhili Quarry that receive almost all of the Refuge's visitation are hardened and therefore experience very few effects from public use. However, access to Crater Hill by commercial photographers will increase the potential for erosion and compaction of trails, for crushing of nesting burrows, and for disturbance to native birds using the grasslands and to outplanting of native vegetation. Access to Crater Hill for this use will be limited in frequency, guided, and appropriately scheduled to minimize adverse effects.

Public Uses

If commercial photography and videography occurred in closed areas where it was readily seen by other Refuge visitors, these other visitors could easily become confused regarding where activities are and are not allowed on the Refuge. This could increase the occurrence of unauthorized access, and impacts to native wildlife and plants. Additionally, if a production company wished to film at the Refuge and that involved a large crew, and a substantial amount of time and equipment, or commercial photographers and videographers wanted to visit during Refuge special events, these activities could adversely affect quality wildlife-dependent recreational and educational experiences by other Refuge visitors. As noted above, stipulations associated with these uses will require visitors to remain behind the perimeter fencing on the Point, not cross fences, and otherwise abide by closed area signage elsewhere on the Refuge. These use conditions will greatly reduce potential public safety concerns. Stipulations associated with commercial photography and videography will limit this use such that effects on other Refuge visitors were avoided or greatly reduced.

Cultural Resources

The Refuge contains a number of historic and prehistoric resources, including the Kīlauea Point Light Station (the lighthouse and associated Coast Guard facilities on the Point) that was listed on the National Register of Historic Places as a historic district in 1979 (USFWS 2006). To the extent that SUPs included clear maps depicting areas permittees were authorized to access and use, and permittees were aware of prohibitions related to cultural resources, impacts to these resources are not expected. Potentially commercial photography and videography could enhance public knowledge of and appreciation for the Refuge's cultural resources.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge's draft comprehensive conservation plan and environmental assessment.

Determination:

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

1. Permission to use the Refuge for commercial image and audio recording will be officially authorized through issuance of an SUP to minimize the possibility of damage to cultural or natural resources or interference with other visitors to the area. Requests must be submitted in writing to the Refuge manager no less than 60 days prior to the requested date(s). Each request will be reviewed on a case-by-case basis. Permits may be approved or denied based on the availability of Refuge staff and resources to administer this use. As appropriate, each permit will authorize a one-time use or repeated uses over a period not to exceed 1 year. SUPs will cover use by a specified individual or organization and cannot be assigned or sub-permitted to others (i.e., the permit is not transferable).

   Prior to potential permit renewal, Refuge staff will meet with permittees to share new information, discuss results of monitoring, review compliance with permit conditions, and address other issues. Other meetings will be scheduled as needed.

2. Permittees will be charged a location fee (in accordance with a fee schedule published in the Federal Register) and a fee equal to the fair market value of the use, an amount to cover Refuge costs associated with administration of the use, or another fee, consistent with applicable Service policy (Administration of Specialized Uses, 5 RM 17). It will benefit the Refuge if commercial image and audio recording generated and broadly distributed quality products that enhanced the public's understanding, appreciation, and support for the Refuge's native fish, wildlife, plants, their habitats, the Refuge's cultural heritage, conservation, Kīlauea Point NWR, and the Refuge System. Permit fees could be adjusted on a case-by-case basis depending on the specific details of each permit to acknowledge such a benefit. The fee must be paid before the SUP will be issued.

3. All activities must comply with 8 RM 16 and 43 CFR 5.1 and may require completion of a Commercial Audio-Visual Production Application and posting of a bond.

4. Prior to recording, permittees will provide the Refuge manager with a copy of their current liability insurance policy. The Refuge must be named as an additional insured on the policy for the duration of the production.

5. Permittees must have the SUP in their possession at all times while on the Refuge. A copy of the permit must also be prominently displayed on the dashboard of permittees' vehicle(s) at all times while on the Refuge. The permit must be presented to Refuge officials upon request.

6. The Refuge will provide permittees with information about the Refuge: its purposes and goals, natural and cultural resources of concern, open and closed areas and times, rules and regulations, and any hazardous conditions. Permittees are expected to review, understand, and comply with Refuge rules and safety, interpretive, regulatory, and other signage.

7. Sites for photo/video shoots will be submitted in advance and approved by the Refuge manager. Most of Kīlauea Point NWR is closed to general public use, so SUPs will include maps clearly depicting the areas permittees will be authorized to access and use, including the Refuge entry point(s). Travel within the Refuge will be by designated road, parking lot, and/or trail. Permission to access Refuge closed areas will be designed to minimize effects on biological and cultural resources and visitors. Permission will generally not be granted to access areas on the Point outside the public safety fence, Mōkōlea Point, Makapili Rock, or the northern shoreline. Permission to access Crater Hill will require use of a guide(s) (Refuge staff or trained volunteer) and will be scheduled to avoid impacts to seabirds and nēnē. In the absence of specific, prior written approval of the Refuge manager (for the purpose of these stipulations, the Refuge manager is the Project Leader of Kaua'i National Wildlife Refuge Complex), permittees are prohibited from straying outside the areas depicted on the maps or accessing the Refuge at times it was closed.

8. No sound-making or lighting devices are permitted, unless specifically authorized by the Refuge manager.

9. Only commercial filming and photography in support of conservation, Refuge purposes, the National Wildlife Refuge System Mission, or for educational and interpretive purposes will be permitted.

10. Permittees are required to secure and maintain the currency of all licenses, permits, and approvals required by State and local governments to engage in the commercial activities they are proposing or pursuing.

11. Permittees are prohibited from constructing new or maintaining existing structures or altering the landscape (e.g., by moving natural or built features or through cutting or removal of vegetation) on the Refuge without specific, prior written approval of the Refuge manager.

12. In the absence of specific, prior written approval of the Refuge manager, permittees are prohibited from collecting and removing any archaeological or historic artifacts, abiotic or biological specimens or samples, or mementos from the Refuge.

13. Consistent with Service policy regarding management of nonhazardous solid waste on Refuges (Resource Conservation and Recovery Act of 1976, as amended [42 U.S.C. 6901-6992k]—Solid Waste (Nonhazardous), 561 FW 5), permittees are prohibited from littering, dumping refuse, abandoning equipment or materials, or otherwise discarding any items on the Refuge.

14. Permittees are required to hold the United States Government harmless from any damages or injury to the permittee or members of the general public in areas and facilities accessed via the terms of their permit.

15. In addition to the stipulations listed here, the general permit conditions and requirements, and the SUP, all visitors are required to comply with Refuge System-related and other applicable laws, regulations, and policies including "Prohibited Acts" listed in the Code of Federal Regulations (50 CFR 27).

16. No changes can be made to any of these stipulations without specific, prior written approval of the Refuge manager.

Commercial Image and Audio Recording

1. The Refuge will provide photographers and others who made audio or video recordings on the Refuge with information about its valuable biological and cultural resources, and about responsible behavior when viewing and photographing or recording these resources. This could include, for example, the "Principles of Ethical Field Practices" developed by the North American Nature Photography Association. Among others, these principles include not distressing or otherwise interfering with animal behaviors, using telephoto lenses to photograph animals, and adhering to local regulatory requirements.

2. Permittees who make audio or video recordings on the Refuge will be requested to label the location of photographs or other recordings as Kīlauea Point National Wildlife Refuge, Kauaʻi, Hawaiʻi, use Hawaiian names (perhaps in addition to English and Latin names) for native wildlife and plant species photographed or recorded, include a conservation message with photographs and recordings, and mention that there is limited general public access to the Refuge.

3. Permittees who make audio or video recordings on the Refuge will be requested to allow the Service to use selected photographs or other recordings, with attribution, for educational, interpretive, and other Refuge management purposes.

4. Permittees who make audio or video recordings on the Refuge will be requested to donate selected photographs or other recordings to the Refuge Friends group to be used, with attribution, for educational, interpretive, and potentially fund-raising purposes.

5. Permittees who make audio or video recordings on the Refuge are prohibited from using feed or call playback recordings to attract wildlife.

6. Permittees are prohibited from obstructing Refuge areas of value for other visitors who are participating in observation, photography, interpretation, education, or other approved uses. Permittees are also prohibited from engaging in active business or political operations while on the Refuge, such as soliciting alms and contributions, campaigning for election to any public office, collecting private debts, soliciting and vending for commercial purposes (including, but not limited to, the vending of newspapers and other publications), displaying or distributing commercial advertising, collecting signatures on petitions, polls, or surveys (except in association with Refuge monitoring and as authorized by the Refuge manager).

7. If, in selected cases, it was determined that commercial photography and videography could conflict with the enjoyment of quality wildlife-dependent recreational and educational experiences by other Refuge visitors, the Refuge manager could deny permission for these commercial uses. Examples include using the Refuge during Refuge special events and filming by a production company that involved a large crew and/or a substantial amount of time and equipment.

8. All commercial photography and videography activities will avoid sensitive areas prone to disturbance (e.g., sensitive vegetation areas) or degradation (e.g., soil compaction), and will be designed to minimize impacts to nesting birds or other breeding, feeding, or resting wildlife. Areas that are open to this use will be evaluated on an annual, seasonal, and sometimes daily basis. Seasonal closures may vary year-to-year based on wildlife use and habitat conditions. Permittees will be expected to comply with closures.

9. When photographing critically endangered ʻīlio-holo-i-ka-uaua or honu (*Chelonia mydas*), whether these animals are in the water or on shore, permittees are required to maintain a distance of at least 50 yards and limit their viewing/photographing time to 30 minutes (NOAA undated). ʻIlio-holo-i-ka-uaua and honu are both listed under the Endangered Species Act (ESA) and ʻilio-holo-i-ka-uaua is also listed under the Marine Mammal Protection Act (MMPA). These acts have mechanisms to encourage management for population growth and recovery and to prohibit any form of "take," except for limited exceptions authorized under Federal permits. Under the ESA, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Under the MMPA, "take" includes actions such as hunting, harassing, killing, capturing, injuring, and disturbing a marine mammal. There are established civil and criminal penalties for, at a minimum, disturbing ʻīlio-holo-i-ka-uaua or honu by getting too close or staying too long, which alters their behavior, thus resulting in take. If ʻīlio-holo-i-ka-uaua or honu display signs of being disturbed, then that 50 yards will be expanded and/or viewing will be minimized or shut down to stop the disturbance and avoid potential take.

Cultural Resources

1. In the absence of specific, prior written approval of the Refuge manager, permittees are prohibited from disturbing or otherwise adversely impacting any prehistoric, historic, or other cultural resources on the Refuge. In the event such resources were inadvertently disturbed in the course of conducting otherwise permitted activities, the disturbing activity will need to be immediately discontinued, and the Refuge manager will need to be notified within 24 hours. If iwi (skeletal human remains) are encountered, the activity will need to be immediately stopped and the Refuge manager, police, and Hawaiʻi Department of Land and Natural Resources should be notified. Collecting and removing any prehistoric or historic artifacts is prohibited.

Justification:

As discussed earlier, commercial photography, filming, and audio recording have the potential to share Kīlauea Point NWR's valuable natural and cultural resources, and the conservation story, with a larger audience over a greater geographic area. This could enhance public understanding and appreciation for the Refuge's natural and cultural resources, and increase support for conservation of the Refuge's native fish, wildlife, plants, their habitats, and its cultural heritage. This is consistent with Service policy on Audio-Visual Productions (8 RM 16) that states such productions can increase

public understanding of America's wildlife and of the Service's role in managing and protecting natural resources through the Refuge System.

This use has the potential to generate effects on fish, wildlife, plants, their habitats, and cultural resources. The stipulations enumerated above, including Refuge information, behavioral guidance, use of maps, specific prohibitions, and monitoring, will greatly reduce or eliminate adverse effects and help enhance potential beneficial effects.

The Refuge will monitor compliance with the stipulations enumerated herein. Violation of any of these stipulations could result in temporary or permanent withdrawal by appropriate Refuge personnel of official permission to continue this use on the Refuge. Permits could be revoked by the Refuge manager with 30-days written notice of noncompliance with these stipulations.

The Refuge will monitor habitat quantity and quality, wildlife use and productivity, and other relevant endpoints to determine if these stipulations for commercial image and audio recording result in expected and desirable outcomes. In consultation with permittees, the Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of this use. New or modified stipulations could be instituted as a result of new information generated by ongoing or new studies; new legal, regulatory, or policy requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants, or their habitats; changes to commercial image or audio recording or related practices; mutual agreement with the permittees; or for other legitimate reasons. Except in the case of emergencies, permittees will be advised of new or significantly modified stipulations at least 90 days prior to their becoming effective.

Compatibility Standard

In order to be allowed on the Refuge, commercial photography, filming, and audio recording need to be determined compatible. By allowing these uses to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, cultural resources, and public use. For the several reasons stated above and consistent with the stipulations described herein, these uses will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point NWR's purposes; or the Refuge System's mission.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: Commercial Wildlife and Landscape Filming and Photography (photography, video, filming, or audio recording – commercial)

Refuge Determination:

Prepared by: _____ (Signature) 9/9/15 (Date)

Acting

Approved by Project Leader, Kaua'i National Wildlife Refuge Complex: _____ (Signature) 9/9/15 (Date)

Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office: Barry W. _____ (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region: Kevin S Foerster _____ (Signature) 9/16/15 (Date)

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Compatibility Determination

Use: Commercial Tours

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kaua‘i, Hawai‘i

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):
The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

This use is any fee-based service providing recreational, educational, or interpretive enjoyment of Refuge lands and waters to the visiting public such as transportation, interpretation, educational materials, and programs. The services must aim to enhance the Refuge visitor's knowledge and enjoyment of the key natural resources and the mission of Kīlauea Point National Wildlife Refuge

(Kīlauea Point NWR; Refuge) and the U.S. Fish and Wildlife Service (Service). Other uses may be determined appropriate and compatible with the purposes of Refuge establishment, including guided wildlife observation or photography, natural history or cultural history tours, transport of individuals or groups (most commonly by bus or van) to or from Refuge lands for wildlife observation or photography, nature study or interpretation, and other wildlife-oriented activities.

The use may be conducted by a Service conservation partner, concessionaire, or private business, but will fall under the general heading of ecotourism. In all cases, participants pay a fee to the individual guide, business, or nonprofit organization for the unique skills, equipment, and expertise of the leader who enhances the experience of the participating individual or party on Refuge lands.

Ecotourism involves travel to natural areas to foster environmental and cultural understanding, appreciation, and conservation. These operations are often conducted on a commercial basis, often attempt to integrate the local community in their ventures, and attempt to conduct their activities in an environmentally sensitive and sustainable manner. They routinely include natural and cultural educational or interpretive components and offer wildlife observation and photography opportunities. In contrast with more traditional tourism, these ventures are usually much smaller in scale.

Areas open to general public use include Kīlauea Point (Point), the cul-de-sac (turnaround) at the end of Kīlauea Road (Overlook), Kāhili Quarry area, and a trail on Crater Hill during guided interpretive hikes. It is possible that some tours could also occur at times or in areas of the Refuge that are closed. This will provide individuals and small groups with access to areas that generally are not available to the public at large. At present, at least five different companies utilize the Point for commercial tours; an unknown but larger number of companies visit the Overlook.

Commercial tours will likely take advantage of Kīlauea Point NWR's multiple opportunities for observation, photography, and interpretation. The Point, where almost all public use at the Refuge occurs, offers outstanding opportunities for observation and photography of a diversity of native seabirds, nēnē (Hawaiian goose, *Branta sandvicensis*), and sometimes shorebirds, whales, dolphins, seals, and sea turtles; the Kīlauea Point Light Station; and classic Hawaiian coastal scenery, including undeveloped bluffs, the remnant walls of an ancient volcano, rocky beaches, and nearshore ocean and islands.

Facilities on the Point that support observation, photography, and interpretation include the Overlook, access road, two parking areas, fee station, visitor center, contact station, outdoor interpretive panels, viewing scopes, paved trails, perimeter safety fence, restrooms, and recycling and trash receptacles. The visitor center includes indoor interpretive exhibits and a bookstore. The contact station has displays, information about the Refuge and lighthouse, and interpretive videos. At the fee station, visitor center, and contact station, visitors can secure brochures with information about the Refuge and its valuable natural and cultural resources. This area is accessed from the town of Kīlauea via Kīlauea Road. Visitors are assessed a fee to enter the main public use area on the Point and a fee will be charged for limited Crater Hill hikes (except during National Wildlife Refuge Week).

In the long-term, under the management direction of the CCP, a potential new offsite visitor center and other facilities will provide visitor contact, orientation and information, fee collection, restrooms, bookstore/retail space, and tour bus parking. Under this management direction, parking for private automobiles and tour buses on the Point will potentially be eliminated, and visitors will access the Refuge primarily via a shuttle from Kīlauea town and/or the new visitor center. On the Point, the existing visitor center will be remodeled to provide interpretive exhibits and displays, interpretation

at the contact station will be expanded, and one of the former lighthouse quarters will be restored and converted into a living history site. Signage at the Overlook will be enhanced to provide more information and interpretation. In addition, efforts will be made to increase opportunities for up-close wildlife observation and photography (e.g., with remote cameras and observation/photo blinds). As a result of these changes, it is expected that the number and quality of observation, photography, and interpretive opportunities will substantially increase.

Operating a commercial program on a refuge or a program that facilitates public access to a refuge in areas or at times that it is closed is a specialized use under U.S. Fish and Wildlife Service (Service) policy (Administration of Specialized Uses, 5 RM 17). To the extent that this use facilitates a program on a refuge, it is also an economic use under relevant Federal regulation (50 CFR 29.1). Before being allowed on the Refuge, this use will first need to be found appropriate (Appropriate Refuge Uses, 603 FW 1) and then be determined compatible (Compatibility, 603 FW 2). Official authorization to access the Refuge for this use will occur through issuance of an SUP.

Availability of Resources:

The Administration of Specialized Uses (5 RM 17) policy requires that a refuge seek to recover its costs associated with administration of such a use and/or charge a fee equal to the fair market value of the benefit received by the user. Benefits provided to the Service by a refuge use are considered in establishing appropriate fees. Direct and indirect costs to administer this use on the Refuge include the following:

- Costs associated with construction, repair, operation, and maintenance of associated facilities;
- Salaries and associated employee expenses related to evaluation of the proposed use (including appropriateness finding, compatibility determination, and compliance with applicable laws, regulations, and policies such as the National Environmental Policy Act (NEPA), Endangered Species Act (ESA), and National Historic Preservation Act (NHPA)) and development of the SUP;
- Salaries and associated employee expenses related to monitoring of this use to ensure that permit requirements are followed and that the use remains compatible. This includes evaluation of effects of this use on the Refuge's natural and cultural resources, and compatible, especially wildlife-dependent, public use;
- Use-related supplies, equipment, and travel; and
- An applicable portion of Refuge overhead costs.

It is very early in the planning process for a potential new visitor center and other facilities for the Refuge. In addition, these facilities will serve multiple purposes (including administrative and maintenance functions in addition to visitor services), so costs will need to be appropriately allocated among various public uses. Therefore, no estimate is made here of the share of construction, operation, and maintenance costs of this set of facilities supportive of commercial tours.

Following is an estimate of one-time costs associated with the commercial tours program:

Projects	Estimated Costs[1]
1. Orientation materials and/or trainings.	$40,000
Total Costs	$40,000

[1] Costs displayed are totals for these changes. Note that many of these changes will also benefit wildlife observation and photography, environmental interpretation and education, and other uses of the Refuge.

Following is an estimate of other costs associated with administering this use on the Refuge:

Tasks	Estimated Costs per Year[1]
1. Permit administration and oversight by GS-13 Project Leader (approximately 20 hours/year).	$1,200
2. Permit administration and oversight by GS-12 Deputy Project Leader (approximately 20 hours/year).	$1,000
3. Permit administration and oversight by GS-9 Supervisory Park Ranger (approximately 80 hours/year).	$2,800
4. Permit administration by GS-4 Budget Clerk (approximately 20 hours/year)	$400
5. Law enforcement by GL-9 Law Enforcement Officer (approximately 40 hours/year).	$1,500
6. Permit monitoring by GS-11 Biologist (approximately 20 hours/year).	$900
7. Refuge overhead costs associated with the above-listed work.[2]	$1,600
8. Facility maintenance, repair, and materials	$3,000
Total Costs	$12,400

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.
[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

Fee revenues collected from commercial uses of this nature are not retained by the Refuge. Instead, these monies are deposited into the U.S. Treasury Department's National Wildlife Refuge Fund. Monies from this fund are used for redistribution to refuges to help offset the costs of administering specialized uses (Expenses for Sales) and for payments in lieu of taxes to counties or other local governments under the Refuge Revenue Sharing Act.

The Refuge currently has adequate budget and staff to support limited commercial use of this nature.

Anticipated Impacts of the Use(s):

In the long term, under the management direction of the CCP, a potential new offsite visitor center, maintenance, and other facilities could provide enhanced interpretive opportunities, and it is likely that participants in commercial tour operations will stop in to enjoy its many features. However, in the absence of site-specific information, attempting to assess many of the anticipated direct and indirect impacts of the construction and operation of these new facilities is premature. Additionally, these facilities will serve multiple purposes (including administrative and maintenance functions in addition to visitor services), so effects attributable to commercial tours will be only a portion of the total effects. For these reasons, many of the anticipated impacts of these potential new facilities are

beyond the scope of this evaluation and are not addressed herein. More detailed evaluations will need to be undertaken, including site-specific effects analysis in compliance with NEPA, NHPA, and other applicable laws and policies. Readers are also referred to the EA accompanying the Refuge draft CCP for more information.

Commercial tours directly or indirectly support Refuge goals 4, 5, and 6. To the extent it enhanced the public's understanding of or appreciation for the importance of conservation, they also support the Refuge System mission.

The effects of tours upon wildlife will likely be associated with disturbance. Human disturbance has differential effects on wildlife and is dependent upon, among other variables, the species involved and its age; the time of year; the breeding cycle stage (if applicable); the surrounding environment; whether the activity involves vehicles; the intensity, speed, noise, nature, and frequency of the disturbing activity; and the directness of approach to an animal (Blanc et al. 2006, Holmes et al. 2005, Hammitt and Cole 1998, Knight and Cole 1995a, Knight and Cole 1995b). Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, change in food habits, physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990, Knight and Cole 1995a, Knight and Swaddle 2007, Miller et al. 1998, Miller and Hobbs 2000, Morton et al. 1989, Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Kitaysky et al. (2003) found levels of corticosterone (a major stress hormone) in ʻuaʻu kani (wedge-tailed shearwaters, *Puffinus pacificus*) at the Refuge to be higher in chicks occupying burrows closer to (within 13 feet of) visitor-use areas. Holmes et al. (2005) found that, even at the recommended minimum approach distance (~16 feet), a single wildlife observer in a royal penguin (*Eudyptes schlegeli*) colony on Macquarie Island, Australia, triggered vigilance behavior and an increased heart rate in the birds. In another study, Holmes et al. (2007) found that vigilance behavior of gentoo penguins (*Pygoscelis papua*) increased as the numbers of observers increased. Additional studies in penguin colonies revealed that a slow approach that ended with a visitor sitting quietly and closely observing a bird had little effect on the bird's heart rate, yet a rapid approach that ended with a visitor remaining standing and closely observing a bird resulted in an elevated heart rate (Nimon et al. 1995).

A variety of factors affect flushing distances among waterbirds, including the species involved; the activity the birds are engaged in (e.g., foraging versus nesting); and the type, speed, and noise of disturbance (e.g., approaching birds by walking versus in a motorized boat) (Rodgers and Smith 1997, Rodgers 1991). Flushing of birds or even raising their alert levels (which usually occurs at a greater distance than that for flushing) creates stress and requires animals to expend energy that otherwise would be invested in essential life history activities such as foraging, mating, nesting, brood-rearing, and predator avoidance.

Breeding birds are especially sensitive to human disturbance (Trulio 2005, Hammitt and Cole 1998). A study of visitors to a colony of kittiwakes (*Rissa tridactyla*) and guillemots (*Uria aalge*) revealed that nesting success was influenced by the distance observers were from the birds (positively correlated) and the number of observers involved (negatively correlated) (Beale and Monaghan 2004).

Studies have had mixed results regarding potential habituation of birds and some other taxa to human disturbance. Wildlife are often less disturbed by routine human activities that repeatedly occur along defined routes (e.g., trails, roads, or water channels), especially frequent disturbance that does not involve direct contact or other threat, compared with those activities that occur irregularly and outside predictable paths/channels (Blanc et al. 2006, Holmes et al. 2007, Knight and Cole 1995b).

In studies of breeding yellow-eyed penguins (*Megadyptes antipodes*), a timid and secretive species, Ratz and Thompson (1999) found that the birds appeared to have habituated to the presence of guided tourists who approached the colony through trenches and closely observed or photographed birds from camouflaged blinds. Jungius and Hirsch (1979) studied seabird colonies and found that birds that were believed to have habituated to tourists and revealed no outward behavioral changes in their presence, nonetheless exhibited stress (as reflected in elevated heartbeat frequencies) when approached by visitors. The scientists speculated that the stress could have a negative effect on breeding. Habituation to some types and levels (intensity and frequency) of human disturbance appears to vary among species, within species, between resident and migratory populations, and potentially between inexperienced and experienced breeders. This makes it difficult to forecast habituation in actual field situations.

ʻĪlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*) numbers are increasing in the main Hawaiian Islands, especially on and around Niʻihau and Kauaʻi (NMFS 2007, Baker and Johanos 2003). Critically endangered ʻīlio-holo-i-ka-uaua are very sensitive to human disturbance (NMFS 2007) and disturbance of female adults with pups is of special concern (Gilmartin 2003). Seals may also injure people. Seals haul out on land to rest, molt, or pup. Approaching photographers could force hauled-out seals to move back into the water and seek a new haul-out site causing them to expend energy and increasing their exposure to predators. Repeated disturbance over time can cause seals to abandon preferred haul-out sites (Gilmartin 2003). It's generally recommended that individuals viewing or photographing seals and sea turtles maintain a distance of at least 50 yards from the animals and limit their viewing/photographing time to 30 minutes (NOAA undated, NOAA Fisheries et al. undated; "Hawaiʻi Viewing Guidelines: Overview, Marine Mammal & Sea Turtle Viewing ʻCode of Conduct'" at http://www.nmfs.noaa.gov/pr/education/Hawaiʻi/).

Wildlife disturbance can be a special concern with wildlife observation and photography (Cline et al. 2007, DeLong 2002, Knight and Cole 1995). Observers and photographers often want to enhance their view or photograph by encroaching closer and closer to their subject. This can cause increased stress in wildlife and eventually lead to flushing. If a bird is nesting or brood-rearing, disturbance can cause temporary or permanent nest desertion. Even if only temporary, eggs and nestlings can face survival challenges associated with temperature extremes and predation.

Commercial tours could also cause trampling of native plants, erosion, and introduction or spread of nonnative species, including invertebrates, plants, and invasive species. All of these impacts will adversely affect native fish, wildlife, plants, their habitats, and are of special concern in Refuge areas struggling with re-establishment of native plant communities. The degree of actual effects upon reproduction, survival of individuals, and diversity and abundance of native species (community health) will depend on specific circumstances. Except with special permission, guided tour permittees and their clients will be required to behave like other visitors, including remaining behind the perimeter fencing on the Point, not crossing fences elsewhere on the Refuge, and otherwise abiding by closed-area signage. These and other stipulations associated with this use have been designed to greatly reduce the likelihood and magnitude of potential effects by commercial tours on biological resources, including roosting, foraging, and breeding birds.

The Refuge has substantial and, in some areas, dense populations of burrow-nesting seabirds. Although some burrows lie on the Point adjacent to the area heavily used by Refuge visitors, the vast majority of the burrows are elsewhere, in less disturbed areas of the Refuge, such as Crater Hill. Humans casually walking through nesting colonies could easily crush burrows, destroy nests and eggs, and kill young or adult seabirds.

Crater Hill grasslands are primarily composed of nonnative species (e.g., Kikuyu grass (*Pennisetum clandestinum*)); however, these areas provide actual and potential habitat for roosting, foraging, and breeding activities by nēnē, mōlī (Laysan albatross**,** *Phoebastria immutabilis*), and shorebirds. Additionally, major efforts have been undertaken to reintroduce native plants to the area. Areas on the Point that receive almost all of the Refuge's visitation and the core of the Kāhili Quarry are hardened and therefore experience very few effects from public use. However, a substantial increase in public use of Crater Hill will increase the potential for erosion and compaction of trails, for crushing of nesting burrows, for disturbance to native birds using the grasslands, and to outplanting of native vegetation. Crater Hill hikes will be limited in frequency and number of participants, guided, and appropriately scheduled to minimize adverse effects.

Public Uses

The Point area (approximately 31 acres in size) and existing facilities (e.g., parking area, visitor center, and contact station) are relatively small for the visitation the Refuge experiences (from 2010 to 2013, the visitor center averaged about 189,963 visitors per year). The single access road is narrow and the parking area is small. There is no single-direction drive through of the parking area (vehicles must turn around to exit the Refuge). Because of all this, the number and size of vehicles that can be safely accommodated are limited.

Additionally, the number of visitors who can simultaneously enjoy a quality wildlife-dependent educational or recreational experience onsite is limited. If guided tour permittees brought large buses full of clients to the Refuge, it could create traffic and safety conflicts and reduce the quality of experience for other Refuge visitors. Currently, large tour buses (25 passenger or larger) are restricted from entering the Refuge. Stipulations limit guided tour permittees to use of medium-sized vans or smaller vehicles to transport their clients to the Refuge and could prohibit their visits during special Refuge events. Many of these concerns will be alleviated with the development of a new visitor center and associated facilities and services.

As noted above, except with special permission, stipulations associated with this use will require visitors to remain behind the perimeter fencing on the Point, not cross fences, and otherwise abide by closed-area signage elsewhere on the Refuge. These use conditions will greatly reduce potential public safety concerns.

If commercial tour operations were conducted in closed areas where it was readily seen by other Refuge visitors, these other visitors could easily become confused regarding where activities are and are not allowed on the Refuge. This could increase the occurrence of unauthorized access, and impacts to native wildlife and plants. Stipulations limit this use to reduce potential effects on other Refuge visitors.

Cultural Resources

The Refuge contains a number of historic and prehistoric resources, including the Kīlauea Point Light Station (the lighthouse and associated Coast Guard facilities on the Point) that was listed on the National Register of Historic Places as a historic district in 1979 (USFWS 2006). Extensive and unregulated commercial tours or ecotourism have the potential to adversely affect these resources. To the extent that SUPs included clear maps depicting areas permittees were authorized to access and use, and permittees and their clients were aware of prohibitions related to cultural resources, impacts to these resources are not expected.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge's draft comprehensive conservation plan and environmental assessment.

Determination:

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

1. Permission to use the Refuge for commercial tours or ecotourism will be officially authorized through issuance of an SUP to minimize the possibility of damage to cultural or natural resources or interference with other visitors to the area. Each request will be reviewed on a case-by-case basis. As appropriate, each permit will authorize a one-time use or repeated uses over a period not to exceed 1 year. SUPs will cover use by a specified individual or organization and cannot be assigned or sub-permitted to others (i.e., the permit is not transferable).

   Prior to potential permit renewal, Refuge staff will meet with permittees to share new information, discuss results of monitoring, review compliance with permit conditions, and address other issues. Other meetings will be scheduled as needed.

2. An appropriate fee will ordinarily be charged for SUPs, but may be fully or partially waived by the Refuge manager. The fee will be based on the details of the SUP and is intended to recover costs associated with administration of the use and/or the fair market value of the benefit received by the user(s).

3. Most of Kīlauea Point NWR is closed to general public use, so SUPs will include maps clearly depicting the areas permittees will be authorized to access and use, including the Refuge entry point(s). Travel within the Refuge will be by designated road, parking lot, and/or trail. Permission to access Refuge closed areas will be designed to minimize safety concerns, effects on biological and cultural resources, and on other visitors. Permission will generally not be granted to access areas on the Point outside the public safety fence, Mōkōlea Point, Makapili Rock, or the northern shoreline. In the absence of specific, prior written approval of the Refuge manager (for the purpose of these stipulations, the Refuge manager is the Refuge Project Leader

of the Kauaʻi National Wildlife Refuge Complex), permittees and their clients are prohibited from straying outside the areas depicted on the maps or accessing the Refuge at times it was closed.

4. Commercial tour participants could also access Crater Hill on the same basis as other members of the general public. These hikes will require the use of a guide(s) (Refuge staff or trained volunteer), and will be limited to individuals 9 years or older (individuals between 9 and 16 years old require adult accompaniment). Unless through prior written agreement with the Refuge manager, a maximum of 15 visitors per group will be allowed on limited hikes and will be routed and scheduled to avoid impacts to seabirds and nēnē. With the exception of special, free hikes during National Wildlife Refuge Week, reservations (up to four persons per reservation) will be required and permittees and their clients (adults age 16 years or older) will be charged the same fee as other member of the public to join these hikes. An injury waiver (i.e., "Release from Injury" form) will be required.

   The Service will assess erosion and compaction on trails and wildlife effects of visitation (e.g., disturbance and crushing of burrows) on Crater Hill and elsewhere and develop solutions to any problems. Potentially, actions could include hardening of trails, rebuilding or rerouting of trails, reducing the frequency of use of trails, rescheduling use of trails, and/or closing trails.

5. All commercial tours will avoid sensitive areas prone to disturbance (e.g., sensitive vegetation areas) or degradation (e.g., soil compaction), and will be designed to minimize impacts to nesting birds or other breeding, feeding, or resting wildlife. Areas that are open to this use will be evaluated on an annual, seasonal, and sometimes daily basis. Seasonal closures may vary year-to-year based on wildlife use and habitat conditions. Permittees are expected to comply with closures.

6. Permittees are required to secure and maintain the currency of all licenses, permits, and approvals required by State and local governments to engage in the commercial activities they are proposing or pursuing.

7. Permittees are prohibited from constructing new or maintaining existing structures on the Refuge without specific, prior written approval of the Refuge manager.

8. In the absence of specific, prior written approval of the Refuge manager, permittees and their clients are prohibited from collecting and removing any archaeological or historic artifacts, abiotic or biological specimens or samples, or mementos from the Refuge.

9. Consistent with Service policy regarding management of nonhazardous solid waste on Refuges (Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901-6992k) – Solid Waste (Nonhazardous), 561 FW 5), permittees and their clients are prohibited from littering, dumping refuse, abandoning equipment or materials, or otherwise discarding any items on the Refuge. Permittees will be required to bring and use recycling and trash receptacles on tours through the Refuge.

10. Permittees are required to hold the United States Government harmless from any damages or injury to the permittee or members of the general public in areas and facilities accessed via the terms of their permit.

11. In addition to the stipulations listed here, the general permit conditions and requirements, and the special permit conditions, all visitors are required to comply with Refuge System-related and other applicable laws, regulations, and policies including "Prohibited Acts" listed in the Code of Federal Regulations (50 CFR 27).

12. No changes could be made to any of these stipulations without specific, prior written approval of the Refuge manager.

Commercial tours

1. Permittees will be required to provide all tour participants (clients) with written and/or oral information about the Refuge System, the Refuge, its purposes and goals, natural and cultural resources of concern, areas and times open and closed to public use, rules and regulations, and any hazardous conditions. The Refuge will provide permittees with information needed to comply with these requirements, and will provide mandatory annual training on interpretation and other subjects for permittees.

2. Permittees will be expected to comply and ensure their clients complied with Refuge rules and safety, interpretive, regulatory, and other signage. Appropriate signage will be installed and maintained. Permittees will be required to advise Refuge staff within 48 hours of signs that were missing or damaged.

3. Commercial tours or ecotourism permittees and their clients who accessed the Point beyond the fee station will be required to pay Refuge entrance fees in the same manner as all Refuge visitors.

4. Permittees are prohibited from obstructing Refuge areas of value for other visitors who are participating in observation, photography, interpretation, education, or other approved uses. Permittees are also prohibited from engaging in active business or political operations while on the Refuge, such as soliciting alms and contributions, campaigning for election to any public office, collecting private debts, soliciting and vending for commercial purposes (including, but not limited to, the vending of newspapers and other publications), displaying or distributing commercial advertising, collecting signatures on petitions, polls, or surveys (except in association with Refuge monitoring and as authorized by the Refuge manager).

5. When viewing or photographing ʻīlio-holo-i-ka-uaua or honu (*Chelonia mydas*), whether these animals are in the water or on shore, permittees and their clients are required to maintain a distance of at least 50 yards and limit their viewing/photographing time to 30 minutes (NOAA undated). ʻIlio-holo-i-ka-uaua and honu are both listed under the ESA and ʻilio-holo-i-ka-uaua is also listed under the Marine Mammal Protection Act (MMPA). These acts have mechanisms to encourage management for population growth and recovery and to prohibit any form of "take," except for limited exceptions authorized under Federal permits. Under the ESA, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Under the MMPA, "take" includes actions such as hunting, harassing, killing, capturing, injuring and disturbing a marine mammal. There are established civil and criminal penalties for, at a minimum, "disturbing" ʻīlio-holo-i-ka-uaua or honu by getting too close or staying too long, which alters their behavior, thus resulting in take. If ʻīlio-holo-i-ka-uaua or honu display signs of being disturbed, then that 50 yards will be expanded and/or viewing will be minimized or shut down to stop the disturbance and avoid potential take.

6. In order to ensure safety and reduce conflicts with other users, guided tour permittees will be limited to use of medium-sized or smaller vans or buses to transport their clients to the Refuge. Additionally, if determined desirable, the frequency of commercial tours on the Refuge could be limited and they could be prohibited from visiting during Refuge special events.

Cultural Resources

1. In the absence of specific, prior written approval of the Refuge manager, permittees and their clients are prohibited from disturbing or otherwise adversely impacting any prehistoric, historic, or other cultural resources on the Refuge. In the event such resources were inadvertently disturbed in the course of conducting otherwise permitted activities, the disturbing activity will need to be immediately discontinued, and the Refuge manager will need to be notified within 24 hours. If iwi (skeletal human remains) are encountered, the activity must be immediately stopped and the Refuge manager, police, and Hawai‘i Department of Land and Natural Resources should be notified. Collecting and removing any prehistoric or historic artifacts is prohibited.

Justification:

Commercial tours provide another opportunity for members of the public to enjoy the Refuge, perhaps as part of a larger birding, nature, or cultural/historic tour program that also visited areas elsewhere on Kaua‘i. During these tours, it is expected that the public will benefit from high-quality environmental and cultural interpretation and enjoy opportunities for wildlife observation and photography. Consistent with relevant law and policy (16 U.S.C. 668dd–668ee; Wildlife Observation, 605 FW 4; Photography, 605 FW 5; and Interpretation, 605 FW 7), these wildlife-dependent general public uses are to be given special consideration in refuge planning and management.

This use has the potential to generate effects on fish, wildlife, plants, their habitats, and cultural resources. The stipulations enumerated above, including Refuge information, training, use of maps, signage, specific prohibitions, and monitoring, will greatly reduce or eliminate adverse effects and help enhance potential beneficial effects.

The Refuge will monitor compliance with the stipulations enumerated herein. Violation of any of these stipulations could result in temporary or permanent withdrawal of official permission to continue this use on the Refuge by appropriate Refuge personnel. Permits could be revoked by the Refuge manager with 30 days’ written notice of noncompliance with these stipulations.

The Refuge will monitor the quality of the visitor experience provided by permittees. Service policy includes criteria to be used in evaluating the quality of wildlife-dependent public use programs (General Guidelines for Wildlife-Dependent Recreation, 605 FW 1.6).

The Refuge will monitor habitat quantity and quality, wildlife use and productivity, and other relevant endpoints to determine if these stipulations for commercial tours result in expected and desirable outcomes. In consultation with permittees, the Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of this use. New or modified stipulations could be instituted as a result of new information generated by ongoing or new studies; new legal, regulatory, or policy

requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants, or their habitats; changes to commercial tour activities or related practices; mutual agreement with the permittees; or for other legitimate reasons. Except in the case of emergencies, permittees will be advised of new or significantly modified stipulations at least 90 days prior to their becoming effective.

Economic Uses

Regulations at 50 CFR 29.1 require that the Service only authorize an economic use of Refuge natural resources where a determination has been made that the use contributes to the achievement of Refuge purposes or the Refuge System mission. The regulations define an economic use to include "operations that facilitate approved programs on national wildlife refuges," so commercial tours, as defined in this CD, qualify as an economic use subject to these regulations.

Commercial tour operations on the Refuge will provide field opportunities to increase public understanding and appreciation for the Refuge System, Kīlauea Point NWR, seabirds and shorebirds, endangered species, cultural resources, and the value of conservation. Where appropriately regulated to reduce or eliminate adverse effects, these activities will contribute to achievement of the Refuge's purposes and the Refuge System mission.

Compatibility Standard

In order to be allowed on the Refuge, commercial tours need to be determined compatible. By allowing this use to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, cultural resources, and other public uses. For the several reasons stated above and consistent with the stipulations described herein, this use will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point NWR's purposes; or the Refuge System's mission.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: Commercial Tours

Refuge Determination:

Prepared by: Acting _____ (Signature) 9/9/15 (Date)

Approved by Project Leader, Kaua'i National Wildlife Refuge Complex: _____ (Signature) 9/9/15 (Date)

Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office: Barry W. _____ (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region: Kevin S Foerster _____ (Signature) 9/16/15 (Date)

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Compatibility Determination

Use: Environmental Education

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kaua‘i, Hawai‘i

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):
The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

U.S. Fish and Wildlife Service (Service) policy defines environmental education (EE) to be "…a process designed to teach citizens and visitors the history and importance of conservation and the biological and the scientific knowledge of our Nation's natural resources. Through this process, …[the Service]… can help develop a citizenry that has the awareness, knowledge, attitudes, skills,

motivation, and commitment to work cooperatively towards the conservation of our Nation's environmental resources. Environmental education within the Refuge System incorporates onsite, offsite, and distance learning materials, activities, programs, and products that address the audience's course of study, refuge purpose(s), physical attributes, ecosystem dynamics, conservation strategies, and the Refuge System mission" (Environmental Education, 605 FW 6).

EE is a formal, structured program that incorporates measurable learning objectives and uses audience-appropriate curricula to satisfy State or other standards. EE activities can be provided by Refuge personnel, a volunteer(s), other Service-authorized agent(s), or through partnerships with groups that share similar goals (e.g., the Kīlauea Point Natural History Association (KPNHA) or others). For purposes of this compatibility determination (CD), EE includes education regarding natural and cultural resources and values.

At Kīlauea Point National Wildlife Refuge (NWR or Refuge), the Service currently offers an EE program with a focus on activities at Kīlauea Point (Point), an area of approximately 31 acres in size. With the assistance of interns and volunteers, the Refuge conducts EE programs throughout the year with the greatest number of students visiting January–May. Between 2010 and 2013, education participants involved in on- and offsite EE programs ranged from 7,200 to 12,032 per year (USFWS 2014).

The Point is accessed from the town of Kīlauea via Kīlauea Road. At the end of the road, school buses travel the winding, narrow, and steep Refuge entrance road to one of the parking areas, two of which are hardened. If they park in one of the hardened parking areas, the buses must turn around after discharging their passengers because there is no drive through. The other parking areas are grassy and serve as nēnē (Hawaiian goose, *Branta sandvicensis*) habitat. These areas become soft and muddy following a heavy rain. After being discharged, students, teachers, and chaperones walk the path from the parking area to the main public use area of the Point. KPNHA funds bus transportation for EE and participants are not charged a Refuge entrance fee.

EE activities are typically scheduled from 8:30 a.m. to 10:00 a.m. This is intended to avoid conflicts with other Refuge visitors by allowing students to depart the Point and the school buses to exit along the narrow entry road prior to the Refuge opening to general public use. However, not all school groups manage to depart by 10:00 a.m. This can create traffic conflicts in the parking area and along the entrance road, create safety problems for school children, and require substantial support by Refuge staff to facilitate a safe departure. In light of the time consumed by unloading, walking, restroom breaks, and loading, approximately 1 hour remains for formal EE.

EE activities are offered in the multi-purpose room in the basement of the visitor center or in the contact station adjacent to Kīlauea Lighthouse. Both areas are also used for other purposes and are limited in size and the number of students they can accommodate. This problem is exacerbated during inclement weather. Occasionally, EE activities are offered on Crater Hill. EE is also an element of Refuge special events and work parties.

To support and supplement the onsite EE activities, the Refuge—with the assistance of volunteers, KPNHA, and interns—has developed EE materials for teachers, including a teachers' manual, field trip leader packets, a traveling trunk, a website, and a junior ranger program. In addition, Refuge staff or interns visit some school classrooms on Kauaʻi.

In the long term, under the management direction of the CCP, a potential new offsite new visitor center and other facilities will provide visitor contact, orientation and information, fee collection, restrooms, bookstore/retail space, multipurpose room, outdoor spaces, public bus stop, and shuttle pick up/drop off. Under this management direction, parking for private automobiles and tour buses on the Point will potentially be eliminated and visitors will access the Refuge primarily via a shuttle from Kīlauea town or the new visitor center. Additional changes for the Point potentially include remodeling of the existing visitor center to provide EE or interpretive exhibits and displays, expanding interpretation at the contact station, and restoring and converting one of the former lighthouse quarters into a living history site. In addition, efforts will be made to increase opportunities for up-close wildlife observation and photography (e.g., with remote cameras and observation/photo blinds). The Refuge is also planning to resume EE trainings for teachers and potentially offering EE activities in the Kāhili Quarry area (e.g., water quality sampling and analyses).

Students often enjoy wildlife observation and photography and environmental interpretation opportunities ancillary to their participation in formal EE activities at the Refuge. Observation, photography, and interpretation opportunities at Kīlauea Point NWR are addressed in a separate CD (CD for Wildlife Observation and Photography and Environmental Interpretation).

EE is a wildlife-dependent general public use and is to be given special consideration in refuge planning and management. When determined compatible on a refuge-specific basis, a wildlife-dependent use becomes a priority public use for that refuge and is to be facilitated, subject to such restrictions or regulations as may be necessary, reasonable, and appropriate (National Wildlife Refuge System Administration Act).

Availability of Resources:

It is early in the planning process for a potential new visitor center and other facilities for the Refuge. In addition, these facilities will serve multiple purposes (including administrative and maintenance functions in addition to visitor services), so costs will need to be appropriately allocated among various public uses. Therefore, no estimate is made here of the share of construction, operation, and maintenance costs of this set of facilities supportive of EE.

Following is an estimate of one-time costs associated with the EE program:

Projects	Estimated Costs[1]
1. Conversion of visitor center to provide interpretive exhibits and displays.	$200,000
2. Expansion of interpretation at the contact station.	$150,000
3. Restoration and conversion of former lighthouse quarters into a living history site.	$550,000
4. Update curricula and materials as necessary.	$20,000
5. Develop a multifaceted Junior Ranger program to reach all ages of young visitors to the Refuge.	$20,000
Total Costs	$940,000

[1] Costs displayed are totals for these changes. Note that many of these changes will also benefit wildlife observation and photography, environmental interpretation and other uses of the Refuge.

Following is an estimate of other costs associated with administering this use on the Refuge:

Tasks	Estimated Costs per Year[1]
1. Administration and oversight by GS-9 Supervisory Park Ranger, including recruiting and training staff and volunteers (approximately 830 hours/year).	$29,800
2. Refuge overhead costs associated with the above-listed work.[2]	$6,000
3. Facility maintenance, repair, and materials	$3,000
4. Supplies (including brochures)	$3,000
Total Costs	$41,800

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.
[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

With the substantial support of KPNHA and volunteers, the Refuge has adequate budget and staff to support the current level of EE on the Refuge.

Anticipated Impacts of the Use(s):

In the long term, under the management direction of the CCP, a potential new offsite visitor center, maintenance, and other facilities could provide enhanced EE opportunities. However, in the absence of site-specific information, attempting to assess many of the anticipated direct and indirect impacts of the construction and operation of these new facilities is premature. Additionally, these facilities will serve multiple purposes (including administrative and maintenance functions in addition to visitor services), so effects attributable to EE will be only a portion of the total effects. For these reasons, many of the anticipated impacts of these potential new facilities are beyond the scope of this evaluation and are not addressed herein. More detailed evaluations will need to be undertaken, including site-specific effects analysis in compliance with the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), and other applicable laws and policies. Readers are also referred to the EA accompanying the Refuge draft CCP for more information.

It is not anticipated that other offsite EE activities, such as those conducted in area schools, will have measurable impacts on the Refuge or its natural or cultural resources.

EE activities support Refuge goal numbers 4, 5, and 6. It is expected that EE will enhance participants' understanding of and appreciation for the importance of conservation; therefore, this use will also support the Refuge System mission.

The vast majority of public use at the Refuge, including EE, occurs at the Point. Visitors have incredible opportunities to hear and view numerous seabirds as they soar overhead, roost or nest on adjacent cliffs and grassy knolls, and forage in the ocean. Nēnē are routinely seen close up, on the grounds. Nēnē are fairly tolerant of human disturbance, but many seabirds are wary and flush when approached too closely.

The effects of EE upon wildlife will likely be associated with disturbance. Human disturbance has differential effects on wildlife and is dependent upon, among other variables, the species involved and its age; the time of year; the breeding cycle stage (if applicable); the surrounding environment;

whether the activity involves vehicles; the intensity, speed, noise, nature, and frequency of the disturbing activity; and the directness of approach to an animal (Blanc et al. 2006, Holmes et al. 2005, Hammitt and Cole 1998, Knight and Cole 1995a, Knight and Cole 1995b). Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, change in food habits, physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990, Knight and Cole 1995a, Knight and Swaddle 2007, Miller et al. 1998, Miller and Hobbs 2000, Morton et al. 1989, Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Kitaysky et al. (2003) found levels of corticosterone (a major stress hormone) in ʻuaʻu kani (wedge-tailed shearwaters, *Puffinus pacificus*) at the Refuge to be higher in chicks occupying burrows closer to (within 13 feet of) visitor-use areas. Holmes et al. (2005) found that, even at the recommended minimum approach distance (~16 feet), a single wildlife observer in a royal penguin (*Eudyptes schlegeli*) colony on Macquarie Island, Australia, triggered vigilance behavior and an increased heart rate in the birds. In another study, Holmes et al. (2007) found that vigilance behavior of gentoo penguins (*Pygoscelis papua*) increased as the numbers of observers increased. Additional studies in penguin colonies revealed that a slow approach that ended with a visitor sitting quietly and closely observing a bird had little effect on the bird's heart rate, yet a rapid approach that ended with a visitor remaining standing and closely observing a bird resulted in an elevated heart rate (Nimon et al.1995).

A variety of factors affect flushing distances among waterbirds, including the species involved; the activity the birds are engaged in (e.g., foraging versus nesting); and the type, speed, and noise of disturbance (e.g., approaching birds by walking versus in a motorized boat) (Rodgers and Smith 1997, Rodgers 1991). Flushing of birds or even raising their alert levels (which usually occurs at a greater distance than that for flushing) creates stress and requires animals to expend energy that otherwise would be invested in essential life history activities such as foraging, mating, nesting, brood-rearing, and predator avoidance.

Breeding birds are especially sensitive to human disturbance (Trulio 2005, Hammitt and Cole 1998). A study of visitors to a colony of kittiwakes (*Rissa tridactyla*) and guillemots (*Uria aalge*) revealed that nesting success was influenced by the distance observers were from the birds (positively correlated) and the number of observers involved (negatively correlated) (Beale and Monaghan 2004).

Studies have had mixed results regarding potential habituation of birds and some other taxa to human disturbance. Wildlife are often less disturbed by routine human activities that repeatedly occur along defined routes (e.g., trails, roads, or water channels), especially frequent disturbance that does not involve direct contact or other threat, compared with those activities that occur irregularly and outside predictable paths/channels (Blanc et al. 2006, Holmes et al. 2007, Knight and Cole 1995b).

In studies of breeding yellow-eyed penguins (*Megadyptes antipodes*), a timid and secretive species, Ratz and Thompson (1999) found that the birds appeared to have habituated to the presence of guided tourists who approached the colony through trenches and closely observed or photographed birds from camouflaged blinds. Jungius and Hirsch (1979) studied seabird colonies and found that birds that were believed to have habituated to tourists and revealed no outward behavioral changes in their presence, nonetheless exhibited stress (as reflected in elevated heartbeat frequencies) when

approached by visitors. The scientists speculated that the stress could have a negative effect on breeding. Habituation to some types and levels (intensity and frequency) of human disturbance appears to vary among species, within species, between resident and migratory populations, and potentially between inexperienced and experienced breeders. This makes it difficult to forecast habituation in actual field situations.

Participants in EE programs could also cause trampling of native plants, erosion, and introduction or spread of nonnative species, including invertebrates, plants, and invasive species. All of these impacts will adversely affect native fish, wildlife, plants, their habitats, and are of special concern in Refuge areas struggling with re-establishment of native plant communities. The degree of actual effects upon reproduction, survival of individuals, and diversity and abundance of native species (community health) will depend on specific circumstances.

The Refuge has substantial and, in some areas, dense populations of burrow-nesting seabirds. Although some burrows lie on the Point adjacent to the area heavily used by Refuge visitors, the vast majority of the burrows are elsewhere, in less disturbed areas of the Refuge, such as Crater Hill. Humans casually walking through nesting colonies could easily crush burrows, destroy nests and eggs, and kill young or adult seabirds.

Crater Hill grasslands are primarily composed of nonnative species such as Kikuyu grass (*Pennisetum clandestinum*); however, these areas provide actual and potential habitat for roosting, foraging, and breeding activities by nēnē, mōlī (Laysan albatross**,** *Phoebastria immutabilis*), and shorebirds. Additionally, major efforts have been undertaken to reintroduce native plants to this area. Areas on the Point that receive almost all of the Refuge's visitation are hardened and therefore experience very few effects from public use. However, a substantial increase in public use of Crater Hill will increase the potential for erosion and compaction of trails, for crushing of nesting burrows, and for disturbance to native birds using the grasslands and to outplanting of native vegetation. Access to Crater Hill for EE will be limited in frequency and number of participants, guided, and appropriately scheduled to minimize adverse effects.

The several stipulations associated with this use have been designed to greatly reduce the likelihood and magnitude of potential biological effects. Importantly, on the Point—where many EE activities occur—participants will be required to remain behind the perimeter fencing. Elsewhere on the Refuge, visitors will be required to not cross fences and otherwise abide by closed-area signage. These use conditions will greatly reduce disturbance to roosting and breeding birds.

Public Use

Almost all visitation to the Refuge occurs on the Point. This area and existing facilities (e.g., parking area, visitor center, and contact station) are relatively small for the visitation the Refuge experiences (from 2010 to 2013, the visitor center averaged about 189,963 visitors per year). The single access road is narrow and the parking areas are small. There is no single-direction drive through of the parking areas (buses and other vehicles must turn around to exit the Refuge). Because of all this, the number and size of vehicles that can be safely accommodated are limited. Additionally, the number of visitors who can simultaneously enjoy a quality wildlife-dependent educational or recreational experience onsite is limited. Consequently, onsite EE activities are typically scheduled from 8:30 a.m. to 10:00 a.m. Peak time for utilization of the Refuge is between 10 a.m. and 2 p.m., with parking overflowing between 11 a.m. and 1 p.m. Earlier EE hours are intended to avoid conflicts with other Refuge visitors by allowing students to depart the Point and the school buses to exit along the narrow

entry road prior to the peak visitation hours. Many of these concerns could be alleviated with the development of a new visitor center and associated facilities and services.

A potential new visitor center will allow development of larger facilities for EE, plus interpretive exhibits and displays, and a larger bookstore. Potential changes for the Point include remodeling of the existing visitor center to provide EE or interpretive exhibits and displays, expanding interpretation at the contact station, and restoring and converting one of the former lighthouse quarters into a living history site; these changes will provide a higher quality EE experience for participants. Restoration of habitat underlying the current parking area and maintenance facilities will allow visitors additional opportunities to observe and photograph native wildlife and plants and efforts will be made to increase opportunities for up-close wildlife observation and photography (e.g., with remote cameras and observation/photo blinds). If implemented, all of these changes will enhance and increase opportunities for EE. As noted above, stipulations associated with these uses will require visitors to remain behind the perimeter fencing on the Point, not cross fences, and otherwise abide by closed-area signage elsewhere on the Refuge. These use conditions will greatly reduce potential public safety concerns.

Cultural Resources and Values

The Refuge contains a number of historic and prehistoric resources, including the Kīlauea Point Light Station (the lighthouse and associated Coast Guard facilities on the Point) that was listed on the National Register of Historic Places as a historic district in 1979 (USFWS 2006). It is not expected that EE will have any effects on cultural resources.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge's draft comprehensive conservation plan and environmental assessment.

Determination:

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

1. Kīlauea Point NWR is mostly closed to general public use. Information about visitation to the Refuge, including maps clearly depicting open areas and Refuge entry point(s), will be provided to teachers and posted on signs, in kiosks, online, and at other appropriate locations. Travel within the Refuge will be limited to designated roads, parking lots, and trails. In the absence of special permission of the Refuge manager (for the purpose of these stipulations, the Refuge manager is the Project Leader of the Kaua‘i National Wildlife Refuge Complex), students, teachers, and chaperones are prohibited from straying outside the areas depicted on the maps and beyond the closed area signs. For their safety and to minimize disturbance to roosting and breeding birds, participants in EE programs on the Point will be required to remain behind the perimeter fencing.

2. Refuge facilities are limited in size and sometimes prescheduled, so teachers will be required to contact the Refuge to schedule EE activities at the Refuge at least 3 weeks prior to a proposed visit. Only teachers who have successfully participated in an EE Teach-the-Teacher workshop conducted or condoned by Kauaʻi National Wildlife Refuge Complex will be allowed to lead EE groups at the Refuge.

3. Occasional EE hikes on Crater Hill will require the use of a guide(s) (Refuge staff or trained volunteer), will be limited to individuals 9 years or older (individuals between 9 and 16 years old require adult accompaniment) and, unless through prior written agreement with the Refuge manager, a maximum of 30 visitors per group. Hikes will be routed and scheduled to avoid key breeding areas and seasons by seabirds and nēnē. An injury waiver (i.e., "Release from Injury" form) will be required. The Service will assess erosion and compaction on trails, wildlife effects of visitation (e.g., disturbance and crushing of burrows) on Crater Hill and elsewhere, and develop solutions to any problems. Potentially, actions could include hardening of trails, rebuilding or rerouting of trails, reducing the frequency of use of trails, rescheduling use of trails, and/or closing trails.

4. In order to avoid harassment, disease, and/or death of native wildlife, or transport of nonnative or invasive plant parts, insects, or other undesirable species, individuals participating in EE are prohibited from bringing dogs or other pets with them to the Point. An exception is legitimate, leashed guide animals.

5. Environmental education participants are prohibited from constructing new or maintaining existing structures; from littering, dumping refuse, abandoning equipment or materials, or otherwise discarding any items; and from disturbing or otherwise adversely impacting any prehistoric, historic, or other cultural resources. With the exception of items specifically associated with approved EE curricula, or in the absence of specific, prior written approval of the Refuge manager, students and teachers are prohibited from collecting and removing any archaeological or historic artifacts, abiotic or biological specimens or samples, or mementos from the Refuge. The Refuge will provide visitors with information and maintain facilities at the Point (e.g., recycling and trash containers) to encourage recycling of water bottles and other recyclables and discourage littering. Additionally, visitors will continue to be able to recycle Refuge brochures at the entrance fee station.

6. In addition to the stipulations listed here, participants in EE programs are required to comply with Refuge System-related and other applicable laws, regulations, and policies including "Prohibited Acts" listed in the Code of Federal Regulations (50 CFR 27).

7. No changes could be made to any of these stipulations without specific, prior written approval of the Refuge manager.

Justification:

Environmental education is a popular, valuable, and proven program at Kīlauea Point NWR. Service policy states that EE programs can, "…promote understanding and appreciation of natural and cultural resources and their management on all lands and waters in the Refuge System" (Environmental Education, 605 FW 6). Service policy strongly encourages Refuge managers to provide quality, compatible EE programs. At Kīlauea Point NWR, it is expected that students and teachers will also enjoy some wildlife observation and photography and environmental interpretation

ancillary to their EE experiences. These are also wildlife-dependent public uses that are to be given special consideration in refuge planning and management.

EE could potentially cause some wildlife disturbance. However, this program has been provided on the Refuge for decades and existing facilities and program management have appropriately minimized public safety concerns and effects upon native wildlife, plants, habitats, and cultural resources. Most of the EE activities take place within structures or on hardened or otherwise developed areas of the Point that are of limited value to wildlife. If the new visitor center and associated facilities are developed, the quality and capacity of the Refuge's EE program will be measurably enhanced. The stipulations included herein continue the positive efforts of the past and provide additional protection to biological and cultural resources and the public.

The Refuge will monitor compliance with the stipulations. The Refuge will also monitor wildlife and habitat disturbance and other potential impacts to determine if these stipulations result in expected and desirable outcomes. The Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of these uses. New or modified stipulations could be instituted as a result of new information generated by ongoing or new studies; new legal, regulatory, or policy requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants, or their habitats; or for other legitimate reasons. Visitors will be appropriately advised of any such changes.

The Refuge reserves the right to terminate permission for this use if individuals violate Refuge rules or regulations; if unacceptable impacts occur to native fish, wildlife, plants, their habitats, cultural resources, Refuge facilities, or other Refuge visitors; or for other legitimate reasons.

Compatibility Standard

In order to be allowed on the Refuge, EE needs to be determined compatible. By allowing this use to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, other public uses, and cultural resources. For the several reasons stated above and consistent with the stipulations described herein, this use will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point NWR's purposes; or the Refuge System's mission.

Mandatory Re-Evaluation Date:

__X__ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

_____ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

____X____ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: Environmental Education

Refuge Determination:

Prepared by: Acting

(Signature) 9/9/15 (Date)

Approved by Project Leader, Kaua'i National Wildlife Refuge Complex:

(Signature) 9/9/15 (Date)

Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office:

Barry W. (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region:

Kevin S Foerster (Signature) 9/16/15 (Date)

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Compatibility Determination

Use: Fishing and Shellfishing

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kaua‘i, Hawai‘i

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):

The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

This use involves recreational fishing on Kīlauea Point National Wildlife Refuge (NWR, Refuge) in the ocean at Kāhili Quarry (Quarry) and in the estuary of Kīlauea River. Included are fishing on a 24-hour basis with hook and line, throw net, spear, and shellfish-gathering. Fishing (including shellfish-gathering) is the only activity allowed at night on Kilauea Point NWR. Anglers can fish from the

shore or by wading into the surf or into Kīlauea River. Species that could be harvested include, but are not limited to, āholehole (Hawaiian flagtail, *Kuhlia sandvicensis*), akule (big-eye scad, *Selar crumenophthalmus*), ʻamaʻama (striped mullet , *Mugil cephalus*), large-mouth bass (*Micropterus salmoides*), Samoan crab (*Scylla serrata*), halalu (juvenile akule), moi (Pacific threadfin, *Polydactylus sexfilis*), ʻoʻopu (various gobies in the families *Gobiidae* and *Eleotridae*), ʻopae oehaʻa (Hawaiian shrimp, *Macrobrachium grandimanus* aka), ulua (giant trevally, *Caranx ignobilis*, and other jacks of the family Carangidae), pāpio (ulua under 10 pounds), uouoa (sharpnose mullet, *Neomyxus leuciscus*), weke (goatfish in the family Mullidae), and oama (juvenile goatfish). The Refuge is currently open for salt water fishing per Refuge-specific regulations for fishing, Hawaiʻi, 50 CFR 32.30. From 2010 to 2013, the number of participants reported ranged from 18–104 per year (USFWS 2014).

Anglers access the area by motor vehicle, foot, horse, or bicycle down Kāhili Quarry Road; by boat from the ocean or across Kīlauea River; or by wading or swimming across Kīlauea River. Anglers and others can also easily access Kāhili Beach (east of the Quarry across Kīlauea River) and Kīlauea Bay via Wailapa Road, an all-weather road. While on the Quarry site, some anglers have open fires, some bring their pets (usually dogs), and some erect temporary shelters or camp overnight. To access other fishing sites or for other purposes, some anglers and perhaps other visitors also walk north from the Quarry area along the east base of Mōkōlea Point on the rocks adjacent to the ocean. There is no formal trail and the cliff-side vegetation is not fenced through this area. It is expected that anglers enjoy some wildlife observation and photography ancillary to their fishing efforts.

To the west of the Quarry are cliffs that define Mōkōlea Point and are densely vegetated with naupaka (*Scaevola sericea*) and other plants. Mōkōle Point has a fence partway up the slope in the main Quarry area. Vegetation extends a short distance below the fence onto the relatively flat Quarry site. The remainder of the Quarry site shows signs of many years of heavy public use, including vehicle use, and has a few scattered trees but little other vegetation. The area has several fire pits, trash, plastic fishing rod holders with their ends encased in concrete, and abandoned motor vehicles. At the south end, between the main road and stream, there are more trees and low vegetation interspersed with additional rutted roads and cleared areas that have been used for camping. The Quarry area is also occasionally used by squatters. There are no designated parking spaces, designated camping sites, potable water, toilets, recycling/garbage cans, or other improvements in the area.

Fishing will continue to be allowed 24 hours a day at Kāhili Quarry in accordance with State regulations. It is expected that anglers could engage in swimming or wading while fishing, depending on the method used. Anglers will be allowed to set up temporary shade or rain shelters during daylight hours only. Anglers will be allowed to bring and use portable stoves or self-contained barbeques (e.g., off-the-ground portable enclosed fires) or fires within a Refuge-designated fire ring or pit. Refuge-designated fire rings or pits will be sited to minimize the potential spread of uncontrolled fires. Visitors will need to bring charcoal or firewood. Fires must be attended at all times. Dogs will be required to be on-leash and under direct control at all times (see separate compatibility determination for dog walking). Kāhili Quarry Road will be repaired and maintained to a standard approved by both the U.S. Fish and Wildlife Service (Service) and the County of Kauaʻi (e.g., using crushed coral). In addition to welcome and orientation, educational, and interpretive signage and messaging, the Refuge will post sign(s) notifying visitors of the rules and regulations surrounding use at Kāhili Quarry and that the area has no drinking water, toilets, or other developed facilities.

The Refuge will appropriately post its jurisdictional boundary in the Quarry area. A new, predator-resistant fence will replace the existing fence and be constructed at the base of vegetation growing down the cliffs defining Mōkōlea Point. The fence line will extend to the ocean at the northern end of the main Quarry area.

This compatibility determination (CD) does not address traditional native Hawaiian fishing at Kīlauea (East) Cove. Instead, see the "Traditional Cultural Practices" CD.

This use is a wildlife-dependent general public use and is to be given special consideration in refuge planning and management (Recreational Fishing, 605 FW 3). When determined compatible on a refuge-specific basis, a wildlife-dependent use becomes a priority public use for that refuge and is to be facilitated, subject to such restrictions or regulations as may be necessary, reasonable, and appropriate (National Wildlife Refuge System Administration Act of 1966, as amended, 16 U.S.C. 668dd-668ee).

This CD has been developed and made publicly available concurrent with the comprehensive conservation plan (CCP) and associated environmental assessment (EA) for Kīlauea Point NWR.

Availability of Resources:

Following is an estimate of one-time costs associated with the fishing and shellfishing program:

Projects	Estimated Costs[1]
1. Posting of jurisdictional boundary with signage and low-profile monuments.	$20,000
2. Installation of new informational and regulatory signage.	$10,000
Total Costs	$30,000

[1] Costs displayed are totals for these changes. Note that many of these changes will also benefit other uses occurring at Kāhili Quarry.

Following is an estimate of annual costs associated with administering this use on the Refuge:

Tasks	Estimated Costs per Year[1]
1. Oversight by GS-13 Project Leader (approximately 10 hours/year).	$600
2. Oversight by GS-12 Deputy Project Leader (approximately 20 hours/year).	$1,000
3. Oversight by GS-9 Supervisory Park Ranger (approximately 80 hours/year).	$2,800
4. Law enforcement by GL-9 Law Enforcement Officer (approximately 120 hours/year).	$4,400
5. Monitoring by GS-11 Biologist (approximately 20 hours/year).	$900
6. Refuge overhead costs associated with the above-listed work.[2]	$2,000
7. Signage and fence maintenance, repair, and materials	$3,000
Total Costs	$14,700

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.
[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

The Refuge currently has adequate budget and staff to support the annual costs associated with a limited recreational fishing program on the Refuge.

Anticipated Impacts of the Use(s):

Allowing recreational fishing on the Refuge will not directly conflict with any Refuge goals.

Human disturbance has differential effects on wildlife and is dependent upon, among other variables, the species involved and its age; the time of year; the breeding cycle stage (if applicable); the surrounding environment; whether the activity involves vehicles; the intensity, speed, noise, nature, and frequency of the disturbing activity; and the directness of approach to an animal (Blanc et al. 2006, Holmes et al. 2005, Hammitt and Cole 1998, Knight and Cole 1995a, Knight and Cole 1995b). Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, change in food habits, physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990, Knight and Cole 1995a, Knight and Swaddle 2007, Miller et al. 1998, Miller and Hobbs 2000, Morton et al. 1989, Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Kitaysky et al. (2003) found levels of corticosterone (a major stress hormone) in ʻuaʻu kani (wedge-tailed shearwaters, *Puffinus pacificus*) at the Refuge to be higher in chicks occupying burrows closer to (within 13 feet of) visitor-use areas. Holmes et al. (2005) found that, even at the recommended minimum approach distance (~16 feet), a single wildlife observer in a royal penguin (*Eudyptes schlegeli*) colony on Macquarie Island, Australia, triggered vigilance behavior and an increased heart rate in the birds. In another study, Holmes et al. (2007) found that vigilance behavior of gentoo penguins (*Pygoscelis papua*) increased as the numbers of observers increased. Additional studies in penguin colonies revealed that a slow approach that ended with a visitor sitting quietly and closely observing a bird had little effect on the bird's heart rate, yet a rapid approach that ended with a visitor remaining standing and closely observing a bird resulted in an elevated heart rate (Nimon et al. 1995).

A variety of factors affect flushing distances among waterbirds, including the species involved; the activity the birds are engaged in (e.g., foraging versus nesting); and the type, speed, and noise of disturbance (e.g., approaching birds by walking versus in a motorized boat) (Rodgers and Smith 1997, Rodgers 1991). Flushing of birds or even raising their alert levels (which usually occurs at a greater distance than that for flushing) creates stress and requires animals to expend energy that otherwise would be invested in essential life history activities such as foraging, mating, nesting, brood-rearing, and predator avoidance.

Breeding birds are especially sensitive to human disturbance (Trulio 2005, Hammitt and Cole 1998). A study of visitors to a colony of kittiwakes (*Rissa tridactyla*) and guillemots (*Uria aalge*) revealed that nesting success was influenced by the distance observers were from the birds (positively correlated) and the number of observers involved (negatively correlated) (Beale and Monaghan 2004).

Studies have had mixed results regarding potential habituation of birds and some other taxa to human disturbance. Wildlife are often less disturbed by routine human activities that repeatedly occur along

defined routes (e.g., trails, roads, or water channels), especially frequent disturbance that does not involve direct contact or other threat, compared with those activities that occur irregularly and outside predictable paths/channels (Blanc et al. 2006, Holmes et al. 2007, Knight and Cole 1995b).

In studies of breeding yellow-eyed penguins (*Megadyptes antipodes*), a timid and secretive species, Ratz and Thompson (1999) found that the birds appeared to have habituated to the presence of guided tourists who approached the colony through trenches and closely observed or photographed birds from camouflaged blinds. Jungius and Hirsch (1979) studied seabird colonies and found that birds that were believed to have habituated to tourists and revealed no outward behavioral changes in their presence, nonetheless exhibited stress (as reflected in elevated heartbeat frequencies) when approached by visitors. The scientists speculated that the stress could have a negative effect on breeding. Habituation to some types and levels (intensity and frequency) of human disturbance appears to vary among species, within species, between resident and migratory populations, and potentially between inexperienced and experienced breeders. This makes it difficult to forecast habituation in actual field situations.

Angling is expected to cause some wildlife disturbance. Seabirds nest in the vegetation at the base of the cliffs at Kāhili Quarry. Nesting birds and their young are expected to experience stress, possibly flush, and potentially be more vulnerable to predation if anglers approached nesting sites too closely, too quickly, too noisily, in large groups, or with dogs. Distance to the birds will be greatest (and effects are expected to be lowest) when anglers fish on the ocean side of the Quarry. Conversely, potential impacts are expected to be greatest if anglers spent time on the cliff side of the Quarry where they will be in proximity to the dense vegetation and bird-nesting sites. The several stipulations associated with this use have been designed to greatly reduce the likelihood and magnitude of potential biological effects. The new fencing and signage will reduce the likelihood that anglers will disturb roosting and nesting birds.

Fishing will have direct, lethal effects on individual fish or shellfish, the target game species. The amount of loss will depend on the angling pressure (i.e., the number of anglers, days of effort, catch success). To the extent that anglers engage in catch-and-release practices, the number of individual fish lost per angler will be reduced, but there will still be some percentage of mortality. Angling on the Refuge is expected to have negligible to minor effects on populations of fish or shellfish because the State of Hawai‘i regulates fishing consistent with sustained yield population management principles.

Fishing tournaments can create significant additional pressure on local fisheries and the surrounding environment. If such activities are conducted as commercial enterprises (e.g., a fee is charged and monetary awards are offered) the tournament could qualify as a commercial use and additional requirements (e.g., permits and fees) could be triggered (Administration of Specialized Uses, 5 RM 17).

‘Īlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*) and honu (*Chelonia mydas*) are known to use Kaua‘i’s north shore. Critically endangered ‘īlio-holo-i-ka-uaua are especially sensitive to human disturbance (NMFS 2007). Approaching anglers could force hauled-out individuals to move back into the water and seek a new haul-out site, causing them to expend energy and increasing their exposure to predators. Potential disturbance of female adults with pups is of special concern. Seals and threatened green sea turtles could also be injured or potentially killed if they became hooked or entangled in fishing lines or nets (NMFS 2007, NMFS and USFWS 1998).

Anglers and their vehicles can trample native plants, cause soil compaction and/or erosion, and potentially introduce or spread nonnative species, including invertebrates, plants, and invasive species. As noted earlier, the Quarry area has received substantial public use for many years. Its naturalness is already seriously compromised and it includes many nonnative plants.

Nighttime fires associated with fishing activities could cause ‘a‘o (Newell’s Shearwater, *Puffinus auricularis newelli)* or ‘ua‘u kani (wedge-tailed shearwaters, *Puffinus pacificus*) returning from foraging all day at sea to become disoriented and not be able to find their burrows and young. Fledglings could similarly become disoriented in their initial flights to the sea and circle such lights until exhausted or crash into obstacles. Fires may also spread to vegetation, destroying habitat for ground-nesting birds.

Cooking and eating food onsite will result in an increase in litter and a buildup of food scraps and will increase the potential for direct feeding of wildlife. These foods will likely attract undesirable pests and predators (e.g., cats and rats) to the Quarry. The presence of food could also attract native wildlife species, reducing their fear of humans and habituating them more to people and human foods. Exposing wildlife to human foods could also reduce their foraging on natural foods and cause young wildlife not to fully develop critical foraging skills, potentially decreasing their survivability in areas and at times when such foods were less or not available. Potentially, human foods could also sicken wildlife or reduce their fitness and affect growth, reproductive potential, and survivability (Heiser undated).

Cultural Resources and Values

Fredericksen and Fredericksen (1989) described the ruins of a sugar-loading complex located on Mōkōlea Point above the fishing areas. However, the same study identified no Hawaiian artifacts from either the historic or prehistoric periods within the affected areas. It is not expected that continued fishing at this site will further impact cultural resources.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge’s draft comprehensive conservation plan and environmental assessment.

Determination:

_____ Use is Not Compatible

____X____ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

1. Anglers are allowed to bring dogs, but prohibited from bringing cats or other pets with them. All dogs brought onto the Refuge in this area will be required to be leashed on a short (8-foot maximum) leash and under direct control at all times and will not be allowed to run free. Dogs will not be allowed to accompany pedestrians past the northeastern end of the main Quarry area. Additionally, signage will be used to delineate accessible and nonaccessible areas.

In association with their fishing, anglers will be allowed to erect temporary shelters (protections from the sun and/or rain) in the Quarry area during daylight hours only. Camping is prohibited. Poles and other fishing equipment must be attended at all times. Barbeques and other equipment, supplies, trash, and human and pet waste must be removed from the Quarry area at the end of each angler's stay. Anglers could bring and use portable stoves or self-contained barbeques (e.g., off-the-ground portable enclosed fires) or fires within a Refuge-designated fire ring or pit. Refuge-designated fire rings or pits will be sited to minimize the potential spread of uncontrolled fires. Visitors will need to bring charcoal or firewood. Fires must be attended at all times.

2. Visitors are prohibited from using motorized or other vehicles off designated routes of travel. At the Quarry, designated routes of travel include Kāhili Quarry Road, the vehicle access to the unimproved boat slide into Kīlauea River, and the hardened vehicle access and parking area in the core of the Quarry area.

3. In the absence of specific, prior written approval of the Refuge manager (for the purpose of these stipulations, the Refuge manager is the Project Leader of the Kauaʻi National Wildlife Refuge Complex) or unless specifically allowed by State of Hawaiʻi fishing regulations, anglers are prohibited from collecting and removing any archaeological or historic artifacts, abiotic or biological specimens or samples, or mementos from the Refuge.

4. In the absence of specific, prior written approval of the Refuge manager, anglers are prohibited from disturbing or otherwise adversely impacting any prehistoric, historic, or other cultural resources on the Refuge.

5. Consistent with Service policy regarding management of nonhazardous solid waste on refuges ("Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901-6992k) – Solid Waste (Nonhazardous)," 561 FW 5), anglers are prohibited from littering, dumping refuse, abandoning equipment or materials, or otherwise discarding any items on the Refuge, including unused or excess fishing line, hooks, lures, and bait.

6. In addition to the stipulations listed here anglers are required to comply with Refuge System-related and other applicable laws, regulations, and policies including "Prohibited Acts" listed in the Code of Federal Regulations (50 CFR 27).

7. No changes could be made to any of these stipulations without specific, prior written approval of the Refuge manager.

Fishing

1. Anglers will be required to secure and have with them relevant State fishing licenses and any other permits needed to fish in the ocean from the Refuge. Anglers will be required to abide by Hawaiʻi fishing regulations when fishing on or from the Refuge.

2. Anglers will be allowed to fish at Kāhili Quarry 24 hours a day. Poles and other fishing gear must be attended at all times.

3. Fishing and other activities are not be allowed within 50 yards of ʻīlio-holo-i-ka-uaua or honu, whether these animals are in the water or on shore.

4. In order to reduce the potential for hooking of ʻīlio-holo-i-ka-uaua or honu, anglers are encouraged to use barbless circle hooks while fishing from the shore.

5. Anglers are prohibited from constructing new or maintaining existing structures or fixtures (including rod holders) on the Refuge without specific, prior written approval of the Refuge manager.

6. Prior to holding any fishing tournaments using any part of the Refuge, tournament organizers will be required to contact and receive specific, prior written approval of the Refuge manager, possibly including a permit, payment of fees, and a tournament-specific compatibility determination.

Justification:

By its nature, fishing will have direct, lethal effects on individual fish or shellfish. However, angling on the Refuge is expected to have negligible to minor effects on populations of fish or shellfish because the State of Hawaiʻi regulates fishing consistent with sustained yield population management principles.

Angling has the potential to cause some disturbance to seabirds and potentially seals and/or turtles. The planned construction of a new fence at the base of vegetation on the west side of the Quarry area, allowing dogs only in the western portion of the area, and prohibiting cats, other pets, and free-roaming dogs onsite will limit potential disturbance to seabirds roosting or nesting in cliff-side vegetation. Additionally, fishing and associated activities will not be allowed within 50 yards of seals or turtles.

Increased Refuge law enforcement is expected to reduce violations of rules and regulations, including camping and squatting. Tournament fishing will require special approval of the Refuge manager.

Fishing is a wildlife-dependent, general public use and is to be given special consideration in refuge planning and management. As noted earlier, it is also expected that anglers will enjoy some wildlife observation and photography ancillary to their fishing efforts. These uses are also wildlife-dependent general public uses that are to be given special consideration in refuge planning and management when compatible.

The Refuge will monitor compliance with the stipulations enumerated herein. This will include enforcement of Hawaiʻi fishing regulations.

The Refuge will monitor wildlife and habitat disturbance and other potential impacts to determine if these stipulations result in expected and desirable outcomes. The Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of these uses. New or modified stipulations could be instituted as a result of new information generated by ongoing or new studies; new legal, regulatory, or policy requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants, or their habitats; changes to fishing practices; or for other legitimate reasons. Refuge personnel will

appropriately advise anglers of any such changes. Any significant changes to rules for fishing on the Refuge will be appropriately promulgated as Federal regulations. These regulations will be supplemented by Refuge-specific information available onsite or at the Kaua‘i National Wildlife Refuge Complex headquarters office.

The Refuge also reserves the right to terminate or modify privileges to fish at the Refuge if anglers violate Refuge rules or regulations; if unacceptable impacts occur to native fish, wildlife, plants, their habitats, cultural resources, Refuge facilities, or other Refuge visitors, or for other legitimate reasons.

Compatibility Standard

In order to be allowed on the Refuge, angling at Kāhili Quarry needs to be determined compatible. By allowing this use to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, other public uses, and cultural resources. For the several reasons stated above and consistent with the stipulations described herein, this use will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point's NWR's purposes; or the Refuge System's mission.

Mandatory Re-Evaluation Date:

__X__ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

_____ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: Fishing and Shellfishing

Refuge Determination:

Prepared by:
Acting
(Signature) 9/9/15 (Date)

Approved by Project Leader, Kaua'i National Wildlife Refuge Complex:
(Signature) 9/9/15 (Date)

Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office:
Barry W. (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region:
Kevin S. Foster (Signature) 9/16/15 (Date)

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Compatibility Determination

Use: General Access for Off-Refuge Stream, Beach, and Ocean Uses (Kāhili Quarry)

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kaua‘i, Hawai‘i

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):
The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

This use involves access through Kīlauea Point National Wildlife Refuge (NWR or Refuge) at Kāhili Quarry (Quarry) or near the mouth of Kīlauea River (aka Kāhili Stream) to access off-Refuge areas (Kāhili Beach, Kīlauea Bay, and the Kīlauea River) for boating, fishing, and other stream, beach, and ocean uses such as surfing, swimming, sunbathing, snorkeling, and walking, including dog walking.

Uses on the Refuge include driving, walking, riding horses, or bicycling on Kāhili Quarry Road; parking vehicles on the Refuge; and launching and loading canoes, kayaks, paddle boards, and surfboards. Canoes, kayaks, paddle boards, surfboards, and perhaps other small watercraft, are launched into Kīlauea River near its mouth. This boat launching site is an unimproved slide cut through the dirt bank into the river. Visitors can also easily access Kāhili Beach (east of the Quarry across Kīlauea River) and Kīlauea Bay via Wailapa Road, an all-weather road.

While in the Quarry area, some visitors have open fires, some bring their pets (usually dogs), and some erect temporary shelters or camp overnight. Some visitors also walk north from the Quarry area along the east base of Mōkōlea Point on the rocks adjacent to the ocean. There is no formal trail and the cliff-side vegetation is not fenced through this area. It is expected that boaters, beach goers, and others enjoy some wildlife observation and photography ancillary to their primary activities; however, the core access uses evaluated herein are not wildlife-dependent general public uses.

To the west of the Quarry are cliffs that define Mōkōlea Point which are densely vegetated with naupaka (*Scaevola sericea*) and other plants. Mōkōlea Point has a fence partway up the slope in the main Quarry area. Vegetation extends a short distance below the fence onto the relatively flat Quarry site. The remainder of the Quarry site shows signs of many years of heavy public use, including vehicle use, and has a few scattered trees but little other vegetation. The area has several fire pits, trash, and abandoned motor vehicles. At the south end between the main road and stream there are more trees and low vegetation interspersed with additional rutted roads, cleared areas that have been used for camping, and the small boat slide. The Quarry area is also occasionally used by squatters. There are no improvements in the area. There are no designated parking spaces, designated camping sites, potable water, toilets, recycling/garbage cans, or other improvements in the area.

Under the management direction of the CCP, we will continue to allow visitors to access Kāhili Beach, Kīlauea Bay, and the Kīlauea River through the Kāhili Quarry area 24 hours a day. Visitors may walk, bicycle, ride horses, and drive motor vehicles on Quarry Road. Off-road travel is prohibited. Visitors may park vehicles and launch and load canoes, kayaks, paddle boards, and surfboards from the unimproved slide along the Kīlauea River. Visitors are allowed to bring and use portable stoves or self-contained barbeques (e.g., off-the-ground portable enclosed fires) or fires within a Refuge-designated fire ring or pit. Refuge-designated fire rings or pits will be sited to minimize the potential spread of uncontrolled fires. Visitors will need to bring charcoal or firewood. Fires must be attended at all times.

The U.S. Fish and Wildlife Service (Service) will continue to work with the Kīlauea community to maintain a passable road to the beach and shoreline. The road will be repaired and maintained to a standard approved by both the Service and the County of Kaua‘i (e.g., using crushed coral). In addition to welcome and orientation, educational, and interpretive signage and messaging, the Refuge will post sign(s) notifying visitors of the rules and regulations surrounding use at Kāhili Quarry and that the area has no drinking water, toilets, or other developed facilities.

The Refuge will appropriately post its jurisdictional boundary in the Quarry area. A new, predator-resistant fence will replace the existing fence and will be constructed at the base of vegetation growing down the cliffs defining Mōkōlea Point. The fence line will extend to the ocean at the northern end of the main Quarry area (see map).

This CD has been developed and made publicly available concurrent with the comprehensive conservation plan (CCP) and associated environmental assessment (EA) for Kīlauea Point NWR.

Availability of Resources:

Following is an estimate of one-time costs associated with the Kāhili Quarry public use program:

Projects	Estimated Costs[1]
1. Replacement of existing fence with new predator-resistant fence along the base of vegetation growing down the cliffs defining Mōkōlea Point.	$300,000
2. Posting of jurisdictional boundary with signage and low-profile monuments.	$20,000
3. Installation of new informational and regulatory signage.	$10,000
Total Costs	$330,000

[1] Costs displayed are totals for these changes. Note that many of these changes will also benefit other uses occurring at Kāhili Quarry.

Following is an estimate of annual costs associated with administering this use on the Refuge:

Tasks	Estimated Costs per Year[1]
1. Oversight by GS-13 Project Leader (approximately 10 hours/year).	$600
2. Oversight by GS-12 Deputy Project Leader (approximately 20 hours/year).	$1,000
3. Oversight by GS-9 Supervisory Park Ranger (approximately 80 hours/year).	$2,800
4. Law enforcement by GL-9 Law Enforcement Officer (approximately 120 hours/year).	$4,400
5. Monitoring by GS-11 Biologist (approximately 20 hours/year).	$900
6. Refuge overhead costs associated with the above-listed work.[2]	$2,000
7. Signage and fence maintenance, repair, and materials	$3,000
Total Costs	$14,700

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.
[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

The Refuge currently has adequate budget and staff to support the annual costs associated with a limited amount of visitor access through the Kāhili Quarry area.

Anticipated Impacts of the Use(s):

Allowing recreational access in the Kāhili Quarry area under the stipulations described below will not directly conflict with any Refuge goals.

Human disturbance has differential effects on wildlife and is dependent upon, among other variables, the species involved and its age; the time of year; the breeding cycle stage (if applicable); the surrounding environment; whether the activity involves vehicles; the intensity, speed, noise, nature, and frequency of the disturbing activity; and the directness of approach to an animal (Blanc et al. 2006, Holmes et al. 2005, Hammitt and Cole 1998, Knight and Cole 1995a, Knight and Cole 1995b). Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, change in food habits, physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990, Knight and Cole 1995a, Knight and Swaddle 2007, Miller et al. 1998, Miller and

Hobbs 2000, Morton et al. 1989, Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Kitaysky et al. (2003) found levels of corticosterone (a major stress hormone) in ʻuaʻu kani (wedge-tailed shearwaters, *Puffinus pacificus*) at the Refuge to be higher in chicks occupying burrows closer to (within 13 feet of) visitor-use areas. Holmes et al. (2005) found that, even at the recommended minimum approach distance (~16 feet), a single wildlife observer in a royal penguin (*Eudyptes schlegeli*) colony on Macquarie Island, Australia, triggered vigilance behavior and an increased heart rate in the birds. In another study, Holmes et al. (2007) found that vigilance behavior of gentoo penguins (*Pygoscelis papua*) increased as the numbers of observers increased. Additional studies in penguin colonies revealed that a slow approach that ended with a visitor sitting quietly and closely observing a bird had little effect on the bird's heart rate, yet a rapid approach that ended with a visitor remaining standing and closely observing a bird resulted in an elevated heart rate (Nimon et al. 1995).

A variety of factors affect flushing distances among waterbirds, including the species involved; the activity the birds are engaged in (e.g., foraging versus nesting); and the type, speed, and noise of disturbance (e.g., approaching birds by walking versus in a motorized boat) (Rodgers and Smith 1997, Rodgers 1991). Flushing of birds or even raising their alert levels (which usually occurs at a greater distance than that for flushing) creates stress and requires animals to expend energy that otherwise would be invested in essential life history activities such as foraging, mating, nesting, brood-rearing, and predator avoidance.

Breeding birds are especially sensitive to human disturbance (Trulio 2005, Hammitt and Cole 1998). A study of visitors to a colony of kittiwakes (*Rissa tridactyla*) and guillemots (*Uria aalge*) revealed that nesting success was influenced by the distance observers were from the birds (positively correlated) and the number of observers involved (negatively correlated) (Beale and Monaghan 2004).

Studies have had mixed results regarding potential habituation of birds and some other taxa to human disturbance. Wildlife are often less disturbed by routine human activities that repeatedly occur along defined routes (e.g., trails, roads, or water channels), especially frequent disturbance that does not involve direct contact or other threat, compared with those activities that occur irregularly and outside predictable paths/channels (Blanc et al. 2006, Holmes et al. 2007, Knight and Cole 1995b).

In studies of breeding yellow-eyed penguins (*Megadyptes antipodes*), a timid and secretive species, Ratz and Thompson (1999) found that the birds appeared to have habituated to the presence of guided tourists who approached the colony through trenches and closely observed or photographed birds from camouflaged blinds. Jungius and Hirsch (1979) studied seabird colonies and found that birds that were believed to have habituated to tourists and revealed no outward behavioral changes in their presence, nonetheless exhibited stress (as reflected in elevated heartbeat frequencies) when approached by visitors. The scientists speculated that the stress could have a negative effect on breeding. Habituation to some types and levels (intensity and frequency) of human disturbance appears to vary among species, within species, between resident and migratory populations, and potentially between inexperienced and experienced breeders. This makes it difficult to forecast habituation in actual field situations.

Walking through the Quarry area and along the ocean-side trail at the east base of Mōkōlea Point is expected to cause some wildlife disturbance. Seabirds nest in the vegetation at the base of the cliffs at Kāhili Quarry. Nesting birds and their young are expected to experience stress, possibly flush, and potentially be more vulnerable to predation if visitors approached nesting sites too closely, too quickly, too noisily, in too large of groups, or with dogs.

ʻĪlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*) and honu (*Chelonia mydas*) are known to use Kauaʻi's north shore. Critically endangered ʻīlio-holo-i-ka-uaua are especially sensitive to human disturbance (NMFS 2007). Approaching visitors could force hauled-out individuals to move back into the water and seek a new haul-out site, causing them to expend energy and increasing their exposure to predators. Potential disturbance of female adults with pups is of special concern.

Refuge visitors, their vehicles, and pets can trample native plants, cause soil compaction and/or erosion, and potentially introduce or spread nonnative species, including invertebrates, plants, and invasive species. As noted earlier, the Quarry area has received substantial public use for many years. Its naturalness is already seriously compromised and it includes many nonnative plants. It is unlikely that continued access through the area will further exacerbate this situation.

Bringing human food onto the Refuge and cooking/eating onsite will result in an increase in litter and a buildup of food scraps and will increase the potential for direct feeding of wildlife. These foods will likely attract undesirable pests and predators (e.g., cats and rats) to the Refuge. The presence of food could also attract native wildlife species, reducing their fear of humans and habituating them more to people and human foods. This can result in adverse impacts for both wildlife and humans. Visitors contribute to wildlife mortality by feeding birds. For example, feeding causes endangered nēnē (Hawaiian goose, *Branta sandvicensis*) to beg at road-sides and parking lots and approach vehicles on highways, increasing bird-vehicular injuries and deaths. Road casualties are a major cause of nēnē mortality at two Hawaiʻi National Parks (55 deaths from 1989 to 1999) (USFWS 2004) and on or adjacent to Kīlauea Point NWR (20 deaths 2010 to 2014) (USFWS unpublished).

Exposing wildlife to human foods could also reduce their foraging on natural foods and cause young wildlife not to fully develop critical foraging skills, potentially decreasing their survivability in areas and at times when such foods were less or not available. Potentially, human foods could also sicken wildlife or reduce their fitness and affect growth, reproductive potential, and survivability (Heiser undated).

The several stipulations associated with this use have been designed to greatly reduce the likelihood and magnitude of potential biological effects. The new fencing and signage will reduce the likelihood that visitors and/or their dogs will disturb roosting and nesting wildlife.

Cultural Resources and Values

Fredericksen and Fredericksen (1989) described the ruins of a sugar-loading complex located on Mōkōlea Point above the fishing areas. However, the same study identified no Hawaiian artifacts from either the historic or prehistoric periods within the affected areas. It is not expected that continued public use at this site will further impact cultural resources.

Public Use

As noted earlier, providing recreational access to off-Refuge areas is not a wildlife-dependent public use and is of lower priority for Refuge management than the fishing and wildlife observation and photography uses that also occur in the Quarry area. These uses have occurred side-by-side in this area for many years. It is not expected that continued use and access through the Quarry area will adversely impact fishing or other wildlife-dependent public uses at the Refuge.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge's draft comprehensive conservation plan and environmental assessment.

Determination:

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

1. Access through Kahili Quarry to access Kāhili Beach, Kīlauea Bay, and the Kīlauea River will be allowed 24 hours a day.

2. Visitors will be allowed to bring dogs, but prohibited from bringing cats or other pets with them to the Kāhili Quarry area. All dogs brought onto the Refuge in this area will be required to be leashed on a short (8-foot maximum) leash and under direct control at all times and will not be allowed to run free. Dogs will not be allowed to accompany pedestrians past the northeastern end of the main Quarry area (refer to map). Additionally, signage will be used to delineate accessible and nonaccessible areas.

3. When viewing or photographing ʻīlio-holo-i-ka-uaua or honu, whether these animals are in the water or on shore, visitors are required to maintain a distance of at least 50 yards and limit their viewing/photographing time to 30 minutes (NOAA undated). ʻIlio-holo-i-ka-uaua and honu are both listed under the Endangered Species Act (ESA) and ʻilio-holo-i-ka-uaua is also listed under the Marine Mammal Protection Act (MMPA). These acts have mechanisms to encourage management for population growth and recovery and to prohibit any form of "take," except for limited exceptions authorized under Federal permits. Under the ESA, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Under the MMPA, "take" includes actions such as hunting, harassing, killing, capturing, injuring and disturbing a marine mammal. There are established civil and criminal penalties for, at a minimum, disturbing ʻīlio-holo-i-ka-uaua or honu by getting too close or staying too long which alter their behavior, thus resulting in take. If ʻīlio-holo-i-ka-uaua or honu display signs of being disturbed, then that 50 yards will be expanded and/or viewing will be minimized or shut down to stop the disturbance and avoid potential take.

4. Visitors are allowed to erect temporary shelters (protections from the sun and/or rain) in the Quarry area during daylight hours only; however, camping is prohibited. All temporary shelters or other structures must be taken down at the end of each day. Visitors could also bring and use self-contained barbeques (i.e., off-the-ground portable enclosed fires) or fires within a Refuge-designated fire ring or pit. Refuge-designated fire rings or pits will be sited to minimize the potential spread of uncontrolled fires. Visitors will need to bring charcoal or firewood. Fires must be attended at all times. With the exception of those structures specifically described herein, visitors are prohibited from constructing new or maintaining existing structures on the Refuge without specific, prior written approval of the Refuge manager (for the purpose of these stipulations, the Refuge manager is the Refuge Project Leader of the Kaua‘i National Wildlife Refuge Complex).

5. Visitors are prohibited from use of motorized or other vehicles off designated routes of travel. At the Quarry, designated routes of travel include Kāhili Quarry Road, the vehicle access to the unimproved boat slide into Kīlauea River, and the hardened vehicle access and parking area in the core of the Quarry area.

6. In the absence of specific, prior written approval of the Refuge manager, visitors are prohibited from collecting and removing any archaeological or historic artifacts, abiotic or biological specimens or samples, or mementos from the Refuge.

7. In the absence of specific, prior written approval of the Refuge manager, visitors are prohibited from disturbing or otherwise adversely impacting any prehistoric, historic, or other cultural resources on the Refuge.

8. Consistent with Service policy regarding management of nonhazardous solid waste on refuges (“Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901-6992k) – Solid Waste (Nonhazardous),” 561 FW 5), visitors are prohibited from littering, dumping refuse, abandoning equipment or materials, or otherwise discarding any items on the Refuge, including glass.

9. In addition to the stipulations listed here, visitors are required to comply with Refuge System-related and other applicable laws, regulations, and policies including “Prohibited Acts” listed in the Code of Federal Regulations (50 CFR 27).

10. No changes could be made to any of these stipulations without specific, prior written approval of the Refuge manager.

Justification:

Kāhili Quarry is an important buffer area for wildlife resources on Mōkōlea Point and Crater Hill, including breeding sites for nēnē, mōlī (Laysan albatross**,** ***Phoebastria immutabilis***), ‘ua‘u kani, koa‘e ‘ula (red-tailed tropicbirds, *Phaethon rubricauda*), as well as roosting or foraging sites for pueo (Hawaiian short-eared owl, *Asio flammeus sandwichensis*) and ‘iwa (great frigatebird, *Fregata minor*). Additionally, accessing Kīlauea River, Kīlauea Bay, and Kāhili Beach through the Kāhili Quarry area on the Refuge has the potential to cause some disturbance to seals and/or turtles. The primary concern in allowing any public access and use at the Quarry is to maintain adverse impacts within acceptable limits. Specific concerns about allowing public access and use at the Quarry include evening and nighttime disturbance from light, noise, human occupation, traffic, and dogs to

seabirds nesting on Mōkōlea Point; ground fires spreading to vegetation; impacts to environmental quality from trash and pollution; and illegal uses such as squatting that may occur during the nighttime.

In addition to the stipulations listed above, a combination of strategies is required to limit the potential for adverse impacts to wildlife and habitats. These strategies include building trust and relationships with local nonprofit organizations and community leaders of Kīlauea to help foster stewardship of this area, maintaining a passable road, posting the Refuge boundary, replacing and re-aligning the predator-resistant fence, adding bollards, exploring the possibility of cooperatively managing with the State, and requiring all dogs to be on a short leash and under direct control at all times.

Not providing drinking water, toilets, or making other improvements onsite is expected to continue to limit the number of individuals who use this area. Visitors could also easily access Kāhili Beach and Kīlauea Bay via Wailapa Road, an all-weather road east of the Quarry across Kīlauea River. Increased Refuge law enforcement will be needed to reduce violations of rules and regulations, including squatting.

Although providing recreational access to off-Refuge areas is not a wildlife-dependent public use as defined by statute (16 U.S.C. 668dd et seq.) and is of lower priority for Refuge management than the fishing, wildlife observation and photography, and environmental interpretation uses that also occur in the Quarry area, this non–wildlife-dependent use will facilitate compatible wildlife-dependent recreation; it is expected that visitors will enjoy some wildlife observation and photography ancillary to their primary activities. To the extent this occurred, it is supportive of one of the Refuge purposes to provide fishing and wildlife-oriented recreation.

The Refuge will monitor compliance with the stipulations enumerated herein. The Refuge will also monitor wildlife and habitat disturbance and other potential impacts to determine if these stipulations result in expected and desirable outcomes. The Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of these uses. New or modified stipulations could be instituted as a result of new information generated by ongoing or new studies; new legal, regulatory, or policy requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants, or their habitats; changes to access practices; or for other legitimate reasons. Refuge personnel will appropriately advise visitors of any such changes.

The Refuge also reserves the right to terminate or modify privileges to access the stream, ocean, or beach through the Refuge if visitors violate Refuge rules or regulations; if unacceptable impacts occur to native fish, wildlife, plants, or their habitats, cultural resources, Refuge facilities, or other Refuge visitors; or for other legitimate reasons.

Compatibility Standard

In order to be allowed on the Refuge, access through the Kāhili Quarry area needs to be determined compatible. By allowing this use to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that

monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, other public uses, and cultural resources. For the several reasons stated above and consistent with the stipulations described herein, this use will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point's NWR's purposes; or the Refuge System's mission.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: General Access for Off-Refuge Stream, Beach, and Ocean Uses (Kāhili Quarry)

Refuge Determination:

Prepared by: Acting _____ (Signature) 9/9/15 (Date)

Approved by Project Leader, Kaua'i National Wildlife Refuge Complex: _____ (Signature) 9/9/15 (Date)

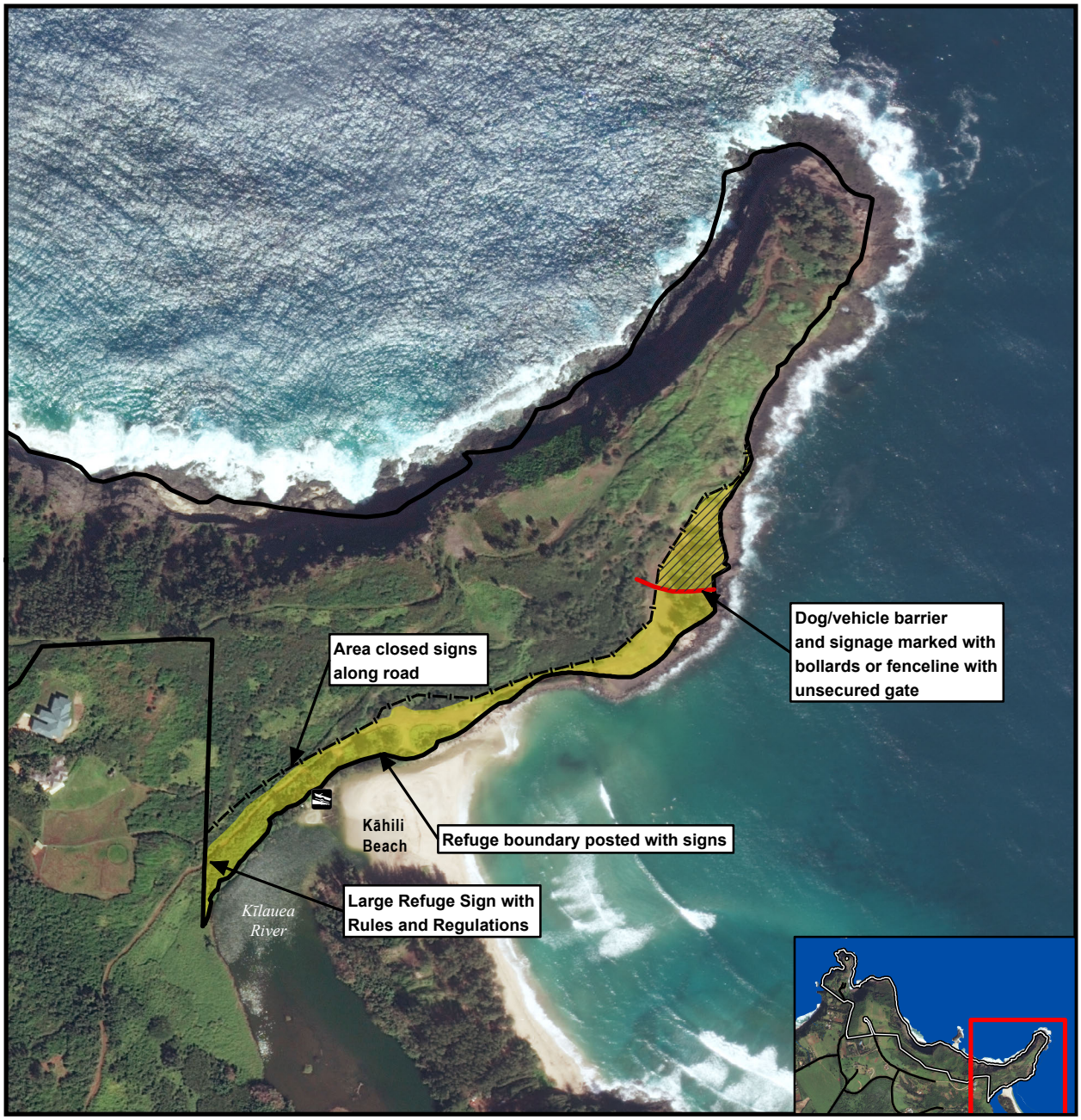
Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office: Barry W. _____ (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region: Kevin S. Foerster (Signature) 9/16/15 (Date)

U.S. Fish & Wildlife Service

Public Use
Kāhili Quarry/Mōkōlea Point, Kīlauea Point NWR



LEGEND

- Refuge Ownership
- Future Fence Alignment
- Future Dog/Vehicle Barrier

Public Use

- Open to Public
- Unimproved Boat Launch
- No Dogs or Vehicles

N

0 300 600 feet

0 100 200 meters

Map Date: 11/19/2014 File: 11-106-5.mxd
Data: USFWS 2014, DigitalGlobe 2010

USFWS R1 Refuge Information Branch

The back sides of maps are blank to improve readability.

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Compatibility Determination

Use: Research and Scientific Collections

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kaua‘i, Hawai‘i

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):
The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

This use involves research and scientific collections conducted by non-National Wildlife Refuge System (Refuge System) parties on Kīlauea Point National Wildlife Refuge (NWR or Refuge).

Research refers to a planned, organized, and systematic investigation of a scientific nature. Such studies are designed to determine the cause(s) of observed biotic or abiotic phenomenon over a finite period, where cause-and-effect relationships usually can be inferred through statistical analyses.

Scientific collecting involves gathering of Refuge natural resources or cultural artifacts for scientific purposes. Examples include collection of vegetation, small mammals, and soils; contaminant sampling; and collection and curation of cultural resources.

Refuge staff periodically receive requests from outside parties (e.g., universities, State agencies, other Federal agencies, and nongovernmental organizations) to conduct research and scientific collections on Refuge lands. These project requests can involve a wide range of natural and cultural resources as well as public use management issues, including collection of new species for identification, habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, modeling of wildlife populations, bioprospecting, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, refuge-specific, or evaluate the relative contribution of refuge lands to larger landscape (ecoregion, region, flyway, national, and international) issues and trends.

The U.S. Fish and Wildlife Service's (Service's) Research and Management Studies (4 RM 6) and Appropriate Refuge Uses (603 FW1) policies indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitat as well as their natural diversity. Projects that contribute to refuge-specific needs for resource management goals and objectives, where applicable, will be given a higher priority over other requests. Attached to this compatibility determination (CD) are examples of high-priority research and scientific collection topics for Kīlauea Point NWR (Attachment 1).

Research and scientific collections on the Refuge will generally be authorized through individual special use permits (SUPs) consistent with Service policy (Administration of Specialized Uses, 5 RM 17).

Projects that are public or private economic uses of the natural resources of the Refuge will need to comply with relevant Federal regulations for such uses (50 CFR 29.1). In such cases, the Refuge needs to first determine that the use contributes to the achievement of Refuge purposes or the Refuge System mission prior to making a determination regarding the project's compatibility.

This programmatic CD has been developed and made publicly available concurrent with the comprehensive conservation plan (CCP) and associated environmental assessment (EA) for Kīlauea Point NWR.

Availability of Resources:

Refuge staff responsibilities for research and scientific collections by non-Refuge System entities are primarily limited to the following: review of proposals, preparation of an SUP(s) and other appropriate compliance documents (e.g., Section 7 of the Endangered Species Act of 1973, Section 106 of the National Historic Preservation Act), and monitoring project implementation to ensure that impacts and conflicts remain within acceptable levels (remain compatible) over time. Additional administrative, logistical, and operational support could also be provided depending on each specific request. Estimated costs for one-time (e.g., prepare SUP) and annually recurring tasks by Refuge staff or other Service employees will be determined on a project-by-project basis. Sufficient funding in the Refuge's general operating budget will need to be available to cover expenses for these projects. The terms and conditions for funding and staff support necessary to administer each project on the Refuge will be clearly stated in the SUP(s).

The Refuge has the following staffing and funding to administratively support and monitor research and scientific collections that are currently taking place on Kīlauea Point NWR (see table below). Any substantial increase in the number of projects will create a need for additional resources to satisfy administrative and monitoring needs to ensure the projects were implemented in a compatible manner. Any substantial additional costs above those itemized below could result in determining a project not compatible unless expenses were offset by the investigator, sponsoring organization, or other party.

Following is an estimate of annual costs associated with administering this use on the Refuge.

Tasks	Estimated Costs per Year[1]
1. Oversight by GS-13 Project Leader (approximately 20 hours/year).	$1,200
2. Oversight by GS-12 Deputy Project Leader (approximately 20 hours/year).	$1,000
3. Law enforcement by GL-9 Law Enforcement Officer (approximately 20 hours/year).	$700
4. Permit monitoring by GS-11 Biologist (approximately 60 hours/year).	$2,600
5. Refuge overhead costs associated with the above-listed work.[2]	$1,100
6. Special equipment, facilities, improvements, and travel.	
Total Costs	$6,600

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.

[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

Anticipated Impacts of the Use(s):

Use of the Refuge to conduct research and scientific collecting will generally provide information of benefit to native fish, wildlife, plants, their habitats, or cultural resources. Scientific findings gained through these projects could provide important information regarding life-history needs of species and species groups, as well as identify or refine management actions to achieve natural or cultural resource management objectives. Reducing uncertainty regarding wildlife and habitat responses to Refuge management actions undertaken in order to achieve desired outcomes (objectives) is essential for adaptive management (Adaptive Management, 522 DM 1).

Potentially, some projects' methods could impact or conflict with Refuge-specific natural or cultural resources, priority wildlife-dependent public uses, other research, or Refuge management programs. In such cases, in order for the project to be determined compatible, it needs to be clearly demonstrated that the project's scientific findings will contribute to Refuge management and that the project could not be conducted off-Refuge. The investigator(s) will need to identify methods/strategies in advance to eliminate or minimize potential impacts and conflicts. If unacceptable impacts, including long-term and cumulative impacts, could not be avoided, then the project could not be determined compatible.

Impacts will be project- and site-specific, and they will vary depending upon the nature and scope of the field work. Data collection techniques will generally have no or minimal animal mortality or disturbance, habitat destruction, no introduction of contaminants, and no introduction of nonindigenous species. In contrast, projects involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection will have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) will be collected for identification and/or experimentation and statistical analysis. Where possible, researchers will coordinate and share collections to reduce sampling needed for multiple projects. For example, if one investigator collects fish for a diet study and another research examines otoliths, then it may be possible to accomplish sampling for both projects with one collection effort.

Investigator(s) obtaining required Federal and State collecting permits will also ensure minimal impacts to fish, wildlife, plants, and their habitats. If, even after incorporating the above strategies, projects will result in long-term or cumulative effects, projects will not be found compatible. A Section 7 consultation under the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884, as amended, Pub. L. 93-205) will be required for activities that may affect a federally listed species and/or critical habitat. Only projects that have no effect or will result in not likely to adversely affect determinations will be considered compatible.

Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel, but will be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary (Attachment 5). If, after all practical measures are taken and unacceptable spread of invasive species is anticipated to occur, then the project will be found not compatible without a restoration or mitigation plan.

There also could be localized and temporary effects from vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support a projects (e.g., permanent transects or plot markers, exclosure devices, monitoring equipment, solar panels to power unattended monitoring equipment). Some level of disturbance is expected with these projects, especially if investigator(s) enter areas closed to the public and collect samples or handle wildlife. However, wildlife disturbance (including altered behavior) will usually be localized and temporary in nature. Where long-term or cumulative unacceptable effects cannot be avoided, the project will not be found compatible. Project proposals will be reviewed by Refuge staff and others, as needed, to assess the potential impacts (short-term, long-term, and cumulative) relative to benefits of the investigation to Refuge management issues and understanding of natural systems.

At least 6 months before initiation of field work (unless an exception is made by prior approval of the Refuge Manager), project investigator(s) must submit a detailed proposal using the format provided

in Attachment 2. Project proposals will be reviewed by Refuge staff and others, as needed, to assess the potential impacts (short-term, long-term, and cumulative) relative to benefits of the investigation to Refuge management issues and understanding of natural systems. This assessment will form the primary basis for allowing or denying a specific project. Projects which result in unacceptable Refuge impacts will not be found compatible. If allowed and found compatible after approval, all projects also will be assessed during implementation to ensure impacts and conflicts remain within acceptable levels.

If the proposal is approved, then the Refuge manager (for the purpose of these stipulations, the Refuge manager is the Refuge Project Leader of the Kaua‘i National Wildlife Refuge Complex) will issue an SUP(s) with required stipulations (terms and conditions) of the project to avoid and/or minimize potential impacts to Refuge resources as well as conflicts with other public use activities and Refuge field management operations. After approval, projects are monitored during implementation to ensure impacts and conflicts remain within acceptable levels based upon documented stipulations.

The combination of stipulations identified and conditions included in any SUP(s) will ensure that proposed projects contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the Refuge. As a result, these projects will help fulfill Refuge purposes; contribute to the Refuge System mission; and maintain the biological integrity, diversity, and environmental health of the Refuge.

Projects which are not covered by the CCP (objectives under Goal 3 (Gather scientific information (surveys, research, and assessments) to support adaptive management decisions)) will require additional NEPA documentation.

It is likely that most proposed research and scientific collection projects will support one or more of the Refuge goals, but each will need to be evaluated separately. Projects that are determined supportive of Refuge goals and the Refuge System mission have a greater chance of being found appropriate, determined compatible, and authorized for implementation.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge’s draft comprehensive conservation plan and environmental assessment.

Determination:

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

1. Permission to use the Refuge for research and scientific collections will be officially authorized through issuance of an SUP. Generally, permits will be issued on a year-to-year basis. SUPs will cover use by a specified individual or organization and cannot be assigned or sub-permitted to

others (i.e., the permit is not transferable). Annual or other short-term SUPs are preferred; however, some permits will be longer, if needed, to allow completion of the project. All SUPs will have a definite termination date in accordance with 5 RM 17.11. Renewals will be subject to Refuge manager review and approval based on timely submission of and content in progress reports, compliance with SUP stipulations, and required permits.

Prior to potential permit renewal, researchers will meet with Refuge staff to share new information, discuss results of monitoring, review compliance with permit conditions, and address other issues. Other meetings will be scheduled as needed.

2. Most of Kīlauea Point NWR is closed to general public use, so SUPs will include maps clearly depicting the areas researchers will be authorized to access and use, including the Refuge entry point(s). Travel within the Refuge will be by designated road or trail. Permittees are prohibited from straying outside the areas depicted on the maps.

3. In order to reduce conflicts with other approved public uses, especially wildlife-dependent public uses, permittees will not be allowed to use the Point, Upper Overlook and associated parking lot, or Crater Hill for research and scientific collections during Refuge special events. An exception to this general stipulation involves research and scientific collections associated with high levels of public use. Special consideration could be made in such situations; however, additional stipulations will likely apply.

4. The Refuge will supply researchers with information about the Refuge; its purposes and goals; natural and cultural resources of concern; open and closed areas, dates, and times; rules and regulations; and any hazardous conditions. Researchers are responsible for reviewing and understanding this information and ensuring that their colleagues also receive, review, and understand this information.

5. Researchers are prohibited from constructing new or maintaining existing structures on the Refuge without specific, prior written approval of the Refuge manager.

6. Unless it was an element included in their approved project proposal, researchers and their colleagues are prohibited from collecting and removing any archaeological or historic artifacts, abiotic or biological specimens or samples, or mementos from the Refuge.

7. Consistent with Service policy regarding management of nonhazardous solid waste on refuges ("Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901-6992k) – Solid Waste (Nonhazardous)," 561 FW 5), permittees are prohibited from littering, dumping refuse, abandoning equipment or materials, or otherwise discarding any items on the Refuge.

8. Researchers are required to hold the United States Government harmless from any damages or injury to the permittee or members of the general public in areas and facilities accessed via the terms of their permit.

9. In addition to the stipulations listed here, the general permit conditions and requirements, and the special permit conditions, researchers and their colleagues are required to comply with Refuge System-related and other applicable laws, regulations, and policies, including "Prohibited Acts" listed in the Code of Federal Regulations (50 CFR 27).

10. No changes can be made to any of these stipulations without specific, prior written approval of the Refuge manager.

Research and Scientific Collections

1. The Refuge will issue a call for research proposals. Proposals received by the stated deadline will be evaluated and considered for approval during the next cycle.

2. At least 6 months before initiation of field work, a researcher(s) is required to submit a detailed proposal (Attachment 2). Among other things, proposals need to adhere to scientifically defensible protocols for data collection, where available and applicable.

   Project proposals will be reviewed by Refuge staff and others, as needed. This review will assess—relative to Refuge management issues and understanding of natural systems—the potential impacts (short-term, long-term, and cumulative) of the investigation. This assessment forms the primary basis for determining whether or not the project could be approved.

3. Researchers will be required to submit progress reports at least annually for multiple-year projects. A list of the minimum required elements for these reports is attached (Attachment 3). Final project reports are due 1 year after completion of the project unless negotiated otherwise with the Refuge manager.

   Researchers will be required to provide Refuge staff with the following:
   a. An opportunity to review and comment on draft manuscripts prior to their submittal to a scientific journal for consideration for publication;
   b. Copies (reprints) of all publications resulting from a project permitted on the Refuge; and
   c. At the conclusion of the project, raw data (preferably in an electronic database format).

   In all written and oral presentations resulting from projects on the Refuge, researchers are required to appropriately cite and acknowledge the Refuge System, Kīlauea Point National Wildlife Refuge, and Refuge staff and other Service personnel who supported or contributed to the project.

   Upon completion of the project or annually (at the discretion of the Refuge manager), researchers will be required to remove all equipment and physical markers (unless required for long-term projects) and restore sites to the Refuge manager's satisfaction. SUPs will specify conditions for removal and clean-up.

4. Researchers will need to obtain all required local, State, and Federal permits for collections and other purposes.

5. A Section 7 consultation under the Endangered Species Act will be required for all projects and activities that may affect federally listed species and/or critical habitat. Only projects which will have "no effect" or will result in a "not likely to adversely affect" determination will be considered for potential approval.

6. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates, and artifacts) will be collected for identification and/or experimentation and statistical analysis.

Where possible, researchers will be required to coordinate and share collections. This could reduce sampling needed for multiple projects and any associated mortality and disturbance. For example, if one investigator collected fish for a diet study and another researcher was examining otoliths, then it could be possible to accomplish sampling for both projects with one collection effort.

All samples collected on Refuge lands or from Refuge waters are the property of the Service even while in the possession of the researcher. Any future work with previously collected samples not clearly identified in the project proposal will require submission of a subsequent proposal for Refuge review and approval. In addition, a new SUP will be required for additional project work. For samples or specimens to be stored at other facilities (e.g., museums), a memorandum of understanding will be necessary (Attachment 4).

7. Except where it was an essential element of an approved research proposal associated with ʻīlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*) or honu (*Chelonia mydas*) to do otherwise, researchers are required to maintain a distance of at least 50 yards from these animals and limit their viewing/photographing time to 30 minutes.

8. To minimize the introduction and/or spread of nonnative plants or animals, diseases, or other pests, sampling equipment and researcher's clothing and vehicles (e.g., ATVs, boats) will need to be thoroughly cleaned (free of dirt and plant material) before being used on the Refuge. Depending on the project, quarantine methods could be necessary (Attachment 5).

9. Researchers are required to secure approval from the Service prior to use of any pesticide (including uses of herbicides, fungicides, and insecticides) on the Refuge. This involves researchers submitting to the Refuge manager a completed Pesticide Use Proposal (PUP) for each proposed pesticide use. These PUPs will need to be submitted at least 60 days prior to proposed use of the pesticide to allow adequate time for evaluation and processing.

10. At any time, Refuge staff can accompany researchers in the field.

11. Researchers are required to report dead or sick endangered birds or other wildlife to Refuge staff within 24 hours.

Cultural Resources

1. In the absence of specific, prior written approval of the Refuge manager, researchers and their colleagues are prohibited from disturbing or otherwise adversely impacting any prehistoric, historic, or other cultural resources on the Refuge. In the event such resources were inadvertently disturbed in the course of conducting otherwise permitted activities, the disturbing activity will need to be immediately discontinued, and the Refuge manager will need to be notified within 24 hours. If iwi (skeletal human remains) are encountered, the activity will need to be immediately stopped and the Refuge manager, police, and Hawaiʻi Department of Land and Natural Resources should be notified. Collecting and removing any prehistoric or historic artifacts is prohibited.

Justification:

Suitable research and scientific collections on refuges are inherently valuable to the Service when they expand scientific information available for resource management decisions about fish, wildlife,

plants, their habitats, cultural resources, and/or public use. In many cases, if it were not for the Refuge staff providing access to Refuge lands and waters along with some support, the project would never occur and less scientific information would be available to aid the Service in managing and conserving Refuge resources.

By allowing the use to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed by this use will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, cultural resources, and public use. Where this was not the case, the proposed project will likely not be compatible and will not be authorized for implementation. As a result, potential research and scientific collections, consistent with the stipulations described herein, will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point NWR's purposes; or the Refuge System's mission.

The Refuge will monitor compliance with the stipulations enumerated herein. Violation of any of these stipulations could result in temporary or permanent withdrawal by appropriate Refuge personnel of official permission to continue research or scientific collections on the Refuge. Permits could be revoked by the Refuge manager with 30 days' written notice of noncompliance with these stipulations.

The Refuge will also monitor habitat quantity and quality, wildlife use and productivity, water quality, cultural resources, and other relevant endpoints to determine if stipulations associated with research and scientific collections result in expected and desirable outcomes. In consultation with researchers, the Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of this use. New or modified stipulations will be instituted as a result of ongoing or new studies; new legal, regulatory, or policy requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants, or their habitats; as a result of mutual agreement with researchers; or for other legitimate reason. Researchers will be advised of new or significantly modified stipulations at least 90 days prior to their becoming effective.

The Refuge also reserves the right to terminate permission for these uses if permittees violate Refuge rules or regulations; if unacceptable impacts occur to native fish, wildlife, plants, or their habitats, cultural resources or Refuge facilities, or other Refuge visitors; or for other legitimate reasons.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: Research and Scientific Collections

Refuge Determination:

Prepared by: _____ (Signature) 9/9/15 (Date)

Acting
Approved by Project Leader, Kaua'i National Wildlife Refuge Complex: _____ (Signature) 9/9/15 (Date)

Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office: Barry W. _____ (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region: Kevin S. Foerster _____ (Signature) 9/16/15 (Date)

Attachment 1

High-Priority Research and Scientific Collections

Following are examples of high-priority research and scientific collection topics for Kīlauea Point NWR. They are not listed in priority order.

- Assess the effectiveness of social and other attraction methods to attract seabirds (e.g., Newell's shearwater and Laysan albatross) to the Refuge. Determine feasibility of relocating Newell's shearwater chicks to the Refuge.
- Assess the effectiveness of various habitat management techniques in enhancing nēnē nesting habitat on Crater Hill and Mōkōlea Point.
- Monitor and assess the causes of seabird and nēnē mortality.
- Evaluate the ability of various fencing systems to bar access to Crater Hill and Mōkōlea Point by mammalian pests and predators such as cats, dogs, mice, pigs, and rats. Evaluate the effectiveness of trapping, bait stations, shooting, and other methods to reduce onsite pest and predator populations.
- Determine the most effective methods to remove nonnative vegetation and restore and maintain native plant species.
- Use pollen core studies and other techniques to reconstruct prehistoric vegetation communities. Continue to explore the most effective techniques to propagate and outplant native plants.
- Design and implement a program(s) to inventory and monitor high-priority plant and animal species and communities, including seabirds and shorebirds, Hawaiian monk seals and green sea turtles, Hawaiian hoary bat, endangered plants, and nonnative pests and predators.
- Map Refuge soils and vegetation communities. Identify important wildlife uses and problems such as nonnative species and erosion.
- Assess the effects of public use on seabirds and shorebirds, including the effects of new or expanded programs such as hikes on Crater Hill. Develop appropriate mitigation measures.
- Assess the effects of leashed dogs on wildlife use and productivity at Kāhili Quarry.
- Enhance understanding of the effects of commercial uses on compatible recreational and educational public uses, especially wildlife-dependent public uses, and develop appropriate mitigation measures.
- Inventory and assess the status of the Refuge's cultural resources, and enhance knowledge and management with archival research and oral histories.
- Design and implement an appropriate climate change monitoring program for the Refuge.

Attachment 2

FORMAT FOR PROPOSALS TO CONDUCT RESEARCH OR LONG-TERM MONITORING ON NATIONAL WILDLIFE REFUGES

A Special Use Permit (SUP) is required to conduct research and/or long-term monitoring on refuge lands. To receive an SUP, a detailed project proposal using the following format must be submitted to the Refuge manager approximately 6 months prior to the start of the project.

Title:

Principal Investigator(s):
Provide the name(s) and affiliation(s) of all principal investigator(s) that will be responsible for implementation of the research and/or long-term monitoring described in the proposal. In addition, provide a brief description or attach vitae of expertise for principal investigator(s) germane to work described in the proposal.

Background and Justification:
In a narrative format, describe the following as applicable:

- *The resource management issue (e.g., decline in Pisonia rainforest) and/or knowledge gap regarding ecological function that currently exists with any available background information.*
- *Benefit of project findings (e.g., management implications) to resources associated with the refuge.*
- *Potential consequences if the conservation issue and/or knowledge gap regarding ecological function is not addressed.*

Objectives:
Provide detailed objective(s) for the proposed project.

Methods and Materials:
Provide a detailed description of the methods and materials associated with field and laboratory work (if applicable) to be conducted for the project. Methods should include the following:

- *study area(s);*
- *number of samples;*
- *sampling dates and locations;*
- *sampling techniques; and*
- *data analyses including **statistical methods** and **significance levels**.*

Previously published methods should be cited without explanation; whereas, new or modified techniques should be described in detail. Include number of personnel as well as all facilities and equipment (e.g., vehicles, boats, structures, markers) required to collect samples/data. Provide a clear description of the relationships among study objectives, field methods, and statistical analyses.

Permits:
Identify all State or Territorial and Federal permits required if applicable.

Potential Impacts to Refuge Resources:
Describe potential impacts to threatened or endangered species as well as other refuge plants, wildlife, and fish species that could result from the implementation of project activities on the refuge. Consider the cumulative impacts associated with this project.

Animal Welfare Plan:
If appropriate, attach a copy of the Institutional Animal Care and Use review and/or animal welfare plans that are required by the principle investigator's affiliation.

Partnerships and Funding Sources:
List other participating institutions, agencies, organizations, or individuals as well as the nature and magnitude of their cooperative involvement (e.g., funding, equipment, personnel).

Project Schedule:
Provide estimated initiation and completion dates for field sampling, laboratory work, data analyses, and report/manuscript preparation. If the project is divided into phases to be accomplished separately, provide separate initiation and completion dates for each phase.

Reports and Raw Data:
Establish a schedule for annual progress and final reports; include adequate time for peer review of the final report/manuscript. Draft reports/manuscripts should be submitted to the Refuge manager for review prior to submission for consideration of publication. At the conclusion of a research study (manuscripts accepted for publication), an electronic copy of the data (e.g., GIS vegetation layers, animal species composition and numbers, genetics) should be provided to the Refuge manager. For long-term monitoring projects, the Service also requires raw data for management and planning purposes for the Refuge.

Publications:
Describe the ultimate disposition of study results as publications in scientific journals, presentation at professional symposiums, or final reports.

Disposition of Samples:
If the project entails the collection of biotic and/or abiotic (e.g., sediment) samples, then describe their storage. Although the samples may be in the possession of scientists for the purposes of conducting the project in accordance with the SUP, the Service retains ownership of all samples collected on refuge lands. If the samples will be used for subsequent research activities that are not described within the original proposal, a new proposal must be submitted to the Refuge manager to obtain an SUP before initiation of the follow-up project. After conclusion of the research activities, consult with the refuge manager regarding the final disposition of the samples. If specimens will be curated at a museum, then prepare an MOU using the format provided in Attachment 3.

Attachment 3

ANNUAL PROGRESS REPORTS FOR REFUGE RESEARCH AND LONG-TERM MONITORING PROJECTS

Study title:

Fiscal year:

Progress:
In a narrative format, summarize the work that was completed on the study including the number and types of samples collected and/or data analyses.

Important findings:
In narrative format, generally describe any conclusions and/or management recommendations that may be drawn from the work completed to date.

Describe problems encountered:
In narrative format, describe any problems that were encountered during the year and their effects upon the study.

Proposed resolution to problems:
For each problem encountered, describe the actions that have been taken to remediate it.

Preparer:

Date prepared:

Attachment 4

**MEMORANDUM OF UNDERSTANDING
FOR CURATORIAL SERVICES
BETWEEN THE**

**(Name of the Federal agency)
AND THE
(Name of the Repository)**

This Memorandum of Understanding is entered into this (**day**) day of (**month and year**), between the United States of America, acting by and through the (**name of the Federal agency**), hereinafter called the Depositor, and the (**name of the Repository**), hereinafter called the Repository, in the State/Territory of (**name of the State/Territory**).

The Parties do witnesseth that

WHEREAS, the Depositor has the responsibility under Federal law to preserve for future use certain collections of paleontological specimens and/or biological samples as well as associated records, herein called the Collection, listed in Attachment A which is attached hereto and made a part hereof, and is desirous of obtaining curatorial services; and

WHEREAS, the Repository is desirous of obtaining, housing, and maintaining the Collection, and recognizes the benefits which will accrue to it, the public, and scientific interests by housing and maintaining the Collection for study and other educational purposes; and

WHEREAS, the Parties hereto recognize the Federal Government's continued ownership and control over the Collection and any other U.S. Government-owned personal property, listed in Attachment B which is attached hereto and made a part hereof, provided to the Repository, and the Federal Government's responsibility to ensure that the Collection is suitably managed and preserved for the public good; and

WHEREAS, the Parties hereto recognize the mutual benefits to be derived by having the Collection suitably housed and maintained by the Repository;

NOW THEREFORE, the Parties do mutually agree as follows:

1. The Repository shall:

    a. Provide for the professional care and management of the Collection from the (**names of the resources**) sites, assigned (**list site numbers**) site numbers. The collections were recovered in connection with the (**name of the Federal or federally authorized project**) project, located in (**name of the nearest city or town**), (**name of the county, if applicable**) county, in the State/Territory of (**name of the State/Territory**)

b. Assign as the Curator, the Collections Manager and the Conservator having responsibility for the work under this Memorandum, persons who are qualified museum professionals and whose expertise is appropriate to the nature and content of the Collection.

c. Begin all work on or about (**month, day, and year**) and continue for a period of (**number of years**) years or until sooner terminated or revoked in accordance with the terms set forth herein.

d. Provide and maintain a repository facility having requisite equipment, space, and adequate safeguards for the physical security and controlled environment for the Collection and any other U.S. Government-owned personal property in the possession of the Repository.

e. Not in any way adversely alter or deface any of the Collection except as may be absolutely necessary in the course of stabilization, conservation, scientific study, analysis, and research. Any activity that will involve the intentional destruction of any of the Collection must be approved in advance and in writing by the Depositor.

f. Annually inspect the facilities, the Collection, and any other U.S. Government-owned personal property. Every (**number of years**) years inventory the Collection and any other U.S. Government-owned personal property. Perform only those conservation treatments as are absolutely necessary to ensure the physical stability and integrity of the Collection, and report the results of all inventories, inspections, and treatments to the Depositor.

g. Within five (5) days of discovery, report all instances of and circumstances surrounding loss of, deterioration and damage to, or destruction of the Collection and any other U.S. Government-owned personal property to the Depositor, and those actions taken to stabilize the Collection and to correct any deficiencies in the physical plant or operating procedures that may have contributed to the loss, deterioration, damage, or destruction. Any actions that will involve the repair and restoration of any of the Collection and any other U.S. Government-owned personal property must be approved in advance and in writing by the Depositor.

h. Review and approve or deny requests for access to or short-term loan of the Collection (or a part thereof) for scientific and educational uses. In addition, refer requests for consumptive uses of the Collection (or a part thereof) to the Depositor for approval or denial.

i. Not mortgage, pledge, assign, repatriate, transfer, exchange, give, sublet, discard, or part with possession of any of the Collection or any other U.S. Government-owned personal property in any manner to any third party either directly or indirectly without the prior written permission of the Depositor, and redirect any such request to the Depositor for response. In addition, not take any action whereby any of the Collection or any other U.S. Government-owned personal property shall or may be encumbered, seized, taken in execution, sold, attached, lost, stolen, destroyed, or damaged.

2. The Depositor shall:

    a. On or about (**month, day, and year**), deliver or cause to be delivered to the Repository the Collection, as described in Attachment A, and any other U.S. Government-owned personal property, as described in Attachment B.

    b. Assign as the Depositor's Representative having full authority with regard to this Memorandum, a person who meets pertinent professional qualifications.

    c. Every (**number of years**) years, jointly with the Repository's designated representative, have the Depositor's Representative inspect and inventory the Collection and any other U.S. Government-owned personal property and inspect the repository facility.

    d. Review and approve or deny requests for consumptively using the Collection (or a part thereof).

3. Removal of all or any portion of the Collection from the premises of the Repository for scientific or educational purposes; any conditions for handling, packaging and transporting the Collection; and other conditions that may be specified by the Repository to prevent breakage, deterioration, and contamination.

4. The Collection or portions thereof may be exhibited, photographed, or otherwise reproduced and studied in accordance with the terms and conditions stipulated in Attachment C to this Memorandum. All exhibits, reproductions, and studies shall credit the Depositor, and read as follows: "Courtesy of the (**name of the Federal agency**)." The Repository agrees to provide the Depositor with copies of any resulting publications.

5. The Repository shall maintain complete and accurate records of the Collection and any other U.S. Government-owned personal property, including information on the study, use, loan, and location of said Collection which has been removed from the premises of the Repository.

6. Upon execution by both parties, this Memorandum of Understanding shall be effective on this (**day**) day of (**month and year**), and shall remain in effect for **(number of years**) years, at which time it will be reviewed, revised, as necessary, and reaffirmed or terminated. This Memorandum may be revised or extended by mutual consent of both parties, or by issuance of a written amendment signed and dated by both parties. Either party may terminate this Memorandum by providing 90 days' written notice. Upon termination, the Repository shall return such Collection and any other U.S. Government-owned personal property to the destination directed by the Depositor and in such manner to preclude breakage, loss, deterioration, and contamination during handling, packaging, and shipping, and in accordance with other conditions specified in writing by the Depositor. If the Repository terminates, or is in default of, this Memorandum, the Repository shall fund the packaging and transportation costs. If the Depositor terminates this Memorandum, the Depositor shall fund the packaging and transportation costs.

7. Title to the Collection being cared for and maintained under this Memorandum lies with the Federal Government.

IN WITNESS WHEREOF, the Parties hereto have executed this Memorandum.

Signed: (signature of the Federal Agency Official) Date: (date)

Signed: (signature of the Repository Official) Date: (date)

Attachment 3A: Inventory of the Collection

Attachment 3B: Inventory of any other U.S. Government-owned Personal Property

Attachment 3C: Terms and Conditions Required by the Depositor

Attachment 5

ALIEN SPECIES QUARANTINE RESTRICTIONS FOR NATIONAL WILDLIFE REFUGES

A. Introduction

Thank you for your interest in conducting research/monitoring on the refuge(s). To protect wildlife and habitat communities found on the refuge, visitation is carefully regulated and requires that each individual, or group, secure a Special Use Permit (SUP) to gain access to the refuge. Each SUP clearly outlines the responsibilities of each permittee, including specific quarantine policies, which may be more detailed than the policies listed within this document. Details for securing an SUP can be found by contacting the refuge manager. Prospective scientific researchers must apply for the SUP at least 6 months prior to their proposed study period.

One of the gravest threats to the refuge(s) is the introduction of alien plant and animal species. The practices described below are complex, but the Service has found them to be effective at greatly reducing additional introductions of invasive species on refuge(s).

B. Definitions

1. **Clothing** - all apparel, including shoes, socks, over and under garments.
2. **Soft gear** - all gear such as books, office supplies, daypacks, fannypacks, packing foam or similar material, camera bags, camera/binocular straps, microphone covers, nets, holding or weighing bags, bedding, tents, luggage, or any fabric or material capable of harboring seeds or insects.
3. **New Clothing/Soft Gear** - new retail items, recently purchased and never used.
4. **Refuge-Dedicated Clothing/Soft Gear** - items that have ONLY been used at the refuge(s), and which have been stored in a quarantined environment between trips to the refuge(s).
5. **Sensitive Gear -** computers, optical equipment, and other sensitive equipment.
6. **Non-Sensitive Equipment and Construction Materials** - building materials, power and hand tools, generators, misc. machinery, etc.
7. **Suitable Plastic Packing Container -** packing containers must be constructed of smooth, durable plastic which can be easily cleaned and will not harbor seeds or insects. Packing containers may be re-used for multiple trips to the refuge(s), but must be thoroughly cleaned before each trip and strictly dedicated to refuge-related projects.
   - Examples of APPROPRIATE plastic packing containers are 5-gallon plastic buckets and plastic totes constructed with a single layer and having a smooth surface. All appropriate packing containers must have tight fitting plastic lids.
   - An example of an INAPPROPRIATE plastic packing container is a US mail tote. Mail totes are typically constructed of cardboard-like plastic that provides a porous multi-layered surface, allowing seeds and insects to easily hitchhike.

C. Special Use Permit (SUP)

All persons requesting use of the refuge(s) must secure an SUP, as described in Section A above, and agree to comply with all refuge requirements to minimize the risk of alien species introductions.

D. Quarantine Inspections

All personal gear, supplies, equipment, machinery, vehicles (e.g., ATVs, trucks, trailers), and vessels (e.g., planes, boats, ships, barges) will be inspected for quarantine compliance by Service staff prior to entering the refuge(s) and again before departing the refuge(s). A concerted effort will be made to ensure that alien pests are not transported. Service staff on the refuge(s) will inspect outbound cargo prior to transport.

E. Prohibited Items (Transport of the following items are strictly prohibited)

1. Rooted plants, cuttings, flowers, and seeds (raw or propagative).
2. Soil, sand, gravel, or any other material that may harbor unwanted plant and animal species.
3. Animals (no exceptions).
4. Cardboard (paper and plastic cardboard harbors seeds and insects).

F. Regulated Items (Transport of the following items are strictly regulated)

1. Food items have the potential to carry alien pests and are therefore selected, packed, and shipped with great care for consumption on the refuge(s). Foods will not be allowed on the refuge(s) without prior authorization.
2. Because wood products often harbor seeds and insect, only treated wood that has been painted or varnished may be allowed on the refuge(s). Approved wood products must also be frozen for 48 hours or fumigated as described in Section K below.

G. Packing Procedures

Ensure that the environment selected for packing has been well cleaned and free of seeds and insects. Keep packing containers closed as much as possible throughout the packing process so insects cannot crawl in before the containers have been securely closed. Quarantine procedures should be performed as close to the transportation date as possible to ensure that pests do not return as hitchhikers on the packing containers.

H. Packing Containers

1. All supplies and gear must be packed and shipped in SUITABLE PLASTIC PACKING CONTAINERS (see Section A for definitions of packing containers). Packing containers must be constructed of smooth, durable plastic that has been thoroughly cleaned prior to use.
2. Packing containers may be re-used for multiple trips to the refuge(s), but must be thoroughly cleaned before each trip and strictly dedicated to refuge-related projects. Cardboard containers are strictly prohibited because they can harbor seeds and insects.

I. Clothing and Soft Gear

1. All persons entering the refuge(s) must have NEW or REFUGE-DEDICATED clothing and soft gear (including all footwear).
    a. Freeze all clothing and soft gear for 48 hours (including both new and refuge-dedicated).
    b. Fumigation under a tarp or in a large container is also an option.

J. Sensitive Equipment

All sensitive gear (e.g., optical equipment, computers, satellite phones, other electronic equipment) must be thoroughly inspected and cleaned.

K. Non-Sensitive Equipment and Construction Materials

1. All non-sensitive equipment, machinery, and construction materials that are water resistant must be steam cleaned or pressure washed to ensure the removal of all dirt, insects, and seeds from external surfaces.
2. All non-water resistant items must be tented and fumigated to kill unwanted pests or frozen for 48 hours.
3. Quarantine procedures should be performed as close to the transportation date as possible to ensure that pests do not return to the equipment or packing containers.

L. Aircraft Quarantine

Aircraft personnel will ensure that the plane has been thoroughly cleaned and free of any alien species prior to flying to refuge(s). The aircraft captain will notify the Service at least 10 full working days prior to all flights departing for the refuge(s) in order to arrange a quarantine inspection of all cargo bound for the refuge(s). Inspections will take place the scheduled day of departure.

M. Commercial Ships and Barges, and Private Sailing and Motor Vessel Quarantine

1. Ship owners or captains will notify the Service at least 10 full working days prior to all vessels departing for the refuge(s) in order to arrange a quarantine inspection of all vessels and cargo bound for the refuge(s). The inspection will be scheduled as close to the departure date as possible.
2. Ship owners or captains will ensure that all ships and barges entering the refuge(s) have had their hulls cleaned of fouling marine/freshwater organisms. The ships and barges must depart for the refuge(s) within 14 days of having had the hulls cleaned. All ship and barge hulls must be re-cleaned should the vessel return to a port for greater than 14 days before returning to the refuge(s). Results of all hull cleanings must be submitted to the Service 2 full working days prior to the vessel departure. Contact the refuge office for additional details.
3. No discharge of ballast water, grey water, sewage, or waste of any kind will be allowed by any vessel within the refuge boundary (e.g., 12-mile territorial sea).

Compatibility Determination

Use: Traditional Cultural Practices

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kaua‘i, Hawai‘i

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):
The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

This use involves participation in traditional Hawaiian cultural practices on Kīlauea Point National Wildlife Refuge (NWR or Refuge). Such practices include fishing with hook and line, throw net, spear, or shellfish-gathering at Kīlauea (East) Cove (Cove) and collection of plant materials, feathers, and possibly other natural resources (e.g., stone, shells, bone) from areas of the Refuge that are open

to public use. Participants use these resources for subsistence, ceremonial, decorative, medicinal, or other purposes. Traditional cultural practices may also include site-specific ceremonial access.

The rocky shore of the Cove is a traditional native Hawaiian fishing site. Access is from the bluff area on top of Kīlauea Point (Point) along a narrow trail that descends the Cove's steep cliffs. Currently, anglers pull aside a short section of safety fence to access the trail. Because of concerns regarding safety of the access trail, individuals fishing at this site are required to sign a liability release and officially check in with Refuge personnel each day they access the Cove.

Refuge files reveal that fishing at the Cove has occurred year-round and, during the past decade, on an average of approximately 40 days per year. Fishing usually occurs by a single angler or perhaps a few family members at a time. At present, almost all the fishing is by a handful of individuals with genealogical ties to the local community.

The Refuge is currently open for saltwater fishing in designated areas (Refuge-Specific Regulations for Hunting and Fishing, Hawai‘i, 50 CFR 32.30). The Refuge boundary along the coast is the highest wash of the waves. Anglers fish at the Cove with hook and line, throw net, spear, or gather shellfish and can cast from the shore or wade into the surf. Species that could be harvested at the Cove include, but are not limited to, āholehole (Hawaiian flagtail, *Kuhlia sandvicensis*), akule (big-eye scad, *Selar crumenophthalmus*), halalu (juvenile akule), moi (Pacific threadfin, *Polydactylus sexfilis*), ulua (giant trevally, *Caranx ignobilis*, and other jacks of the family Carangidae), pāpio (ulua under 10 pounds), weke (goatfish in the family Mullidae), and oama (juvenile goatfish).

Examples of natural resources of potential interest for collection include, but are not limited to, hala leaves and fruit seeds for weaving mats and baskets, for thatching, and for lei (*Pandanus spp.*); ‘ilima flowers for lei and medicinal purposes (*Sida fallax*); milo wood for woodworking (*Thespesia populnea*); naupaka kahakai flowers and fruits for lei, food, and medicinal purposes (*Scaevola sericea)*; nuts, fronds, and wood of niu (coconut, *Cocos nucifer*) for food, oil, containers, and fiber for cordage, for thatching and weaving baskets, and for woodworking; ti leaves for wrapping food, making clothes, and thatching (*Cordyline fruitcosa*); and possibly other native and naturalized plants (Kāne 1997). Feathers could be gathered, strung, and used to make lei and other items.

Resource collection and access to closed areas are uses not usually available to the general public. Such uses are defined as specialized uses under U.S. Fish and Wildlife Service (Service) policy (Administration of Specialized Uses, 5 RM 17). Official authorization to access the Refuge for these uses will occur through issuance of a special use permit (SUP), unless accompanied by official Refuge personnel.

This compatibility determination (CD) has been developed and made publicly available concurrent with the comprehensive conservation plan (CCP) and associated environmental assessment (EA) for Kīlauea Point NWR.

Availability of Resources:

Following is an estimate of annual costs associated with administering this use on the Refuge:

Tasks	Estimated Costs per Year[1]
1. Oversight by GS-13 Project Leader (approximately 10 hours/year).	$600
2. Oversight by GS-12 Deputy Project Leader (approximately 20 hours/year).	$1,000
3. Oversight by GS-9 Supervisory Park Ranger (approximately 20 hours/year).	$700
4. Law enforcement by GL-9 Law Enforcement Officer (approximately 20 hours/year).	$700
5. Permit monitoring by GS-11 Biologist (approximately 10 hours/year).	$400
6. Refuge overhead costs associated with the above-listed work.[2]	$700
7. Signage and fence maintenance, repair, and materials	$3,000
Total Costs	$7,100

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.
[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

The Refuge currently has adequate budget and staff to support the limited traditional cultural practices on the Refuge, as described herein.

Anticipated Impacts of the Use(s):

With appropriate stipulations, allowing kama‘āina to participate in traditional cultural practices is consistent with Refuge goals 4 and 5.

The vast majority of public use at the Refuge occurs at the Point. Visitors have incredible opportunities to hear and view numerous seabirds as they soar overhead, roost or nest on adjacent cliffs and grassy knolls, and forage in the ocean. Nēnē (Hawaiian goose, *Branta sandvicensis*) are routinely seen close up, on the grounds. Nēnē are fairly tolerant of human disturbance, but many seabirds are wary and flush when approached too closely.

Human disturbance has differential effects on wildlife and is dependent upon, among other variables, the species involved and its age; the time of year; the breeding cycle stage (if applicable); the surrounding environment; whether the activity involves vehicles; the intensity, speed, noise, nature, and frequency of the disturbing activity; and the directness of approach to an animal (Blanc et al. 2006, Holmes et al. 2005, Hammitt and Cole 1998, Knight and Cole 1995a, Knight and Cole 1995b). Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, change in food habits, physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990, Knight and Cole 1995a, Knight and Swaddle 2007, Miller et al. 1998, Miller and Hobbs 2000, Morton et al. 1989, Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Kitaysky et al. (2003) found levels of corticosterone (a major stress hormone) in ʻuaʻu kani (wedge-tailed shearwaters, *Puffinus pacificus*) at the Refuge to be higher in chicks occupying burrows closer to (within 13 feet of) visitor-use areas. Holmes et al. (2005) found that, even at the recommended minimum approach distance (~16 feet), a single wildlife observer in a royal penguin (*Eudyptes schlegeli*) colony on Macquarie Island, Australia, triggered vigilance behavior and an increased heart rate in the birds. In another study, Holmes et al. (2007) found that vigilance behavior of gentoo penguins (*Pygoscelis papua*) increased as the numbers of observers increased. Additional studies in penguin colonies revealed that a slow approach that ended with a visitor sitting quietly and closely observing a bird had little effect on the bird's heart rate, yet a rapid approach that ended with a visitor remaining standing and closely observing a bird resulted in an elevated heart rate (Nimon et al. 1995).

A variety of factors affect flushing distances among waterbirds, including the species involved; the activity the birds are engaged in (e.g., foraging versus nesting); and the type, speed, and noise of disturbance (e.g., approaching birds by walking versus in a motorized boat) (Rodgers and Smith 1997, Rodgers 1991). Flushing of birds or even raising their alert levels (which usually occurs at a greater distance than that for flushing) creates stress and requires animals to expend energy that otherwise would be invested in essential life history activities such as foraging, mating, nesting, brood-rearing, and predator avoidance.

Breeding birds are especially sensitive to human disturbance (Trulio 2005, Hammitt and Cole 1998). A study of visitors to a colony of kittiwakes (*Rissa tridactyla*) and guillemots (*Uria aalge*) revealed that nesting success was influenced by the distance observers were from the birds (positively correlated) and the number of observers involved (negatively correlated) (Beale and Monaghan 2004).

Studies have had mixed results regarding potential habituation of birds and some other taxa to human disturbance. Wildlife are often less disturbed by routine human activities that repeatedly occur along defined routes (e.g., trails, roads, or water channels), especially frequent disturbance that does not involve direct contact or other threat, compared with those activities that occur irregularly and outside predictable paths/channels (Blanc et al. 2006, Holmes et al. 2007, Knight and Cole 1995b).

In studies of breeding yellow-eyed penguins (*Megadyptes antipodes*), a timid and secretive species, Ratz and Thompson (1999) found that the birds appeared to have habituated to the presence of guided tourists who approached the colony through trenches and closely observed or photographed birds from camouflaged blinds. Jungius and Hirsch (1979) studied seabird colonies and found that birds that were believed to have habituated to tourists and revealed no outward behavioral changes in their presence, nonetheless exhibited stress (as reflected in elevated heartbeat frequencies) when approached by visitors. The scientists speculated that the stress could have a negative effect on breeding. Habituation to some types and levels (intensity and frequency) of human disturbance appears to vary among species, within species, between resident and migratory populations, and potentially between inexperienced and experienced breeders. This makes it difficult to forecast habituation in actual field situations.

Fishing will have direct, lethal effects on individual fish and shellfish, the target game species. The amount of loss will depend on the angling pressure (i.e., the number of anglers, days of effort, catch success). To the extent that anglers engaged in catch-and-release practices, the number of individual fish lost per angler will be reduced, but there will still be some percentage of mortality. Angling on the Refuge will be expected to have negligible to minor effects on populations of fish or shellfish

because the State of Hawai‘i regulates fishing consistent with sustained yield population management principles.

Angling is also expected to cause some wildlife disturbance. Walking down and back up the narrow trail that traverses the Cove's cliffs has the potential to disturb seabirds that use cliff-side vegetation for roosting and nesting. Once on the Cove's rocky shore, the angler will be separated by substantial vertical distance from such birds and disturbance is less likely. The amount of disturbance will depend on the proximity of the angler to the birds and the duration of his or her presence.

‘Īlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*) numbers are increasing in the main Hawaiian Islands, especially on and around Ni‘ihau and Kaua‘i (NMFS 2007, Baker and Johanos 2003), and ‘īlio-holo-i-ka-uaua and honu (*Chelonia mydas*) are known to use the Cove's ocean waters and rocky shore. Critically endangered ‘īlio-holo-i-ka-uaua are especially sensitive to human disturbance (NMFS 2007). Seals can be disturbed by people, vehicles, and dogs; disturbance of female adults with pups is of special concern (Gilmartin 2003). Seals may also injure people. Seals, like other pinnipeds, may be vulnerable to diseases transmitted from livestock, pets, and feral animals including heartworm, canine distemper, leptospirosis, toxoplasmosis, and brucellosis (Braun 2003).

Seals haul-out on land to rest, molt, or pup. Approaching anglers could force hauled-out seals to move back into the water and seek a new haul-out site, causing them to expend energy and increasing their exposure to predators. Repeated disturbance over time can cause seals to abandon preferred haul-out sites (Gilmartin 2003). It is generally recommended that individuals viewing or photographing seals and sea turtles maintain a distance of at least 50 yards from the animals and limit their viewing/photographing time to no more than 30 minutes (NOAA undated, NOAA Fisheries et al. undated; "Hawai‘i Viewing Guidelines: Overview, Marine Mammal & Sea Turtle Viewing ‘Code of Conduct'" at http://www.nmfs.noaa.gov/pr/education/Hawai‘i/). The base of the Cove where fishing occurs is less than 50 yards wide. Seals and threatened green sea turtles could also be injured or potentially killed if they became hooked or entangled in fishing lines or nets (NMFS 2007, NMFS and USFWS 1998).

Anglers are expected to cause trampling of native plants, erosion, and potential introduction or spread of nonnative species, including invertebrates, plants, and invasive species. These impacts will be focused in the Cove and surrounding cliffs, and could adversely affect native fish, wildlife, plants, and their habitats. The degree of actual effects upon reproduction, survival of individuals, and diversity and abundance of native species (community health) will depend on specific circumstances. In light of the fact that this trail has been in use for many years, and future use is expected to be light, additional impacts of this nature will be expected to be minimal.

To access the Cove trail, anglers pull away a portion of the public safety fence. If this portion of fence is not properly replaced, cats or dogs could access the area outside the fence that is used by seabirds for roosting and nesting, resulting in additional predation.

The effects associated with collection of plants, feathers, and potentially other natural resources will depend on whether collections were made from live plants or birds, whether the species were natives versus nonnatives, the volume of materials collected, and the areas in which and times of day and year during which the collections occurred. If parts were collected from live plants or birds, the survival of those individuals could be impacted. "Surplus" plant materials, including those that drop or otherwise break off parent plants and lay decomposing on the ground, and detached bird feathers

serve various ecological roles in the environment. Plant parts (e.g., nuts, berries, flowers, and leaves) provide forage for herbivores. Dead and decaying plant parts and feathers are consumed by detritivores and eventually help replenish soil nutrients. Additionally, these materials are used by wildlife for cover and nesting materials. However, if parts were not removed from live organisms and in light of the substantial rainfall and year-round growing period on Kaua‘i (especially on the North Shore), it is unlikely that a modest amount of collection and removal of such materials will measurably impact such ecological cycles or adversely affect associated wildlife values at the Refuge.

A greater impact could result from wildlife disturbance and other indirect effects associated with these collections. If collectors were allowed to freely roam in areas used for foraging, roosting, loafing, or nesting by any of the native species of special management concern, adverse effects could occur. As noted earlier regarding potential effects associated with fishing access, approaching birds too closely raises their alert levels and creates stress. Flushing requires birds to expend energy that would otherwise be invested in essential life history activities such as foraging, mating, nesting, brood-rearing, and predator avoidance. Disturbance can cause nest desertion; impact survival of individual birds, eggs, nestlings, or broods; and alter behavior of nonbreeding birds. Breeding birds are especially sensitive to human disturbance (Trulio 2005).

Additionally, the Refuge has substantial and, in some areas, dense populations of burrow-nesting seabirds. Although some burrows lie on the Point within the area heavily used by Refuge visitors, the vast majority of the burrows are elsewhere, in less disturbed areas of the Refuge. Humans casually walking through nesting colonies could easily crush burrows, destroy nests and eggs, and kill young or adult seabirds. Collectors could also trample native plants, accelerate erosion, and potentially introduce or spread nonnative species, including invertebrates, plants, and invasive species. These impacts could adversely affect native fish, wildlife, plants, their habitats, and are of special concern in Refuge areas struggling with re-establishment of native plant communities.

Public Use

As noted earlier, anglers pull away a portion of the public safety fence to access the Cove trail. Other Refuge visitors could see anglers crossing through the fence and attempt to do so themselves, creating new safety issues.

If resource collecting occurred in areas readily seen by other Refuge visitors, these other visitors could easily become confused regarding what activities are and are not allowed on the Refuge, and this could increase the amount of unauthorized collections that occurred.

Otherwise, it is not expected that participation in traditional cultural practices by a limited number of Refuge visitors will adversely impact other public use at the Refuge.

Cultural Resources and Values

The Refuge contains a number of historic and prehistoric resources, including the Kīlauea Point Light Station (the lighthouse and associated Coast Guard facilities on the Point) that was listed on the National Register of Historic Places as a historic district in 1979 (USFWS 2006). It is not expected that fishing at Kīlauea (East) Cove, including accessing the site along the cliff trail, or limited collecting of plant materials, feathers, and possibly other natural resources will have any effects on cultural resources.

The activities discussed herein are of special cultural significance to native Hawaiians. Providing opportunities for such individuals to use the traditional native Hawaiian fishing site at Kīlauea (East) Cove or to collect and use materials from native plants or canoe plants, feathers, and possibly other natural resources for traditional subsistence, ceremonial, decorative, medicinal, or other purposes will support restoration and maintenance of native Hawaiian cultural values.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge's draft comprehensive conservation plan and environmental assessment.

Determination:

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

1. Individuals participating in traditional cultural practices on the Refuge are allowed to engage in these activities for subsistence, ceremonial, medicinal, decorative, or other similar personal, family, and/or community purposes. Participating in traditional cultural practices on the Refuge for commercial purposes is prohibited.

2. Requests for access to closed areas for nonconsumptive traditional cultural practices (e.g., oli and hula) have been infrequent in the past and therefore will be administered on a case-by-case basis. Access to closed areas is a use not usually available to the general public; such uses are defined as specialized uses and typically require an SUP. In this case, unless the cultural practitioner is accompanied by official Refuge personnel, an SUP will be required. Stipulations within the SUP will take into account impacts to wildlife resources including timing, place, and limits on construction of structures during nesting season. The practice of nonconsumptive traditional cultural activities in open areas (e.g., Kāhili Quarry) will not require a permit. Prior to participating in consumptive traditional cultural practices on the Refuge (including fishing at the Cove and resource collections), unless accompanied by official Refuge personnel, each participant will be issued and need to sign an annual SUP.

3. All resource collectors and anglers will be required to sign a "Release from Injury" form prior to collecting materials from the Refuge or fishing at the Cove. The existing form will undergo a legal review and needed changes will be made, as appropriate. Those who have signed a previous version of the form will have to sign the updated version.

4. Participation in traditional cultural practices at the Cove will be allowed during daylight hours only, when the Refuge is open to visitation by the general public.

5. In order to avoid harassment, disease, and/or death of native wildlife, or transport of nonnative or invasive plant parts, insects, or other undesirable species, individuals participating in traditional

cultural practices are prohibited from bringing dogs or other pets with them onto the Refuge. If a hoʻokupu is comprised of plants or other natural materials, these should be native.

6. In the absence of specific, prior written approval of the Refuge manager (for the purpose of these stipulations, the Refuge manager is the Refuge Project Leader of the Kauaʻi National Wildlife Refuge Complex), or unless specifically allowed by State of Hawaiʻi fishing regulations, individuals participating in traditional cultural practices are prohibited from collecting and removing any archaeological or historic artifacts, abiotic or biological specimens or samples, or mementos from the Refuge.

7. Consistent with Service policy regarding management of nonhazardous solid waste on refuges ("Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901-6992k) – Solid Waste (Nonhazardous)," 561 FW 5), individuals participating in traditional cultural practices are prohibited from littering, dumping refuse, abandoning equipment or materials, or otherwise discarding any items on the Refuge, including unused or excess fishing line, hooks, lures, and bait. A hoʻokupu is not considered litter or refuse.

8. In addition to the stipulations listed here, individuals participating in traditional cultural practices are required to comply with Refuge System-related and other applicable laws, regulations, and policies including "Prohibited Acts" listed in the Code of Federal Regulations (50 CFR 27).

9. No changes can be made to any of these stipulations without specific, prior written approval of the Refuge manager.

Fishing

1. Prior to fishing at the Cove, individuals will first need to officially check in with Refuge personnel to sign in and learn of any changes that could affect their practices that day or into the future. Due to limited areas and to ensure trail safety, group size will be limited to a maximum of five individuals.

2. Prior to descending the Cove trail, Refuge personnel will scan the shore and adjacent waters of the Cove for ʻīlio-holo-i-ka-uaua and honu. Fishing will not be allowed if either seals or turtles are present. Additionally, if an angler is already at the Cove and either seals or turtles appear in Cove waters or on the shore, fishing will be discontinued while these animals are present and the angler will depart the Cove.

3. In order to minimize potential disturbance to roosting and nesting seabirds, anglers will need to descend and ascend the cliff-side Cove trail in as quickly a manner as they could safely do so.

4. In order to reduce the potential for hooking ʻīlio-holo-i-ka-uaua or honu, anglers will be encouraged to use barbless circle hooks while fishing from the shore.

5. Anglers are prohibited from constructing new or maintaining existing structures or fixtures (including rod holders) on the Refuge without specific, prior written approval of the Refuge manager.

6. Anglers are required to abide by Hawai‘i fishing regulations when fishing on the Refuge. This includes securing and having with them relevant State fishing licenses and any other permits needed to fish in the ocean from the Refuge.

7. Participation in fishing at the Cove will be limited to individuals of native Hawaiian heritage who have genealogical ties to the local community, that is, the Kīlauea and Kāhili Ahupua‘a or surrounding ahupua‘a including Namahana, Kalihiwai, Kalihikai, Waiakalua, and Pīla‘a (Wilson and Jay 2010). This restriction is based on a list of Kīlauea sugar plantation families who were previously allowed to fish on Service land. Over generations, a few of these families have acquired and passed down through genealogical ties the knowledge of how to safely access the Cove.

Resource Collecting

1. Prior to resource collecting on the Refuge, traditional cultural practitioners first need to officially check in with Refuge personnel to sign in and learn of any changes that could affect their practices that day or into the future. Individuals wishing to make collections will be provided a map or shown in-person the areas approved for collections and areas that are off-limits to such activities.

2. Individuals wishing to collect from migratory birds or species listed under the Endangered Species Act need to acquire appropriate Federal and State permits and have those permits with them when collecting on the Refuge.

3. Individuals will be limited to a specific amount of material that can be collected each day. Such limits can vary depending on the species or parts to be collected. No collections of feathers or other animal parts may be made from live animals. No collections may be made from live plants listed under the Endangered Species Act.

4. The collection and use of materials from native plants or canoe plants, feathers, and possibly other natural resources for traditional subsistence, ceremonial, decorative, medicinal, or other purposes will not be restricted to specific ahupua‘a.

Cultural Resources and Values

1. In the absence of specific, prior written approval of the Refuge manager, individuals participating in traditional cultural practices are prohibited from disturbing or otherwise adversely impacting any prehistoric, historic, or other cultural resources on the Refuge.

Justification:

By its nature, fishing has direct, lethal effects on individual fish and shellfish. However, angling on the Refuge is expected to have negligible to minor effects on populations of fish or shellfish because of the very limited nature of this use and because the State of Hawai‘i regulates fishing consistent with sustained yield population management principles.

Angling has the potential to cause some disturbance to seabirds and potentially seals and/or turtles. Proposed stipulations will limit the duration of any potential disturbance to seabirds using cliff-side vegetation by requiring that anglers descend and ascend the cliff-side Cove trail in as quickly a

manner as they can safely do so. Additionally, fishing will not be allowed if either seals or turtles are present.

Fishing at the Cove will remain a safe activity because access will be limited to daylight hours and to individuals who have personal knowledge and a lengthy family history of using this traditional Hawaiian fishing site. The Refuge will install a locked gate with a warning sign along the section of fence used to access the Cove trail. This will minimize the likelihood that unauthorized visitors will access the steep and narrow Cove trail.

As with fishing at the Cove, it is expected that a limited number of individuals will participate in resource collecting at the Refuge. Refuge personnel will direct collectors away from areas of the Refuge where native plants and animals could be disturbed or destroyed. Additionally, there will be daily collection limits by species or parts, and no collections could be made from live animals or plants listed under the Endangered Species Act. With these stipulations, it is expected that resource collecting will not have a measurable effect on Refuge resources.

Providing opportunities for traditional cultural practices on the Refuge supports perpetuation of native Hawaiian cultural values.

As noted earlier, one of the purposes of the Refuge is to provide fish and wildlife-oriented recreation. Although the activities discussed herein are of special cultural significance, fishing and resource collecting could also be considered wildlife-oriented recreational activities and therefore could help support achievement of Refuge purposes.

The Refuge will monitor compliance with the stipulations enumerated herein. This will include enforcement of Hawai‘i fishing regulations.

The Refuge will monitor fishing, resource collecting, wildlife and habitat disturbance, conflicts with other Refuge visitors, and other potential impacts to determine if these stipulations result in expected and desirable outcomes. The Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of these uses. New or modified stipulations could be instituted as a result of new information generated by ongoing or new studies; new legal, regulatory, or policy requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants, or their habitats; changes to fishing practices; or for other legitimate reasons. Refuge personnel will advise individuals participating in traditional cultural practices of any such changes. Any significant changes to rules for fishing on the Refuge will be appropriately promulgated as Federal regulations. These regulations will be supplemented by Refuge-specific information available onsite or at the Kaua‘i National Wildlife Refuge Complex headquarters office.

The Refuge also reserves the right to terminate permission for these uses if individuals participating in traditional cultural practices violate Refuge rules or regulations; if unacceptable impacts occur to native fish, wildlife, plants, their habitats, cultural resources, Refuge facilities, or other Refuge visitors; or for other legitimate reasons.

Compatibility Standard

In order to be allowed on the Refuge, traditional cultural practices need to be determined compatible. By allowing these uses to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, other public uses, and cultural resources. For the several reasons stated above and consistent with the stipulations described herein, this use will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point NWR's purposes; or the Refuge System's mission.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: Traditional Cultural Practices

Refuge Determination:

Prepared by: Acting _____ (Signature) 9/9/15 (Date)

Approved by Project Leader, Kaua'i National Wildlife Refuge Complex: _____ (Signature) 9/9/15 (Date)

Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office: Barry W. _____ (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region: Kevin S. Foerster (Signature) 9/16/15 (Date)

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Compatibility Determination

Use: Wildlife Observation and Photography and Interpretation

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kaua‘i, Hawai‘i

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):
The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

Interpretation is the communication of information about, or the explanation of, the nature, origin, and purpose of historical, natural, or cultural resources, objects, sites, and phenomena. The National Association for Interpretation defines interpretation as "…a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and the

meanings inherent in the resource" (http://www.interpnet.com/). For national wildlife refuges, the purposes of interpretation are to convey an understanding of and appreciation for refuge resources, the issues that affect them, and the conservation techniques and programs pursued in their management (Interpretation, 605 FW 7). For purposes of this compatibility determination (CD), interpretation addresses environmental and cultural resources and values.

Wildlife observation, photography, and interpretation are often enhanced with the provision of brochures, wildlife and plant lists, interpretive signs and displays, trails, vehicle pullouts, viewing platforms or towers, viewing equipment, photography or viewing blinds, interpretive presentations and tours, visitor stations or centers, and bookstores or similar retail outlets. Many of these facilities and information sources serve all three activities. In addition, all three activities are often enjoyed together. Information can be conveyed in person, in writing, with images, with sound, and, increasingly, through a diversity of electronic media and devices.

For purposes of this CD, observation and photography include viewing and capturing images of wild plants and animals, wildlife habitats, wildlands, waters, landscapes, cultural resources, and cultural activities; noncommercial recording of all types (e.g., filming, videography, audiography, writing, and drawing or painting); and general nature study and appreciation. Recording of images and audio for commercial purposes is addressed in a separate CD for commercial wildlife and landscape filming and photography. Observation, photography, and interpretation opportunities offered by commercial tours are addressed in the CD for commercial tours.

Kīlauea Point NWR provides multiple opportunities for visitors to enjoy observation, photography, and interpretation. Refuge visitors can engage in these activities during open times (10 a.m. to 4 p.m. on Tuesday–Saturday, except Federal holidays) by visiting any of Kīlauea Point National Wildlife Refuge's (NWR or Refuge) open areas, including Kīlauea Point (Point), the cul-de-sac (turnaround) at the end of Kīlauea Road (Overlook), Kāhili Quarry area, and a trail on Crater Hill during guided interpretive hikes. Almost all public use on the Refuge occurs on the Point, the same location for the vast majority of current observation, photography, and interpretation opportunities. This area offers outstanding opportunities for observation and photography of a diversity of native seabirds, nēnē (Hawaiian goose, *Branta sandvicensis*), and sometimes shorebirds, whales, dolphins, seals, and sea turtles; the Kīlauea Point Light Station; and classic Hawaiian coastal scenery, including undeveloped bluffs, the remnant walls of an ancient volcano, rocky beaches, and nearshore ocean and islands.

The Point is approximately 31 acres in size. Facilities that support observation, photography, and interpretation include the Overlook, access road and two parking areas, fee station, visitor center, contact station, outdoor interpretive panels, viewing scopes, trails, perimeter safety fence, restrooms, and recycling and trash receptacles. The visitor center includes indoor interpretive exhibits and a bookstore. The contact station has displays, information about the Refuge and lighthouse, and interpretive videos. At the fee station, visitor center, and contact station, visitors can obtain brochures with information about the Refuge and its valuable natural and cultural resources. Visitors can access the lighthouse on a guided tour, currently offered weekly and on Lighthouse Day. Visitor services provided on a regular basis on the Point include in-person orientation, information, and interpretation by roving volunteer interpreters, binoculars and field guides available to borrow, and a golf cart to provide local transportation for visitors with disabilities and others wishing assistance. In addition to its regular offerings, the Refuge also provides extra visitor opportunities and services during Refuge special events, such as Lighthouse Day and National Wildlife Refuge Week. During these events, special interpretive guides and hikes (e.g., on Crater Hill and Mōkōlea Point) are offered. Crater Hill includes a rustic trail(s) and two overlooks. The Kīlauea Point Natural History Association (KPNHA,

the Refuge's cooperating association and Friends group) provides substantial staffing support for the visitor services program on the Point. This area is accessed from the town of Kīlauea primarily by automobile via Kīlauea Road. Efforts are ongoing to provide a trail connection between Kīlauea Town and the Refuge, and to increase exhibits and workshops focused on wildlife observation and photography. Visitors are assessed a fee to enter the main public use area on the Point and a fee will be charged for limited Crater Hill hikes (except during National Wildlife Refuge Week).

Refuge visitors can also enjoy observation and photography ancillary to fishing or other activities at Kāhili Quarry, or associated with invasive species control or a habitat restoration work party, or a special tour led by Refuge personnel, a volunteer, or other U.S. Fish and Wildlife Service- (Service) authorized agent. Observation, photography, and interpretation opportunities are also provided through ecotourism operations. Such operations are addressed in a separate CD (Commercial Tours).

Under the management direction of the CCP, a new visitor center, maintenance, and other facilities and functions will potentially be developed off the Refuge. This new set of facilities will provide visitor contact, orientation and information, fee collection, restrooms, bookstore/retail space, a multipurpose room, outdoor spaces, administration offices, private vehicle and tour bus parking, public bus stop, shuttle pick up/drop off, and maintenance baseyard (with buildings to store supplies and store and maintain/repair equipment). A location has not been chosen for these new facilities, but they could be sited adjacent to the Refuge boundary or up to 1 mile away. Additionally, parking for private automobiles on the Point will potentially be eliminated and visitors will primarily access the Refuge via a shuttle from Kīlauea town and/or the new visitor center. It is also proposed that bicycle parking be provided at the Overlook.

On the Point, the existing visitor center will be remodeled to provide EE or interpretive exhibits and displays, interpretation at the contact station will be expanded, one of the former lighthouse quarters will be restored and converted into a living history site, another of the former lighthouse quarters will be remodeled to provide basic administrative and volunteer offices, at least one guided interpretive activity will be offered daily, and potentially a limited number of guided interpretive hikes to Crater Hill will be offered. Signage at the Overlook will be enhanced to provide more information and interpretation. In addition, efforts will be made to increase opportunities for up-close wildlife observation and photography (e.g., with remote cameras and observation/photo blinds). As a result of all these changes, it is expected that the number and quality of observation, photography, and interpretive opportunities will substantially increase.

Observation, photography, and interpretation are wildlife-dependent general public uses and are to be given special consideration in refuge planning and management. When determined compatible on a refuge-specific basis, a wildlife-dependent use becomes a priority public use for that refuge and is to be facilitated, subject to such restrictions or regulations as may be necessary, reasonable, and appropriate (National Wildlife Refuge System Administration Act).

This compatibility determination (CD) has been developed and made publicly available concurrent with the comprehensive conservation plan (CCP) and associated environmental assessment (EA) for Kīlauea Point NWR.

Availability of Resources:

It is early in the planning process for a potential new visitor center and other facilities for the Refuge. In addition, these facilities will serve multiple purposes (including administrative and maintenance functions in addition to visitor services), so costs will need to be appropriately allocated among various public uses. Therefore, no estimate is made here of the share of construction, operation, and maintenance costs of this set of facilities supportive of observation, photography, and interpretation.

Following is an estimate of one-time costs associated with this program:

Projects	Estimated Costs[1]
1. Conversion of visitor center to provide interpretive exhibits and displays.	$200,000
2. Expansion of interpretation at the contact station.	$150,000
3. Restoration and conversion of former lighthouse quarters into a living history site.	$550,000
4. Orientation materials and/or trainings.	$40,000
Total Costs	$940,000

[1] Costs displayed are totals for these changes. Note that many of these changes will also benefit environmental interpretation and education and other uses of the Refuge.

Following is an estimate of other costs associated with administering this use on the Refuge:

Tasks	Estimated Costs per Year[1]
1. Oversight by GS-13 Project Leader (approximately 20 hours/year).	$1,200
2. Oversight by GS-12 Deputy Project Leader (approximately 20 hours/year).	$1,000
3. Administration and oversight by GS-9 Supervisory Park Ranger, including recruiting and training staff and volunteers (approximately 80 hours/year).	$2,900
4. Law enforcement by GL-9 Law Enforcement Officer (approximately 40 hours/year).	$1,500
5. Refuge overhead costs associated with the above-listed work.[2]	$1,300
6. Facility maintenance, repair, and materials	$5,000
7. Supplies (including brochures)	$3,000
Total Costs	$15,900

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.
[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

With the substantial support of KPNHA and volunteers, the Refuge has adequate budget and staff to support the current level of observation, photography, and interpretation on the Refuge.

Anticipated Impacts of the Use(s):

In the long term, under the management direction of the CCP, a potential new offsite visitor center, maintenance, and other facilities could provide enhanced interpretation opportunities, and wildlife observers and photographers will likely stop in to enjoy its many features. However, in the absence of site-specific information, attempting to assess many of the anticipated direct and indirect impacts of the construction and operation of these new facilities is premature. Additionally, these facilities will serve multiple purposes (including administrative and maintenance functions in addition to

visitor services), so effects attributable to wildlife observation, photography, and interpretation will be only a portion of the total effects. For these reasons, many of the anticipated impacts of these potential new facilities are beyond the scope of this evaluation and are not addressed herein. More detailed evaluations will need to be undertaken, including site-specific effects analysis in compliance with the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), and other applicable laws and policies. Readers are also referred to the EA accompanying the Refuge CCP for more information.

Wildlife observation, photography, and interpretation activities support Refuge goal numbers 4, 5, and 6. It is expected that these uses will enhance the public's understanding of and appreciation for the importance of conservation; therefore, they will also support the Refuge System mission.

The vast majority of public use, including observation, photography, and interpretation, at the Refuge occurs at the Point. Visitors have incredible opportunities to hear and view numerous seabirds as they soar overhead, roost or nest on adjacent cliffs and grassy knolls, and forage in the ocean. Nēnē are routinely seen close-up on the grounds. Nēnē are fairly tolerant of human disturbance, but many seabirds are wary and flush when approached too closely.

The effects of wildlife observation and photography, and environmental interpretation upon wildlife will likely be associated with disturbance. Human disturbance has differential effects on wildlife and is dependent upon, among other variables, the species involved and its age; the time of year; the breeding cycle stage (if applicable); the surrounding environment; whether the activity involves vehicles; the intensity, speed, noise, nature, and frequency of the disturbing activity; and the directness of approach to an animal (Blanc et al. 2006, Holmes et al. 2005, Hammitt and Cole 1998, Knight and Cole 1995a, Knight and Cole 1995b). Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, change in food habits, physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990, Knight and Cole 1995a, Knight and Swaddle 2007, Miller et al. 1998, Miller and Hobbs 2000, Morton et al. 1989, Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Kitaysky et al. (2003) found levels of corticosterone (a major stress hormone) in ʻuaʻu kani (wedge-tailed shearwaters, *Puffinus pacificus*) at the Refuge to be higher in chicks occupying burrows closer to (within 13 feet of) visitor-use areas. Holmes et al. (2005) found that, even at the recommended minimum approach distance (~16 feet), a single wildlife observer in a royal penguin (*Eudyptes schlegeli*) colony on Macquarie Island, Australia, triggered vigilance behavior and an increased heart rate in the birds. In another study, Holmes et al. (2007) found that vigilance behavior of gentoo penguins (*Pygoscelis papua*) increased as the numbers of observers increased. Additional studies in penguin colonies revealed that a slow approach that ended with a visitor sitting quietly and closely observing a bird had little effect on the bird's heart rate, yet a rapid approach that ended with a visitor remaining standing and closely observing a bird resulted in an elevated heart rate (Nimon et al. 1995).

A variety of factors affect flushing distances among waterbirds, including the species involved; the activity the birds are engaged in (e.g., foraging versus nesting); and the type, speed, and noise of disturbance (e.g., approaching birds by walking versus in a motorized boat) (Rodgers and Smith 1997, Rodgers 1991). Flushing of birds or even raising their alert levels (which usually occurs at a

greater distance than that for flushing) creates stress and requires animals to expend energy that otherwise would be invested in essential life history activities such as foraging, mating, nesting, brood-rearing, and predator avoidance.

Breeding birds are especially sensitive to human disturbance (Trulio 2005, Hammitt and Cole 1998). A study of visitors to a colony of kittiwakes (*Rissa tridactyla*) and guillemots (*Uria aalge*) revealed that nesting success was influenced by the distance observers were from the birds (positively correlated) and the number of observers involved (negatively correlated) (Beale and Monaghan 2004).

Studies have had mixed results regarding potential habituation of birds and some other taxa to human disturbance. Wildlife are often less disturbed by routine human activities that repeatedly occur along defined routes (e.g., trails, roads, or water channels), especially frequent disturbance that does not involve direct contact or other threat, compared with those activities that occur irregularly and outside predictable paths/channels (Blanc et al. 2006, Holmes et al. 2007, Knight and Cole 1995b).

In studies of breeding yellow-eyed penguins (*Megadyptes antipodes*), a timid and secretive species, Ratz and Thompson (1999) found that the birds appeared to have habituated to the presence of guided tourists who approached the colony through trenches and closely observed or photographed birds from camouflaged blinds. Jungius and Hirsch (1979) studied seabird colonies and found that birds that were believed to have habituated to tourists and revealed no outward behavioral changes in their presence, nonetheless exhibited stress (as reflected in elevated heartbeat frequencies) when approached by visitors. The scientists speculated that the stress could have a negative effect on breeding. Habituation to some types and levels (intensity and frequency) of human disturbance appears to vary among species, within species, between resident and migratory populations, and potentially between inexperienced and experienced breeders. This makes it difficult to forecast habituation in actual field situations.

ʻĪlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*) numbers are increasing in the main Hawaiian Islands, especially on and around Niʻihau and Kauaʻi (NMFS 2007, Baker and Johanos 2003). Critically endangered ʻīlio-holo-i-ka-uaua are very sensitive to human disturbance (NMFS 2007) and disturbance of female adults with pups is of special concern (Gilmartin 2003). Seals may also injure people. Seals haul out on land to rest, molt, or pup. Approaching observers, photographers, or participants in an interpretation program could force hauled-out seals to move back into the water and seek a new haul-out site, causing them to expend energy and increasing their exposure to predators. Repeated disturbance over time can cause seals to abandon preferred haul-out sites (Gilmartin 2003). It is generally recommended that individuals viewing or photographing seals and sea turtles maintain a distance of at least 50 yards from the animals and limit their viewing/photographing time to 30 minutes (NOAA undated, NOAA Fisheries et al. undated; "Hawaiʻi Viewing Guidelines: Overview, Marine Mammal & Sea Turtle Viewing ʻCode of Conduct'" at http://www.nmfs.noaa.gov/pr/education/Hawaiʻi/).

Wildlife disturbance can be a special concern with wildlife observation and photography (Cline et al. 2007, DeLong 2002, Knight and Cole 1995). Observers and photographers often want to enhance their view or photograph by encroaching closer and closer to their subject. This can cause increased stress in wildlife and eventually lead to flushing. If a bird is nesting or brood-rearing, disturbance can cause temporary or permanent nest desertion. Even if only temporary, eggs and nestlings can face survival challenges associated with temperature extremes and predation.

Observers, photographers, or participants in interpretation programs could also cause trampling of native plants, erosion, and introduction or spread of nonnative species, including invertebrates, plants, and invasive species. All of these impacts will adversely affect native fish, wildlife, plants, their habitats, and are of special concern in Refuge areas struggling with re-establishment of native plant communities. The degree of actual effects upon reproduction, survival of individuals, and diversity and abundance of native species (community health) will depend on specific circumstances.

The Refuge has substantial and, in some areas, dense populations of burrow-nesting seabirds. Although some burrows lie on the Point adjacent to the area heavily used by Refuge visitors, the vast majority of the burrows are elsewhere, in less disturbed areas of the Refuge, such as Crater Hill. Humans casually walking through nesting colonies could easily crush burrows, destroy nests and eggs, and kill young or adult seabirds.

Crater Hill grasslands are primarily composed of nonnative species such as Kikuyu grass (*Pennisetum clandestinum*); however, these areas provide actual and potential habitat for roosting, foraging, and breeding activities by nēnē, mōlī (Laysan albatross**,** *Phoebastria immutabilis*), and shorebirds. Additionally, major efforts have been undertaken to reintroduce native plants to this area. Areas on the Point that receive almost all of the Refuge's visitation and the core of the Kāhili Quarry are hardened and therefore experience very few effects from public use. However, a substantial increase in public use of Crater Hill will increase the potential for erosion and compaction of trails, for crushing of nesting burrows, for disturbance to native birds using the grasslands, and to outplanting of native vegetation. Crater Hill hikes will be limited in frequency and number of participants, guided, and appropriately scheduled to minimize adverse effects.

The Refuge's Kāhili Quarry area is also open to general public use, including observation and photography. Walking through the Quarry area and along the ocean-side trail at the east base of Mōkōlea Point is expected to cause some wildlife disturbance. Seabirds nest in the vegetation at the base of the cliffs at Kāhili Quarry. Nesting birds and their young are expected to experience stress, possibly flush, and potentially be more vulnerable to predation if visitors approached nesting sites too closely, too quickly, too noisily, in too large of groups, or with dogs. The proposed new fencing alignment and north end gate, along with restrictions on dog walking, will greatly reduce public use impacts to wildlife.

The several stipulations associated with these uses have been designed to greatly reduce the likelihood and magnitude of potential biological effects. Importantly, on the Point—where almost all observation, photography, and interpretation occur—visitors will be required to remain behind the perimeter fencing. Elsewhere on the Refuge, visitors will be required to not cross fences and otherwise abide by closed area signage. These use conditions will greatly reduce disturbance to roosting and breeding birds.

Public Use

The vast majority of visitors to the Refuge enjoy observation, photography, and interpretation on the Point. This area (approximately 31 acres in size) and existing facilities (e.g., parking area, visitor center, and contact station) are relatively small for the visitation the Refuge experiences. The single access road is narrow and the parking areas are small. There is no single-direction drive through of the parking areas (vehicles must turn around to exit the Refuge). Because of this, the number and size of vehicles that can be safely accommodated are limited. Additionally, the number of visitors who can simultaneously enjoy a high quality, wildlife-dependent educational or recreational experience

onsite is limited. If implemented, a new visitor center will allow development of more and higher quality interpretive exhibits, displays, and a larger bookstore. The new visitor center could have many more parking spaces than currently provided on the Point, which, along with the shuttle, will allow more visitors to access and enjoy the Point.

Improved signage will reduce the likelihood that visitors wishing to visit the Point do not become lost in Kīlauea Town. Restoration of habitat underlying the current parking area and maintenance facilities will allow visitors additional opportunities to observe and photograph native wildlife and plants. As noted above, stipulations associated with these uses will require visitors to remain behind the perimeter fencing on the Point, and not cross fences and otherwise abide by closed area signage elsewhere on the Refuge. These use conditions will greatly reduce potential public safety concerns.

Cultural Resources and Values

The Refuge contains a number of historic and prehistoric resources, including the Kīlauea Point Light Station (the lighthouse and associated Coast Guard facilities on the Point) that was listed on the National Register of Historic Places as a historic district in 1979 (USFWS 2006). It is not expected that observation, photography, and interpretation will have any effects on cultural resources.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge's draft comprehensive conservation plan and environmental assessment.

Determination:

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

1. Until the potential new visitor center and associated transportation infrastructure are developed and operating, visitors will continue to access the Point area of the Refuge along the narrow access road and park in one of the small parking areas. Once the parking areas filled, the Refuge will be closed to new vehicles until an existing vehicle has departed.

2. The Point area of the Refuge will be open from 10 a.m. to 4 p.m. on Tuesday–Saturday, except on Federal holidays. Hours and days may be adjusted depending upon the availability of staff and resources. Visitors will be charged an entrance fee. For their safety and to minimize disturbance to roosting and breeding birds, visitors to this area will be required to remain behind the perimeter fencing. Similarly, visitors elsewhere on the Refuge will be required to not cross fences and otherwise abide by closed area signage. The Refuge will continue to maintain trails, fences, and adjacent vegetation to ensure safety and enhance wildlife and landscape viewing and photography opportunities.

3. Visitors will be informed of desired behaviors when viewing and photographing wildlife. Examples include the "Principles of Ethical Field Practices" developed by the North American Nature Photography Association. Among others, these principles include not distressing or otherwise interfering with animal behaviors, using telephoto lenses to photograph animals, and adherence to local regulatory requirements. Other practices that can reduce wildlife disturbance when observing or photographing wildlife include use of observation/photo blinds and use of binoculars or spotting scopes to enable good viewing while maintaining a respectful distance from individuals or colonies. Observers and photographers are prohibited from using feed or call playback recordings on the Refuge to attract wildlife.

   When viewing or photographing ʻīlio-holo-i-ka-uaua or honu (*Chelonia mydas*), whether these animals are in the water or on shore, visitors are required to maintain a distance of at least 50 yards and limit their viewing/photographing time to 30 minutes (NOAA undated). ʻIlio-holo-i-ka-uaua and honu are both listed under the Endangered Species Act (ESA) and ʻilio-holo-i-ka-uaua is also listed under the Marine Mammal Protection Act (MMPA). These acts have mechanisms to encourage management for population growth and recovery and to prohibit any form of "take," except for limited exceptions authorized under Federal permits. Under the ESA, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Under the MMPA, "take" includes actions such as hunting, harassing, killing, capturing, injuring and disturbing a marine mammal. There are established civil and criminal penalties for, at a minimum, disturbing ʻīlio-holo-i-ka-uaua or honu by getting too close or staying too long which alter their behavior, thus resulting in take. If ʻīlio-holo-i-ka-uaua or honu display signs of being disturbed, then that 50 yards will be expanded and/or viewing will be minimized or shut down to stop the disturbance and avoid potential take.

4. Hikes on Crater Hill will require the use of a guide(s) (Refuge staff or trained volunteer), will be limited to individuals 9 years or older (individuals between 9 and 16 years old require adult accompaniment) and, unless through prior written agreement with the Refuge manager, a maximum of 15 visitors per group. Hikes will be offered at a limited frequency, and will be routed and scheduled to avoid key breeding areas and seasons by seabirds and nēnē. With the exception of special, free hikes during National Wildlife Refuge Week, reservations (up to four persons per reservation) will be required and adults (16 years or older) will be charged a moderate fee to join these hikes. An injury waiver ("Release from Injury" form) will be required. The Service will assess erosion and compaction on trails and wildlife effects of visitation (e.g., disturbance and crushing of burrows) on Crater Hill and elsewhere and develop solutions to any problems. Potentially, actions could include hardening of trails, rebuilding or rerouting of trails, reducing the frequency of use of trails, rescheduling use of trails, and/or closing trails.

5. To ensure that visitors are provided high quality orientation, information, and interpretation, the Refuge will continue to provide comprehensive training, at least annually, to roving volunteer interpreters and other Refuge volunteers.

6. In order to avoid harassment, disease, and/or death of native wildlife, or transport of nonnative or invasive plant parts, insects, or other undesirable species, individuals participating in wildlife observation, photography, and interpretation are prohibited from bringing dogs or other pets to the Point. An exception is legitimate, leashed guide animals.

7. At Kāhili Quarry area, the Refuge proposes to build a new, predator-resistant fence at the base of vegetation growing down the cliffs defining Mōkōlea Point. The fence line will extend to the ocean at the northern end of the main Quarry area. Visitors will be allowed to bring dogs, but prohibited from bringing cats or other pets with them to the Kāhili Quarry area. All dogs brought onto the Refuge in this area are required to be leashed on a short (8-foot maximum) leash and under control at all times and are not be allowed to run free. Dogs will not be allowed to accompany pedestrians past the northeastern end of the main Quarry area.

8. Visitors are prohibited from constructing new or maintaining existing structures; from littering, dumping refuse, abandoning equipment or materials, or otherwise discarding any items; from disturbing or otherwise adversely impacting any prehistoric, historic, or other cultural resources; or collecting and removing any archaeological or historic artifacts, abiotic or biological specimens or samples, or mementos from the Refuge. The Refuge will provide visitors with information and will maintain facilities at the Point (e.g., recycling and trash containers) to encourage recycling of water bottles and other recyclables and discourage littering. Additionally, visitors will continue to be able to recycle Refuge brochures at the entrance fee station.

9. In addition to the stipulations listed here, visitors are required to comply with Refuge System-related and other applicable laws, regulations, and policies including "Prohibited Acts" listed in the Code of Federal Regulations (50 CFR 27).

10. No changes can be made to any of these stipulations without specific, prior written approval of the Refuge manager (for the purpose of these stipulations, the Refuge manager is the Refuge Project Leader of the Kauaʻi National Wildlife Refuge Complex).

Justification:

Service policy states that, "Viewing and photographing wildlife in natural or managed environments should foster a connection between visitors and natural resources" (General Guidelines for Wildlife-Dependent Recreation, 605 FW 1). Policy also advises that wildlife observation and photography can promote understanding and appreciation of natural resources and their management across the Refuge System (Wildlife Observation, 605 FW 4 and Wildlife Photography, 605 FW 5).

Participation in Refuge interpretive and informational programs can instill a sense of wonder; cultivate a connection with nature; foster a life-long relationship with a Refuge and the Refuge System; encourage a conservation ethic; and enhance the public's understanding of and appreciation for fish, wildlife, plants, their habitats, cultural resources, and Refuge management programs to conserve these valuable resources.

Service policy and Federal law require that wildlife-dependent public uses, including wildlife observation, photography, and environmental interpretation, be given special consideration in refuge planning and management, and opportunities to allow these uses are to be considered in each refuge CCP (Refuge Planning Overview, 602 FW 1 and NWRS Administration Act). When determined compatible on a refuge-specific basis, a wildlife-dependent use, including interpretation, becomes a priority public use for that refuge and is to be facilitated, subject to such restrictions or regulations as may be necessary, reasonable, and appropriate (National Wildlife Refuge System Administration Act).

Visitation figures (19th highest in the Refuge System) reflect the popularity of the observation, photography, interpretation, and other public use opportunities currently available at Kīlauea Point NWR. Maintaining these uses will continue that tradition and open the way for new and exciting enhancements.

These activities can cause some wildlife disturbance. However, they have been available on the Refuge for decades and existing facilities and program management have appropriately minimized effects upon native wildlife, plants, their habitats, and cultural resources. The stipulations included herein continue those efforts and provide additional protection.

The Refuge will monitor compliance with the stipulations enumerated herein. The Refuge will also monitor wildlife and habitat disturbance and other potential impacts to determine if these stipulations result in expected and desirable outcomes. The Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of these uses. New or modified stipulations could be instituted as a result of new information generated by ongoing or new studies; new legal, regulatory, or policy requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants, or their habitats; or for other legitimate reasons. Visitors will be appropriately advised of any such changes.

The Refuge also reserves the right to terminate permission for these uses if individuals violate Refuge rules or regulations; if unacceptable impacts occur to native fish, wildlife, plants, their habitats, cultural resources, Refuge facilities, or other Refuge visitors; or for other legitimate reasons.

Compatibility Standard

In order to be allowed on the Refuge, wildlife observation, photography, and interpretation need to be determined compatible. By allowing these uses to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, other public uses, and cultural resources. For the several reasons stated above and consistent with the stipulations described herein, these uses will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point NWR's purposes; or the Refuge System's mission.

Mandatory Re-Evaluation Date:

__X__ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

_____ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: Wildlife Observation, Photography, and Interpretation

Refuge Determination:

Prepared by: Acting _____ (Signature) 9/9/15 (Date)

Approved by Project Leader, Kaua'i National Wildlife Refuge Complex: _____ (Signature) 9/9/15 (Date)

Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office: Barry W. _____ (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region: Kevin S. Foerster (Signature) 9/16/15 (Date)

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Compatibility Determination

Use: Dog Walking (Kāhili Quarry)

Refuge Name: Kīlauea Point National Wildlife Refuge

County and State: County of Kaua‘i, Hawai‘i

Establishing and Acquisition Authorities:

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, as amended (16 U.S.C. 667b–667d)
- Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k–460k-4)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531–1544)
- Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Pub. L. 108–481)

Refuge Purpose(s):
The purposes for Kīlauea Point NWR have been identified in historic legal documentation establishing and adding refuge lands and are specified as follows:

> "… particular value in carrying out the national migratory bird management program …" (Transfer of Certain Real Property for Wildlife Conservation Purposes Act)
>
> "… suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors …" (Refuge Recreation Act)
>
> "… to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (Endangered Species Act)
>
> "(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…" (Kīlauea Point National Wildlife Refuge Expansion Act)

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife 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." (National Wildlife Refuge System Administration Act of 1966 as amended, 16 U.S.C. 668dd–668ee).

Description of Use(s):

The public comes to Kāhili Quarry (Quarry) with several objectives, including (1) fishing or shellfishing; (2) viewing or photographing wildlife; or (3) accessing off-Refuge areas for surfing, swimming, kayaking, and other uses. Some bring their dogs with them while engaging in these activities. The Code of Federal Regulations states that no dog shall be permitted to roam at large on

refuge lands (50 CFR 26.21(b)). Kauaʻi County ordinance requires dogs to be on-leash when off the owner's property (Kauaʻi County Code Leash Law Section 22, Article 2: "Dogs must be under control of the owner by a leash (not more than 8 feet long) when off the owner's property"). However, qualitative observations have shown that a substantial percentage of dogs at Kāhili Quarry, as well as adjacent off-Refuge areas (e.g., Kāhili Beach), are unleashed. Dogs may also be present at night, either accompanying visitors engaged in night fishing or unauthorized overnight camping.

The Quarry area has received substantial public use for many years. Its naturalness is already compromised and it includes many nonnative plants. However, the Quarry is an important buffer area for wildlife resources on Mōkōlea Point and Crater Hill, including breeding sites for nēnē (Hawaiian goose, *Branta sandvicensis*), mōlī (Laysan albatross**,** *Phoebastria immutabilis*), ʻuaʻu kani (wedge-tailed shearwaters, *Puffinus pacificus*), koaʻe ʻula (red-tailed tropicbirds, *Phaethon rubricauda*), as well as roosting or foraging sites for pueo (Hawaiian short-eared owl, *Asio flammeus sandwichensis*) and ʻiwa (great frigatebird, *Fregata minor*).

The Refuge will allow people to walk dogs on Kīlauea Point NWR, at the southwestern end of the Quarry while engaging in one or more of the existing wildlife-dependent public uses (fishing, wildlife observation, and photography) or while accessing off-Refuge areas (Kīlauea River, Kīlauea Bay, and Kāhili Beach) for stream, beach, and ocean uses.

Dogs are required to be on-leash (8 feet or less) and under control at all times. Leashed dogs on the designated area will be allowed concurrent with other public use on a year-round basis. Visitors walking their dogs on-leash are required to pick up after their dogs(s) and remove all feces from the Refuge. Dogs will not be allowed past the northeastern end of the main Quarry area. The Refuge will appropriately post its jurisdictional boundary in the Quarry area. A new, predator-resistant fence will replace the existing fence and be constructed at the base of vegetation growing down the cliffs defining Mōkōlea Point. The fence line will extend to the ocean at the northern end of the main Quarry area.

The Refuge will post a sign(s) at the end of pavement on Kāhili Road advising visitors that dogs must be on-leash, under direct control at all times, and that dog feces must be picked up and removed from the Refuge. The northeastern end of the main Quarry area will also be signed to indicate that dogs may not be walked in that area. The Refuge will enforce these regulations through warnings and ticketing by the Kauaʻi National Wildlife Refuge Complex law enforcement officer. Periodic evaluations will be done to ensure that dog walking does not interfere with compatible, wildlife-dependent uses or impact wildlife resources. Unacceptable levels of violations or disturbance will result in eliminating or restricting dog walking at the Quarry. This CD will be revised within 10 years of this CCP or sooner, to incorporate additional data and new information.

Availability of Resources

Following is an estimate of one-time costs associated with this program:

Projects	Estimated Costs[1]
1. Replacement of existing fence with new predator-resistant fence along the base of vegetation growing down the cliffs defining Mōkōlea Point.	$300,000
2. Posting of jurisdictional boundary with signage and low-profile monuments.	$20,000
3. Installation of new informational and regulatory signage.	$10,000
Total Costs	$330,000

[1] Costs displayed are totals for these changes. Note that many of these changes will also benefit other uses occurring at Kāhili Quarry.

Following is an estimate of annual costs associated with administering this use on the Refuge:

Tasks	Estimated Costs per Year[1]
1. Oversight by GS-13 Project Leader (approximately 10 hours/year).	$600
2. Oversight by GS-12 Deputy Project Leader (approximately 10 hours/year).	$500
3. Oversight by GS-9 Supervisory Park Ranger (approximately 40 hours/year).	$1,400
4. Law enforcement by GL-9 Law Enforcement Officer (approximately 80 hours/year).	$3,000
5. Monitoring by GS-11 Biologist (approximately 20 hours/year).	$900
6. Refuge overhead costs associated with the above-listed work.[2]	$1,300
7. Signage and fence maintenance, repair, and materials	$3,000
Total Costs	$10,700

[1] Annual personnel costs = 2014 step 1 salary for appropriate GS level x 12.25% COLA x 40% for benefits.
[2] Overhead costs = salary + benefit costs x 0.22. Overhead expenses include building rent, utilities, equipment and supplies, and support personnel, and do not include salary-related benefits.

The Refuge currently has adequate budget and staff to support the annual costs associated with dog walking at Kāhili Quarry.

Anticipated Impacts of the Use

Domestic dogs have retained instincts to hunt and chase (Sime 1999) and dogs can chase and kill wildlife (Knight and Cole 1995). Dogs can also disrupt roosting, foraging, and breeding activities among birds and flush birds from nests (Thomas 2000, Sime 1999). Ground-dwelling birds appear to be most affected. The mere presence of a dog can cause stress (evidenced by an increased heart rate (Knight and Cole 1995)) or other disturbance to wildlife, and when a dog accompanies a human, the dog can exacerbate the disturbance effects of the human. In a study of disturbance to birds in natural areas, Banks and Bryant (2007) found that on-leash dog walking caused significant reductions in species diversity and abundance, substantially more than when humans walked the same trails without dogs. This occurred even in areas where dog walking was frequent. Also, dog walkers are apparently more likely to leave designated paths, which increases the potential for wildlife disturbance. When dogs are running free, off-leash, they cause even more wildlife disturbance than when being walked on-leash (Blanc et al. 2006).

A report prepared for the California Department of Fish and Game found that dog harassment of wildlife is opportunistic and is associated with the concentration of wildlife in a given area (Jones and Stokes 1977). A follow-up study exploring the effects of dog density and wildlife abundance on the frequency of dog-induced wildlife flushes in an area of low vegetative cover suggests that dog-induced wildlife flushes in this type of habitat are a function of dog-human densities and wildlife concentration, among other variables (Abraham 2001). In a wildlife-rich environment, with its stimulating sights, sounds, and smells, free-roaming dogs at the Quarry are expected to disturb and potentially kill seabirds.

Free-roaming dogs can harass, injure, or kill wildlife. On Kauaʻi, free-roaming dogs have killed shearwaters and mōlī at nesting colonies, sometimes in large numbers in a single incident (Hawaiʻi Department of Land and Natural Resources 2013a and 2013b). As a result, Hawaiʻi DNR now recommends that all dogs be leashed and all cats kept indoors. As noted above, Kauaʻi County regulations require dogs to be on leashes when off their owners' property.

ʻĪlio-holo-i-ka-uaua (Hawaiian monk seal, *Monachus schauinslandi*) and honu (*Chelonia mydas*) are known to use Kauaʻi's north shore. Critically endangered ʻīlio-holo-i-ka-uaua are especially sensitive to human disturbance (NMFS 2007). Approaching dog-walkers could force hauled-out individuals to move back into the water and seek a new haul-out site, causing them to expend energy and increasing their exposure to predators. Potential disturbance of female adults with pups is of special concern. Dogs have been known to attack, injure, and kill ʻīlio-holo-i-ka-uaua, and can potentially transmit diseases to seals (Braun 2003, MMC et al. 2003, NOAA 2014). Dogs can also transport parasites and nonnative seeds into wildlife habitat and transmit diseases to wildlife (e.g., distemper, parvovirus, rabies, and plague) (Sime 1999, NOAA undated).

Refuge-specific impacts:

Impacts from dog walking can be contained most effectively, mitigating the overall effect on Refuge wildlife and on visitors engaged in wildlife-dependent uses, by ensuring that dogs are always on-leash, under direct control, and remain in designated areas. This public use management strategy will continue to be implemented under the CCP. The Refuge is aware that some visitors already disobey Federal regulations prohibiting free-roaming dogs on refuges, and county ordinances requiring dogs to be on-leash. Dog walking and any potential impacts from this public use will be monitored by Refuge law enforcement to ensure it does not interfere or have any negative impacts to compatible, wildlife-dependent uses or wildlife resources.

Public Review and Comment:

This compatibility determination was submitted for 44-day public review and comment as an appendix to the Refuge's draft comprehensive conservation plan and environmental assessment.

Determination

_____ Use is Not Compatible

____X____ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility

User stipulations

1. Visitors will be allowed to bring leashed dogs only to Kāhili Quarry. Dogs will not be allowed past the northeastern end of the main Quarry area. Signage will be used to delineate accessible and nonaccessible areas. Dogs are not allowed elsewhere at Kilauea Point. Cats or other pets are prohibited throughout the Refuge.

2. Dogs must be kept leashed (8 feet or less) and under direct control at all times.

3. Visitors must pick up and remove their dog(s)' feces from the Refuge.

4. Visitors are required to maintain a distance of at least 50 yards to ʻīlio-holo-i-ka-uaua or honu, whether these animals are in the water or on shore (NOAA undated). If ʻīlio-holo-i-ka-uaua or honu display signs of being disturbed, then that 50 yards will be expanded and the activity will be shut down to stop the disturbance and avoid potential take.

Administrative stipulations

1. Regulations will be available to the public through a Refuge brochure.

2. Signs will be posted to inform the public of regulations concerning dogs.

Justification

Dog walking in the Kāhili Quarry area of the Refuge has the potential to cause disturbance to seabirds and potentially seals and/or turtles. The construction of a new fence at the base of vegetation on the west side of the Quarry area, limiting dog walking to the western portion of the area, and requiring dogs to be on-leash and under direct control will limit potential disturbance to seabirds roosting or nesting in cliff-side vegetation. Additionally, visitors are not allowed within 50 yards of seals or turtles.

Dog walking is not a wildlife-dependent use of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.). However, it is expected that visitors will enjoy some wildlife observation and photography ancillary to walking dogs. The Refuge will use this opportunity to reach out to dog owners, to educate them about how to minimize the effects of dogs on wildlife, and to encourage them to observe wildlife and to learn about the National Wildlife Refuge System.

The Refuge will monitor compliance with the stipulations enumerated herein. The Refuge will also monitor wildlife and habitat disturbance and other potential impacts to determine if these stipulations result in expected and desirable outcomes. The Refuge will apply adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results.

The Refuge reserves the right to add to or otherwise modify the stipulations listed herein in order to ensure the continued compatibility of these uses. New or modified stipulations could be instituted as a result of new information generated by ongoing or new studies; new legal, regulatory, or policy requirements; significant changes to the Refuge environment or status of native fish, wildlife, plants,

or their habitats; or for other legitimate reasons. Refuge personnel will appropriately advise visitors of any such changes.

The Refuge also reserves the right to terminate or modify privileges to walk dogs on the Refuge if visitors violate Refuge rules or regulations; if unacceptable impacts occur to native fish, wildlife, plants, their habitats, cultural resources, Refuge facilities, or other Refuge visitors; or for other legitimate reasons.

Compatibility Standard

In order to be allowed on the Refuge, dog walking in the Kāhili Quarry area needs to be determined compatible. By limiting dog walking to west side of Kāhili Quarry, and allowing this use to occur under the stipulations described above, it is anticipated that wildlife which could be disturbed would find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, their habitats, other public uses, and cultural resources. For the several reasons stated above and consistent with the stipulations described herein, this use will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point's NWR's purposes; or the Refuge System's mission.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

This compatibility determination was developed and issued concurrently with the draft CCP and EA for Kīlauea Point NWR.

Compatibility Determination: Dog Walking (Kāhili Quarry)

Refuge Determination:

Prepared by: _____ (Signature) 9/9/15 (Date)

Acting

Approved by Project Leader, Kaua'i National Wildlife Refuge Complex: _____ (Signature) 9/9/15 (Date)

Concurrence:

Refuge and Monument Supervisor, Pacific Islands Refuges and Monuments Office: Barry W. _____ (Signature) 9/10/15 (Date)

Regional Chief, National Wildlife Refuge System, Pacific Region: Kevin S. Foerster (Signature) 9/16/15 (Date)

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Appendix C. Implementation

C.1 Overview

Implementation of the CCP will require increased funding, which will be sought from a variety of sources including congressional allocations and public and private partnerships and grants. There are no guarantees that additional Federal funds will be made available to implement any of these projects. Activities and projects identified will be implemented as funds become available.

Many of the infrastructure and facility projects will be eligible for funding through construction or Federal Lands Highway Program funds (i.e., Refuge roads).

The CCP identifies several projects to be implemented over the next 15 years. Some of these projects are included in the Refuge Management Information Systems (RONS–Refuge Operational Needs System or SAMMS–Service Asset Maintenance Management System) which are used to request funding from Congress. Upon completion of the CCP, new projects that are needed to meet Refuge goals and objectives and legal mandates will be entered into RONS documents or SAMMS databases. Currently, a large backlog of maintenance needs exists on the Refuge. Prioritized staffing needs identified in RONS will be necessary to implement the CCP to meet Refuge goals and objectives and legal mandates. The SAMMS database documents and tracks repairs, replacements, and maintenance of facilities and equipment. Smaller proposed projects will be implemented as funding allows, and funding would be sought for these projects through a variety of sources.

Unless congressionally directed, annual revenue sharing payments to Kaua‘i County will continue. If the Refuge expands through the purchase of inholdings (privately owned lands within the current approved boundary) or through an expanded Refuge boundary, additional in lieu of tax payments will be made to the county.

Monitoring activities will be conducted on a percentage of all new and existing projects and activities to document wildlife populations and changes across time, habitat conditions, and responses to management practices. Actual monitoring and evaluation procedures will be detailed in step-down management plans (see below).

C.2 Step-Down Plans

The CCP is one of several necessary plans used by managers, biologists, and staff for Refuge management. The CCP provides guidance in the form of goals, objectives, and strategies for several Refuge program areas, but may lack some of the specifics needed for implementation. All step-down plans require appropriate NEPA compliance, and implementation may require additional county, State, and Federal permits. Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down plans. Step-down plans for the Refuge follow:

- Sign plan (initiate planning after completion of CCP);
- Facilities, equipment, and vehicle maintenance plan (includes rotation);
- Safety plan;
- Visitor Services plan (KNWRC-wide);
- Inventory and monitoring plan (2017);

- Cultural/Historic resource management plan (2019);
- Historic structure treatment plan for the Kīlauea Point Light Station (2020);
- Fire management plan (originally done in 2004);
- Master Site Plan;
- Habitat management plan (2017);
- Plant restoration strategy (2017).

C.3 Costs to Implement CCP

The following sections detail both one-time and recurring costs for various projects as described within the CCP. One-time costs (Table C-1) reflect the initial costs associated with a project, such as the purchase of equipment, contracting services, construction, or other activity. Recurring costs (Tables C-2 and C-3) reflect the future operational and maintenance costs associated with the project. Table C-4 summarizes the total budgets needed to implement the CCP. The potential funding sources identify both base funding that is appropriated by Congress as part of the Refuge's budget (e.g., 126X series such as 1261, 1262, etc.) and grants/external funds received (e.g., ES, NAWCA, I&M). Note that for both Tables C-1 and C-2, only costs the Refuge is directly responsible for have been identified. For partnering strategies identified, due to the unknown associated costs and timing, these costs have not been identified in the tables below.

C.3.1 One-time costs

One-time costs have a start-up cost associated with them, such as purchasing equipment necessary for wildlife and habitat monitoring, or designing, constructing, and installing an interpretive sign. Some cost estimates are for projects that can be completed in 3 years or less. One-time costs can include the cost of temporary or term salary associated with a short-term project. Salary for existing and new positions, and operational costs, are reflected in operational (or recurring) costs.

Funds for one-time costs would be sought through increases in Refuge base funding, special project funds, and grants. Projects listed below in Table C-1 show one-time start-up and implementation costs, such as those associated with building and facility needs, including replacement of buildings, public use facilities, road/trail improvements, and new signs. One-time costs in Table C-1 are also associated with projects such as habitat restoration, research, and infrastructure developments. In many cases, new research projects, because of their relatively high initial establishment cost, are considered one-time projects and include costs of contracting services or hiring a temporary staff position for the short-term project. Some project costs are estimated from past projects and RONS or SAMMS proposals. Others are not yet in any project database and their costs have been estimated, particularly if the scope of the project is unknown at this time due to lack of baseline data.

Table C-1. One-time Costs (in Thousands).

CCP objective/strategy (5 year interval timeline)	Current Management	Future Management	Potential Fund Source
Species and Habitat Restoration and Protection			
Obj. 1.1: Explore the possibility of expansion of or additions to the Nihoku Ecosystem Restoration Project predator-proof fence		TBD	126x, RO, ISST, ES, KPNHA, grants
Obj. 1.2: Rehabilitate and maintain irrigation system at Crater Hill for native plant establishment		$100	DM, 1113(ES)
Obj. 1.3: Stabilize areas of accelerated erosion identified in the road and trail assessment and analysis		$70	
Surveys, Inventories, Monitoring, and Research			
Obj. 1.3 and 3.3: Conduct a road and trail assessment and analysis and identify problem areas (e.g., accelerated erosion, compaction) and solutions (e.g., water bars, erosion matting, revegetation)	$10	$10	1260 funds
Obj. 1.3 and 3.1: Design and implement a monitoring program for 1–2 indicator species (e.g., ‘ā) to detect natural or anthropogenic variation in habitat conditions		$75	1260 funds
Obj. 3.1: Within 1 year, map type and status of all fences and gates (2016)		$8	DM, 1113(ES)
Obj. 3.1: Within first 2–3 years, re-evaluate, develop, or initiate Refuge-specific monitoring plans (protocols, sample designs, and databases) for high-priority taxa (e.g., listed, highly pest, or indicator species, species/species groups of regional concern) within the regional I&M framework; work with USGS Biological Resources Discipline, universities, and other partners to develop efficient systems for synthesis, analysis, and reporting of Refuge monitoring data (2017)		$75	I&M, USGS
Obj. 3.1: Within first 2 years, design and conduct a vegetation monitoring program that will allow for assessment in reaching habitat management objectives (2017)		$0	Costs supported in other strategies
Obj. 3.1: Within first 5 years, conduct a comprehensive inventory of plants, invertebrates, and vertebrates occurring at the Refuge. Use initial inventories as baseline data to assess past and future changes in plant and animal communities (2020)		$25	I&M, 1113 (ES), USGS
Obj. 3.1: Map soils, vegetation, and bird distributions	$65	$65	USGS, NRCS, 1113 (ES)

CCP objective/strategy (5 year interval timeline)	Current Management	Future Management	Potential Fund Source
Obj. 3.1: Develop GIS layers to support biological goals and objectives and I&M program (2020)		$15	USGS, RO, I&M
Obj. 3.1: Conduct early detection and rapid response pest plant species assessment; rank species to target for control		$20	ISST
Obj. 3.2: Investigate effects of visitor activities on survival and reproduction of priority bird species		$75	
Obj. 3.2: Investigate the relative importance of causes of mortality (e.g., predators, disease, vehicle strikes) for nēnē and seabirds of concern		$75	
Obj. 3.2: Investigate daily and seasonal movements of nēnē		$75	
Obj. 3.2: Investigate status and distribution of ʻōpeʻapeʻa; identify management priorities		TBD	
Obj. 3.2: Investigate status and distribution of endemic insects, particularly species of concern		$0	Costs supported in other strategies
Obj. 3.2: Develop survey methods to reliably estimate population size for species of high conservation concern		$40	
Obj. 3.2: Investigate breeding and foraging ecology of nēnē in lowlands		$150	
Obj. 5.1: Prepare a cultural resource overview and management step-down plan of each Refuge by compiling a library of pertinent cultural resource sites, surveys, historical documents, maps, GIS files, etc., and prepare report that presents this information (within 4 years of CCP completion) (2019)	$25	$25	126x, 8081, KPNHA/ Friends
Obj. 5.1: Conduct a field inventory and evaluation of cultural resources identified and predicted by the archival research and communication program described above in concert with the information provided by the cultural resources overview (2019)	$180	$180	126x, 8081, KPNHA/ Friends
Obj. 5.1: Conduct archival research and communication with Native Hawaiian organizations, kūpuna, communities, and institutions to document the stories, occupation, and land use history of the Refuge and to consult on the protection of cultural resources (2025)	$20	$20	126x, 8081

CCP objective/strategy (5 year interval timeline)	Current Management	Future Management	Potential Fund Source
Cultural and Historic Resources			
Obj. 5.2: Prepare and/or update historic structure reports for each element of the Kīlauea Point Light Station (2019)	$25	$25	
Obj. 5.2: Prepare a historic structure treatment plan that addresses the needs, priorities, costs, and schedule for maintenance, restoration, and reuse of each element of the Kīlauea Point Light Station (2020)	$25	$25	
Obj. 5.2: Develop an outreach program and materials so that cultural resource messages become part of events in the area, including the State's Archaeology Month, National Wildlife Refuge Week, and appropriate local festivals		$15	
Facilities Development			
Obj. 4.1: Provide bicycle parking at overlook		$10	
Obj. 4.1: Explore options for removing parking currently on Refuge and renovate area for shuttle stop from the visitor welcome and orientation center. Improve pedestrian circulation		$25	
Obj. 4.2: Explore options for redesigning and enhancing the scenic overlook at the entrance to the Refuge to provide greater orientation and information, increased interpretation	$75	$75	
Obj. 1.2: In conjunction with transportation planning, evaluate the feasibility of redesigning the Overlook area in order to provide a corridor for nēnē transiting between the Point and Crater Hill.		TBD	Costs identified in other strategies
Obj. 4.2: Explore the establishment of a ***new offsite Welcome and Orientation Center on lands adjacent to or within 1 mile of the Refuge, including within Kīlauea Town,*** which would include the following: visitor contact, orientation and information, fee collection, restrooms, bookstore/retail, multipurpose room, outdoor spaces, administrative offices, private vehicle and tour bus parking, public bus stop, and shuttle pick-up/drop-off		TBD	
Obj. 4.2: Re-examine the site layout at Kīlauea Point and evaluate non–site-dependent functions currently located there and ***move as many as feasible and possible***		TBD	Costs identified in other strategies

CCP objective/strategy (5 year interval timeline)	Current Management	Future Management	Potential Fund Source
off the Point (e.g., bookstore, administrative and maintenance functions, equipment storage, fee collection, parking) to improve the visitor experience			
Obj. 4.2, 4.3: Explore options for remodeling the existing VC for either EE or new interpretive exhibits and displays. Maintain bookstore operations at the new welcome and orientation center		$200	
Obj. 4.3: Remodel the contact station (radio beacon building) to provide expanded interpretation and/or scenic view		$150 (expand scenic view)	
Obj. 4.3: Explore the restoration and conversion of one of the former lighthouse keeper's homes (Quarters #1) to house other functions (e.g., living history site, bookstore)		$550 (living history site, book store offsite)	
Obj. 4.3, 4.5: Offer a limited number of guided interpretive hikes to Crater Hill designed (location of trail, timing, group size) to have negligible negative effects on breeding birds yet provide a quality experience for visitors		$0	Costs reflected in other strategies
Obj. 4.6: Replace the existing fence with a predator-resistant fence in a modified alignment for approximately 600 feet, following the base of vegetation growing down the cliffs defining Mōkōlea Point	$300	$300	126x, RO, DM, ISST, ES, KPNHA, grants
Obj. 4.6: Install bollards at the northeast end of the Quarry area to protect seabird nesting areas		TBD	
Obj. 6.1: Develop new maintenance baseyard (e.g., storage sheds, bays, pole barns, nursery)		TBD (off-Refuge)	126x,DM,CI ENG
Obj. 6.1: Remodel Quarters #3 for basic administrative and volunteer offices		$100	126x, DM
Public Use/Visitor Services			
Obj. 4.1: Develop a data collection plan (e.g., better traffic and parking count, documenting "overage", accident and incident data,) that is updated and reviewed annually to continue to evaluate transportation network efficacy	TBD	TBD	
Obj. 4.1: Within the first 5–10 years, implement recommendation from the Transportation Assistance Group	TBD	TBD	
Obj. 4.1: Explore options for a ***mandatory shuttle which would prohibit private vehicles*** from traveling into the Refuge and		TBD	

CCP objective/strategy (5 year interval timeline)	Current Management	Future Management	Potential Fund Source
would require all visitors to use a shuttle system from a visitor welcome and orientation center			
Obj. 4.1: If a shuttle system is implemented, examine the feasibility of allowing pedestrian and/or bicycle access from the Overlook into the Point		TBD	
Obj. 4.2: Identify and develop methods to provide greater information to visitors prior to entering the Refuge (e.g., volunteers at overlook, cell phone audio tour at overlook, AM radio station, rangers onboard shuttles to the Refuge, operating hours on highway signage)	$200	$200	
Obj. 4.3: Develop orientation materials and/or train Service staff, volunteers, partners and tour operators to ensure understanding of the significant resources and messages that the interpretive program should be addressing	$40	$40	
Obj. 4.4: Update curricula and materials as necessary to ensure that programs support and complement the Service's mission and current initiatives, as well as the Refuge's purposes and goals		$15	
Obj. 4.4: Develop a multifaceted Junior Ranger program to reach young visitors to the Refuge		$10	
Obj. 4.5: Expand program offerings, workshops, activities, and exhibits used to teach and enhance wildlife viewing skills and ethics		$50	
Obj. 4.5: Increase compatible opportunities for up-close and personal viewing of wildlife (e.g., remote cameras, observation/photo blinds, guided ranger- and/or volunteer-led hikes)		$25	
Obj. 4.8: Enhance and expand existing volunteer/intern program (e.g., complete needs assessment and create new position descriptions for volunteers and interns, recruit, and train) to a corps of at least 200 volunteers/interns in order to support a greater variety of Refuge programs		$25	
Obj. 4.8: Develop a volunteer program that combines resource management (e.g., pest control, plant restoration) with interpretation (e.g., guided hike and birding on Crater Hill)	$25	$25	

CCP objective/strategy (5 year interval timeline)	Current Management	Future Management	Potential Fund Source
Obj. 6.2: Develop outreach tools (e.g., brochures, website) specifically for Refuge protection and safety issues and identify methods for circulation (2024)		$10	126x, 8081, KPNHA/ Friends, Grants
Additional Costs			
To support strategies, additional equipment costs include vehicle for staff and field work. Average cost is $35,000.		$350 (10 vehicles)	126x

C.3.2 Annual Operational (Recurring) Costs

Operational costs reflect Refuge spending of base funds allocated each year. These are also known as recurring costs and are usually associated with day-to-day operations and projects that last longer than 3 years. Operational costs use base funding in Service fund code 1260.

Table C-2 displays projected annual operating costs to implement strategies under the CCP. The CCP will require increased funding for new or expanded public uses and facilities, habitat management and restoration activities, and new monitoring needs. This table includes such things as salary and operational expenditures such as travel, training, supplies, utilities, and maintenance costs. Project costs listed in Table C-2 include administrative support for all programs and projects as well as permanent and seasonal staff needed year after year to accomplish each project. These staffing costs are not isolated in this table but are included as part of the entire project cost.

Table C-2. Operational (Recurring) Costs (Annual in Thousands).

CCP objective/strategy (these costs will run through the entire 15-year plan and are annual)	Current Management	Future Management	Potential Fund source
Species and Habitat Restoration and Protection			
Obj. 1.1: Reduction in pest ironwood and other species by 2–5 acres/year in priority areas (e.g., obstacles to flight, limiting nesting)		$1	126x, RO, ISST, ES, KPNHA, grants
Obj. 1.1: Mowing an additional 2–3 acres of grasslands per year to set back invasive shrub succession, <6 inch vegetation height	$3	$3	126x, RO, ISST, ES, KPNHA, grants
Obj. 1.1: Small-scale outplanting native plants (e.g., ʻāheahea, hala) that provide suitable habitat structure and function for seabirds		$1	DM, 1113 (ES)

CCP objective/strategy (these costs will run through the entire 15-year plan and are annual)	Current Management	Future Management	Potential Fund source
Obj. 1.1, 1.2, 2.2: Use IPM strategies including mechanical/physical (e.g., mowing, brush-cutting, excavation, prescribed fire), cultural, chemical (e.g., herbicides), biological, and other suitable techniques to control Christmasberry, lantana, ironwood, and other pest/undesirable plants	$20	$20	126x, RO, ISST, ES, ISST, KPNHA, grants
Obj. 1.1, 2.2: If insect threats (e.g., mosquitoes, ants, scale insects) to breeding seabirds are detected during monitoring, use IPM control techniques (e.g., removing potential breeding sites for mosquitoes, ant bait stations (e.g., Fipronil), approved biocontrols, hand removal of infected leaves, granular and spot-treating plants with insecticides (e.g., Sevin ®))	TBD	TBD	126x, RO, ISST, ES, ISST, KPNHA, grants
Obj. 1.1, 1.2: Maintain or replace 2.7 miles of existing hogwire fencing	$6	$6	126x, RO, ISST, ES, KPNHA, grants
Obj. 1.1: Keep the area under the chain-link fence at the Point free from weeds to prevent bird entrapment	$0	$0	Costs covered in other strategies (e.g., 126x, RO, ISST, ES KPNHA, grants)
Obj. 1.1: Evaluate the potential for restoration of some portion of the parking areas on the Point focusing on shrubland revegetation for the benefit of shearwaters		TBD	
Obj. 1.1, 1.2: Live-trapping, shooting, and bait stations to reduce predation on migratory birds by introduced vertebrate pests	$15	$15	126x, RO, ISST, ES, KPNHA, grants
Obj. 1.1: With partners, maintain predator-proof fence east of Crater Hill	TBD	TBD	
Obj. 1.2: Mowing at a frequency to stimulate vigorous growth of grasses; maintain <4-6 inches tall	$0	$0	Costs covered in other strategies (e.g., 126x, RO, ISST, ES KPNHA, grants)

CCP objective/strategy (these costs will run through the entire 15-year plan and are annual)	Current Management	Future Management	Potential Fund source
Obj. 1.2: Enhance grasslands with native shrubland plant communities that provide suitable habitat structure and function for nēnē (e.g., naupaka, ʻakoko, nehe for nēnē food and cover)		$5	DM, 1113 (ES)
Obj. 2.1: Continue to maintain ʻaʻo colony on the Point (NESH Hill), while increasingly putting emphasis for ʻaʻo recovery on Crater Hill/Mōkōlea Point areas (including the Nihoku Ecosystem Restoration Project area)	TBD	TBD	126x, 1113 (ES)
Obj. 2.1: Sustain or expand current distribution of seabirds		$0	Costs covered by other strategies
Obj. 2.1: Re-establish populations of extirpated seabird species		$1,000	
Obj. 2.1: Use social attraction techniques to enhance the ʻaʻo and other seabird populations; monitor for bird and predator responses to stimuli	$20	$20	
Surveys, Inventories, Monitoring, and Research			
Obj. 1.1: Explore the use of a predator control index based on the loss of mōlī eggs and chicks, on a 5-year average		$2	
Obj. 2.1, 3.2: With partners, determine feasibility of the Refuge as a potential ʻaʻo and/or ʻuaʻu chick translocation site		TBD	
Obj. 3.1: Monitor population size of all native breeding birds at least each decade and species of high conservation concern annually (e.g., ʻaʻo, mōlī, nēnē)		$2	
Obj. 3.1: Monitor seabird and nēnē populations and mortality and morbidity		$2	
Obj. 3.1: Monitor response of pest species and habitat to management actions within an adaptive management framework		$2	
Obj. 3.1: Monitor sex structure and demography of the mōlī population using molecular or other techniques		$2	

CCP objective/strategy (these costs will run through the entire 15-year plan and are annual)	Current Management	Future Management	Potential Fund source
Obj. 3.1: Monitor effects of visitor activities on wildlife and re-evaluate the program every 5 years		$2	
Obj. 4.2: Every 5 years, evaluate Refuge fees and conduct a visitor survey to evaluate existing programs as well as new programs under development, analyze current and potential Refuge visitor profiles, and explore visitation trends	$300 ($60 every 5 years)	$300 ($60 every 5 years)	
Obj. 4.3: Every 5–10 years, conduct an analysis of visitation trends and their implications for interpretation	$0	$0	Costs covered under other strategies
Public Use/Visitor Services			
Obj. 4.3: Continue to provide, on an on-call basis, golf carts to transport visitors who may need assistance getting to the VC or lighthouse	$16	$16	
Obj. 4.4: Annually disseminate current EE program guidelines and activities offered to all educators within the target audience	$1	$1	
Obj. 4.7: Provide staff with opportunities for outreach training (e.g., outreach basics, building community support, working with news media, congressional operations)		$10	
Facilities Development			
Maintaining infrastructure as identified under one-time costs table (including public use/ visitor services)	$50	$70	126x

C.3.3 Maintenance Costs

The Refuge maintenance program funding need over the next 15 years is defined as funds needed to repair or replace buildings, equipment, and facilities. Maintenance actions include preventative maintenance; cyclic maintenance; repairs; replacement of parts, components, or items of equipment; adjustments, lubrication, and cleaning (nonjanitorial) of equipment; painting; resurfacing; rehabilitation; special safety inspections; and other actions to assure continuing service and to prevent breakdown. Maintenance costs include the maintenance backlog needs that are due but are as yet unfunded, as well as the increased maintenance need associated with new facilities.

The facilities associated with the Refuge that require maintenance include trails, interpretive panels, regulatory signs, roads, parking lots, fencing, septic systems, water storage tanks and distribution

systems, and office and other buildings (e.g., nursery, sheds). Major equipment includes vehicles and heavy equipment. Operational (nonproject) maintenance funding for KNWRC is expended on all three Complex refuges including Kīlauea Point NWR and varies significantly by year. Operational funding is determined by station, regional office, and Washington office priorities and allocations.

C.3.4 Staffing

To fulfill Complex visions and Refuge System mission, a full and skilled workforce must be fostered that operates with integrity to achieve their greatest potential in an environment that promotes appreciation, team work, efficient business practices, and effective communication. Current (2014) staffing and proposed staffing to implement the programs detailed within the CCP are shown in Table C-3.

Table C-3. Staffing Costs (Annual). Costs include salary (assumed at Step 1), 12.25 percent COLA and benefits at 40 percent (applicable only to Federal employees). Salaries are based on 2014 salary tables (OPM 2014a, OPM 2014b, DCPAS 2014). Note that (*) positions are Complex-wide. As a result, for Complex-wide positions, staffing cost identified is proportional. If multiple grade levels are specified, the full performance level is assumed.

Staff	Current Management	Future Management	Potential Funding Source
Current Staff			
Project Leader (GS-13)*	$42,804	$42,804	1261, 1263
Deputy Project Leader (GS-12)*	$35,996	$35,996	1261, 1263
Wildlife Biologist (GS-11)*	$30,031	$30,031	1261
Supervisory Park Ranger (GS-9)*	$59,572	$59,572	8081
Park Ranger (GS-5)	$49,145	$49,145	8081
Park Ranger (GS-3)	$39,128	$39,128	8081
Park Ranger (GS-3)	$39,128	$39,128	8081
Administrative Officer (GS-9)*	$24,822	$24,822	1261
Administrative Support Assistant (GS-5)*	$16,382	$16,382	1261
Park Ranger (Law Enforcement Officer) (GL-9)*	$25,649	$25,649	8081, 1264
Engineer Equipment Operator (Supervisory) (WG-8/10)*	$28,033	$28,033	1262
Facilities Maintenance Worker (WG-8)	$73,877	$73,877	8081
Tractor Operator (WG-5)	$58,502	$58,502	8081
Janitorial Laborer (WG-2)	$25,894	$25,894	8081
Janitorial Laborer (WG-2)	$25,894	$25,894	8081
Biological Science Technician (Predator Control) (GS-5)*	$16,382	$16,382	1262-A111, ES. Could be contracted
Interpretation/biological interns (AmeriCorps)*	$4,662	$4,662	1261, 8081
Interpretation/biological interns (AmeriCorps)*	$4,662	$4,662	1261, 8081
Interpretation/biological interns (AmeriCorps)*	$4,662	$4,662	1261, 8081

Staff	Current Management	Future Management	Potential Funding Source
Proposed Staff			
*Restoration Ecologist (GS-7/9/11) **		*$30,031*	*TBD*
*Biological Science Technician (TERM GS-5/7)**		*$20,292*	*TBD*
*Biological Science Technician (TERM GS-5/7)**		*$20,292*	*TBD*
*Biological Science Technician (TERM GS-5/7)**		*$20,292*	*TBD*
*Mechanic (WG-7/8)**	*$24,626*	*$24,626*	*TBD*
*Mechanic (WG-7/8)**	*$24,626*	*$24,626*	*TBD*
*Wildlife Refuge Specialist (GS-5/7/9)**		*$24,822*	*RONS – 1261; (HAN – FY08 5336)*
*Wildlife Refuge Specialist (GS-5/7/9) **		*$24,822*	*RONS – 1261; (HAN – FY08 5336)*
*Park Ranger (Law Enforcement Officer) (GL-5/7/9)**	*$25,649*	*$20,292*	*RONS – 1264; FY08-7150 or FY10-1286*
*Cultural Resources Specialist (TERM GS-7)**		*$30,031*	*TBD*
*GIS Specialist (GS-5/7/9/11)**	*$30,031*	*$30,031*	*TBD*
Environmental Education/Interpretation Specialist (GS-4/5)		*$49,145*	*TBD*
Environmental Education/Interpretation Specialist (Americorps)		*$10,000*	*AmeriCorps*
Environmental Education/Interpretation Specialist (GS-4/5)		*$49,145*	*TBD*
Environmental Education/Interpretation Specialist (Americorps)		*$10,000*	*AmeriCorps*
Environmental Education/Interpretation Specialist (GS-4/5)		*$49,145*	*TBD*
Environmental Education/Interpretation Specialist (GS-4/5)		*$49,145*	*TBD*
Environmental Education/Interpretation Specialist (GS-4/5)		*$49,145*	*TBD*
Maintenance Worker (TERM WG-5/6)		*$63,656*	*TBD*
Maintenance Worker (WG-5/6)		*$63,656*	*TBD*

Staff	Current Management	Future Management	Potential Funding Source
Maintenance Worker (WG-5/6)		*$63,656*	*TBD*
Maintenance Worker (WG-6/7/8)	*$73,877*	*$73,877*	*TBD*

GS: General Schedule Federal Employee, WG: Wage Grade Federal Employee, GL: Law Enforcement Officers (LEOs)

C.3.5 Budget Summary

Table C-4 summarizes the data from Tables C-1 and C-2 and displays the overall funding needed for KNWRC to implement the CCP for Kīlauea Point NWR.

Table C-4. Budget Summary (Annual in Thousands).

Budget Category	Current Management		Future Management	
	One- time cost	Annual recurring cost	One- time cost	Annual recurring cost
Species and Habitat Restoration and Protection		$64 x 15 years = $960	$170	$1,071 x 15 years =$16,065
Surveys, Inventories, Monitoring, and Research	$300	$20 x 15 years = $300	$933	$32 x 15 years = $480
Cultural Resources	$50		$65	
Facilities Development	$375	$50 x 15 years = $750	$1,410	$70 x 15 years = $1,050
Public Use/Visitor Services	$265	$17 x 15 years = $255	$400	$27 x 15 years = $405
Additional Costs	$350		$350	
Staffing	$784 x 15 years = $11,761		$1,402 x 15 years =$21,024	
Total:	**$15,366**		**$42,352**	

NOTE: For offsite facilities, figures are to be determined (TBD). However, for the purposes of this summary and separate from Tables C-2 and C-3, a cost equivalent to an onsite facility was estimated.

C.4 Partnering Opportunities

Partnerships are an important component of the implementation of this CCP. Toward this end, we rely on partnering opportunities, both in terms of funding and personnel. Partnering opportunities are reflected in the goals, objectives, and strategies identified in Chapter 2. Coordinated partnership efforts focus on species and habitat restoration and protection; surveys, inventories, and research; visitor services; and cultural/historic resources management. Refuge staff will work to strengthen existing partnerships and will actively look for new partnerships to assist in achieving the goals, objectives, and strategies in this CCP. Current and past partners include Federal and State agencies, nonprofit and nongovernmental organizations, volunteers, and other individuals.

C.5 References

U.S. Department of Defense – Defense Civilian Personnel Advisory Service (DCPAS). 2014. Federal wage system regular and special production facilitating wage rate schedules for the State of Hawai‘i (Island of Kaua‘i) (HI) wage area. http://www.cpms.osd.mil/Content/AF%20Schedules/survey-sch/044/044R-05Aug2014.html

U.S. Office of Personnel Management (OPM). 2014a. Salary table 2014-HI. http://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/pdf/2014/HI.pdf

U.S. Office of Personnel Management (OPM). 2014b. Salary table 2014-HI (LEO). http://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/pdf/2014/HI%20(LEO).pdf

Appendix D. Wilderness Review for Kīlauea Point National Wildlife Refuge

D.1 Introduction

D.1.1 Policy and Direction for Wilderness Reviews

U.S. Fish and Wildlife Service (Service) policy (Part 602 FW 3.4 C.(1) (c)) requires that wilderness reviews be completed as part of the Comprehensive Conservation Planning process. This review includes the re-evaluation of refuge lands existing during the initial 10-year review period of the Wilderness Act of 1964, as amended (16 U.S.C. 1131–1136), as well as new lands and waters added to the Refuge System since 1974. A preliminary inventory of the wilderness resources is to be conducted during pre-acquisition planning for new or expanded refuges (341 FW 2.4 B., "Land Acquisition Planning"). Refuge System policy on Wilderness Stewardship (610 FW 1–5) includes guidance for conducting wilderness reviews (610 FW 4—Wilderness Review and Evaluation).

A wilderness review is the process of determining whether the Service should recommend Refuge System lands and waters to Congress for wilderness designation. The wilderness review process consists of three phases: wilderness inventory, wilderness study, and wilderness recommendation.

Wilderness Inventory

The inventory is a broad look at a refuge to identify lands and waters that meet the minimum criteria for wilderness: size, naturalness, and outstanding opportunities for solitude or primitive and unconfined type of recreation. All areas meeting the criteria are preliminarily classified as Wilderness Study Areas (WSAs). If WSAs are identified, the review proceeds to the study phase.

Wilderness Study

During the study phase, WSAs are further analyzed:

1) for all values ecological, recreational, cultural, economic, symbolic;
2) for all resources, including wildlife, vegetation, water, minerals, soils;
3) for existing and proposed public uses;
4) for existing and proposed refuge management activities within the area;
5) to assess the refuge's ability to manage and maintain the wilderness character in perpetuity, given the current and proposed management activities. Factors for evaluation may include, but are not limited to, staffing and funding capabilities, increasing development and urbanization, public uses, and safety.

We evaluate at least an "All Wilderness Alternative" and a "No Wilderness Alternative" for each WSA to compare the benefits and impacts of managing the area as wilderness as opposed to managing the area under an alternate set of goals, objectives, and strategies that do not involve wilderness designation. We may also develop "Partial Wilderness Alternatives" that evaluate the benefits and impacts of managing portions of a WSA as wilderness.

In the alternatives, we evaluate:

1) the benefits and impacts to wilderness values and other resources;
2) how each alternative will achieve the purposes of the Wilderness Act and the National Wilderness Preservation System (NWPS);
3) how each alternative will affect achievement of refuge purpose(s) and the refuge's contribution toward achieving the Refuge System mission;
4) how each alternative will affect maintaining and, where appropriate, restoring BIDEH at various landscape scales;
5) other legal and policy mandates;
6) whether a WSA can be effectively managed as wilderness by considering the effects of existing private rights, land status and Service jurisdiction, refuge management activities and refuge uses, and the need for or possibility of eliminating Section 4(c) prohibited uses.

Wilderness Recommendation

If the wilderness study demonstrates that a WSA meets the requirements for inclusion in the NWPS, a wilderness study report should be written that presents the results of the wilderness review, accompanied by a Legislative Environmental Impact Statement (LEIS). The wilderness study report and LEIS that support wilderness designation are then transmitted through the Secretary of the Interior to the President of the United States, and ultimately to the United States Congress for action. Refuge lands recommended for wilderness consideration by the wilderness study report will retain their WSA status and be managed as "… wilderness according to the management direction in the final CCP until Congress makes a decision on the area or we amended the CCP to modify or remove the wilderness recommendation" (610 FW 4.22B). When a WSA is revised or eliminated, or when there is a revision in "wilderness stewardship direction, we include appropriate interagency and tribal coordination, public involvement, and documentation of compliance with NEPA" (610 FW 3.13).

D.1.2 Criteria for Evaluating Lands for Possible Inclusion in the National Wilderness Preservation System

The Wilderness Act of 1964, as amended (16 U.S.C. 1131–1136), provides the following description of wilderness:

> "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act as an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions..."

The following criteria for identifying areas as wilderness are outlined in Section 2(c) of the Act and are further expanded upon in Refuge System policy (610 FW 4). The first three criteria are evaluated during the wilderness inventory phase; the fourth criterion is evaluated during the wilderness study phase:

1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation;

3) has at least 5,000 acres of land or is of a sufficient size as to make practicable its preservation and use in an unimpaired condition;
4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

Criterion 3 is further defined in Section 3(c) of the Act as (1) a roadless area of 5,000 contiguous acres or more, or (2) a roadless island. Roadless is defined as the absence of improved roads suitable and maintained for public travel by means of 4-wheeled motorized vehicles that are intended for highway use.

D.2 Wilderness Inventory

The following constitutes the wilderness inventory phase of the wilderness review for Kīlauea Point National Wildlife Refuge (NWR or Refuge).

D.2.1 Process of Analysis

The following evaluation process was used in identifying the suitability of the Refuge units for wilderness designation:

- Determination of Refuge unit sizes;
- Assessment of the units' capacity to provide opportunities for solitude or primitive and unconfined recreation;
- Assessment of "naturalness" of Refuge units.

More detail on the actual factors considered and used for each assessment step follows:

Unit Size: Roadless areas meet the size criteria if any one of the following standards apply:

- An area with over 5,000 contiguous acres solely in Service ownership.
- A roadless island of any size. A roadless island is defined as an area surrounded by permanent waters or an area that is markedly distinguished from the surrounding lands by topographical or ecological features.
- An area of less than 5,000 contiguous Federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous Federal acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another Federal wilderness managing agency, such as the Forest Service, National Park Service, or Bureau of Land Management.

Inventory Unit A consists of the entire Kīlauea Point NWR (acquired lands only, Figure E-1), and is 199 acres.

This unit does not meet the criteria identified above as it is not over 5,000 contiguous acres, is not a roadless island, is not an area of sufficient size as to make its preservation in accordance with wilderness management, and is not contiguous with any other wilderness areas (existing or potential) as there are no adjacent Federal land owners.

Outstanding Solitude or Primitive and Unconfined Recreation.

A designated wilderness area must provide outstanding opportunities for solitude or a primitive and unconfined type of recreation. Possession of only one of these outstanding opportunities is sufficient for an area to qualify as wilderness, and it is not necessary for one of these outstanding opportunities to be available on every acre. Furthermore, an area does not have to be open to public use and access to qualify under these criteria.

"Opportunities for solitude" refers to the ability of a visitor to be alone and secluded from other visitors in the area. "Primitive and unconfined recreation" means nonmotorized, dispersed, outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport. Primitive recreation activities may provide opportunities to experience challenge and risk, self-reliance, and adventure.

Inventory Unit A contains a portion that is open to the general public and receives approximately 400,000–500,000 visitors annually. There are several structures, including facilities listed on the National Historic Register, which are onsite. The portion of the Refuge closed to the general public has some facilities that include a radio tower, water storage, and protective fencing. In addition, this portion of the Refuge is maintained by staff to provide habitat for endangered nēnē and nesting seabirds. This includes fence maintenance, mowing of grasses, invasive weed management, and predator control. Additionally, adjacent to the Refuge on the east side is a popular beach area where people often surf, camp, picnic, fish, and participate in other recreational activities. Due to this, Inventory Unit A does not offer opportunities for solitude or primitive and unconfined recreation.

Naturalness and Wildness: the area generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable.

This criterion must be evaluated in the context of current natural conditions and societal values and expectations without compromising the original intent of the Wilderness Act. It is well recognized that there are few areas remaining on the planet that could be truly classified as primeval or pristine, with even fewer, if any, existing in the conterminous United States. Likewise, few areas exist that do not exhibit some impact from anthropogenic influences, be it noise, light, or air pollution, water quality or hydrological manipulations, past and current land management practices, road or trails, suppression of wildfires, invasions by pest species of plants and animals, or public uses. While allowing for the near-complete pervasiveness of modern society on the landscape, the spirit of the Wilderness Act is to protect lands that still retain the wilderness qualities of being: (1) natural, (2) untrammeled, (3) undeveloped. These three qualities are cornerstones of wilderness character. For areas proposed or designated as wilderness, wilderness character must be monitored to determine baseline conditions and thereafter be periodically monitored to assess the condition of these wilderness qualities. Proposed and designated wilderness areas by law and policy are required to maintain wilderness character through management and/or restoration in perpetuity.

Defining the first two qualities (natural and untrammeled) requires a knowledge and understanding of the ecological systems which are being evaluated as potential wilderness. Ecological systems comprise three primary attributes—composition, structure, function. Composition is the components that make up an ecosystem, such as the habitat types, native species of plants and animals, and abiotic (physical and chemical) features. These contribute to the diversity of the area. Structure is the spatial arrangement of the components that contribute to the complexity of the area. Composition and structure are evaluated to determine the naturalness of the area. Function is the processes that result

from the interaction of the various components, both temporally and spatially, and the disturbance processes that shape the landscape. These processes include, but are not limited to, predator-prey relationships, insect and disease outbreaks, nutrient and water cycles, decomposition, fire, windstorms, flooding, and both general and cyclic weather patterns. Ecological functions are evaluated to determine the wildness or untrammeled quality of the area.

The third quality assessment is whether an area is undeveloped. Undeveloped refers to the absence of permanent structures such as roads, buildings, dams, fences, and other human alterations to the landscape. Exceptions can be made for historic structures or structures required for safety or health considerations, providing they are made of natural materials and are relatively unobtrusive on the landscape.

General guidelines used for evaluating areas for wilderness potential during this wilderness inventory process include:

1) The area should provide a variety of habitat types and associated abiotic features, as well as a nearly complete complement of native plants and wildlife indicative of those habitat types. Pest species should compose a negligible portion of the landscape.
2) The area should be spatially complex (vertically and/or horizontally) and exhibit all levels of vegetation structure typical of the habitat type, have an interspersion of these habitats, and provide avenues for plant and wildlife dispersal.
3) The area should retain the basic natural functions that define and shape the associated habitats including, but not limited to, flooding regimes, fire cycles, unaltered hydrology and flowage regimes, and basic predator-prey relationships, including herbivory patterns.
4) Due to their size, islands may not meet the habitat guidelines in 1 and 2 above. Islands should, however, exhibit the natural cover type with which they evolved and continue to be shaped and modified by natural processes. Islands should be further analyzed during the study portion of the review if they provide habitat for a significant portion of a population, or key life-cycle requirements for any resources of concern or listed species.
5) Potential wilderness areas should be relatively free of permanent structures or human alterations. Areas may be elevated to the study phase if existing structures or alterations can be removed or remediated within a reasonable timeframe, and prior to wilderness recommendation to the Secretary of the Interior.

Inventory Unit A does provide a variety of habitat types and associated abiotic features, but is a fairly degraded habitat due to the presence of invasive species, so a nearly complete complement of native plants and wildlife does not exist. The unit is not spatially complex nor does it exhibit all levels of vegetation structure typical of the habitat type. Basic natural functions are retained; however, there are several permanent structures and human alterations that will not be removed due to historic properties. The land bears substantial human alterations given its past history as a U.S. Coast Guard and Army facility and ranching/plantation operations. Consequently, Inventory Unit A does not meet this criterion.

Evaluation of Supplemental Values

Supplemental values are defined by the Wilderness Act as “ecological, geological, or other features of scientific, educational, scenic, or historic value.”

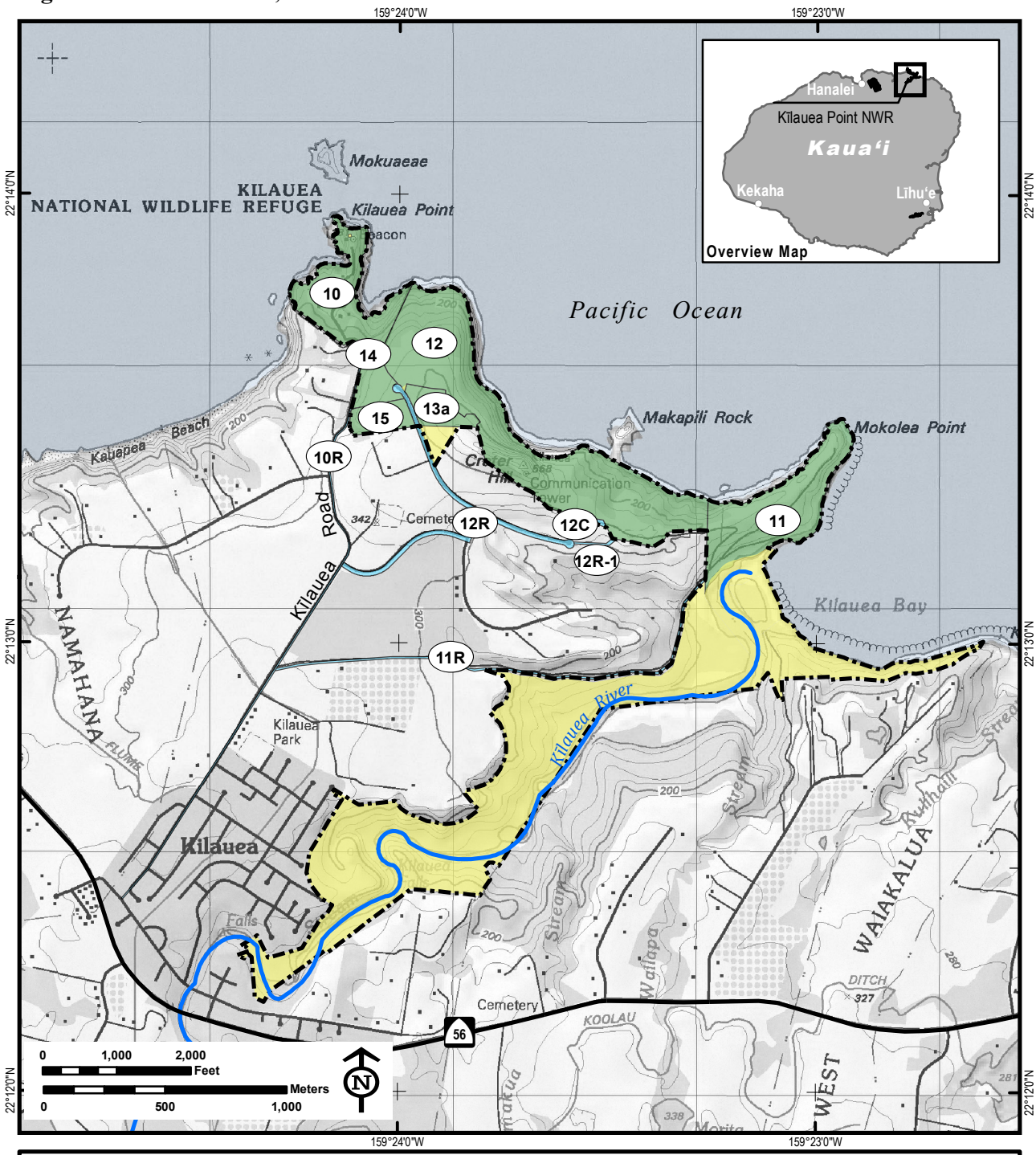
Inventory Unit A has ecological value as it supports breeding populations of endangered nēnē, and efforts to establish breeding populations of the endangered Newell's shearwater have been ongoing. The area is also home to several species of seabirds that are rarely found in the main Hawaiian Islands due to loss of habitat and predators such as cats and rats. As a result, Inventory Unit A has large educational values as it is the only place where viewing such wildlife can be done accessibly by the general public. Several school groups each year area also brought to the Refuge. There are several structures at the Refuge that are listed on the National Historic Register, lending it the historic value. The vast views of the coastline from the peninsula provide its scenic value.

D.2.2 Inventory Summary and Conclusion

Based on the analysis conducted above, Inventory Unit A does not meet the wilderness inventory criteria, therefore no wilderness study is recommended.

Wilderness Inventory Analysis	**Inventory Unit A:** KPNWR (199 ac)
(1) Has at least 5,000 ac of land or is of sufficient size to make practicable its preservation and use in an unconfined condition, or is a roadless island.	No
(2) Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable.	No
(3a) Has outstanding opportunities for solitude.	No
(3b) Has outstanding opportunities for a primitive and unconfined type of recreation.	No
(4) Contains ecological, geological, or other features of scientific, educational, scenic, or historical value.	Yes (ecological, historic, educational, and scenic values)
Parcel qualifies as a wilderness study area (meets criteria 1, 2 & 3a, or 3b).	No

Figure D-1. Land Status, Kīlauea Point NWR.



LEGEND

- Approved Acquisition Boundary
- Inholding
- Acquired: Fee
- Acquired: Road Easement
- Highways
- Rivers

The spatial and positional accuracy of land status features vary depending on the elements of the legal description and the accuracy of the source data. We strive to improve the accuracy of our boundaries and do so when better base data or surveys are available.

Approved acquisition boundaries represent the extent of lands authorized by Congress for purchase by the USFWS for inclusion into the National Wildlife Refuge System. Inholdings are lands within this boundary that have not been, and might not ever be, acquired.

Map Date: 9/16/2014 File: 11-065-3.mxd

Title: Land Status, Kilauea Point
USFWS R1 Refuge Information Branch

The back sides of maps are blank to improve readability.

Appendix E. Biological Resources of Concern

E.1 Introduction

Management direction of individual refuges is driven by refuge purposes and statutory mandates, coupled with species and habitat priorities. Management on a refuge should first and foremost address the individual refuge purposes. Additionally, management should address maintenance and, where appropriate, restoration of biological integrity, diversity, and environmental health as well as management for Refuge System resources of concern. In this approach, a refuge contributes to the goals of the Refuge System (601 FW 1) and achievement of the Refuge System mission.

In concert with this approach, and as an initial step in planning, the planning team identified resources of concern for Kīlauea Point NWR. As defined in the Policy on Habitat Management Plans (620 FW 1), resources of concern are:

> "all plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, State, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect 'migrating waterfowl and shorebirds.' Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts (620 FW 1.4G)."

To provide a framework for development of goals and objectives in the CCP, the planning team identified resources of concern, following the process outlined in the handbook *Identifying Refuge Resources of Concern and Management Priorities: A Handbook* (USFWS 2010).

E.2 Comprehensive Resources of Concern

A comprehensive list of potential resources of concern for the Kaua'i National Wildlife Refuge Complex (KNWRC or Complex) was created early in the planning process. The team identified species, species groups, and communities of concern, based upon a review of the Kīlauea Point, Hanalei, and Hulē'ia Refuges' establishing history and purposes (see Section 1.6 of the CCP), a description of the key habitat types existing at each Refuge and a review of numerous conservation plans (see Section 1.7 of the CCP), many of which highlight priority species or habitats for conservation. The Comprehensive Resources of Concern list for the Complex is contained in Table E-1.

Table E-1. Kaua‘i National Wildlife Refuge Complex comprehensive resources of concern.

Species/Habitat	Refuge(s) Purpose Species	Indicator of Biological Integrity, Diversity, and Environmental Health	Federally listed Threatened or Endangered or of special Refuge Concern with no Federal status	State-listed Threatened or Endangered	Birds of Conservation Concern (BCC) Bird Conservation Region #67 (Table 36)	Birds of Management Concern	BCC – Region 1 (Table 39)	Waterbird Plan Category	HI Comprehensive Wildlife Conservation Strategy (CWCS)	U.S. Pacific Islands Regional Shorebird Conservation Plan	Recovery Plans	North American Waterfowl Management Plan	Natural Heritage Program Rank
Birds													
Mōlī/Laysan albatross (*Phoebastria immutabilis*)	X	X			X	F		H	X				G3
Ka‘upu/Black-footed albatross (*Phoebastria nigripes*)	X	X	Co	T	X	F	X	HI	X				G3/ G4
‘Ua ‘u/Hawaiian petrel (*Pterodroma sandwichensis*)	X	X	E	E		T/E		HI	X		X		G2/ T2
‘A‘o/Newell’s shearwater (*Puffinus auricularis newelli*)	X	X	T	T		T/E		HI	X		X		G2/ T2
‘Ua‘u kani/Wedge-tailed shearwater (*Puffinus pacificus*)	X	X							X				G4/ G5
Koa‘e‘ula/Red-tailed tropicbird (*Phaethon rubricauda*)	X	X							X				G4/ G5
Koa‘e kea/White-tailed tropicbird (*Phaethon lepturus*)	X	X						H	X				G5
‘A/Red-footed booby (*Sula sula*)	X	X						H	X				G5
‘A/Brown booby (*Sula leucogaster*)	X	X						H	X				G5
‘Iwa/Great frigatebird (*Fregata minor palmerstoni*)	X	X							X				G4
‘Ou/Bulwer’s petrel (*Bulweria bulwerii*)									X				G4
Great blue heron (*Ardea herodias*)													G5
‘Au‘ku‘u/Black-crowned night-heron (*Nycticorax nycticorax*)									X				G5
White-faced ibis (*Plegadis chihi*)													G5
Greater white-fronted goose (*Anser albifrons*)						X						X	G5
Canada goose (*Branta canadensis*)						F						X	G5
Cackling goose (*Branta hutchinsii*)						F						X	G5
Nēnē/Hawaiian goose (*Branta sandvicensis*)	X	X	E	E		T/E			X		X	X	G1

Table E-1. Kaua'i National Wildlife Refuge Complex comprehensive resources of concern.

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Black brant (*Branta bernicla nigricans*)						F						X	G5
Eurasian wigeon (*Anas penelope*)												X	G5
American wigeon (*Anas americana*)						X			X			X	G5
Eurasian teal (*Anas crecca*)												X	G5
Green-winged teal (*Anas carolinensis*)						X						X	G5
Mallard (*Anas platyrhynchos*)						X						X	G5
Laysan duck (*Anas laysanensis*)			E	E		T/E			X		X	X	G1
Koloa maoli/Hawaiian duck (*Anas wyvilliana*)	X	X	E	E		T/E			X		X	X	G1
Northern pintail (*Anas acuta*)						X			X			X	G5
Garganey (*Anas querquedula*)												X	G5
Blue-winged teal (*Anas discors*)						X						X	G5
Cinnamon teal (*Anas cyanoptera*)						X						X	G5
Northern shoveler (*Anas clypeata*)						X			X			X	G5
Canvasback (*Aythya valisineria*)						X						X	G5
Redhead (*Aythya americana*)						X						X	G5
Ring-necked duck (*Aythya collaris*)		X				X						X	G5
Tufted duck (*Aythya fuligula*)		X										X	G5
Greater scaup (*Aythya marila*)		X				F						X	G5
Lesser scaup (*Aythya affinis*)		X				F			X			X	G5
Bufflehead (*Bucephala albeola*)		X										X	G5
Northern harrier (*Circus cyaneus*)													G5
Peregrine falcon (*Falco peregrinus*)			DL			X	X						G4

Table E-1. Kaua‘i National Wildlife Refuge Complex comprehensive resources of concern.

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‘Alae‘ula/Hawaiian moorhen (*Gallinula chloropus sandvicensis*)	X	X	E	E		T/E			X		X		G5/ T2
‘Alae ke‘oke‘o/Hawaiian coot (*Fulica alai*)	X	X	E	E		T/E			X		X		G2
Ae‘o/Hawaiian stilt (*Himantopus mexicanus knudseni*)	X	X	E	E		T/E			X	5	X		G5/ T2
Kōlea/Pacific golden-plover (*Pluvialis fulva*)									X	5			G5
Black-bellied plover (*Pluvialis squatarola*)													G5
Semipalmated plover (*Charadrius semipalmatus*)													G5
Killdeer (*Charadrius vociferus*)													G5
Black-tailed godwit (*Limosa limosa*)													
Bar-tailed godwit (*Limosa lapponica*)						X							G5
Marbled godwit (*Limosa lapponica*)						F	X						G5
Whimbrel (*Numenius phaeopus*)						X	X						G5
Kioea/Bristle-thighed curlew (*Numenius tahitiensis*)			Co		X	X	X		X	5			G2
Marsh sandpiper (*Tringa stagnatilis*)													
Greater yellowlegs (*Tringa melanoleuca*)													G5
Lesser yellowlegs (*Tringa flavipes*)						X							
Solitary sandpiper (*Tringa solitaria*)						X							G5
Spotted sandpiper (*Actitis macularia*)													
‘Ulili/Wandering tattler (*Tringa incana*)									X	4			
‘Akekeke/Ruddy turnstone (*Arenaria interpres*)									X	3			G5
Wilson's phalarope (*Phalaropus tricolor*)													G5

Table E-1. Kaua‘i National Wildlife Refuge Complex comprehensive resources of concern.

Species/Habitat	Refuge(s) Purpose Species	Indicator of Biological Integrity, Diversity, and Environmental Health	Federally listed Threatened or Endangered or of special Refuge Concern with no Federal status	State-listed Threatened or Endangered	Birds of Conservation Concern (BCC) Bird Conservation Region #67 (Table 36)	Birds of Management Concern	BCC – Region 1 (Table 39)	Waterbird Plan Category	HI Comprehensive Wildlife Conservation Strategy (CWCS)	U.S. Pacific Islands Regional Shorebird Conservation Plan	Recovery Plans	North American Waterfowl Management Plan	Natural Heritage Program Rank
Red phalarope (*Phalaropus fulicarius*)													G5
Wilson's snipe (*Gallinago delicate*)						X							
Short-billed dowitcher (*Limnodromus griseus*)						X	X						G5
Long-billed dowitcher (*Limnodromus scolopaceus*)													G5
Red knot (*Calidris canutus*)						F	X						G4
Hunakai/Sanderling (*Calidris alba*)									X				G5
Semipalmated sandpiper (*Calidris pusilla*)													G5
Western sandpiper (*Calidris mauri*)													G5
Red-necked stint (*Calidris ruficollis*)													G5
Least sandpiper (*Calidris minutilla*)													G5
Pectoral sandpiper (*Calidris melanotos*)													G5
Sharp-tailed sandpiper (*Calidris acuminata*)													
Dunlin (*Calidris alpina*)													G5
Curlew sandpiper (*Calidris ferruginea*)													G5?
Stilt sandpiper (*Micropalama himantopus*)													
Ruff (*Philomachus pugnax*)													G5
Caspian tern (*Sterna caspia*)													G5
Arctic tern (*Sterna paradisaea*)								H					G5
Least tern (*Sterna antillarum*)													G4
Pueo/Short-eared owl (*Asio flammeus sandwichensis*)		X	Co	E	X	X	X		X				G5/ T2
Plants													
Alula (*Brighamia insignis*)			E	E					X		X		G1

Table E-1. Kaua‘i National Wildlife Refuge Complex comprehensive resources of concern.

Species/Habitat	Refuge(s) Purpose Species	Indicator of Biological Integrity, Diversity, and Environmental Health	Federally listed Threatened or Endangered or of special Refuge Concern with no Federal status	State-listed Threatened or Endangered	Birds of Conservation Concern (BCC) Bird Conservation Region #67 (Table 36)	Birds of Management Concern	BCC – Region 1 (Table 39)	Waterbird Plan Category	HI Comprehensive Wildlife Conservation Strategy (CWCS)	U.S. Pacific Islands Regional Shorebird Conservation Plan	Recovery Plans	North American Waterfowl Management Plan	Natural Heritage Program Rank
Oha‘i (*Sesbania tomentosa*)	X	X	E	E					X		X		G2
Loulu (*Pritchardia napaliensis*)	X	X	E	E					X		X		
Native plants	X	X							X				
Mammals													
Ilio-holo-i-ka-uaua/Hawaiian monk seal (*Monachus schauinslandi*)	X	X	E	E					X		X		G2
‘Ōpe‘ape‘a/ Hawaiian hoary bat (*Lasiurus cinereus semotus*)	X	X	E	E					X		X		G2 / T2
Reptiles													
Honu/Pacific green turtle (*Chelonia mydas*)	X	X	T	T					X		X		G3
Hawksbill turtle (*Eretmochelys imbricata*)	X	X	E	E					X		X		G3
Freshwater Fish													
O‘opu alamo‘o (*Lentipes concolor*)			Co	Co					X				

Federal Status
T = Threatened
E = Endangered
C = Candidate
Co = Refuge Species of Concern, no Federal status
NFS = No Federal status
DL = Delisted

State Status
T = Threatened
E = Endangered
Co = Species of Concern

BMC Designations: F = Focal species; X = Birds of management concern; T/E = Threatened or Endangered
Waterbird Plan Category of Conservation (listed **only** categories above High): HI = Highly Imperiled; H= High Concern
Shorebird Plan Area Importance: 5 = Area of high importance, supporting hemispheric populations; 4 = Area of high importance especially within the flyway; 3 = Area is within the primary range of the species but birds present in low abundance relative to other areas
North American Waterfowl Management Plan: Listed **only** species mentioned in the plan with breeding population objectives or listed habitat to restore/enhance
Natural Heritage Program Ranks: G1 = Critically imperiled; G2 = Species secure; G3 = Vulnerable; G4 = Apparently secure; G5 = Species secure; T2 = Subspecies imperiled

E.3 Priority Resources of Concern

The priority resources of concern for Kīlauea Point NWR (Table E-2) were selected from the Comprehensive Resources of Concern list as particular indicators by which to gauge habitat conditions. The priority resources of concern table includes focal species, including birds, fish, reptiles, amphibians, invertebrates, and plants that were selected as representatives or indicators for

the overall condition of important Refuge habitats. Most of the biological emphasis of the CCP is focused on maintaining and restoring these priority resources.

Several different conservation focal species may be listed for specific habitats to cover the variety of habitat structures and plant associations. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Other species utilizing the habitat are generally expected to benefit as a result of management for the focal species.

Definitions for the column headings in Table E-2 are as follows:

- **Focal Species:** Species selected as representatives or indicators for the overall condition of the conservation target. In situations where the conservation target may include a broad variety of habitat structures and plant associations, several different conservation focal species may be listed. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Management will be focused on attaining conditions required by the focal species. Other species utilizing the conservation target are generally expected to benefit as a result of management for the focal species.
- **Habitat Type:** The general habitat description utilized by the focal species.
- **Habitat Structure:** The specific and measurable habitat attributes considered necessary to support the focal species.
- **Life History Requirement:** The general season of use for the focal species.
- **Other Benefiting Species:** Other species that are expected to benefit from management for the selected focal species. The list is not comprehensive; see the table of potential resources of concern for the Refuge for a more complete list.

Table E-2. Kīlauea Point NWR priority resources of concern.

Focal Resources	Habitat Type	Habitat Structure	Life History Requirements	Other Benefiting Species
Mōlī/kaʻupu (albatrosses)	Coastal mixed woodland-grassland	Variable. Large windward sandy, grassy, or shrubby areas with open runways for take-off and landing.	Breeding, prospecting	ʻUaʻu kani, nēnē, koaʻe ʻula, ʻā, ʻiwa, kōlea and other shorebirds, associated native plant and insect communities
ʻAʻo/ʻuaʻu kani (shearwaters)	Coastal mixed woodland-grassland and sea cliff	Substrates with good soil or root structure, or sub-canopy layer for burrowing, rock and root crevices, with open flight corridors.	Breeding, prospecting	Nēnē, koaʻe ʻula, koaʻe kea, ʻa, ʻiwa, ʻou, associated native plant and insect communities

Focal Resources	Habitat Type	Habitat Structure	Life History Requirements	Other Benefiting Species
ʻĀ/ʻiwa (red-footed booby and frigatebird)	Coastal mixed woodland-grassland, sea cliff, and beach strand	Variable. Woody vegetation >1.5–3 ft tall	Breeding, roosting, prospecting	Koaʻe ʻula, koaʻe kea, ʻa, ʻiwa, ʻou, ʻaʻo, ʻuaʻu kani, associated native plant and insect communities
Nēnē/pueo	Coastal mixed woodland-grassland, sea cliff	Sward-forming grass-legume mix with high moisture content, managed <6 inches tall. Shrublands with an open understory, forage value, adjacent to grasslands.	Breeding, roosting, foraging	ʻUaʻu kani, koaʻe ʻula, mōlī, kaʻupu, kōlea, kioea, and other shorebirds, associated native plant and insect communities
ʻIlio-holo-i-ka-uaua/ honu	Beach strand	Protected, un-vegetated or sparsely-vegetated beaches with little to no human activity.	Hauling out and nursing (ʻilio-holo-i-ka-uaua), basking (honu)	Migratory shorebirds, ʻiwa, ʻā, and rare native coastal plant communities.

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Appendix F. Statement of Compliance

STATEMENT OF COMPLIANCE

for Implementation of the

Kīlauea Point National Wildlife Refuge, Kaua‘i County, Hawai‘i

Comprehensive Conservation Plan

The following Executive orders and legislative acts have been reviewed as they apply to implementation of the Kīlauea Point National Wildlife Refuge Comprehensive Conservation Plan.

Coastal Zone Management Act, Section 307. Section 307(c)(1) of the Coastal Zone Management Act of 1972, as amended, requires each Federal agency conducting or supporting activities directly affecting the coastal zone to conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state coastal management programs.

Endangered Species Act of 1973. This Act provides for the conservation of threatened and endangered species of fish, wildlife, and plants by Federal action and by encouraging the establishment of state programs. It provides for the determination and listing of endangered and threatened species and the designation of critical habitats. CCP implementation is expected to result in supporting listed species and their recovery. Section 7 requires refuge managers to perform consultations before initiating projects which affect or may affect endangered species. The Refuge will conduct consultations under Section 7 of the Endangered Species Act for any Refuge management program actions that have the potential to affect listed species.

Executive Order 11988. Floodplain Management. Under this order Federal agencies “shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by flood plains.” The CCP is consistent with Executive Order 11988 because CCP implementation would protect floodplains from adverse impacts as a result of modification or destruction.

Executive Order 12372. Intergovernmental Review. Coordination and consultation with affected Tribal, local and State governments, other Federal agencies, and the landowners has been completed through personal contact by the Refuge manager and supervisors, and Service planners.

Executive Order 12898. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. All Federal actions must address and identify, as appropriate, disproportionally high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. The CCP was evaluated and no adverse human health or environmental effects were identified for minority or low-income populations, Indian Tribes, or anyone else.

Executive Order 13186. Responsibilities of Federal Agencies to Protect Migratory Birds. The CCP is consistent with Executive Order 13186 because the CCP and National Environmental Policy Act analyses evaluate the effects of agency actions on migratory birds and, through its proposed actions, supports conservation of these species.

Executive Order 13112 Responsibilities of Federal Agencies Pertaining to Invasive Species. This EO requires federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

Federal Noxious Weed Act of 1975. The Federal Noxious Weed Act of 1975 (7 USC 2801-2814, January 3, 1975, as amended, 1988 and 1994) provides for the control and management of nonnative weeds that injure of have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.

Integrated Pest Management, 517 DM 1 and 7 RM 14. In accordance with 517 DM 1 and 7 RM 14, an integrated pest management (IPM) approach has been adopted to eradicate, control, or contain pest and invasive species. In accordance with 517 DM 1, only pesticides registered with the EPA in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act and as provided in regulations, orders, or permits issued by EPA may be applied on lands and waters under Refuge jurisdiction.

Migratory Bird Treaty Act. Established in 1918, with subsequent amendments and provisions following, this Act protects birds migrating between the U.S. and Canada, Mexico, Russia, and Japan. This Act makes it illegal for people to "take" migratory birds, their eggs, feathers, or nests (take is any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof).

National Environmental Policy Act (1969). The planning process has been conducted in accordance with NEPA Implementing Procedures, Department of the Interior and Service procedures, and has been performed in coordination with the affected public.

An environmental assessment (EA) was prepared that integrated the CCP into the NEPA document and process. The draft CCP/EA was released for a 44-day public comment period. The affected public was notified of the availability of the draft CCP/EA through a Federal Register notice, news release to local media outlets, the Service's Refuge and Refuge planning websites, and a planning update. Copies of the draft CCP/EA and/or planning update were distributed to an extensive mailing list.

The CCP is programmatic in many respects and specific details of certain projects and actions cannot be determined until a later date, depending on funding and implementation schedules. Certain projects or actions may require additional NEPA compliance.

National Historic Preservation Act (1966). Implementation of the CCP should not affect cultural resources. The Service will comply with the NHPA if any management actions have the potential to affect any historic properties which may be present.

National Wildlife Administration Act of 1966, as amended by The National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee). Appropriate Use Findings and Compatibility Determinations have been prepared and can be found under Appendices A and B of this CCP.

Wilderness Act. The Service has evaluated the suitability of the Refuge for wilderness designation and recommended no wilderness study.

Barry W. _____ 9/10/15

Refuge Supervisor, Hawaiian and Pacific Islands National Wildlife Refuge Complex

Date

Appendix G. Integrated Pest Management (IPM)

G.1 Background

IPM is an interdisciplinary approach utilizing methods to prevent, eliminate, contain, and/or control pest species in concert with other management activities on refuge lands and waters to achieve wildlife and habitat management goals and objectives. IPM is also a scientifically based, adaptive management process where available scientific information and best professional judgment of the refuge staff as well as other resource experts would be used to identify and implement appropriate management strategies that can be modified and/or changed over time to ensure effective, site-specific management of pest species to achieve desired outcomes. In accordance with 43 CFR 46.145, adaptive management would be particularly relevant where long-term impacts may be uncertain and future monitoring would be needed to make adjustments in subsequent implementation decisions. After a tolerable pest population (threshold) is determined considering achievement of refuge resource objectives and the ecology of pest species, one or more methods, or combinations thereof, would be selected that are feasible, efficacious, and most protective of non-target resources, including native species (fish, wildlife, and plants), and Service personnel, Service authorized agents, volunteers, and the public. Staff time and available funding would be considered when determining feasibility/practicality of various treatments.

IPM techniques to address pests are presented as CCP strategies (see Chapter 2 of this CCP) in an adaptive management context to achieve refuge resource objectives. In order to satisfy requirements for IPM planning as identified in the Director's Memo (dated September 9, 2004) entitled *Integrated Pest Management Plans and Pesticide Use Proposals: Updates, Guidance, and an Online Database*, the following elements of an IPM program have been incorporated into this CCP:

- Habitat and/or wildlife objectives that identify pest species and appropriate thresholds to indicate the need for and successful implementation of IPM techniques; and
- Monitoring before and/or after treatment to assess progress toward achieving objectives including pest thresholds.

Where pesticides would be necessary to address pests, this appendix provides a structured procedure to evaluate potential effects of proposed uses involving ground-based applications to refuge biological resources and environmental quality in accordance with effects analyses (environmental consequences) of this CCP. Only pesticide uses that likely would cause minor, temporary, or localized effects to refuge biological resources and environmental quality with appropriate best management practices (BMPs), where necessary, would be allowed for use on the Refuge.

This appendix does not describe the more detailed process to evaluate potential effects associated with aerial applications of pesticides. Moreover, it does not address effects of mosquito control with pesticides (larvicides, pupacides, or adulticides). However, the basic framework to assess potential effects to refuge biological resources and environmental quality from aerial application of pesticides or use of insecticides for mosquito management would be similar to the process described in this appendix for ground-based treatments of other pesticides.

G.2 Pest Management Laws and Policies

In accordance with Service policy 569 FW 1 (Integrated Pest Management), plant, invertebrate, and vertebrate pests on units of the National Wildlife Refuge System can be controlled to ensure balanced wildlife and fish populations in support of refuge-specific wildlife and habitat management objectives. Pest control on Federal (refuge) lands and waters also is authorized under the following legal mandates:

- National Wildlife Refuge System Administration Act of 1966, as amended (16 USC 668dd-668ee);
- Plant Protection Act of 2000 (7 USC 7701 *et seq*.);
- Noxious Weed Control and Eradication Act of 2004 (7 USC 7781-7786, Subtitle E);
- Federal Insecticide, Fungicide, and Rodenticide Act of 1996 (7 USC 136-136y);
- National Invasive Species Act of 1996 (16 USC 4701);
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (16 USC 4701);
- Food Quality Protection Act of 1996 (7 USC 136);
- Executive Order 13148, Section 601(a);
- Executive Order 13112; and
- Animal Damage Control Act of 1931 (7 USC 426-426c, 46 Stat. 1468).

Pests are defined as "…living organisms that may interfere with the site-specific purposes, operations, or management objectives or that jeopardize human health or safety" from Department policy 517 DM 1 (Integrated Pest Management Policy). Similarly, 569 FW 1 defines pests as "…invasive plants and introduced or native organisms that may interfere with achieving our management goals and objectives on or off our lands, or that jeopardize human health or safety." 517 DM 1 also defines an invasive species as "a species that is nonnative to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health." Throughout the remainder of this CCP, the terms pest and invasive species are used interchangeably because both can prevent/impede achievement of refuge wildlife and habitat objectives and/or degrade environmental quality.

In general, control of pests (vertebrate or invertebrate) on the Refuge would conserve and protect the nation's fish, wildlife, and plant resources as well as maintain environmental quality. From 569 FW 1, animal or plant species that are considered pests may be managed if the following criteria are met[1]:

- Threat to human health and well being or private property, the acceptable level of damage by the pest has been exceeded, or State or local government has designated the pest as noxious;
- Detrimental to resource objectives as specified in a refuge resource management plan (e.g., comprehensive conservation plan, habitat management plan), if available; and

[1] Note that during the 15-year life span of the CCP, policies, such as 569 FW 1, may be updated and revised. As such, the Refuge will comply with the most updated Service policies related to IPM.

- Control would not conflict with attainment of resource objectives or the purpose(s) for which the Refuge was established.

The specific justifications for pest management activities on the Refuge are the following:

- Protect human health and well being;
- Prevent substantial damage to important to refuge resources;
- Protect newly introduced or re-establish native species;
- Control nonnative (exotic) species in order to support existence for populations of native species;
- Prevent damage to private property; and
- Provide the public with quality, compatible wildlife-dependent recreational opportunities.

In accordance with Service policy 620 FW 1 (Habitat Management Plans), there are additional management directives regarding invasive species found on the Refuge:

- "We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere."
- "Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and prevent new and expanded infestations of invasive species. Conduct refuge habitat management activities to prevent, control, or eradicate invasive species…"

Animal species damaging/destroying Federal property and/or detrimental to the management program of a refuge may be controlled as described in 50 CFR 31.14 (Official Animal Control Operations).

Trespass and feral animals also may be controlled on refuge lands. Based upon 50 CFR 28.43 (Destruction of Dogs and Cats), dogs and cats running at large on a national wildlife refuge and observed in the act of killing, injuring, harassing or molesting humans or wildlife may be disposed of in the interest of public safety and protection of the wildlife. Feral animals should be disposed by the most humane method(s) available and in accordance with relevant Service directives (including Executive Order 11643). Disposed wildlife specimens may be donated or loaned to public institutions. Donation or loans of resident wildlife species will only be made after securing State approval (50 CFR 30.11 [Donation and Loan of Wildlife Specimens]). Surplus wildlife specimens may be sold alive or butchered, dressed and processed subject to federal and state laws and regulations (50 CFR 30.12 [Sale of Wildlife Specimens]).

G.3 Strategies

To fully embrace IPM as identified in 569 FW 1, the following strategies, where applicable, would be carefully considered on the Refuge for each pest species.

G.3.1 Prevention

This is the most effective and least expensive long-term management option for pests. It encompasses methods to prevent new introductions or the spread of the established pests to uninfested areas. It requires identifying potential routes of invasion to reduce the likelihood of infestation. Hazard Analysis and Critical Control Points (HACCP) planning can be used to determine if current management activities on a refuge may introduce and/or spread invasive species in order to identify appropriate BMPs for prevention. See http://www.haccp-nrm.org/ for more information about HACCP planning.

Prevention may include source reduction, using pathogen-free or weed-free seeds or fill; exclusion methods (e.g., barriers) and/or sanitation methods (e.g., wash stations) to prevent re-introductions by various mechanisms including vehicles, personnel, and loose livestock. Because invasive species are frequently the first to establish newly disturbed sites, prevention would require a reporting mechanism for early detection of new pest occurrences with quick response to eliminate any new satellite pest populations. Prevention would require consideration of the scale and scope of land management activities that may promote pest establishment within uninfested areas or promote reproduction and spread of existing populations. Along with preventing initial introduction, prevention would involve halting the spread of existing infestations to new sites (Mullin et al. 2000). The primary reason of prevention would be to keep pest-free lands or waters from becoming infested. Executive Order 11312 emphasizes the priority for prevention with respect to managing pests.

The following are methods to prevent the introduction and/or spread of pests on refuge lands:

- Before beginning ground-disturbing activities (e.g., disking, scraping), inventory and prioritize pest infestations in project operating areas and along access routes. Refuge staff would identify pest species on-site or within reasonably expected potential invasion vicinity. Where possible, the refuge staff would begin project activities in uninfested areas before working in pest-infested areas.
- The refuge staff would locate and use pest-free project staging areas. They would avoid or minimize travel through pest-infested areas, or restrict to those periods when spread of seed or propagules of invasive plants would be least likely.
- The refuge staff would determine the need for, and when appropriate, identify sanitation sites where equipment can be cleaned of pests. Where possible, the refuge staff would clean equipment before entering lands at on-refuge approved cleaning site(s). This practice does not pertain to vehicles traveling frequently in and out of the project area that will remain on roadways. Seeds and plant parts of pest plants would need to be collected, where practical. The refuge staff would remove mud, dirt, and plant parts from project equipment before moving it into a project area.
- The refuge staff would clean all equipment, before leaving the project site, if operating in areas infested with pests. The refuge staff would determine the need for, and when appropriate, identify sanitation sites where equipment can be cleaned.
- Refuge staff, their authorized agents, and refuge volunteers would, where possible, inspect, remove, and properly dispose of seed and parts of invasive plants found on their clothing and equipment. Proper disposal means bagging the seeds and plant parts and then properly discarding of them (e.g., incinerating).

- The refuge staff would evaluate options, including closure, to restrict the traffic on sites with on-going restoration of desired vegetation. The refuge staff would revegetate disturbed soil (except travel ways on surfaced projects) to optimize plant establishment for each specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. The refuge staff would use native material, where appropriate and feasible. The refuge staff would use certified weed-free or weed-seed-free hay or straw where certified materials are reasonably available.
- The refuge staff would provide information, training, and appropriate pest identification materials to permit holders and recreational visitors. The refuge staff would educate them about pest identification, biology, impacts, and effective prevention measures.
- The refuge staff would inspect borrowed material for invasive plants prior to use and transport onto and/or within refuge lands.
- The refuge staff would consider invasive plants in planning for road maintenance activities.
- The refuge staff would restrict off-road travel to designated routes.

The following would be methods to prevent the introduction and/or spread of pests into refuge waters:

- The refuge staff would inspect boats (including air boats), trailers, and other boating equipment and where possible, remove any visible plants, animals, or mud before leaving any waters or boat launching facilities. Where possible, staff would drain water from motor, live well, bilge, and transom wells while on land before leaving the site. If possible, the refuge staff would wash and dry boats, downriggers, anchors, nets, floors of boats, propellers, axles, trailers, and other boating equipment to kill pests not visible at the boat launch.

These prevention methods to minimize/eliminate the introduction and/or spread of pests were taken verbatim or slightly modified from Appendix E of the U.S. Forest Service's *Preventing and Managing Invasive Plants Final Environmental Impact Statement* (2005).

G.3.2 Mechanical/Physical Methods

These methods would remove and destroy, disrupt the growth of, or interfere with the reproduction of pest species. For plants species, these treatments can be accomplished by hand, hand tool (manual), or power tools (mechanical) and include pulling, grubbing, digging, tilling/disking, cutting, swathing, grinding, shearing, girdling, mowing, and mulching of the pest plants.

For animal species, Service employees or their authorized agents could use mechanical/physical methods (including trapping) to control pests as a refuge management activity. Based upon 50 CFR 31.2, trapping can be used on a refuge to reduce surplus wildlife populations for a "balanced conservation program" in accordance with Federal or state laws and regulations. In some cases, non-lethally trapped animals would be relocated to off-refuge sites with prior approval from the state.

Each of these tools would be efficacious to some degree and applicable to specific situations. In general, mechanical controls can effectively control annual and biennial pest plants. However, to control perennial plants, the root system has to be destroyed or it would resprout and continue to grow and develop. Mechanical controls are typically not capable of destroying a perennial plant's root system. Although some mechanical tools (e.g., disking, plowing) may damage root systems, they

may stimulate regrowth producing a denser plant population that may aid in the spread depending upon the target species. In addition, steep terrain and soil conditions would be major factors that can limit the use of many mechanical control methods.

Some mechanical control methods (e.g., mowing), used in combination with herbicides, can be a very effective technique to control perennial species. For example, mowing perennial plants followed sequentially by treating the plant regrowth with a systemic herbicide often would improve the efficacy of the herbicide compared to herbicide only treatment.

G.3.3 Cultural Methods

These methods would involve manipulating habitat to increase pest mortality by reducing its suitability to the pest. Cultural methods could include water-level manipulation, mulching, changing planting dates to minimize pest impact, prescribed burning (facilitate revegetation, increase herbicide efficacy, and remove litter to assist in emergence of desirable species), flaming with propane torches, trap crops, crop rotations that would include non-susceptible crops, moisture management, addition of beneficial insect habitat, reducing clutter, proper trash disposal, planting or seeding desirable species to shade or out-compete invasive plants, applying fertilizer to enhance desirable vegetation, prescriptive grazing, and other habitat alterations.

G.3.4 Biological Control Agents

Classical biological control would involve the deliberate introduction and management of natural enemies (parasites, predators, or pathogens) to reduce pest populations. Many of the most ecologically or economically damaging pest species in the United States originated in foreign countries. These newly introduced pests, which are free from natural enemies found in their country or region of origin, may have a competitive advantage over cultivated and native species. This competitive advantage often allows introduced species to flourish, and they may cause widespread economic damage to crops or out compete and displace native vegetation. Once the introduced pest species population reaches a certain level, traditional methods of pest management may be cost prohibitive or impractical. Biological controls typically are used when these pest populations have become so widespread that eradication or effective control would be difficult or no longer practical.

Biological control has advantages as well as disadvantages. Benefits would include reducing pesticide usage, host specificity for target pests, long-term self-perpetuating control, low cost/acre, capacity for searching and locating hosts, synchronizing biological control agents to hosts' life cycles, and the unlikelihood that hosts will develop resistance to agents. Disadvantages would include the following: limited availability of agents from their native lands, the dependence of control on target species density, slow rate at which control occurs, biotype matching, the difficulty and expense of conflicts over control of the target pest, and host specificity when host populations are low.

A reduction in target species populations from biological controls is typically a slow process, and efficacy can be highly variable. It may not work well in a particular area although it does work well in other areas. Biological control agents would require specific environmental conditions to survive over time. Some of these conditions are understood; whereas, others are only partially understood or not at all.

Biological control agents will not completely eradicate a target pest. When using biological control agents, residual levels of the target pest typically are expected; the agent population level or survival would be dependent upon the density of its host. After the pest population decreases, the population of the biological control agent would decrease correspondingly. This is a natural cycle. Some pest populations (e.g., invasive plants) would tend to persist for several years after a biological control agent becomes established due to seed reserves in the soil, inefficiencies in the agents search behavior, and the natural lag in population buildup of the agent.

The full range of pest groups potentially found on refuge lands and waters would include diseases, invertebrates, vertebrates, and invasive plants (most common group). Often it is assumed that biological control would address many if not most of these pest problems. There are several well-documented success stories of biological control of invasive species in Hawai‘i, including banana poka and Eurythrina gall wasps. However, historically, each new introduction of a biological control agent in the United States has only about a 30% success rate (Coombs et al. 2004).

Introduced species without desirable close relatives in the United States would generally be selected as biological controls. Natural enemies that are restricted to one or a few closely related plants in their country of origin are targeted as biological controls (Center et al. 1997, Hasan and Ayres 1990).

The refuge staff would ensure introduced agents are approved by the applicable authorities. Except for a small number of formulated biological control products registered by USEPA under FIFRA, most biological control agents are regulated by the U.S. Department of Agriculture (USDA)-Animal Plant Health Inspection Service, Plant Protection and Quarantine (APHIS-PPQ). State departments of agriculture and, in some cases, county agricultural commissioners or weed districts, have additional approval authority.

Federal permits (USDA-APHIS-PPQ Form 526) are required to import biocontrols agents from another state. Form 526 may be obtained by writing:

USDA-APHIS-PPQ
Biological Assessment and Taxonomic Support
4700 River Road, Unit 113
Riverdale, MD 20737

Or through the internet at:

http://www.aphis.usda.gov/plant_health/permits/organism/plantpest_howtoapply.shtml

The Service strongly supports the development, and legal and responsible use of appropriate, safe, and effective biological control agents for nuisance and non-indigenous or pest species.

State and county agriculture departments may also be sources for biological control agents or they may have information about where biological control agents may be obtained. Commercial sources should have an Application and Permit to Move Live Plant Pests and Noxious Weeds (USDA-PPQ Form 226 USDA-APHIS-PPQ, Biological Assessment and Taxonomic Support, 4700 River Road, Unit 113, Riverdale, MD 20737) to release specific biological control agents in a state and/or county. Furthermore, certification regarding the biological control agent’s identity (genus, specific epithet, sub-species and variety) and purity (e.g., parasite free, pathogen free, and biotic and abiotic contaminants) should be specified in purchase orders.

Biological control agents are subject to 7 RM 8 (Exotic Species Introduction and Management). In addition, the refuge staff would follow the International Code of Best Practice for Classical Biological Control of Weeds (http://wiki.bugwood.org/Code_of_Best_Practices) as ratified by delegates to the X International Symposium on Biological Control of Weeds, Bozeman, MT, July 9, 1999. This code identifies the following:

- Release only approved biological control agents;
- Use the most effective agents;
- Document releases; and
- Monitor for impact to the target pest species, nontarget species, and the environment.

Biological control agents formulated as pesticide products and registered by the USEPA (e.g., *Bti*) are also subject to PUP review and approval (see below).

A record of all releases would be maintained with date(s), location(s), and environmental conditions of the release site(s); the identity, quantity, and condition of the biological control agents released; and other relevant data and comments such as weather conditions. Systematic monitoring to determine the establishment and effectiveness of the release is also recommended.

The NEPA documents regarding biological and other environmental effects of biological control agents prepared by another federal agency, where the scope is relevant to evaluation of releases on refuge lands, would be reviewed. Possible source agencies for such NEPA documents include the Bureau of Land Management, U.S. Forest Service, National Park Service, U.S. Department of Agriculture-Animal and Plant Health Inspection Service, and the military services. It might be appropriate to incorporate by reference parts or all of existing document(s) from the review. Incorporating by reference (43 CFR 46.135) is a technique used to avoid redundancies in analysis. It also can reduce the bulk of a Service NEPA document, which only must identify the documents that are incorporated by reference. In addition, relevant portions must be summarized in the Service NEPA document to the extent necessary to provide the decision maker and public with an understanding of relevance of the referenced material to the current analysis.

G.3.5 Pesticides

The selective use of pesticides would be based upon pest ecology (including mode of reproduction), the size and distribution of its populations, site-specific conditions (e.g., soils, topography), known efficacy under similar site conditions, and the capability to utilize best management practices (BMPs) to reduce/eliminate potential effects to non-target species, sensitive habitats, and potential to contaminate surface and groundwater. All pesticide usage (pesticide, target species, application rate, and method of application) would comply with the applicable federal (FIFRA) and state regulations pertaining to pesticide use, safety, storage, disposal, and reporting. Before pesticides can be used to eradicate, control, or contain pests on refuge lands and waters, pesticide use proposals (PUPs) would be prepared and approved in accordance with 569 FW 1. The PUP records would provide a detailed, time-, site-, and target-specific description of the proposed use of pesticides on the Refuge. All PUPs would be created, approved or disapproved, and stored in the Pesticide Use Proposal System (PUPS), which is a centralized database only accessible on the Service's intranet (https://systems.fws.gov/pups). Only Service employees would be authorized to access PUP records for a refuge in this database.

Application equipment would be selected to provide site-specific delivery to target pests while minimizing/eliminating direct or indirect (e.g., drift) exposure to non-target areas and degradation of surface and groundwater quality. Where possible, target-specific equipment (e.g., backpack sprayer, wiper) would be used to treat target pests. Other target-specific equipment to apply pesticides would include soaked wicks or paint brushes for wiping vegetation and lances, hatchets, or syringes for direct injection into stems. Granular pesticides may be applied using seeders or other specialized dispensers. In contrast, aerial spraying (e.g., fixed wing or helicopter) would only be used where access is difficult (remoteness) and/or the size/distribution of infestations precludes practical use of ground-based methods.

Because repeated use of one pesticide may allow resistant organisms to survive and reproduce, multiple pesticides with variable modes of action would be considered for treatments on refuge lands and waters. This is especially important if multiple applications within years and/or over a growing season likely would be necessary for habitat maintenance and restoration activities to achieve resource objectives. Integrated chemical and non-chemical controls also are highly effective, where practical, because pesticide-resistant organisms can be removed from the site.

Cost may not be the primary factor in selecting a pesticide for use on a refuge. If the least expensive pesticide would potentially harm natural resources or people, then a different product would be selected, if available. The most efficacious pesticide available with the least potential to degrade environment quality (soils, surface water, and groundwater) as well as least potential effect to native species and communities of fish, wildlife, plants, and their habitats would be acceptable for use on refuge lands in the context of an IPM approach.

G.3.6 Habitat Restoration/Maintenance

Restoration and/or proper maintenance of refuge habitats associated with achieving wildlife and habitat objectives would be essential for long-term prevention, eradication, or control (at or below threshold levels) of pests. Promoting desirable plant communities through the manipulation of species composition, plant density, and growth rate is an essential component of invasive plant management (Masters et al. 1996, Masters and Sheley 2001, Brooks et al. 2004). The following three components of succession could be manipulated through habitat maintenance and restoration: site availability, species availability, and species performance (Cox and Anderson 2004). Although a single method (e.g., herbicide treatment) may eliminate or suppress pest species in the short term, the resulting gaps and bare soil create niches that are conducive to further invasion by the species and/or other invasive plants. On degraded sites where desirable species are absent or in low abundance, revegetation with native/desirable grasses, forbs, and legumes may be necessary to direct and accelerate plant community recovery, and achieve site-specific objectives in a reasonable time frame. The selection of appropriate species for revegetation would be dependent on a number of factors including resource objectives and site-specific, abiotic factors (e.g., soil texture, precipitation/temperature regimes, and shade conditions). Seed availability and cost, ease of establishment, seed production, and competitive ability also would be important considerations.

G.4 Priorities for Treatments

For many refuges, the magnitude (number, distribution, and sizes of infestations) of pest problems is too extensive and beyond the available capital resources to effectively address during any single field season. To manage pests in the Refuge, it would be essential to prioritize treatment of infestations.

Highest priority treatments would be focused on early detection and rapid response to eliminate infestations of new pests, if possible. This would be especially important for aggressive pests potentially impacting species, species groups, communities, and/or habitats associated refuge purpose(s), Refuge System resources of concern (Federally listed species, migratory birds, selected marine mammals, and interjurisdictional fish), and native species for maintaining/restoring biological integrity, diversity, and environmental health.

The next priority would be treating established pests that appear in one or more previously uninfested areas. Moody and Mack (1988) demonstrated through modeling that small, new outbreaks of invasive plants eventually would infest an area larger than the established, source population. They also found that control efforts focusing on the large, main infestation rather than the new, small satellites reduced the chances of overall success. The lowest priority would be treating large infestations (sometimes monotypic stands) of well-established pests. In this case, initial efforts would focus upon containment of the perimeter followed by work to control/eradicate the established infested area. If containment and/or control of a large infestation is not effective, then efforts would focus upon halting pest reproduction or managing source populations. Maxwell et al. (2009) found treating fewer populations that are sources represents an effective long-term strategy to reduce of total number of invasive populations and decreasing meta-population growth rates.

Although State listed noxious weeds would always of high priority for management, other pest species known to cause substantial ecological impact would also be considered. For example, short-spined kiawe may not be listed by a State as noxious, but it can greatly alter fire regimes in the coastal dryland shrub habitat resulting in large monotypic stands that displace native bunch grasses, forbs, and shrubs. Pest control would likely require a multi-year commitment from Refuge staff. Essential to the long-term success of pest management would be pre- and post-treatment monitoring, assessment of the successes and failures of treatments, and development of new approaches when proposed methods do not achieve desired outcomes.

G.5 Best Management Practices (BMPs)

The BMPs can minimize or eliminate possible effects associated with pesticide usage to non-target species and/or sensitive habitats as well as degradation of water quality from drift, surface runoff, or leaching. Based upon the Department of the Interior Pesticide Use Policy (517 DM 1) and the Service Integrated Pest Management Policy and Responsibilities (30 AM 12), the use of applicable BMPs (where feasible) also would likely ensure that pesticide uses may not adversely affect federally listed species and/or their critical habitats through determinations made using the process described in 50 CFR part 402.

The following are BMPs pertaining to mixing/handling and applying pesticides for all ground-based treatments of pesticides, which would be considered and utilized, where feasible, based upon target- and site-specific factors and time-specific environmental conditions. Although not listed below, the most important BMP to eliminate/reduce potential impacts to non-target resources would be an IPM approach to prevent, control, eradicate, and contain pests.

G.5.1 Pesticide Handling and Mixing

- As a precaution against spilling, spray tanks would not be left unattended during filling.

- All pesticide containers would be triple rinsed and the rinsate would be used as water in the sprayer tank and applied to treatment areas.
- All pesticide spray equipment would be properly cleaned. Where possible, rinsate would be used as part of the makeup water in the sprayer tank and applied to treatment areas.
- The refuge staff would dispose of triple-rinsed pesticide containers per label directions.
- All unused pesticides would be properly discarded at a local "safe send" collection.
- Pesticides and pesticide containers would be lawfully stored, handled, and disposed of in accordance with the label and in a manner safeguarding human health, fish, and wildlife and prevent soil and water contaminant.
- The refuge staff would consider the water quality parameters (e.g., pH, hardness) that are important to ensure greatest efficacy where specified on the pesticide label.
- All pesticide spills would be addressed immediately using procedures identified in the refuge spill response plan.

G.5.2 Applying Pesticides

- Pesticide treatments would only be conducted by or under the supervision of Service personnel and non-Service applicators with the appropriate state or Bureau of Land Management certification to safely and effectively conduct these activities on refuge lands and waters.
- The refuge staff would comply with all federal, state, and local pesticide use laws and regulations as well as Department, Service, and Refuge System pesticide-related policies. For example, the refuge staff would use application equipment and apply rates for the specific pest(s) identified on the pesticide label as required under FIFRA.
- Before each treatment season and prior to mixing or applying any product for the first time each season, all applicators would review the labels, MSDSs, and Pesticide Use Proposal (PUPs) for each pesticide, determining the target pest, appropriate mix rate(s), PPE, and other requirements listed on the pesticide label.
- A 1-foot no-spray buffer from the water's edge would be used, where applicable and where it does not detrimentally influence effective control of pest species.
- Use low-impact herbicide application techniques (e.g., spot treatment, cut stump, oil basal, Thinvert system applications) rather than broadcast foliar applications (e.g., boom sprayer, other larger tank wand applications), where practical.
- Use low-volume rather than high-volume foliar applications where low-impact methods above are not feasible or practical, to maximize herbicide effectiveness and ensure correct and uniform application rates.
- Applicators would use and adjust spray equipment to apply the coarsest droplet size spectrum with optimal coverage of the target species while reducing drift.
- Applicators would use the largest droplet size that results in uniform coverage.

- Applicators would use drift reduction technologies such as low-drift nozzles, where possible.
- Where possible, spraying would occur during low (average<7 mph and preferably 3-5 mph) and consistent direction wind conditions with moderate temperatures (typically <85°F).
- Where possible, applicators would avoid spraying during inversion conditions (often associated with calm and very low wind conditions) that can cause large-scale herbicide drift to non-target areas.
- Equipment would be calibrated regularly to ensure that the proper rate of pesticide is applied to the target area or species.
- Spray applications would be made at the lowest height for uniform coverage of target pests to minimize/eliminate potential drift.
- If windy conditions frequently occur during afternoons, spraying (especially boom treatments) would typically be conducted during early morning hours.
- Spray applications would not be conducted on days with >30% forecast for rain within 6 hours, except for pesticides that are rapidly rain fast (e.g., glyphosate in 1 hour) to minimize/eliminate potential runoff.
- Where possible, applicators would use drift retardant adjuvants during spray applications, especially adjacent to sensitive areas.
- Where possible, applicators would use a non-toxic dye to aid in identifying target area treated as well as potential over spray or drift. A dye can also aid in detecting equipment leaks. If a leak is discovered, the application would be stopped until repairs can be made to the sprayer.
- For pesticide uses associated with cropland and facilities management, buffers, as appropriate, would be used to protect sensitive habitats, especially wetlands and other aquatic habitats.
- When drift cannot be sufficiently reduced through altering equipment set up and application techniques, buffer zones may be identified to protect sensitive areas downwind of applications. The refuge staff would only apply adjacent to sensitive areas when the wind is blowing the opposite direction.
- Applicators would utilize scouting for early detection of pests to eliminate unnecessary pesticide applications.
- The refuge staff would consider timing of application so native plants are protected (e.g., senescence) while effectively treating invasive plants.
- Rinsate from cleaning spray equipment after application would be recaptured and reused or applied to an appropriate pest plant infestation.
- Application equipment (e.g., sprayer, all-terrain vehicle, tractor) would be thoroughly cleaned and personal protective equipment (PPE) would be removed/disposed of on-site by applicators after treatments to eliminate the potential spread of pests to uninfested areas.
- Cleaning boots (or use rubber boots to aid in sanitation) and brush off clothing in a place where monitoring is feasible to control for new seed transportation.

G.6 Safety

G.6.1 Personal Protective Equipment

All applicators would wear the specific personal protective equipment (PPE) identified on the pesticide label. The appropriate PPE will be worn at all times during handling, mixing, and applying. PPE can include the following: disposable (e.g., Tyvek) or laundered coveralls; gloves (latex, rubber, or nitrile); rubber boots; and/or an NIOSH-approved respirator. Because exposure to concentrated product is usually greatest during mixing, extra care should be taken while preparing pesticide solutions. Persons mixing these solutions can be best protected if they wear long gloves, an apron, footwear, and a face shield.

Coveralls and other protective clothing used during an application would be laundered separately from other laundry items. Transporting, storing, handling, mixing and disposing of pesticide containers will be consistent with label requirements, USEPA and OSHA requirements, and Service policy.

If a respirator is necessary for a pesticide use, then the following requirements would be met in accordance with Service safety policy: a written Respirator Program, fit testing, physical examination (including pulmonary function and blood work for contaminants), and proper storage of the respirator.

G.6.2 Notification

The restricted entry interval (REI) is the time period required after the application at which point someone may safely enter a treated area without PPE. Refuge staff, authorized management agents of the Service, volunteers, and members of the public who could be in or near a pesticide treated area within the stated re-entry time period on the label would be notified about treatment areas. Posting would occur at any site where individuals might inadvertently become exposed to a pesticide during other activities on the Refuge. Where required by the label and/or state-specific regulations, sites would also be posted on its perimeter and at other likely locations of entry. The refuge staff would also notify appropriate private property owners of an intended application, including any private individuals who have requested notification. Special efforts would be made to contact nearby individuals who are beekeepers or who have expressed chemical sensitivities.

G.6.3 Medical Surveillance

Medical surveillance may be required for Service personnel and approved volunteers who mix, apply, and/or monitor use of pesticides (see 242 FW 7 [Pesticide Users] and 242 FW 4 [Medical Surveillance]). In accordance with 242 FW 7.12A, Service personnel would be medically monitoring if one or more of the following criteria is met: exposed or may be exposed to concentrations at or above the published permissible exposure limits or threshold limit values (see 242 FW 4); use pesticides in a manner considered "frequent pesticide use"; or use pesticides in a manner that requires a respirator (see 242 FW 14 for respirator use requirements). In 242 FW 7.7A, "**Frequent Pesticide Use** means when a person applying pesticide handles, mixes, or applies pesticides, with a Health Hazard rating of 3 or higher, for 8 or more hours in any week or 16 or more hours in any 30-day period." Under some circumstances, individuals may be medically monitored who use pesticides infrequently (see Section G.7.7), experience an acute exposure (sudden, short-term), or use pesticides

with a health hazard ranking of 1 or 2. This decision would consider the individual's health and fitness level, the pesticide's specific health risks, and the potential risks from other pesticide-related activities. Refuge cooperators (e.g., cooperative farmers) and other authorized agents (e.g., state and county employees) would be responsible for their own medical monitoring needs and costs.

Standard examinations (at refuge expense) of appropriate refuge staff would be provided by the nearest certified occupational health and safety physician as determined by Federal Occupational Health.

G.6.4 Certification and Supervision of Pesticide Applicators

Appropriate refuge staff or approved volunteers handling, mixing, and/or applying or directly supervising others engaged in pesticide use activities would be trained and state or federally (BLM) licensed to apply pesticides to refuge lands or waters. In accordance with 242 FW 7.18A and 569 FW 1.10B, certification is required to apply restricted use pesticides based upon USEPA regulations. For safety reasons, all individuals participating in pest management activities with general use pesticides also are encouraged to attend appropriate training or acquire pesticide applicator certification. The certification requirement would be for a commercial or private applicator depending upon the state. New staff unfamiliar with proper procedures for storing, mixing, handling, applying, and disposing of herbicides and containers would receive orientation and training before handling or using any products. Documentation of training would be kept in the files at the refuge office.

G.6.5 Record Keeping

Labels and Material Safety Data Sheets

Pesticide labels and material safety data sheets (MSDSs) would be maintained at the refuge shop and laminated copies in the mixing area. These documents also would be carried by field applicators, where possible. A written reference (e.g., note pad, chalk board, dry erase board) for each tank to be mixed would be kept in the mixing area for quick reference while mixing is in progress. In addition, approved PUPs stored in the PUPS database typically contain website links (URLs) to pesticide labels and MSDSs.

Pesticide Use Proposals (PUPs)

A PUP would be prepared for each proposed pesticide use associated with annual pest management on refuge lands and waters. A PUP would include specific information about the proposed pesticide use including the common and chemical names of the pesticide(s), target pest species, size and location of treatment site(s), application rate(s) and method(s), and federally listed species determinations, where applicable.

In accordance with Service guidelines (Director's memo [December 12, 2007]), refuge staff may receive up to five-year approvals for Washington Office and field reviewed proposed pesticide uses based upon meeting identified criteria including an approved IPM plan, where necessary (see http://www.fws.gov/contaminants/Issues/IPM.cfm). For a refuge, an IPM plan (requirements described herein) can be completed independently or in association with a CCP or a habitat management plant (HMP) if IPM strategies and potential environmental effects are adequately addressed within appropriate NEPA documentation.

The PUPs would be created, approved or disapproved, and stored as records in the Pesticide Use Proposal System (PUPS), which is centralized database on the Service's intranet (https://systems.fws.gov/pups). Only Service employees can access PUP records in this database.

Pesticide Usage

In accordance with 569 FW 1, the refuge Project Leader would be required to maintain records of all pesticides annually applied on lands or waters under refuge jurisdiction. This would encompass pesticides applied by other Federal agencies, state and county governments, non-government applicators including cooperators and their pest management service providers with Service permission. For clarification, pesticide means all insecticides, insect and plant growth regulators, desiccants, herbicides, fungicides, rodenticides, acaricides, nematicides, fumigants, avicides, and piscicides.

The following usage information can be reported for approved PUPs in the PUPS database:

- Pesticide trade name(s);
- Active ingredient(s);
- Total acres treated;
- Total amount of pesticides used (lbs. or gallons);
- Total amount of active ingredient(s) used (lbs.);
- Target pest(s); and
- Efficacy (% control) .

To determine whether treatments are efficacious (eradicating, controlling, or containing the target pest) and achieving resource objectives, habitat and/or wildlife response would be monitored both pre- and post-treatment, where possible. Considering available annual funding and staffing, appropriate monitoring data regarding characteristics (attributes) of pest infestations (e.g., area, perimeter, degree of infestation-density, % cover, density) as well as habitat and/or wildlife response to treatments may be collected and stored in a relational database (e.g., Refuge Habitat Management Database), preferably a geo-referenced data management system (e.g., Refuge Lands GIS [RLGIS]) to facilitate data analyses and subsequent reporting. In accordance with adaptive management, data analysis and interpretation would allow treatments to be modified or changed over time, as necessary, to achieve resource objectives considering site-specific conditions in conjunction with habitat and/or wildlife responses. Monitoring could also identify short- and long-term impacts to natural resources and environmental quality associated with IPM treatments in accordance with adaptive management principles identified in 43 CFR 46.145.

G.7 Evaluating Pesticide Use Proposals

Pesticides would only be used on refuge lands for habitat management as well as croplands/facilities maintenance after approval of a PUP. In general, proposed pesticide uses on refuge lands would only be approved where there would likely be minor, temporary, or localized effects to fish and wildlife species as well as minimal potential to degrade environmental quality. Potential effects to listed and non-listed species would be evaluated with quantitative ecological risk assessments and other

screening measures. Potential effects to environmental quality would be based upon pesticide characteristics of environmental fate (water solubility, soil mobility, soil persistence, and volatilization) and other quantitative screening tools. Ecological risk assessments as well as characteristics of environmental fate and potential to degrade environmental quality for pesticides would be documented in Chemical Profiles (see Section G.7.5). These profiles would include threshold values for quantitative measures of ecological risk assessments and screening tools for environmental fate that represent minimal potential effects to species and environmental quality. In general, only pesticide uses with appropriate BMPs (see Section G.4) for habitat management and cropland/facilities maintenance on refuge lands that would potentially have minor, temporary, or localized effects on refuge biological and environmental quality (threshold values not exceeded) would be approved.

G.7.1 Overview of Ecological Risk Assessment

An ecological risk assessment process would be used to evaluate potential adverse effects to biological resources as a result of a pesticide(s) proposed for use on refuge lands. It is an established quantitative and qualitative methodology for comparing and prioritizing risks of pesticides and conveying an estimate of the potential risk for an adverse effect. This quantitative methodology provides an efficient mechanism to integrate best available scientific information regarding hazard, patterns of use (exposure), and dose-response relationships in a manner that is useful for ecological risk decision-making. It would provide an effective way to evaluate potential effects where there is missing or unavailable scientific information (data gaps) to address reasonable, foreseeable adverse effects in the field as required under 40 CFR Part 1502.22. Protocols for ecological risk assessment of pesticide uses on the Refuge were developed through research and established by the U.S. Environmental Protection Agency (2004). Assumptions for these risk assessments are presented in Section G.7.2.3.

The toxicological data used in ecological risk assessments are typically results of standardized laboratory studies provided by pesticide registrants to the USEPA to meet regulatory requirements under FIFRA. These studies assess the acute (lethality) and chronic (reproductive) effects associated with short- and long-term exposure to pesticides on representative species of birds, mammals, freshwater fish, aquatic invertebrates, and terrestrial and aquatic plants. Other effects data publicly available would also be utilized for risk assessment protocols described herein. Toxicity endpoint and environmental fate data are available from a variety of resources. Some of the more useful resources can be found at the end of Section G.7.5.

Table G-1. Ecotoxicity Tests Used to Evaluate Potential Effects to Birds, Fish, and Mammals to Establish Toxicity Endpoints for Risk Quotient Calculations

Species Group	Exposure	Measurement Endpoint
Bird	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[1]
Fish	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[2]
Mammal	Acute	Oral Lethal Dose (LD_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[3]

[1]Measurement endpoints typically include a variety of reproductive parameters (e.g., number of eggs, number of offspring, eggshell thickness, and number of cracked eggs).
[2]Measurement endpoints for early life stage/life cycle typically include embryo hatch rates, time to hatch, growth, and time to swim-up.
[3]Measurement endpoints include maternal toxicity, teratogenic effects or developmental anomalies, evidence of mutagenicity or genotoxicity, and interference with cellular mechanisms such as DNA synthesis and DNA repair.

G.7.2 Determining Ecological Risk to Fish and Wildlife

The potential for pesticides used on the Refuge to cause direct adverse effects to fish and wildlife would be evaluated using USEPA's Ecological Risk Assessment Process (USEPA 2004). This deterministic approach, which is based upon a two-phase process involving estimation of environmental concentrations and then characterization of risk, would be used for ecological risk assessments. This method integrates exposure estimates (estimated environmental concentration [EEC] and toxicological endpoints [e.g., LC_{50} and oral LD_{50}]) to evaluate the potential for adverse effects to species groups (birds, mammals, and fish) representative of legal mandates for managing units of the Refuge System. This integration is achieved through risk quotients (RQs) calculated by dividing the EEC by acute and chronic toxicity values selected from standardized toxicological endpoints or published effect (Table G-1).

$$RQ = EEC/Toxicological\ Endpoint$$

The level of risk associated with direct effects of pesticide use would be characterized by comparing calculated RQs to the appropriate Level of Concern (LOC) established by USEPA (1998 [Table G-2]). The LOC represents a quantitative threshold value for screening potential adverse effects to fish and wildlife resources associated with pesticide use. The following are four exposure-species group scenarios that would be used to characterize ecological risk to fish and wildlife on the Refuge: acute-listed species, acute-nonlisted species, chronic-listed species, and chronic-nonlisted species.

Acute risk would indicate the potential for mortality associated with short-term dietary exposure to pesticides immediately after an application. For characterization of acute risks, median values from LC_{50} and LD_{50} tests would be used as toxicological endpoints for RQ calculations. In contrast, chronic risks would indicate the potential for adverse effects associated with long-term dietary exposure to pesticides from a single application or multiple applications over time (within a season and over years). For characterization of chronic risks, the no observed concentration (NOAEC) or no observed effect concentration (NOEC) for reproduction would be used as toxicological endpoints for RQ calculations. Where available, the NOAEC would be preferred over a NOEC value.

Listed species are those federally designated as threatened, endangered, or proposed in accordance with the Endangered Species Act of 1973 (16 USC 1531-1544, 87 Stat. 884, as amended-Public Law 93-205). For listed species, potential adverse effects would be assessed at the individual level because loss of individuals from a population could detrimentally impact a species. In contrast, risks to nonlisted species would consider effects at the population level. A RQ<LOC would indicate the proposed pesticide use "may affect, not likely to adversely affect" individuals (listed species) and it would not pose an unacceptable risk for adverse effects to populations (non-listed species) for each taxonomic group (Table G-2). In contrast, a RQ>LOC would indicate a "may affect, likely to adversely affect" for listed species and it would also pose unacceptable ecological risk for adverse effects to nonlisted species.

Table G-2. Presumption of Unacceptable Risk for Birds, Fish, and Mammals (USEPA 1998)

Risk Presumption		Level of Concern	
		Listed Species	Non-listed Species
Acute	Birds	0.1	0.5
	Fish	0.05	0.5
	Mammals	0.1	0.5
Chronic	Birds	1.0	1.0
	Fish	1.0	1.0
	Mammals	1.0	1.0

Environmental Exposure

Following release into the environment through application, pesticides would experience several different routes of environmental fate. Pesticides which would be sprayed can move through the air (e.g., particle or vapor drift) and may eventually end up in other parts of the environment such as non-target vegetation, soil, or water. Pesticides applied directly to the soil may be washed off the soil into nearby bodies of surface water (e.g., surface runoff) or may percolate through the soil to lower soil layers and groundwater (e.g., leaching) (Baker and Miller 1999, Pope et al. 1999, Butler et al. 1998, Ramsay et al. 1995, EXTOXNET 1993). Pesticides which would be injected into the soil may also be subject to the latter two fates. The aforementioned possibilities are by no means complete, but it does indicate movement of pesticides in the environment is very complex with transfers occurring continually among different environmental compartments. In some cases, these exchanges occur not only between areas that are close together, but it also may involve transportation of pesticides over long distances (Barry 2004, Woods 2004).

Terrestrial Exposure

The estimated environmental concentration (ECC) for exposure to terrestrial wildlife would be quantified using an USEPA screening-level approach (USEPA 2004). This screening-level approach is not affected by product formulation because it evaluates pesticide active ingredient(s). This approach would vary depending upon the proposed pesticide application method: spray or granular.

Terrestrial – Spray Application

For spray applications, exposure would be determined using the Kanaga nomogram method (USEPA 2005a, USEPA 2004, USEPA 2012, Pfleeger et al. 1996) through the USEPA's Terrestrial Residue Exposure model (T-REX) version 1.2.3 (USEPA 2005b). To estimate the maximum (initial) pesticide

residue on short grass (<20 cm tall) as a general food item category for terrestrial vertebrate species, T-REX input variables would include the following from the pesticide label: maximum pesticide application rate (pounds active ingredient [acid equivalent]/acre) and pesticide half-life (days) in soil. Although there are other food item categories (tall grasses; broadleaf plants and small insects; and fruits, pods, seeds and large insects), short grass was selected because it would yield maximum EECs (240 ppm per lb. ai/acre) for worst-case risk assessments. Short grass is not representative of forage for carnivorous species (e.g., raptors), but it would characterize the maximum potential exposure through the diet of avian and mammalian prey items. Consequently, this approach would provide a conservative screening tool for pesticides that do not biomagnify.

For RQ calculations in T-REX, the model would require the weight of surrogate species and Mineau scaling factors (Mineau et al. 1996). For example, body weights of bobwhite quail and mallard are included in T-REX by default, but body weights of other organisms (Table G-3) would be entered manually. The Mineau scaling factor accounts for small-bodied bird species that may be more sensitive to pesticide exposure than would be predicted only by body weight. Mineau scaling factors would be entered manually with values ranging from 1 to 1.55 that are unique to a particular pesticide or group of pesticides. If specific information to select a scaling factor is not available, then a value of 1.15 would be used as a default. Alternatively, zero would be entered if it is known that body weight does not influence toxicity of pesticide(s) being assessed. The upper bound estimate output from the T-REX Kanaga nomogram would be used as an EEC for calculation of RQs. This approach would yield a conservative estimate of ecological risk.

Table G-3. Average Body Weight of Selected Terrestrial Wildlife Species Frequently Used in Research to Establish Toxicological Endpoints (Dunning 1984)

Species	Body Weight (kg)
Mammal (15 g)	0.015
House sparrow	0.0277
Mammal (35 g)	0.035
Starling	0.0823
Red-winged blackbird	0.0526
Common grackle	0.114
Japanese quail	0.178
Bobwhite quail	0.178
Rat	0.200
Rock dove (aka pigeon)	0.542
Mammal (1,000 g)	1.000
Mallard	1.082
Ring-necked pheasant	1.135

Terrestrial – Granular Application

Granular pesticide formulations and pesticide-treated seed would pose a unique route of exposure for avian and mammalian species. The pesticide is applied in discrete units which birds or mammals might ingest accidentally with food items or intentionally as in the case of some bird species actively seeking and picking up gravel or grit to aid digestion or seed as a food source. Granules may also be consumed by wildlife foraging on earthworms, slugs or other soft-bodied soil organisms to which the granules may adhere.

Terrestrial wildlife RQs for granular formulations or seed treatments would be calculated by dividing the maximum milligrams of active ingredient (a.i.) exposed (e.g., EEC) on the surface of an area equal to 1 square foot by the appropriate LD_{50} value multiplied by the surrogate's body weight (Table G-3). An adjustment to surface area calculations would be made for broadcast, banded, and in-furrow applications. An adjustment also would be made for applications with and without incorporation of the granules. Without incorporation, it would be assumed that 100% of the granules remain on the soil surface available to foraging birds and mammals. Press wheels push granules flat with the soil surface, but they are not incorporated into the soil. If granules are incorporated in the soil during band or T-band applications or after broadcast applications, it would be assumed only 15% of the applied granules remain available to wildlife. It would be assumed that only 1% of the granules are available on the soil surface following in-furrow applications.

EECs for pesticides applied in granular form and as seed treatments would be determined considering potential ingestion rates of avian or mammalian species (e.g., 10-30% body weight/day). This would provide an estimate of maximum exposure that may occur as a result of granule or seed treatment spills such as those that commonly occur at end rows during application and planting. The availability of granules and seed treatments to terrestrial vertebrates would also be considered by calculating the loading per unit area (LD_{50}/ft^2) for comparison to USEPA Level of Concerns (USEPA 1998). The T-REX version 1.2.3 (USEPA 2005) contains a submodel which automates Kanaga exposure calculations for granular pesticides and treated seed.

The following formulas will be used to calculate EECs depending upon the type of granular pesticide application:

- In-furrow applications assume a typical value of 1% granules, bait, or seed remain unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/acre)(\%\ a.i.)(453{,}580\ mg/lbs)(1\%\ exposed))] / \{[(43{,}560\ ft.^2/acre)/(row\ spacing\ (ft.))] / (row\ spacing\ (ft.)\}$$

or

$$mg\ a.i./ft^2 = [(lbs\ product/1{,}000\ ft.\ row)(\%\ a.i.)(1{,}000\ ft\ row)(453{,}580\ mg/lb.)(1\%\ exposed)$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

- Incorporated banded treatments assume that 15% of granules, bait, and seeds are unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/1{,}000\ row\ ft.)(\%\ a.i.)(453{,}580\ mg/lb.)(1-\%\ incorporated)] / (1{,}000\ ft.)(band\ width\ (ft.))$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

- Broadcast treatment without incorporation assumes 100% of granules, bait, seeds are unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/acre)(\%\ a.i.)(453{,}590\ mg/lb.)] / (43{,}560\ ft.^2/acre)$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

Where:

- *% of pesticide biologically available = 100% without species specific ingestion rates*
- *Conversion for calculating mg a.i./ft.^{2} using ounces: 453,580 mg/lb. /16 = 28,349 mg/oz.*

The following equation would be used to calculate a RQ based on the EEC calculated by one of the above equations. The EEC would be divided by the surrogate LD_{50} toxicological endpoint multiplied by the body weight (Table G-3) of the surrogate.

$$RQ = EEC / [LD_{50} (mg/kg) * body\ weight\ (kg)]$$

As with other risk assessments, a RQ>LOC would be a presumption of unacceptable ecological risk. A RQ<LOC would be a presumption of acceptable risk with only minor, temporary, or localized effects to species.

Aquatic Exposure

Exposures to aquatic habitats (e.g., wetlands, meadows, ephemeral pools, water delivery ditches) would be evaluated separately for ground-based pesticide treatments of habitats managed for fish and wildlife compared with cropland/facilities maintenance. The primary exposure pathway for aquatic organisms from any ground-based treatments likely would be particle drift during the pesticide application. However, different exposure scenarios would be necessary as a result of contrasting application equipment and techniques as well as pesticides used to control pests on agricultural lands (especially those cultivated by cooperative farmers for economic return from crop yields) and facilities maintenance (e.g., roadsides, parking lots, trails) compared with other managed habitats on the Refuge. In addition, pesticide applications may be done <25 feet of the high water mark of aquatic habitats for habitat management treatments; whereas, no-spray buffers (≥25 feet) would be used for croplands/facilities maintenance treatments.

Habitat Treatments

For the worst-case exposure scenario to non-target aquatic habitats, EECs (Table G-4) would be would be derived from Urban and Cook (1986) that assumes an intentional overspray to an entire, non-target water body (1-foot depth) from a treatment <25 feet from the high water mark using the max application rate (acid basis [see above]). However, use of BMPs for applying pesticides (see Section G.4.2) would likely minimize/eliminate potential drift to non-target aquatic habitats during actual treatments. If there would be unacceptable (acute or chronic) risk to fish and wildlife with the simulated 100% overspray (RQ>LOC), then the proposed pesticide use may be disapproved or the PUP would be approved at a lower application rate to minimize/eliminate unacceptable risk to aquatic organisms (RQ=LOC).

Table G-4. Estimated Environmental Concentrations (ppb) of Pesticides in Aquatic Habitats (1 foot depth) Immediately after Direct Application (Urban and Cook 1986)

Lbs/acre	EEC (ppb)
0.10	36.7
0.20	73.5
0.25	91.9

Lbs/acre	EEC (ppb)
0.30	110.2
0.40	147.0
0.50	183.7
0.75	275.6
1.00	367.5
1.25	459.7
1.50	551.6
1.75	643.5
2.00	735.7
2.25	827.6
2.50	919.4
3.00	1103.5
4.00	1471.4
5.00	1839
6.00	2207
7.00	2575
8.00	2943
9.00	3311
10.00	3678

Cropland/Facilities Maintenance Treatments

Field drift studies conducted by the Spray Drift Task Force, which is a joint project of several agricultural chemical businesses, were used to develop a generic spray drift database. From this database, the AgDRIFT computer model was created to satisfy USEPA pesticide registration spray drift data requirements and as a scientific basis to evaluate off-target movement of pesticides from particle drift and assess potential effects of exposure to wildlife. Several versions of the computer model have been developed (i.e., v2.01 through v2.10). The Spray Drift Task Force AgDRIFT® model version 2.01 (SDTF 2003, AgDRIFT 2001) would be used to derive EECs resulting from drift of pesticides to refuge aquatic resources from ground-based pesticide applications >25 feet from the high water mark. The Spray Drift Task Force AgDRIFT model is publicly available at http://www.agdrift.com. At this website, click "AgDRIFT 2.0" and then click "Download Now" and follow the instructions to obtain the computer model.

The AgDRIFT model is composed of submodels called tiers. Tier I Ground submodel would be used to assess ground-based applications of pesticides. Tier outputs (EECs) would be calculated with AgDRIFT using the following input variables: max application rate (acid basis [see above]), low boom (20 inches), fine to medium droplet size, EPA-defined wetland, and a ≥25-foot distance (buffer) from treated area to water.

Use of Information on Effects of Biological Control Agents, Pesticides, Degradates, and Adjuvants

NEPA documents regarding biological and other environmental effects of biological control agents, pesticides, degradates, and adjuvants prepared by another federal agency, where the scope would be relevant to evaluation of effects from pesticide uses on refuge lands, would be reviewed. Possible

source agencies for such NEPA documents would include the Bureau of Land Management, U.S. Forest Service, National Park Service, U.S. Department of Agriculture-Animal and Plant Health Inspection Service, and the military services. It might be appropriate to incorporate by reference parts or all of existing document(s). Incorporating by reference (40 CFR 1502.21) is a technique used to avoid redundancies in analysis. It also would reduce the bulk of a Service NEPA document, which only would identify the documents that are incorporated by reference. In addition, relevant portions would be summarized in the Service NEPA document to the extent necessary to provide the decision maker and public with an understanding of relevance of the referenced material to the current analysis.

In accordance with the requirements set forth in 43 CFR 46.135, the Service would specifically incorporate through reference ecological risk assessments prepared by the U.S. Forest Service (http://www.fs.fed.us/foresthealth/management/fhm-invasives-plants.shtml) and Bureau of Land Management (http://www.blm.gov/wo/st/en/prog/more/veg_eis.html). These risk assessments and associated documentation also are available in total with the administrative record for the Final Environmental Impact Statement entitled *Pacific Northwest Region Invasive Plant Program – Preventing and Managing Invasive Plants* (USFS 2005) and *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS* (PEIS) (Bureau of Land Management 2007). In accordance with 43 CFR 46.120(d), use of existing NEPA documents by supplementing, tiering to, incorporating by reference, or adopting previous NEPA environmental analyses would avoid redundancy and unnecessary paperwork.

As a basis for completing "Chemical Profiles" for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide and adjuvant uses prepared by the U.S. Forest Service would be incorporated by reference:

- 2,4-D
- Chlorsulfuron
- Clopyralid
- Dicamba
- Glyphosate
- Imazapic
- Imazapyr
- Metsulfuron methyl
- Picloram
- Sethoxydim
- Sulfometuron methyl
- Triclopyr
- Nonylphenol polyethylate (NPE) based surfactants

As a basis for completing "Chemical Profiles" for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide uses as well as evaluation of risks associated with pesticide degradates and adjuvants prepared by the Bureau of Land Management would be incorporated by reference:

- Bromacil
- Chlorsulfuron
- Diflufenzopyr
- Diquat
- Diuron
- Fluridone
- Imazapic
- Overdrive (diflufenzopyr and dicamba)
- Sulfometuron methyl
- Tebuthiuron
- Pesticide degradates and adjuvants (*Appendix D – Evaluation of risks from degradates, polyoxyethylene-amine (POEA) and R-11, and endocrine disrupting chemicals*)

Assumptions for Ecological Risk Assessments

There are a number of assumptions involved with the ecological risk assessment process for terrestrial and aquatic organisms associated with utilization of the USEPA's (2004) process. These assumptions may be risk neutral or may lead to an over- or underestimation of risk from pesticide exposure depending upon site-specific conditions. The following describes these assumptions, their application to the conditions typically encountered, and whether or not they may lead to recommendations that are risk neutral, underestimate, or overestimate ecological risk from potential pesticide exposure.

- Indirect effects would not be evaluated by ecological risk assessments. These effects include the mechanisms of indirect exposure to pesticides: consuming prey items (fish, birds, or small mammals), reductions in the availability of prey items, and disturbance associated with pesticide application activities.

- Exposure to a pesticide product can be assessed based upon the active ingredient. However, exposure to a chemical mixture (pesticide formulation) may result in effects that are similar or substantially different compared to only the active ingredient. Non-target organisms may be exposed directly to the pesticide formulation or only various constituents of the formulation as they dissipate and partition in the environment. If toxicological information for both the active ingredient and formulated product are available, then data representing the greatest potential toxicity would be selected for use in the risk assessment process (USEPA 2004). As a result, this conservative approach may lead to an overestimation of risk characterization from pesticide exposure.

- Because toxicity tests with listed or candidate species or closely related species are not available, data for surrogate species would be most often used for risk assessments. Specifically, bobwhite quail and mallard duck are the most frequently used surrogates for evaluating potential toxicity to federally listed avian species. Bluegill sunfish, rainbow trout, and fathead minnow are the most common surrogates for evaluating toxicity for freshwater fishes. However, sheep's head minnow can be an appropriate surrogate marine species for coastal environments. Rats and mice are the most common surrogates for evaluating toxicity for mammals. Interspecies sensitivity is a major source of uncertainty in pesticide assessments. As a result of this uncertainty, data are selected for the most sensitive species tested within a taxonomic group (birds, fish, and mammals) given the quality of the data is acceptable. If additional toxicity data for more species of organisms in a particular group are available, the selected data will not be limited to the species previously listed as common surrogates.

- The Kanaga nomogram outputs maximum EEC values that may be used to calculate an average daily concentration over a specified interval of time, which is referred to as a time-weighted-average (TWA). The maximum EEC would be selected as the exposure input for both acute and chronic risk assessments in the screening-level evaluations. The initial or maximum EEC derived from the Kanaga nomogram represents the maximum expected instantaneous or acute exposure to a pesticide. Acute toxicity endpoints are determined using a single exposure to a known pesticide concentration typically for 48 to 96 hours. This value is assumed to represent ecological risk from acute exposure to a pesticide. On the other hand, chronic risk to pesticide exposure is a function of pesticide concentration and duration of exposure to the pesticide. An organism's response to chronic pesticide exposure may result from either the concentration of the pesticide, length of exposure, or some combination of both factors. Standardized tests for chronic toxicity typically involve exposing an organism to several different pesticide concentrations for a specified length of time (days, weeks, months, years or generations). For example, avian reproduction tests include a 10-week exposure phase. Because a single length of time is used in the test, time response data are usually not available for inclusion into risk assessments. Without time response data it is difficult to determine the concentration which elicited a toxicological response.

- Using maximum EECs for chronic risk estimates may result in an overestimate of risk, particularly for compounds that dissipate rapidly. Conversely, using TWAs for chronic risk estimates may underestimate risk if it is the concentration rather than the duration of exposure that is primarily responsible for the observed adverse effect. The maximum EEC would be used for chronic risk assessments although it may result in an overestimate of risk. TWAs may be used for chronic risk assessments, but they will be applied judiciously considering the potential for an underestimate or overestimate of risk. For example, the number of days exposure exceeds a Level of Concern may influence the suitability of a pesticide use. The greater the number of days the EEC exceeds the Level of Concern translates into greater the ecological risk. This is a qualitative assessment, and is subject to reviewer's expertise in ecological risk assessment and tolerance for risk.

- The length of time used to calculate the TWA can have a substantial effect on the exposure estimates and there is no standard method for determining the appropriate duration for this estimate. The T-REX model assumes a 21-week exposure period, which is equivalent to avian reproductive studies designed to establish a steady-state concentration for bioaccumulative compounds. However, this does not necessarily define the true exposure

duration needed to elicit a toxicological response. Pesticides, which do not bioaccumulate, may achieve a steady-state concentration earlier than 21 weeks. The duration of time for calculating TWAs will require justification and it will not exceed the duration of exposure in the chronic toxicity test (approximately 70 days for the standard avian reproduction study). An alternative to using the duration of the chronic toxicity study is to base the TWA on the application interval. In this case, increasing the application interval would suppress both the estimated peak pesticide concentration and the TWA. Another alternative to using TWAs would be to consider the number of days that a chemical is predicted to exceed the LOC.

- Pesticide dissipation is assumed to be first-order in the absence of data suggesting alternative dissipation patterns such as bi-phasic. Field dissipation data would generally be the most pertinent for assessing exposure in terrestrial species that forage on vegetation. However, these data are often not available and it can be misleading particularly if the compound is prone to "wash-off." Soil half-life is the most common degradation data available. Dissipation or degradation data that would reflect the environmental conditions typical of refuge lands would be utilized, if available.

- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column.

- Actual habitat requirements of any particular terrestrial species are not considered, and it is assumed that species exclusively and permanently occupy the treated area, or adjacent areas receiving pesticide at rates commensurate with the treatment rate. This assumption would produce a maximum estimate of exposure for risk characterization. This assumption would likely lead to an overestimation of exposure for species that do not permanently and exclusively occupy the treated area (USEPA 2004).

- Exposure through incidental ingestion of pesticide contaminated soil is not considered in the USEPA risk assessment protocols. Research suggests <15% of the diet can consist of incidentally ingested soil depending upon species and feeding strategy (Beyer et al. 1994). An assessment of pesticide concentrations in soil compared to food item categories in the Kanaga nomogram indicates incidental soil ingestion would not likely increase dietary exposure to pesticides. Inclusion of soil into the diet would effectively reduce the overall dietary concentration compared to the present assumption that the entire diet consists of a contaminated food source (Fletcher et al. 1994). An exception to this may be soil-applied pesticides in which exposure from incidental ingestion of soil may increase. Potential for pesticide exposure under this assumption may be underestimated for soil-applied pesticides and overestimated for foliar-applied pesticides. The concentration of a pesticide in soil would likely be less than predicted on food items.

- Exposure through inhalation of pesticides is not considered in the USEPA risk assessment protocols. Such exposure may occur through three potential sources: spray material in droplet form at time of application, vapor phase with the pesticide volatilizing from treated surfaces, and airborne particulates (soil, vegetative matter, and pesticide dusts). The USEPA (1990) reported exposure from inhaling spray droplets at the time of application is not an appreciable route of exposure for birds. According to research on mallards and bobwhite quail, respirable particle size (particles reaching the lung) in birds is limited to maximum diameter of 2 to 5 microns. The spray droplet spectra covering the majority of pesticide application scenarios

indicate that less than 1% of the applied material is within the respirable particle size. This route of exposure is further limited because the permissible spray drop size distribution for ground pesticide applications is restricted to ASAE medium or coarser drop size distribution.

- Inhalation of a pesticide in the vapor phase may be another source of exposure for some pesticides under certain conditions. This mechanism of exposure to pesticides occurs post application, and it would pertain to those pesticides with a high vapor pressure. The USEPA is currently evaluating protocols for modeling inhalation exposure from pesticides including near-field and near-ground air concentrations based upon equilibrium and kinetics-based models. Risk characterization for exposure with this mechanism is unavailable.

- The effect from exposure to dusts contaminated with the pesticide cannot be assessed generically as partitioning issues related to application site soils and chemical properties of the applied pesticides render the exposure potential from this route highly situation specific.

- Dermal exposure may occur through three potential sources: direct application of spray to terrestrial wildlife in the treated area or within the drift footprint, incidental contact with contaminated vegetation, or contact with contaminated water or soil. Interception of spray and incidental contact with treated substrates may pose risk to avian wildlife (Driver et al. 1991). However, available research related to wildlife dermal contact with pesticides is extremely limited, except dermal toxicity values are common for some mammals used as human surrogates (rats and mice). The USEPA is currently evaluating protocols for modeling dermal exposure. Risk characterization may be underestimated for this route of exposure, particularly with high- risk pesticides such as some organophosphates or carbamate insecticides. If protocols are established by the USEPA for assessing dermal exposure to pesticides, they will be considered for incorporation into pesticide assessment protocols.

- Exposure to a pesticide may occur from consuming surface water, dew or other water on treated surfaces. Water soluble pesticides have the potential to dissolve in surface runoff and puddles in a treated area may contain pesticide residues. Similarly, pesticides with lower organic carbon partitioning characteristics and higher solubility in water have a greater potential to dissolve in dew and other water associated with plant surfaces. Estimating the extent to which such pesticide loadings to drinking water occurs is complex and would depend upon the partitioning characteristics of the active ingredient, soils types in the treatment area, and the meteorology of the treatment area. In addition, the use of various water sources by wildlife is highly species-specific. Currently, risk characterization for this exposure mechanism is not available. The USEPA is actively developing protocols to quantify drinking water exposures from puddles and dew. If and when protocols are formally established by the USEPA for assessing exposure to pesticides through drinking water, these protocols will be incorporated into pesticide risk assessment protocols.

- Risk assessments are based upon the assumption that the entire treatment area would be subject to pesticide application at the rates specified on the label. In most cases, there is potential for uneven application of pesticides through such plausible incidents such as changes in calibration of application equipment, spillage, and localized releases at specific areas in or near the treated field that are associated with mixing and handling and application equipment as well as applicator skill. Inappropriate use of pesticides and the occurrence of spills represent a potential underestimate of risk. It is likely not an important factor for risk characterization. All pesticide applicators are required to be certified by the state in which

they apply pesticides. Certification training includes the safe storage, transport, handling, and mixing of pesticides; equipment calibration; and proper application with annual continuing education.

- The USEPA relies on Fletcher (1994) for setting the assumed pesticide residues in wildlife dietary items. The USEPA (2004) "believes that these residue assumptions reflect a realistic upper-bound residue estimate, although the degree to which this assumption reflects a specific percentile estimate is difficult to quantify." Fletcher's (1994) research suggests that the pesticide active ingredient residue assumptions used by the USEPA represent a 95th percentile estimate. However, research conducted by Pfleeger et al. (1996) indicates USEPA residue assumptions for short grass was not exceeded. Baehr and Habig (2000) compared USEPA residue assumptions with distributions of measured pesticide residues for the USEPA's UTAB database. Overall residue selection level will tend to overestimate risk characterization. This is particularly evident when wildlife individuals are likely to have selected a variety of food items acquired from multiple locations. Some food items may be contaminated with pesticide residues whereas others are not contaminated. However, it is important to recognize differences in species feeding behavior. Some species may consume whole above-ground plant material, but others will preferentially select different plant structures. Also, species may preferentially select a food item although multiple food items may be present. Without species specific knowledge regarding foraging behavior characterizing ecological risk other than in general terms is not possible.

- Acute and chronic risk assessments rely on comparisons of wildlife dietary residues with LC_{50} or NOEC values expressed as concentrations of pesticides in laboratory feed. These comparisons assume that ingestion of food items in the field occurs at rates commensurate with those in the laboratory. Although the screening assessment process adjusts dry-weight estimates of food intake to reflect the increased mass in fresh-weight wildlife food intake estimates, it does not allow for gross energy and assimilative efficiency differences between wildlife food items and laboratory feed. Differences in assimilative efficiency between laboratory and wild diets suggest that current screening assessment methods are not accounting for a potentially important aspect of food requirements.

- There are several other assumptions that can affect non-target species not considered in the risk assessment process. These include possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic and biotic factors) and behavioral changes induced by exposure to a pesticide. These factors may exist at some level contributing to adverse effects to non-target species, but they are usually characterized in the published literature in only a general manner limiting their value in the risk assessment process.

- It is assumed that aquatic species exclusively and permanently occupy the water body being assessed. Actual habitat requirements of aquatic species are not considered. With the possible exception of scenarios where pesticides are directly applied to water, it is assumed that no habitat use considerations specific for any species would place the organisms in closer proximity to pesticide use sites. This assumption produces a maximum estimate of exposure or risk characterization. It would likely be realistic for many aquatic species that may be found in aquatic habitats within or in close proximity to treated terrestrial habitats. However,

the spatial distribution of wildlife is usually not random because wildlife distributions are often related to habitat requirements of species. Clumped distributions of wildlife may result in an under- or over-estimation of risk depending upon where the initial pesticide concentration occurs relative to the species or species habitat.

- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column. Additional chemical exposure from materials associated with suspended solids or food items is not considered because partitioning onto sediments likely is minimal. Adsorption and bioconcentration occurs at lower levels for many newer pesticides compared with older more persistent bioaccumulative compounds. Pesticides with RQs close to the listed species level of concern, the potential for additional exposure from these routes may be a limitation of risk assessments, where potential pesticide exposure or risk may be underestimated.

- Mass transport losses of pesticide from a water body (except for losses by volatilization, degradation and sediment partitioning) would not be considered for ecological risk assessment. The water body would be assumed to capture all pesticide active ingredients entering as runoff, drift, and adsorbed to eroded soil particles. It would also be assumed that pesticide active ingredient is not lost from the water body by overtopping or flow-through, nor is concentration reduced by dilution. In total, these assumptions would lead to a near maximum possible water-borne concentration. However, this assumption would not account for the potential to concentrate pesticide through the evaporative loss. This limitation may have the greatest impact on water bodies with high surface-to-volume ratios such as ephemeral wetlands, where evaporative losses are accentuated and applied pesticides have low rates of degradation and volatilization.

- For acute risk assessments, there would be no averaging time for exposure. An instantaneous peak concentration would be assumed, where instantaneous exposure is sufficient in duration to elicit acute effects comparable to those observed over more protracted exposure periods (typically 48 to 96 hours) tested in the laboratory. In the absence of data regarding time-to-toxic event, analyses and latent responses to instantaneous exposure, risk would likely be overestimated.

- For chronic exposure risk assessments, the averaging times considered for exposure are commensurate with the duration of invertebrate life-cycle or fish-early life stage tests (e.g., 21-28 days and 56-60 days, respectively). Response profiles (time to effect and latency of effect) to pesticides likely vary widely with mode of action and species and should be evaluated on a case-by-case basis as available data allow. Nevertheless, because the USEPA relies on chronic exposure toxicity endpoints based on a finding of no observed effect, the potential for any latent toxicity effects or averaging time assumptions to alter the results of an acceptable chronic risk assessment prediction is limited. The extent to which duration of exposure from water-borne concentrations overestimate or underestimate actual exposure depends on several factors. These include the following: localized meteorological conditions, runoff characteristics of the watershed (e.g., soils, topography), the hydrological characteristics of receiving waters, environmental fate of the pesticide active ingredient, and the method of pesticide application. It should also be understood that chronic effects studies are performed using a method that holds water concentration in a steady state. This method is not likely to reflect conditions associated with pesticide runoff. Pesticide concentrations in

the field increase and decrease in surface water on a cycle influenced by rainfall, pesticide use patterns, and degradation rates. As a result of the dependency of this assumption on several undefined variables, risk associated with chronic exposure may in some situations underestimate risk and overestimate risk in others.

- There are several other factors that can affect non-target species not considered in the risk assessment process. These would include the following: possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic [not pesticides] and biotic factors), and sub-lethal effects such as behavioral changes induced by exposure to a pesticide. These factors may exist at some level contributing to adverse effects to non-target species, but they are not routinely assessed by regulatory agencies. Therefore, information on the factors is not extensive limiting their value for the risk assessment process. As this type of information becomes available, it would be included, either quantitatively or qualitatively, in this risk assessment process.

- USEPA is required by the Food Quality Protection Act to assess the cumulative risks of pesticides that share common mechanisms of toxicity, or act the same within an organism. Currently, USEPA has identified four groups of pesticides that have a common mechanism of toxicity requiring cumulative risk assessments. These four groups are: the organophosphate insecticides, N-methyl carbamate insecticides, triazine herbicides, and chloroacetanilide herbicides.

G.7.3 Pesticide Mixtures and Degradates

Pesticide products are usually a formulation of several components generally categorized as active ingredients and inert or other ingredients. The term active ingredient is defined by the FIFRA as preventing, destroying, repelling, or mitigating the effects of a pest, or it is a plant regulator, defoliant, desiccant, or nitrogen stabilizer. In accordance with FIFRA, the active ingredient(s) must be identified by name(s) on the pesticide label along with its relative composition expressed in percentage(s) by weight. In contrast, inert ingredient(s) are not intended to affect a target pest. Their role in the pesticide formulation is to act as a solvent (keep the active ingredient is a liquid phase), an emulsifying or suspending agent (keep the active ingredient from separating out of solution), or a carrier (such as clay in which the active ingredient is impregnated on the clay particle in dry formulations). For example, if isopropyl alcohol would be used as a solvent in a pesticide formulation, then it would be considered an inert ingredient. FIFRA only requires that inert ingredients identified as hazardous and associated percent composition, and the total percentage of all inert ingredients must be declared on a product label. Inert ingredients that are not classified as hazardous are not required to be identified.

The USEPA (September 1997) issued Pesticide Regulation Notice 97-6, which encouraged manufacturers, formulators, producers, and registrants of pesticide products to voluntarily substitute the term “other ingredients” for “inert ingredients” in the ingredient statement. This change recognized that all components in a pesticide formulation potentially could elicit or contribute to an adverse effect on non-target organisms and, therefore, are not necessarily inert. Whether referred to as “inerts” or “other ingredients,” these constituents within a pesticide product have the potential to affect species or environmental quality. The USEPA categorizes regulated inert ingredients into the following four lists (http://www.epa.gov/opprd001/inerts/index.html):

- List 1 – Inert Ingredients of Toxicological Concern
- List 2 – Potentially Toxic Inert Ingredients
- List 3 – Inerts of Unknown Toxicity
- List 4 – Inerts of Minimal Toxicity

Several of the List 4 compounds are naturally-occurring earthen materials (e.g., clay materials, simple salts) that would not elicit toxicological response at applied concentrations. However, some of the inerts (particularly the List 3 compounds and unlisted compounds) may have moderate to high potential toxicity to aquatic species based on MSDSs or published data.

Comprehensively assessing potential effects to non-target fish, wildlife, plants, and/or their habitats from pesticide use is a complex task. It would be preferable to assess the cumulative effects from exposure to the active ingredient, its degradates, and inert ingredients as well as other active ingredients in the spray mixture. However, it would only be feasible to conduct deterministic risk assessments for each component in the spray mixture singly. Limited scientific information is available regarding ecological effects (additive or synergistic) from chemical mixtures that typically rely upon broadly encompassing assumptions. For example, the U.S. Forest Service (2005) found that mixtures of pesticides used in land (forest) management likely would not cause additive or synergistic effects to non-target species based upon a review of scientific literature regarding toxicological effects and interactions of agricultural chemicals (ATSDR 2004). Moreover, information on inert ingredients, adjuvants, and degradates is often limited by the availability of and access to reliable toxicological data for these constituents.

Toxicological information regarding "other ingredients" may be available from sources such as the following:

- TOMES (a proprietary toxicological database including USEPA's IRIS, the Hazardous Substance Data Bank, the Registry of Toxic Effects of Chemical Substances [RTECS]).
- USEPA's ECOTOX database, which includes AQUIRE (a database containing scientific papers published on the toxic effects of chemicals to aquatic organisms).
- TOXLINE (a literature searching tool).
- Material Safety Data Sheets (MSDSs) from pesticide suppliers.
- Other sources such as the Farm Chemicals Handbook.

Because there is a lack of specific inert toxicological data, inert(s) in a pesticide may cause adverse ecological effects. However, inert ingredients typically represent only a small percentage of the pesticide spray mixture, and it would be assumed that negligible effects would be expected to result from inert ingredient(s).

Although the potential effects of degradates should be considered when selecting a pesticide, it is beyond the scope of this assessment process to consider all possible breakdown chemicals of the various product formulations containing an active ingredient. Degradates may be more or less mobile and more or less hazardous in the environment than their parent pesticides (Battaglin et al. 2003). Differences in environmental behavior (e.g., mobility) and toxicity between parent pesticides and degradates would make assessing potential degradate effects extremely difficult. For example, a less

toxic and more mobile, bioaccumulative, or persistent degradate may have potentially greater effects on species and/or degrade environmental quality. The lack of data on the toxicity of degradates for many pesticides would represent a source of uncertainty for assessing risk.

A USEPA-approved label specifies whether a product can be mixed with one or more pesticides. Without product-specific toxicological data, it would not be possible to quantify the potential effects of these mixtures. In addition, a quantitative analysis could only be conducted if reliable scientific information allowed a determination of whether the joint action of a mixture would be additive, synergistic, or antagonistic. Such information would not likely exist unless the mode of action would be common among the chemicals and receptors. Moreover, the composition of and exposure to mixtures would be highly site- and/or time-specific and, therefore, it would be nearly impossible to assess potential effects to species and environmental quality.

To minimize or eliminate potential negative effects associated with applying two or more pesticides as a mixture, the use would be conducted in accordance with the labeling requirements. Labels for two or more pesticides applied as a mixture should be completely reviewed, where products with the least potential for negative effects would be selected for use on the Refuge. This is especially relevant when a mixture would be applied in a manner that may already have the potential for an effect(s) associated with an individual pesticide (e.g., runoff to ponds in sandy watersheds). Use of a tank mix under these conditions would increase the level of uncertainty in terms of risk to species or potential to degrade environmental quality.

Adjuvants generally function to enhance or prolong the activity of pesticide. For terrestrial herbicides, adjuvants aid in the absorption into plant tissue. Adjuvant is a broad term that generally applies to surfactants, selected oils, anti-foaming agents, buffering compounds, drift control agents, compatibility agents, stickers, and spreaders. Adjuvants are not under the same registration requirements as pesticides and the USEPA does not register or approve the labeling of spray adjuvants. Individual pesticide labels identify types of adjuvants approved for use with it. In general, adjuvants compose a relatively small portion of the volume of pesticides applied. Selection of adjuvants with limited toxicity and low volumes would be recommended to reduce the potential for the adjuvant to influence the toxicity of the pesticide.

G.7.4 Determining Effects to Soil and Water Quality

The approval process for pesticide uses would consider potential to degrade water quality on and off refuge lands. A pesticide can only affect water quality through movement away from the treatment site. After application, pesticide mobilization can be characterized by one or more of the following (Kerle et al. 1996):

- Attach (sorb) to soil, vegetation, or other surfaces and remain at or near the treated area;
- Attach to soil and move off-site through erosion from runoff or wind;
- Dissolve in water that can be subjected to runoff or leaching.

As an initial screening tool, selected chemical characteristics and rating criteria for a pesticide can be evaluated to assess potential to enter ground and/or surface waters. These would include the following: persistence, sorption coefficient (K_{oc}), groundwater ubiquity score (GUS), and solubility.

Persistence, which is expressed as half-life (t½), represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially). Persistence in the soil can be categorized as the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996). Half-life data are usually available for aquatic and terrestrial environments.

Another measure of pesticide persistence is dissipation time (DT_{50}). It represents the time required for 50% of the deposited pesticide to degrade and move from a treated site; whereas, half-life describes the rate for degradation only. As for half-life, units of dissipation time are usually expressed in days. Field or foliar dissipation time is the preferred data for use to estimate pesticide concentrations in the environment. However, soil half-life is the most common persistence data cited in published literature. If field or foliar dissipation data are not available, soil half-life data may be used. The average or representative half-life value of most important degradation mechanism will be selected for quantitative analysis for both terrestrial and aquatic environments.

Mobility of a pesticide is a function of how strongly it is adsorbed to soil particles and organic matter, its solubility in water, and its persistence in the environment. Pesticides strongly adsorbed to soil particles, relatively insoluble in water, and not environmentally persistent would be less likely to move across the soil surface into surface waters or to leach through the soil profile and contaminate groundwater. Conversely, pesticides that are not strongly adsorbed to soil particles, are highly water soluble, and are persistent in the environment would have greater potential to move from the application site (off-site movement).

The degree of pesticide adsorption to soil particles and organic matter (Kerle et al. 1996) is expressed as the soil adsorption coefficient (K_{oc}). The soil adsorption coefficient is measured as micrograms of pesticide per gram of soil (µg/g) that can range from near zero to the thousands. Pesticides with higher K_{oc} values are strongly absorbed to soil and, therefore, would be less subject to movement.

Water solubility describes the amount of pesticide that will dissolve in a known quantity of water. The water solubility of a pesticide is expressed as milligrams of pesticide dissolved in a liter of water (mg/L or parts per million [ppm]). Pesticide with solubility <0.1 ppm are virtually insoluble in water, 100-1000 ppm are moderately soluble, and >10,000 ppm highly soluble (USGS 2000). As pesticide solubility increases, there would be greater potential for off-site movement.

The Groundwater Ubiquity Score (GUS) is a quantitative screening tool to estimate a pesticide's potential to move in the environment. It utilizes soil persistence and adsorption coefficients in the following formula.

$$GUS = log_{10}(t_{½}) \times [4 - log_{10}(K_{oc})]$$

The potential pesticide movement rating would be based upon its GUS value. Pesticides with a GUS <0.1 would considered to have an extremely low potential to move toward groundwater. Values of 1.0-2.0 would be low, 2.0-3.0 would be moderate, 3.0-4.0 would be high, and >4.0 would have a very high potential to move toward groundwater.

Water solubility describes the amount of pesticide dissolving in a specific quantity of water, where it is usually measured as mg/L or ppm. Solubility is useful as a comparative measure because pesticides with higher values are more likely to move by runoff or leaching. GUS, water solubility, t½, and K_{oc} values are available for selected pesticides from the OSU Extension Pesticide Properties Database at http://npic.orst.edu/ppdmove.htm. Many of the values in this database were derived from

the SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making (Wauchope et al. 1992).

Soil properties influence the fate of pesticides in the environment. The following six properties are mostly likely to affect pesticide degradation and the potential for pesticides to move off-site by leaching (vertical movement through the soil) or runoff (lateral movement across the soil surface).

- Permeability is the rate of water movement vertically through the soil. It is affected by soil texture and structure. Coarse textured soils (e.g., high sand content) have a larger pore size and they are generally more permeable than fine textured soils (i.e., high clay content). The more permeable soils would have a greater potential for pesticides to move vertically down through the soil profile. Soil permeability rates (inches/hour) are usually available in county soil survey reports.

- Soil texture describes the relative percentage of sand, silt, and clay. In general, greater clay content with smaller the pore size would lower the likelihood and rate water that would move through the soil profile. Clay also serves to adsorb (bind) pesticides to soil particles. Soils with high clay content would absorb more pesticide than soils with relatively low clay content. In contrast, sandy soils with coarser texture and lower water holding capacity would have a greater potential for water to leach through them.

- Soil structure describes soil aggregation. Soils with a well-developed soil structure have looser, more aggregated, structure that would be less likely to be compacted. Both characteristics would allow for less restricted flow of water through the soil profile resulting in greater infiltration.

- Organic matter would be the single most important factor affecting pesticide adsorption in soils. Many pesticides are adsorbed to organic matter which would reduce their rate of downward movement through the soil profile. Also, soils high in organic matter would tend to hold more water, which may make less water available for leaching.

- Soil moisture affects how fast water would move through the soil. If soils are already wet or saturated before rainfall or irrigation, excess moisture would runoff rather than infiltrate into the soil profile. Soil moisture also would influence microbial and chemical activity in soil, which affects pesticide degradation.

- Soil pH would influence chemical reactions that occur in the soil which in turn determines whether or not a pesticide will degrade, rate of degradation, and, in some instances, which degradation products are produced.

Based upon the aforementioned properties, soils most vulnerable to groundwater contamination would be sandy soils with low organic matter. In contrast, the least vulnerable soils would be well-drained clayey soils with high organic matter. Consequently, pesticides with the lowest potential for movement in conjunction with appropriate best management practices (see below) would be used in an IPM framework to treat pests while minimizing effects to non-target biota and protecting environmental quality.

Along with soil properties, the potential for a pesticide to affect water quality through runoff and leaching would consider site-specific environmental and abiotic conditions including rainfall, water table conditions, and topography (Huddleston 1996).

- Water is necessary to separate pesticides from soil. This can occur in two basic ways. Pesticides that are soluble move easily with runoff water. Pesticide-laden soil particles can be dislodged and transported from the application site in runoff. The concentration of pesticides in the surface runoff would be greatest for the first runoff event following treatment. The rainfall intensity and route of water infiltration into soil, to a large extent, determine pesticide concentrations and losses in surface runoff. The timing of the rainfall after application also would have an effect. Rainfall interacts with pesticides at a shallow soil depth (¼ to ½ inch), which is called the mixing zone (Baker and Miller 1999). The pesticide/water mixture in the mixing zone would tend to leach down into the soil or runoff depending upon how quickly the soil surface becomes saturated and how rapidly water can infiltrate into the soil. Leaching would decrease the amount of pesticide available near the soil surface (mixing zone) to runoff during the initial rainfall event following application and subsequent rainfall events.

- Terrain slope would affect the potential for surface runoff and the intensity of runoff. Steeper slopes would have greater potential for runoff following a rainfall event. In contrast, soils that are relatively flat would have little potential for runoff, except during intense rainfall events. In addition, soils in lower areas would be more susceptible to leaching as a result of receiving excessive water from surrounding higher elevations.

- Depth to groundwater would be an important factor affecting the potential for pesticides to leach into groundwater. If the distance from the soil surface to the top of the water table is shallow, pesticides would have less distance to travel to reach groundwater. Shallower water tables that persist for longer periods would be more likely to experience groundwater contamination. Soil survey reports are available for individual counties. These reports provide data in tabular format regarding the water table depths and the months during which it persists. In some situations, a hard pan exists above the water table that would prevent pesticide contamination from leaching.

G.7.5 Determining Effects to Air Quality

Pesticides may volatilize from soil and plant surfaces and move from the treated area into the atmosphere. The potential for a pesticide to volatilize is determined by the pesticide's vapor pressure which would be affected by temperature, sorption, soil moisture, and the pesticide's water solubility. Vapor pressure is often expressed in mm Hg. To make these numbers easier to compare, vapor pressure may be expressed in exponent form ($I \times 10^{-7}$), where I represents a vapor pressure index. In general, pesticides with $I<10$ would have a low potential to volatilize; whereas, pesticides with $I>1,000$ would have a high potential to volatilize (Oregon State University 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA Agricultural Research Service (ARS) pesticide database.

G.7.6 Preparing a Chemical Profile

The following instructions would be used by Service personnel to complete Chemical Profiles for pesticides. Specifically, profiles would be prepared for pesticide active ingredients (e.g., glyphosate, imazapic) that would be contained in one or more trade name products that are registered and labeled with USEPA. All information fields under each category (e.g., Toxicological Endpoints, Environmental Fate) would be completed for a Chemical Profile. If no information is available for a specific field, then "No data are available in references" would be recorded in the profile. Available

scientific information would be used to complete Chemical Profiles. Each entry of scientific information would be shown with applicable references.

Completed Chemical Profiles would provide a structured decision-making process utilizing quantitative assessment/screening tools with threshold values (where appropriate) that would be used to evaluate potential biological and other environmental effects to refuge resources. For ecological risk assessments presented in these profiles, the "worst-case scenario" would be evaluated to determine whether a pesticide could be approved for use considering the maximum single application rate specified on pesticide labels for habitat management and croplands/facilities maintenance treatments pertaining to refuges. Where the "worst-case scenario" likely would only result in minor, temporary, and localized effects to listed and non-listed species with appropriate BMPs (see Section G.5), the proposed pesticide's use in a PUP would have a scientific basis for approval under any application rate specified on the label that is at or below rates evaluated in a Chemical Profile. In some cases, the Chemical Profile would include a lower application rate than the maximum labeled rate in order to protect refuge resources. As necessary, Chemical Profiles would be periodically updated with new scientific information or as pesticides with the same active ingredient are proposed for use on the Refuge in PUPs.

Throughout this section, threshold values (to prevent or minimize potential biological and environmental effects) would be clearly identified for specific information presented in a completed Chemical Profile. Comparison with these threshold values provides an explicit scientific basis to approve or disapprove PUPs for habitat management and cropland/facilities maintenance on refuge lands. In general, PUPs would be approved for pesticides with Chemical Profiles where there would be no exceedances of threshold values. However, BMPs are identified for some screening tools that would minimize/eliminate potential effects (exceedance of the threshold value) as a basis for approving PUPs.

Date: Service personnel would record the date when the Chemical Profile is completed or updated. Chemical Profiles (e.g., currently approved pesticide use patterns) would be periodically reviewed and updated, as necessary. The most recent review date would be recorded on a profile to document when it was last updated.

Trade Name(s): Service personnel would accurately and completely record the trade name(s) from the pesticide label, which includes a suffix that describes the formulation (e.g., WP, DG, EC, L, SP, I, II or 64). The suffix often distinguishes a specific product among several pesticides with the same active ingredient. Service personnel would record a trade name for each pesticide product with the same active ingredient.

Common chemical name(s): Service personnel would record the common name(s) listed on the pesticide label or material safety data sheet (MSDS) for an active ingredient. The common name of a pesticide is listed as the active ingredient on the title page of the product label immediately following the trade name, and the MSDS, Section 2: Composition/Information on Ingredients. A Chemical Profile is completed for each active ingredient.

Pesticide Type: Service personnel would record the type of pesticide for an active ingredient as one of the following: herbicide, desiccant, fungicide, fumigant, growth regulator, insecticide, piscicide, or rodenticide.

EPA Registration Number(s): This number (EPA Reg. No.) appears on the title page of the label and MSDS, Section 1: Chemical Product and Company Description. It is not the EPA Establishment Number that is usually located near it. Service personnel would record the EPA Reg. No. for each trade name product with an active ingredient based upon PUPs.

Pesticide Class: Service personnel would list the general chemical class for the pesticide (active ingredient). For example, malathion is an organophosphate and carbaryl is a carbamate.

CAS (Chemical Abstract Service) Number: This number is often located in the second section (Composition/Information on Ingredients) of the MSDS. The MSDS table listing components usually contains this number immediately prior to or following the % composition.

Other Ingredients: From the most recent MSDS for the proposed pesticide product(s), Service personnel would include any chemicals in the pesticide formulation not listed as an active ingredient that are described as toxic or hazardous, or regulated under the Superfund Amendments and Reauthorization Act (SARA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Administration (OSHA), State Right-to-Know, or other listed authorities. These are usually found in MSDS sections titled "Hazardous Identifications," "Exposure Control/Personal Protection," and "Regulatory Information." If concentrations of other ingredients are available for any compounds identified as toxic or hazardous, then Service personnel would record this information in the Chemical Profile by trade name. MSDS(s) may be obtained from the manufacturer, manufacturer's website or from an on-line database maintained by Crop Data Management Systems, Inc. (see list below).

G.7.7 Toxicological Endpoints

Toxicological endpoint data would be collected for acute and chronic tests with mammals, birds, and fish. Data would be recorded for species available in the scientific literature. If no data are found for a particular taxonomic group, then "No data are available in references" would be recorded as the data entry. Throughout the Chemical Profile, references (including toxicological endpoint data) would be cited using parentheses (#) following the recorded data.

Mammalian LD_{50}: For test species in the scientific literature, Service personnel would record available data for oral lethal dose (LD_{50}) in mg/kg-bw (body weight) or ppm-bw. Most common test species in scientific literature are the rat and mouse. The lowest LD_{50} value found for a rat would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk to mammals (see Table G-1 in Section G.7.1).

Mammalian LC_{50}: For test species in the scientific literature, Service personnel would record available data for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). Most common test species in scientific literature are the rat and mouse. The lowest LC_{50} value found for a rat would be used as a toxicological endpoint for diet-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Mammalian Reproduction: For test species listed in the scientific literature, Service personnel would record the test results (e.g., Lowest Observed Effect Concentration [LOEC], Lowest Observed Effect Level [LOEL], No Observed Adverse Effect Level [NOAEL], No Observed Adverse Effect Concentration [NOAEC]) in mg/kg-bw or mg/kg-diet for reproductive test procedure(s) (e.g.,

generational studies [preferred], fertility, new born weight). Most common test species available in scientific literature are rats and mice. The lowest NOEC, NOAEC, NOEL, or NOAEL test results found for a rat would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Avian LD_{50}: For test species available in the scientific literature, Service personnel would record values for oral lethal dose (LD_{50}) in mg/kg-bw or ppm-bw. Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LD_{50} value found for an avian species would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Avian LC_{50}: For test species available in the scientific literature, Service personnel would record values for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LC_{50} value found for an avian species would be used as a toxicological endpoint for dietary-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Avian Reproduction: For test species available in the scientific literature, Service personnel would record test results (e.g., LOEC, LOEL, NOAEC, NOAEL) in mg/kg-bw or mg/kg-diet consumed for reproductive test procedure(s) (e.g., early life cycle, reproductive). Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest NOEC, NOAEC, NOEL, or NOAEL test results found for an avian species would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Fish LC_{50}: For test freshwater or marine species listed in the scientific literature, Service personnel would record a LC_{50} in ppm or mg/L. Most common test species available in the scientific literature are the bluegill, rainbow trout, and fathead minnow (marine). Test results for many game species may also be available. The lowest LC_{50} value found for a freshwater fish species would be used as a toxicological endpoint for RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Fish Early Life Stage (ELS)/Life Cycle: For test freshwater or marine species available in the scientific literature, Service personnel would record test results (e.g., LOEC, NOAEL, NOAEC, LOAEC) in ppm for test procedure(s) (e.g., early life cycle, life cycle). Most common test species available in the scientific literature are bluegill, rainbow trout, and fathead minnow. Test results for other game species may also be available. The lowest test value found for a fish species (preferably freshwater) would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Other: For test invertebrate as well as non-vascular and vascular plant species available in the scientific literature, Service personnel would record LC_{50}, LD_{50}, LOEC, LOEL, NOAEC, NOAEL, or EC_{50} (environmental concentration) values in ppm or mg/L. Most common test invertebrate species available in scientific literature are the honey bee and the water flea (*Daphnia magna*). Green algae (*Selenastrum capricornutum*) and pondweed (*Lemna minor*) are frequently available test species for aquatic non-vascular and vascular plants, respectively.

G.7.8 Ecological Incident Reports

After a site has been treated with pesticide(s), wildlife may be exposed to these chemical(s). When exposure is high relative to the toxicity of the pesticides, wildlife may be killed or visibly harmed

(incapacitated). Such events are called ecological incidents. The USEPA maintains a database (Ecological Incident Information System) of ecological incidents. This database stores information extracted from incident reports submitted by various federal and state agencies and non-government organizations. Information included in an incident report is date and location of the incident, type, and magnitude of effects observed in various species, use(s) of pesticides known or suspected of contributing to the incident, and results of any chemical residue and cholinesterase activity analyses conducted during the investigation.

Incident reports can play an important role in evaluating the effects of pesticides by supplementing quantitative risk assessments. All incident reports for pesticide(s) with the active ingredient and associated information would be recorded.

G.7.9 Environmental Fate

Water Solubility: Service personnel would record values for water solubility (S_w), which describes the amount of pesticide that dissolves in a known quantity of water. S_w is expressed as mg/L (ppm). Pesticide S_w values would be categorized as one of the following: insoluble <0.1 ppm, moderately soluble = 100 to 1000 ppm, highly soluble >10,000 ppm (USGS 2000). As pesticide S_w increases, there would be greater potential to degrade water quality through runoff and leaching.

S_w would be used to evaluate potential for bioaccumulation in aquatic species [see **Octanol-Water Partition Coefficient (K_{ow})** below].

Soil Mobility: Service personnel would record available values for soil adsorption coefficient (K_{oc} [µg/g]). It provides a measure of a chemical's mobility and leaching potential in soil. K_{oc} values are directly proportional to organic content, clay content, and surface area of the soil. K_{oc} data for a pesticide may be available for a variety of soil types (e.g., clay, loam, sand).

K_{oc} values would be used in evaluating the potential to degrade groundwater by leaching (see **Potential to Move to Groundwater** below).

Soil Persistence: Service personnel would record values for soil half-life ($t_{½}$), which represents the length of time (days) required for 50% of the deposited pesticide to degrade (completely or partially) in the soil. Based upon the $t_{½}$ value, soil persistence would be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996).

Threshold for Approving PUPs:

If soil $t_{½}$ ≤100 days, then a PUP would be approved without additional BMPs to protect water quality.

*If soil $t_{½}$ >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the **Specific Best Management Practices (BMPs)** section to minimize potential surface runoff and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*

- *Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

Along with K_{oc}, soil t½ values would be used in evaluating the potential to degrade groundwater by leaching (see **Potential to Move to Groundwater** below).

Soil Dissipation: Dissipation time (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade and move from a treated site; whereas, soil t½ describes the rate for degradation only. As for t½, units of dissipation time are usually expressed in days. Field dissipation time would be the preferred data for use to estimate pesticide concentrations in the environment because it is based upon field studies compared to soil t½, which is derived in a laboratory. However, soil t½ is the most common persistence data available in the published literature. If field dissipation data are not available, soil half-life data would be used in a Chemical Profile. The average or representative half-life value of most important degradation mechanism would be selected for quantitative analysis for both terrestrial and aquatic environments.

Based upon the DT_{50} value, environmental persistence in the soil also would be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days.

Threshold for Approving PUPs:

If soil DT_{50} ≤100 days, then a PUP would be approved without additional BMPs to protect water quality.

*If soil DT_{50} >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the **Specific Best Management Practices (BMPs)** section to minimize potential surface runoff and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

Along with K_{oc}, soil DT_{50} values (preferred over soil t½) would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below), if available.

Aquatic Persistence: Service personnel would record values for aquatic t½, which represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially) in water. Based upon the t½ value, aquatic persistence would be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996).

Threshold for Approving PUPs:

If aquatic t½ ≤100 days, then a PUP would be approved without additional BMPs to protect water quality.

If aquatic t½ >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the ***Specific Best Management Practices (BMPs)*** *section to minimize potential surface runoff and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

Aquatic Dissipation: Dissipation time (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade or move (dissipate); whereas, aquatic t½ describes the rate for degradation only. As for t½, units of dissipation time are usually expressed in days. Based upon the DT_{50} value, environmental persistence in aquatic habitats also would be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days.

Threshold for Approving PUPs:

If aquatic DT_{50} ≤100 days, then a PUP would be approved without additional BMPs to protect water quality.

If aquatic DT_{50} >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the ***Specific Best Management Practices (BMPs)*** *section to minimize potential surface runoff and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

Potential to Move to Groundwater: Groundwater Ubiquity Score (GUS) = $\log_{10}$(soil t ½) x [4 – $\log_{10}(K_{oc})$]. If a DT_{50} value is available, it would be used rather than a t ½ value to calculate a GUS score. Based upon the GUS value, the potential to move toward groundwater would be recorded as one of the following categories: extremely low potential <1.0, low—1.0 to 2.0, moderate—2.0 to 3.0, high—3.0 to 4.0, or very high >4.0.

Threshold for Approving PUPs:

If GUS ≤4.0, then a PUP would be approved without additional BMPs to protect water quality.

*If GUS >4.0, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the **Specific Best Management Practices (BMPs)** section to minimize potential surface runoff and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

Volatilization: Pesticides may volatilize (evaporate) from soil and plant surfaces and move off-target into the atmosphere. The potential for a pesticide to volatilize is a function of its vapor pressure that is affected by temperature, sorption, soil moisture, and the pesticide's water solubility. Vapor pressure is often expressed in mm Hg. To make these values easier to compare, vapor pressure would be recorded by Service personnel in exponential form ($I \times 10^{-7}$), where I represents a vapor pressure index. In general, pesticides with I<10 would have low potential to volatilize; whereas, pesticides with I >1,000 would have a high potential to volatilize (Oregon State University 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA Agricultural Research Service (ARS) pesticide database (see References).

Threshold for Approving PUPs:

If I ≤1,000, then a PUP would be approved without additional BMPs to minimize drift and protect air quality.

*If I >1,000, then a PUP would only be approved with additional BMPs specifically to minimize drift and protect air quality. One or more BMPs such as the following would be included in the **Specific Best Management Practices (BMPs)** section to reduce volatilization and potential to drift and degrade air quality:*

- *Do not treat when wind velocities are <2 or >10 mph with existing or potential inversion conditions.*
- *Apply the large-diameter droplets possible for spray treatments.*
- *Avoid spraying when air temperatures >85°F.*
- *Use the lowest spray height possible above target canopy.*
- *Where identified on the pesticide label, soil incorporate pesticide as soon as possible during or after application.*

Octanol-Water Partition Coefficient (K_{ow}): The octanol-water partition coefficient (K_{ow}) is the concentration of a pesticide in octanol and water at equilibrium at a specific temperature. Because octanol is an organic solvent, it is considered a surrogate for natural organic matter. Therefore, K_{ow} would be used to assess potential for a pesticide to bioaccumulate in tissues of aquatic species (e.g., fish). If K_{ow} >1,000 or S_w<1 mg/L and soil t½>30 days, then there would be high potential for a pesticide to bioaccumulate in aquatic species such as fish (USGS 2000).

Threshold for Approving PUPs:

If there is not a high potential for a pesticide to bioaccumulate in aquatic species, then the PUP would be approved.

If there is a high potential to bioaccumulate in aquatic species (K_{ow}>1,000 or S_w<1 mg/L and soil t½>30 days), then the PUP would not approved, except under unusual circumstances where approval would only be granted by the Washington Office.

Bioaccumulation/Bioconcentration: The physiological process where pesticide concentrations in tissue would increase in biota because they are taken and stored at a faster rate than they are metabolized or excreted. The potential for bioaccumulation would be evaluated through bioaccumulation factors (BAFs) or bioconcentration factors (BCFs). Based upon BAF or BCF values, the potential to bioaccumulate would be recorded as one of the following: low – 0 to 300, moderate – 300 to 1,000, or high >1,000 (Calabrese and Baldwin 1993).

Threshold for Approving PUPs:

If BAF or BCF≤1,000, then a PUP would be approved without additional BMPs.

If BAF or BCF>1,000, then a PUP would not approved, except under unusual circumstances where approval would only be granted by the Washington Office.

Worst-Case Ecological Risk Assessment

Max Application Rates (acid equivalent): Service personnel would record the highest application rate of an active ingredient (ae basis) for habitat management and cropland/facilities maintenance treatments in this data field of a Chemical Profile. These rates can be found in Table CP.1 under the column heading "Max Product Rate – Single Application (lbs/acre – AI on acid equiv basis)." This table would be prepared for a Chemical Profile from information specified in labels for trade name products identified in PUPs. If these data are not available in pesticide labels, then write "NS" for "not specified on label" in this table.

EECs: An estimated environmental concentration (ECC) represents potential exposure to fish and wildlife (birds and mammals) from using a pesticide. EECs would be derived by Service personnel using an USEPA screening-level approach (USEPA 2004). For each max application rate [see description under **Max Application Rates (acid equivalent)**], Service personnel would record 2 EEC values in a Chemical Profile; these would represent the worst-case terrestrial and aquatic exposures for habitat management and croplands/facilities maintenance treatments. For terrestrial and aquatic EEC calculations, see description for data entry under **Presumption of Unacceptable Risk/Risk Quotients**, which is the next field for a Chemical Profile.

Presumption of Unacceptable Risk/Risk Quotients: Service personnel would calculate and record acute and chronic risk quotients (RQs) for birds, mammals, and fish using the provided tabular formats for habitat management and/or cropland/facilities maintenance treatments. RQs recorded in a Chemical Profile would represent the worst-case assessment for ecological risk. See Section G.7.2 for discussion regarding the calculations of RQs.

For aquatic assessments associated with habitat management treatments, RQ calculations would be based upon selected acute and chronic toxicological endpoints for fish and the EEC would be derived

from Urban and Cook (1986) assuming 100% overspray to an entire 1-foot deep water body using the max application rate (ae basis [see above]).

For aquatic assessments associated with cropland/facilities maintenance treatments, RQ calculations would be done by Service personnel based upon selected acute and chronic toxicological endpoints for fish and an EEC would be derived from the aquatic assessment in AgDRIFT® model version 2.01 under Tier I ground-based application with the following input variables: max application rate (acid basis [see above]), low boom (20 inches), fine to medium/coarse droplet size, 20 swaths, EPA-defined wetland, and 25-foot distance (buffer) from treated area to water.

See Section G.7.2.1.2 for more details regarding the calculation of EECs for aquatic habitats for habitat management and cropland/facilities maintenance treatments.

For terrestrial avian and mammalian assessments, RQ calculations would be done by Service personnel based upon dietary exposure, where the "short grass" food item category would represent the worst-case scenario. For terrestrial spray applications associated with habitat management and cropland/facilities maintenance treatments, exposure (EECs and RQs) would be determined using the Kanaga nomogram method through the USEPA's T-REX version 1.2.3. T-REX input variables would include the following: max application rate (acid basis [see above]) and pesticide half-life (days) in soil to estimate the initial, maximum pesticide residue concentration on general food items for terrestrial vertebrate species in short (<20 cm tall) grass.

For granular pesticide formulations and pesticide-treated seed with a unique route of exposure for terrestrial avian and mammalian wildlife, see Section G.7.2 for the procedure that would be used to calculate RQs.

All calculated RQs in both tables would be compared with Levels of Concern (LOCs) established by USEPA (see Table G-2 in Section G.7.2). If a calculated RQ exceeds an established LOC value (in brackets inside the table), then there would be a potential for an acute or chronic effect (unacceptable risk) to federally listed (T&E) species and nonlisted species. See Section G.7.2 for detailed descriptions of acute and chronic RQ calculations and comparison to LOCs to assess risk.

Threshold for Approving PUPs:

If RQs≤LOCs, then a PUP would be approved without additional BMPs.

If RQs>LOCs, then a PUP would only be approved with additional BMPs specifically to minimize exposure (ecological risk) to bird, mammal, and/or fish species. One or more BMPs such as the following would be included in the ***Specific Best Management Practices (BMPs)*** *section to reduce potential risk to non-listed or listed species:*

- *Lower application rate and/or fewer number of applications so RQs≤LOCs*
- *For aquatic assessments (fish) associated with cropland/facilities maintenance, increase the buffer distance beyond 25 feet so RQs≤LOCs.*

Justification for Use: Service personnel would describe the reason for using the pesticide based control of specific pests or groups of pests. In most cases, the pesticide label will provide the appropriate information regarding control of pests to describe in the section.

Specific Best Management Practices (BMPs): Service personnel would record specific BMPs necessary to minimize or eliminate potential effects to non-target species and/or degradation of environmental quality from drift, surface runoff, or leaching. These BMPs would be based upon scientific information documented in previous data fields of a Chemical Profile. Where necessary and feasible, these specific practices would be included in PUPs as a basis for approval.

If there are no specific BMPs that are appropriate, then Service personnel would describe why the potential effects to refuge resources and/or degradation of environmental quality is outweighed by the overall resource benefit(s) from the proposed pesticide use in the BMP section of the PUP. See Section G.4 of this document for a complete list of BMPs associated with mixing and applying pesticides appropriate for all PUPs with ground-based treatments that would be additive to any necessary, chemical-specific BMPs.

References: Service personnel would record scientific resources used to provide data/information for a chemical profile. Use the number sequence to uniquely reference data in a chemical profile.

The following on-line data resources are readily available for toxicological endpoint and environmental fate data for pesticides:

1. California Product/Label Database. Department of Pesticide Regulation, California Environmental Protection Agency. (http://www.cdpr.ca.gov/docs/label/labelque.htm#regprods)

2. ECOTOX database. Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C. (http://cfpub.epa.gov/ecotox/)

3. Extension Toxicology Network (EXTOXNET) Pesticide Information Profiles. Cooperative effort of University of California-Davis, Oregon State University, Michigan State University, Cornell University and University of Idaho through Oregon State University, Corvallis, Oregon. (http://extoxnet.orst.edu/pips/ghindex.html)

4. FAO specifications and evaluations for plant protection products. Pesticide Management Unit, Plant Protection Services, Food and Agriculture Organization, United Nations.

5. Human health and ecological risk assessments. Pesticide Management and Coordination, Forest Health Protection, U.S. Department of Agriculture, U.S. Forest Service.

6. Pesticide Chemical Fact Sheets. Clemson University Pesticide Information Center. (http://www.clemson.edu/extension/pest_ed/safety_ed_prog/label_msds/factshee.html)

7. Pesticide Fact Sheets. Published by Information Ventures, Inc. for Bureau of Land Management, Department of Interior; Bonneville Power Administration, U.S. Department of Energy; and Forest Service, U.S. Department of Agriculture.

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Chemical Profile

Date:			
Trade Name(s):		**Common Chemical Name(s):**	
Pesticide Type:		**EPA Registration Number:**	
Pesticide Class:		**CAS Number:**	
Other Ingredients:			

Toxicological Endpoints

Mammalian LD_{50}:	
Mammalian LC_{50}:	
Mammalian Reproduction:	
Avian LD_{50}:	
Avian LC_{50}:	
Avian Reproduction:	
Fish LC_50:	
Fish ELS/Life Cycle:	
Other:	

Ecological Incident Reports

Environmental Fate

Water solubility (S_w):	

Soil Mobility (K_{oc}):	
Soil Persistence (t½):	
Soil Dissipation (DT_{50}):	
Aquatic Persistence (t½):	
Aquatic Dissipation (DT_{50}):	
Potential to Move to Groundwater (GUS score):	
Volatilization (mm Hg):	
Octanol-Water Partition Coefficient (K_{ow}):	
Bioaccumulation/Bioconcentration:	**BAF:** **BCF:**

Worst Case Ecological Risk Assessment

Max Application Rate (ai lbs/acre – ae basis)	**Habitat Management:** **Croplands/Facilities Maintenance:**
EECs	**Terrestrial (Habitat Management):** **Terrestrial (Croplands/Facilities Maintenance):** **Aquatic (Habitat Management):** **Aquatic (Croplands/Facilities Maintenance):**

Habitat Management Treatments:

Presumption of Unacceptable Risk		**Risk Quotient (RQ)**	
		Listed (T&E) Species	**Nonlisted Species**
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Cropland/Facilities Maintenance Treatments:

Presumption of Unacceptable Risk		**Risk Quotient (RQ)**	
		Listed (T&E) Species	**Nonlisted Species**
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Justification for Use:	
Specific Best Management Practices (BMPs):	
References:	

Table CP.1 Pesticide Name

Trade Name[a]	Treatment Type[b]	Max Product Rate – Single Application (lbs/acre or gal/acre)	Max Product Rate -Single Application (lbs/acre - AI on acid equiv basis)	Max Number of Applications Per Season	Max Product Rate Per Season (lbs/acre/ season or gal/acre/ season)	Minimum Time Between Applications (Days)

[a]From each label for a pesticide identified in pesticide use proposals (PUPs), Service personnel would record application information associated with possible/known uses on Service lands.
[b]Treatment type: H – habitat management or CF – cropland/facilities maintenance. If a pesticide is labeled for both types of treatments (uses), then record separate data for H and CF applications.

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Appendix H. Common Acronyms and Abbreviations

ABC	American Bird Conservancy
Ac	Acres
ADA	Americans with Disabilities Act
Administration Act	National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee)
AHPA	Archaeological and Historic Preservation Act
ARPA	Archaeological Resources Protection Act
ATS	Alternative Transportation Study
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	Appropriate Use Findings
BASH	Bird Aircraft Strike Hazard
BIDEH	Biological Integrity, Diversity, and Environmental Health
BMP	Best Management Practices
CCP	Comprehensive Conservation Plan
CD	Compatibility Determination
CEQ	White House Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
CWCS	Comprehensive Wildlife Conservation Strategy
CWRM	Hawai‘i Commission on Water Resource Management
DBEDT	Hawai‘i Department of Business, Economic Development, and Tourism
DLNR	Hawai‘i Department of Land and Natural Resources
DM	Departmental Manual
DFM	Deferred Maintenance
DO	U.S. Fish and Wildlife Service Director’s Order
DOFAW	Division of Forestry and Wildlife
DOH	Hawai‘i Department of Health
DOI	U.S. Department of the Interior
Draft CCP/EA	Draft Comprehensive Conservation Plan and Environmental Assessment
EA	Environmental Assessment
EE	Environmental Education
ENSO	El Niño Southern Oscillation
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FHWA	Federal Highways Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FLREA	Federal Lands Recreation Enhancement Act

FONSI	Finding of No Significant Impact
FR	Federal Register
FW	U.S. Fish and Wildlife Service Manual
FY	Fiscal Year
Ft	Feet (Foot)
GAO	U.S. General Accounting Office
GHG	Greenhouse Gases
HDOE	Hawai‘i Department of Education
HDOT	Hawai‘i Department of Transportation
HEEA	Hawai‘i Environmental Education Alliance
HELP	Hawai‘i Environmental Literacy Plan
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HPINWRC	Hawaiian and Pacific Islands National Wildlife Refuge Complex
I&M	Inventory and Monitoring
IBA	Important Bird Area
Improvement Act	National Wildlife Refuge System Improvement Act of 1997
In	Inch(es)
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
ITS	Intelligent Transportation System
KNWRC	Kaua‘i National Wildlife Refuge Complex
KPNHA	Kīlauea Point Natural History Association
LCC	Landscape Conservation Cooperative
LE	Law Enforcement
LEIS	Legislative Environmental Impact Statement
LWCF	Land and Water Conservation Fund
MBCA	Migratory Bird Conservation Act
MBTA	Migratory Bird Treaty Act
MGR	Median Gross Rent
MHI	Main Hawaiian Islands
Mi	Mile(s)
MMS	Maintenance Management System
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAGPRA	Native American Graves Repatriation Act
NAS	National Audubon Society
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	USDA Natural Resources Conservation Service

NRHP	National Register of Historic Places
NWHI	Northwestern Hawaiian Islands
NWR	National Wildlife Refuge
NWRC	National Wildlife Refuge Complex
NWPS	National Wilderness Preservation System
NWRS or Refuge System	National Wildlife Refuge System
RM	National Wildlife Refuge System Manual
OHA	Office of Hawaiian Affairs
ORV	Off-road Vehicles
PDO	Pacific Decadal Oscillation
PICCC	Pacific Islands Climate Change Cooperative
PIFWO	Pacific Islands Fish and Wildlife Office
PUP	Pesticide Use Proposal
RAPP	Refuge Annual Performance Plan
RHPO	Regional Historic Preservation Officer
RO	Regional Office
ROC	Resource of Concern
RONS	Refuge Operational Needs System
RRS	Refuge Revenue Sharing
SAMMS	Service Asset Maintenance and Management System
SCORP	State Comprehensive Outdoor Recreation Plan
SDMP	Step-down Management Plan
SHPO	State Historic Preservation Office
SLR	Sea Level Rise
SOC	Species of Concern
SUP	Special Use Permit
T&E	Threatened and Endangered
TAG	Transportation Assistance Group
TBD	To Be Determined
TCP	Traditional Cultural Property
USFWS, FWS, the Service	U.S. Fish and Wildlife Service
USC	United States Code
USGS	U.S. Geological Survey
WSA	Wilderness Study Area

Appendix I. CCP Team Members and Public Involvement

I.1 CCP Team Members

The CCP was developed and prepared primarily by a core team made up of local Refuge staff and Regional Office (RO) staff. The core team sought expertise and review from professionals from several different agencies and organizations. The List of Preparers below includes core team members as well as the people who wrote specific portions of the plan. Many others provided assistance in developing and reviewing the CCP and associated products and in providing advice through the planning process. These people are captured in the List of Reviewers and Advisors.

Table I-1. List of Preparers (in alphabetical order).

Name and title	CCP Contributions
Noreen Bautista, Administrative Officer, KNWRC	Developer/reviewer: visitor services goals/objectives/strategies; analysis; budget
Shayna Carney, Acting Visitor Services Manager, KNWRC (departed 2011)	Writer/reviewer: lead on visitor services goals/objectives/strategies; affected environment and environmental consequences; research/analysis
Liz Cruz, Geographer/GIS Specialist, RO *replaced,* David Hoy, Geographer/GIS Specialist, RO	GIS data gathering and analysis (e.g., habitats and vegetation, infrastructure, public use, alternatives development); development of maps for public involvement and documents
Catherine Cullinane-Thomas, Economist, Policy Analysis & Science Assistance Branch, Fort Collins Science Center/US Geological Survey	Writer/analysis: affected environment and environmental consequences (economics)
Padraic Gallagher, Park Ranger (previously Administrative Assistant), KNWRC (departed 2015)	Developer/reviewer: cultural and historic goals/objectives/strategies; CCP mailing list; administrative support for workshops, meetings, and public open houses
Sandra Hall, External Affairs, HPINWRC (retired 2015)	Layout and reviewer of planning updates; assisted with formatting of CCP document
Lynne Koontz, Economist, Policy Analysis & Science Assistance Branch, Fort Collins Science Center/US Geological Survey	Writer/analysis: affected environment and environmental consequences (economics)
Laurie Miskimins, Transportation Planner, Federal Highways Administration-Central Federal Lands Highway Division	Writer/analysis: affected environment and environmental consequences
Michael Mitchell, Deputy Project Leader, KNWRC	Writer/reviewer: biological and maintenance and facilities goals/objectives/strategies, affected environment and environmental consequences; assist coordination with staff and public/partners; reviewed AUFs/CDs
Steve Moore, Big Foot Consulting	Writer of environmental consequences and appendices A and B

Name and title	CCP Contributions
Robert Petersen, Facilities and Maintenance, KPNWR *replaced,* Ron Langdon, Facilities and Maintenance (departed 2008)	Writer/reviewer: maintenance and facilities goals/objectives/strategies, affected environment and environmental consequences
Sheri Saari, Park Ranger, KPNWR (departed)	Writer/reviewer: visitor services goals/objectives/strategies; writer: affected environment
Natalie Sexton, Policy Analysis & Science Assistance Branch, Fort Collins Science Center/US Geological Survey	Writer/analysis: affected environment and environmental consequences (social)
Chadd Smith, Facilities and Maintenance, Hanalei and Hulēʻia NWRs	Assisted with public open houses and participated in development of goals and objectives
Shannon Smith, Project Leader, KNWRC (departed 2015) *replaced,* Mike Hawkes, Project Leader, KNWRC (departed 2008)	Decision-maker and document quality reviewer; public involvement and communications (including coordination of Federal, State, County, partner, and community organizations); compatibility determinations and implementation; overall guidance for CCP development and coordination with staff
Khem So, Conservation Planner, RO, *replaced* Christine Ogura, Natural Resource Planner, HPINWRC (departed 2013) *replaced,* Bill Perry, Refuge Conservation Planner, HPINWRC (departed 2010) *replaced,* Charlie Pelizza, Refuge Conservation Planner, HPINWRC (departed 2008)	CCP team leader responsible for regional and Honolulu office coordination and process and policy guidance for CCP development; CCP schedule manager; facilitator of team, partner, and public meetings/workshops; document and related product management (including planning record), format and review; writer of affected environment and environmental consequences and planning updates; public involvement and communications
Andrew Swan, Park Ranger, KPNWR (departed 2010)	Developer: visitor services goals/objectives/strategies; writer: affected environment
Kimberly Uyehara, Biologist, KNWRC *replaced,* Brenda Zaun, Biologist, KNWRC (departed 2008)	Writer/reviewer: lead on biological goals/objectives/strategies, biological component on affected environment and related environmental consequences; biological resources of concern, taxa lists and habitats, integrated pest management; research/analysis; coordinate with biological and natural resource management partners; reviewed AUFs/CDs
Jennifer Waipa, Supervisory Park Ranger, KPNWR	Writer/reviewer: lead on cultural and historic goals/objectives/strategies, affected environment, and environmental consequences

Table I-2. List of Reviewers and Advisors (in alphabetical order).

Name and title	CCP Contributions
Marie Bruegmann, Botanist, Ecological Services, USFWS-Pacific Islands Fish and Wildlife Office	Reviewer of plant restoration strategies
Joe Engler, Assistant Regional Biologist, RO	Review of biological goals/objectives/strategies; AUFs and CDs; IPM
Bridgette Flanders-Wanner, Assistant Regional Refuge Biologist and Regional IPM Coordinator, RO	Lead reviewer of biological goals/objectives/strategies; AUFs and CDs; IPM
Kevin Foerster, Regional Chief of Refuges, RO *replaced,* Robin West, Regional Chief of Refuges, RO (retired 2014)	Major decisions on CCP direction, CCP/EA, and Federal Register Notice approvals
Glenda Franich, Visitor Services and Communication, RO, *replaced,* Patrick Stark, Visitor Services and Communication, RO (departed)	Document and related products (e.g., planning update) print management; CCP cover design
Holly Freifeld, Biologist, Division of Migratory Birds and Habitat Programs, RO (departed)	Reviewer of biological goals/objectives/strategies
Ben Harrison, Deputy Regional Chief of Refuges (formerly Division Chief, Natural and Cultural Resources), RO (retired 2014)	CCP advisor, reviewer of policy, AUF, CDs, environmental consequences, and wilderness
Jeff Holm, Chief, Branch of Transportation, Refuge Assets and Planning, RO	Review of transportation-related goals/objective/strategies
Charles Houghten, Division Chief, Lands Division, RO	CCP advisor for planning policy and guidance; reviewer; coordination with other divisions and the Washington, DC, office
Jean Kenyon, Regional Inventory and Monitoring Specialist, (RO-Honolulu)	Reviewer of biological inventory and monitoring strategies
Kay Kier-Haggenjos, Writer/Editor, RO	Technical edit and processing of Federal Register notices; review and processing of document and related products (e.g., planning updates); website management
Kevin Kilbride, Regional Inventory and Monitoring Coordinator, RO	Reviewer of biological goals/objectives/strategies; AUFs and CDs; IPM
Nicole McCarthy, Writer/Editor, RO	Technical edit and review of CCP and processing of Federal Register notices; assist with public comment period coordination
Scott McCarthy, Chief, Planning, RO	CCP advisor for planning policy and guidance; planning workload priorities; coordination with other divisions and the Washington, DC, office
Mike Marxen, Branch Chief ,Visitor Services and Communication, RO	Visitor Services review and guidance on public use goals/objectives/strategies; assistance with related alternatives development workshop

Name and title	CCP Contributions
Don Palawski, Deputy Project Leader, HPINWRC (retired), Jerry Leinecke, Deputy Project Leader, HPINWRC (retired 2009)	Assist with Regional Office coordination; reviewer of document and related products; guidance on overall process and components
Charles Parrott, Realty Specialist, RO	Realty analysis, review of related sections in document, assisted with verifying map accuracy
Fred Paveglio, Branch Chief Refuge Biology, RO (retired 2010)	Development and review of biological goals/objectives
Anan Raymond, Regional Archaeologist, RO	Review of cultural and historic resources goals/objectives/strategies and affected environment and environmental consequences
Andre Raine, Coordinator, Kauaʻi Endangered Seabird Recovery Project	Review of biological objectives and strategies
Barry Stieglitz, Project Leader, HPINWRC	Decision-maker; reviewer of document and related products
Robyn Thorson, Regional Director, RO	Final decision-maker, CCP/EA, and Federal Register Notice approvals
Jared Underwood, Zone Inventory and Monitoring Biologist, HPINWRC	Reviewer of biological inventory and monitoring strategies
Lee Ann Woodward, Resource Contaminants Specialist, Pacific Reefs NWRC	Reviewer of contaminants section in affected environments

I.2 Summary of Public Involvement

The initial CCP planning process for the Kauaʻi National Wildlife Refuge Complex, which includes three national wildlife refuges—Hanalei, Hulēʻia, and Kīlauea Point—began in 2007. A core team and an expanded team were formed to guide development of the CCP. However, CCP development was not restricted to just these teams; we held workshops and meetings with local, State, and Federal agencies, elected officials, community groups, Refuge users, nonprofit organizations, and others. Additionally, public scoping occurred during 2009–2010 and over 80 people participated. This helped us to further identify issues and priorities to consider during CCP development (see Chapter 1). Another public open house to share the draft alternatives we developed was held in August 2011; over 20 people participated during the public comment period. We provided planning updates throughout the development of the draft CCP/EA, which allowed for comment opportunities to assist with alternatives development. Following is a brief summary of public involvement:

- September 28, 2009 – Federal Register Notice announcing a notice of intent to prepare the draft CCP/EA and public open house meetings;
- October 8, 2009 – Talk story session at Hanalei;
- November 4, 2009 – Talk story session at Kīlauea;
- January 2010 – Planning Update 1 announcing the official start of public scoping with public open house meetings, summarizing talk story sessions already held, and previewing preliminary issues and goals for CCP consideration;

- January 12, 2010 – Talk story session at Hulēʻia;
- January 22, 2010 – News release to announce public open house meetings;
- January 26, 2010 – Public open house at Līhuʻe Public Library;
- January 28, 2010 – Public open house at Kīlauea Elementary School;
- February 2011 – Planning Update 2 summarized the public scoping efforts and outlined the next steps in CCP development;
- March 21–25, 2011 – Alternative Transportation Workshop with various agencies (County, State, Federal);
- August 10, 2011 – Public open house to share initial draft alternatives developed;
- 2010-2011 – Refuge staff also held specific meetings to provide updates and discuss management considerations with partners and interested parties (e.g., Division of Forestry and Wildlife, KPNHA, NOAA, elected officials);
- February 12, 2015 – Federal Register Notice and Planning Update 3 announcing the availability of the draft CCP/EA for public comment and review;
- February 24, 2015 – Public open hose at Kīlauea Neighborhood Center;
- February 25, 2015 – Public open house at Kīlauea Elementary School;
- February 25–March 27, 2015 – Refuge staff also held specific meetings to solicit feedback on the draft CCP/EA from partners and interested parties (e.g., Division of Forestry and Wildlife, County of Kauaʻi, one Kauaʻi County Council member, the Kīlauea Neighborhood Association, and kūpuna)

Distribution and notification of the opportunities above was done using multiple methods including news releases, a mail/email list of over 800 people—interested individuals, kūpuna, local conservation and interest groups, research organizations, Native Hawaiian organizations, and local, State, and Federal government agencies and elected officials—community and association events and meetings, and a CCP-specific website (http://www.fws.gov/refuge/Kilauea_Point/what_we_do/planning.html).

The draft CCP/EA and final CCP reflect this extensive public involvement in all chapters as issues identified, related goals/objectives/strategies and alternatives drafted, and final management direction were shaped by the feedback received during public involvement. The following table summarizes the comments heard during public scoping and identifies where or how they were addressed in the draft CCP/EA.

Table I-3. Summary of Scoping Comments.

Issue	Where/How Addressed in Draft CCP/EA
Focus visitors at Kīlauea Point NWR with smaller-scale opportunities at Hanalei NWR	Visitor use has been focused at Kīlauea Point NWR (see Chapter 2 for the preferred alternative)
Concern about being overrun by tours to raise money for the Refuge	It is not the intent of the Refuge to grow visitation. It is our desire to provide high-quality visitor experiences. For this reason, the Refuge's preferred alternative is D, which would allow more focused visitation that is managed in a quality way (see Chapter 2)
Ensure there are ample opportunities for	We would provide opportunities through environmental

Issue	Where/How Addressed in Draft CCP/EA
young people on the Refuge	education as well as research/partnership strategies to involve young people (see Chapter 2)
Other visitor services opportunities: expansion of hiking opportunities at all three refuges and an interpretive person at both the Kīlauea Point NWR and Hanalei NWR overlooks	Interpretive hiking opportunities and increased interpretation with more available staff are identified as strategies under several of the alternatives proposed for visitor services, including the preferred alternative (see Chapter 2)
Partnerships with specific organizations such as local high schools and the Kaua‘i Community College	This has been incorporated as part of research and partnerships (see Chapter 2)
Develop additional outreach and education opportunities (e.g., web cams and a virtual tour on the Refuge website)	These opportunities are identified in Chapter 2
Add a goal of evaluating expansion of the sites to include other important habitats on the island or adjacent to existing Refuge areas	At this time, given the 15-year horizon of this plan and the fact that the Refuge already underwent an expansion process in 2007, there are no strategies for additional expansion for habitat purposes identified. However, we will continue to work with willing sellers to acquire the current inholdings. Please see Chapter 2 under Common to All Alternatives under acquisition of inholdings.
Develop a walking trail up Crater Hill for wildlife and sunset viewing and a parking lot for sunset viewing	Crater Hill interpretive hikes are listed under several of the alternatives (including the preferred). Sunset viewing was considered but not developed (see Chapter 2 for reasoning on both issues)
Create pedestrian or bicycle access path or lane to the lighthouse	A pedestrian path was identified under some alternatives as well as providing bike parking at the overlook. However, neither are offered directly to the lighthouse (see Chapter 2)
Enhance the overlook including public toilets, trash cans, and signage	See Chapter 2 related to the objective 4.2, improving visitor information and orientation
The Service should consider having a more formal visitor center/facility at Kīlauea Point NWR	This is identified in alternatives C and D, the preferred alternative. See Chapter 2
The Service should incorporate and interpret Hawaiian culture, potential to do cultural demonstrations for fishing	Better integration of Native Hawaiian culture into our interpretive program is identified in Goal 5 in Chapter 2
Enhance community partnerships, especially in the areas of transportation planning at Kīlauea Point NWR	See Chapter 2 where several partnering strategies have been identified. Additionally, the draft CCP/EA was developed using previous transportation planning initiatives such as the Alternative Transportation Study and Transportation Assistance Group (TAG), which involved community participation
Implement small-scale improvements to improve traffic congestion and visitor safety	This is a Common to All Alternatives strategy and can be seen in Chapter 2 as part of implementing some of the recommendations which came out of TAG
Kīlauea Point NWR’s expansion should	It is Service policy to work with willing sellers. Please see

Issue	Where/How Addressed in Draft CCP/EA
continue in coordination with willing sellers	Chapter 2 under Common to All Alternatives under acquisition of inholdings
Fishing outside of the normal operating hours. Fish do not run at 10 a.m.; sunset and sunrise are key fishing times	Fishing is addressed in the related compatibility determination, which can be found in Appendix B
Protection of important historic properties and consideration of moving the administrative facilities to adjacent lands and restoring historic structures. This would provide an opportunity to interpret the history of Kīlauea Point, including the light station	Please see Goal 5 for protection of historic properties and Goal 4 where the moving of administrative facilities and interpretation are proposed under alternatives C and D (see Chapter 2)
Closing the Refuge, will that really make a difference to wildlife; [Closing the refuge] Resources and employees (healthier for longevity) need rest; Very important to close 1 day/week (Sunday suggested), will set [positive] precedent; Would like to see Refuge opened 7 days a week if at all possible	Due to flat and declining budgets, starting in February 2014, the Service reduced the days that Kīlauea Point proper is opened to the general public from 7 to 5 days a week. The Refuge is closed each Sunday and Monday. After a trial period of 1 year, the visitation days will be reassessed to see if it would be possible to reopen on a 6- or 7-day-a-week schedule. However, closures will continue to be a management option depending upon the availability of staff and resources.
Keep the bookstore on the Point	This is one option offered in two out of the four alternatives considered
Possibly expand current [visitor services] footprint (e.g., interactive exhibits)	This is identified under several of the alternatives proposed, including the preferred alternative
Increase wildlife, not tourism; Purpose of Kīlauea Point NWR is for the birds (it doesn't have to be Disneyland); Getting cars out of there will set an example for fragile places; Maintain historical and biological integrity of the Point (Point cannot deal with 10–15% increase in visitation); Restore center of "where the birds live" – more meaningful than closing the Refuge for 1 day/week; Taking things off the Point is very good; Wildlife first, no Crater Hill hikes; Keeping areas free of human disturbance (e.g., Crater Hill hikes). Any hikes during nēnē breeding season and red-footed booby breeding are of concern as hikes will be negative and these birds are generally sensitive to human disturbance. Keep current Crater Hill access status (only for maintenance, biological monitoring, one or two time periods during as NWRS week). Other parts of Kīlauea Point NWR are managed for visitors and EE so Mōkōlea Point and	Our preferred alternative focuses on increasing wildlife at the Refuge, while minimizing impacts of visitor use. As stated previously, it is not the intent of the Refuge to grow visitation or to turn it into a Disneyland-like venue. It is our desire to provide quality (not quantity) visitor experiences. For this reason, the Refuge's preferred alternative would allow more focused visitation that is managed in a quality way (see Chapter 2). Interpretive hikes are still considered in our alternatives as they help to build biological knowledge as well as conservation support for Refuge management Mōkōlea Point and Crater Hill are not open to the general public in any of the alternatives. Interpretive hikes would only be allowed on Crater Hill in limited numbers and not during important breeding seasons or other sensitive times of the year. Additionally, these hikes would be guided by Refuge-authorized personnel

Issue	Where/How Addressed in Draft CCP/EA
Crater Hill should be for habitats and native plants/seabirds; Concern over concentration of time, attention, and resources going into VS program, possibly at the expense of biological program. Should not go away from primary purpose and mission (conservation, management and restoration of habitat and biological resources)	
No buildings on Crater Hill/Building on Crater Hill corner is an encroachment on habitat, therefore Alt D is better	Our preferred alternative does not build on Crater Hill, though this strategy is still retained in Alternative C
Building on Service-owned property would require less overall funding to move the project forward, location is closer to the Refuge and this might benefit both staff and visitors	This strategy was kept, but is not our preferred
Secondary hub should be in commercial area; Pavilion's property better alternative; If the Visitor Center (VC) location were on the highway in the area behind the existing VC and a new bypass road was constructed, I would support this alternative; Do not like a site in Kīlauea Town Center (Refuge/Lighthouse is a "stand alone" site and should have its own unique and separate [site] from the town location); Buy agricultural park from county along Kahili Rock quarry road and place VC/trans hub there	Actual location would be identified in a separate planning process should the alternative containing these strategies be selected and funding made available to proceed. Efforts would be made to coordinate the location with potential bypass (see Chapter 2 paragraph on the bypass issue)
Consider combining the hub with other entities (NOAA-Haena State Park); Expand the area to be considered out to 3 miles to include Princeville airport; Shuttles from 2 miles away are another expenditure that would have to be paid for from Refuge funds or by increased fees; deters visitors, takes time away from visitor vacation day, and typically less time would be spent on the Refuge because spent shuttling to and from	Every effort would be made to partner with other initiatives in the area, however, it was determined that looking within 1 mile of the Refuge boundary would allow visitors to have a better visitor experience by being closer to the Refuge and its resources and fulfill our objective of providing "quality" visitor services
Will there be snacks at the VC? Bids for local Kīlauea vendors [should be sought]. Should be available to local family. [Bids should go to local vendors and local families.] KPNHA bookstore should incorporate a café (coffee, snack, drinks—this would provide an opportunity to talk	These details will be identified in a separate planning process should the alternative containing these strategies be selected and funding made available to proceed

Issue	Where/How Addressed in Draft CCP/EA
over experience just had); Movie booths in new VC; what type of shuttle and will there be a related park and ride; Could charge a small fee for Lighthouse tours; Could charge a small fee for Crater Hill tours	
Would like to see history of WWII on Crater Hill (offer guided hikes 2–3x/day)	See Goals 4 and 5 in Chapter 2. Though the history of WWII would not necessarily be the sole focus of proposed interpretive hikes, it would be woven into the narrative
Utilize other surfaces that are porous and still ADA/Reduce asphalt if possible	See alternatives C and D for reducing cars on the Point. Also note that Goal 4 wording identifies "Ensure that visitors and kama'āina of all ages and abilities feel welcome"
Like objectives in goals 1 and 3 (habitat restoration, predator control), a predator control staff person is important; Recruit more volunteers to work on habitat	For staffing and funding information, please see Appendix C. Volunteers are identified as important in supporting Refuge management. See Chapter 2
Provide direct trail access to the overlook area in Sea Cliff (not through gated subdivision for sunset viewing and or environmental viewing)	This access is already provided for non-vehicular users
Provide safe public access to Rock Quarry by fixing road access way	The road to this area is owned by multiple entities. The Refuge maintains its portion of the road and is open to partnering with the other landowners for road repairs to allow for safe public access
Crater Hill – install a boardwalk and have information stops along the way. Self-tours and the boardwalk would keep people off the Hill itself	Boardwalks would be difficult to maintain given the sea salt and windy environment. Interpretive hikes, given the species present, will be conducted by a Refuge-authorized agent to ensure a quality experience, while minimizing biological impacts
Erect some small, elevated areas on all sides of the Point where children could get a better view. A clear plastic barrier could be used for protection	Current viewfinders already have a step-up for children attached to them and binoculars are also provided
Feasibility was a common comment with everyone	Please see Appendix C for funding information and cost comparisons between alternatives

The CCP planning team also reviewed and evaluated all of the comments received during the draft CCP/EA comment period. These comments and the Service's responses are presented in Appendix K, Public Comments and Service Responses.

Appendix J. Kīlauea Point NWR Species Lists

Partial list of species that occur at Kīlauea Point NWR

Status: End = Endemic, Ind = Indigenous, Mig = Migratory, Pol = Polynesian introduced, Int = Introduced, E = Endangered, T = Threatened, C = Candidate, SOC = Species of Concern, R = Rare

PLANTS

Family	Scientific Name	Common Name	Hawaiian Name	Status
Dicots				
Acanthaceae - Acanthus	*Asystasia gangetica*	Chinese violet		Int
Acanthaceae - Acanthus	*Barleria repens*	Barleria		Int
Acanthaceae - Acanthus	*Justicia betonica*	White shrimp plant		Int
Acanthaceae - Acanthus	*Pseuderanthemum carruthersii*	Golden eldorado		Int
Acanthaceae - Acanthus	*Thunbergia fragrans*	Sweet clock-vine		Int
Aizoaceae - Fig-marigold	*Sesuvium portulacastrum*	Sea purslane	ʻākulikuli	Ind
Aizoaceae - Fig-marigold	*Tetragonia tetragonioides*	New Zealand spinach		Int
Amaranthaceae - Amaranth	*Amaranthus viridis*	Slender amaranth	pakai, `āheahea	Int
Anacardiaceae - Mango	*Schinus terebinthifolius*	Christmasberry	wilelaiki	Int
Apocynaceae - Dogbane	*Allamanda cathartica*	Yellow allamanda		Int
Apocynaceae - Dogbane	*Thevetia peruviana*	Be-still tree, yellow oleander, lucky nut		Int
Araliaceae - Ivy	*Schefflera actinophylla*	Octopus tree		Int
Araliaceae - Ivy	*Tetraplasandra kavaiensis*		ʻohe‘ohe	End
Asteraceae - Sunflower	*Ageratum conyzoides*	Tropic ageratum	maile hohono, maile honohono, maile kula	Int
Asteraceae - Sunflower	*Aster subulatus var. sandwicensis*	Annual saltmarsh aster		Int
Asteraceae - Sunflower	*Bidens alba var. radiata*	Beggartick		Int
Asteraceae - Sunflower	*Bidens pilosa*		kī, kī nehe, kī pipili, nehe	Int
Asteraceae - Sunflower	*Conyza bonariensis*	Hairy horseweed		Int
Asteraceae - Sunflower	*Cyanthillium cinereum*	Little ironweed		Int
Asteraceae - Sunflower	*Eclipta prostrata*	False daisy		Int
Asteraceae - Sunflower	*Emilia fosbergii*		pualele	Int

Family	Scientific Name	Common Name	Hawaiian Name	Status
Asteraceae - Sunflower	*Erigeron bellioides*	Daisy fleabane		Int
Asteraceae - Sunflower	*Lipochaeta lobata*		nehe	End
Asteraceae - Sunflower	*Lipochaeta succulenta*		nehe	End
Asteraceae - Sunflower	*Parthenium hysterophorus*	Santa Maria		Int
Asteraceae - Sunflower	*Pluchea carolinensis*	Sourbush		Int
Asteraceae - Sunflower	*Pluchea indica*	Indian fleabane, Indian pluchea		Int
Asteraceae - Sunflower	*Pluchea x fosbergii*	Marsh fleabane		Int
Asteraceae - Sunflower	*Pseudognaphalium sp.*	Gnaphalium		Int
Asteraceae - Sunflower	*Sonchus oleraceus*		pualele	Int
Asteraceae - Sunflower	*Sphagneticola trilobata*	Bay Biscayne Creeping-oxeye		Int
Asteraceae - Sunflower	*Synedrella nodiflora*	Node weed		Int
Asteraceae - Sunflower	*Xanthium strumarium var. canadense*	cocklebur		Int
Bignoniaceae - Bignonia	*Tabebuia sp.*	Trumpet tree		Int
Boraginaceae - Borage	*Carmona retusa*	Fukien tea		Int
Boraginaceae - Borage	*Cordia subcordata*		kou	Ind
Brassicaceae - Mustard	*Cardamine flexuosa*	Bittercress		Int
Brassicaceae - Mustard	*Lepidium virginicum*	Peppergrass		Int
Campanulaceae - Bellflower	*Cyanea sp.*	Cyanea	hāhā	End
Campanulaceae - Bellflower	*Hippobroma longiflora*	Star of bethlehem		Int
Caricaceae - Papaya	*Carica papaya*	Papaya	mīkana, hēʻī, milikana, papaia	Int
Casuarinaceae - She-oak	*Casuarina equisetifolia*	Common ironwood	paina	Int
Chenopodiacea - Goosefoot	*Chenopodium murale*	Lamb's quarters	`āheahea	Int
Chenopodiacea - Goosefoot	*Chenopodium oahuense*		`āheahea, ahea, `āhewahewa, alaweo, `āweoweo, kāha`iha`i	End
Clusiaceae - Mangosteen	*Clusia rosea*	Autograph tree		Int
Combretaceae - Combretums	*Terminalia catappa*	Tropical or Indian almond	false kamani, kamani haole, kamani `ula	Int

Family	Scientific Name	Common Name	Hawaiian Name	Status
Convolvulaceae - Morning glory	*Ipomoea obscura*	Obscure morning glory		Int
Convolvulaceae - Morning glory	*Ipomoea pes-caprae*	Beach morning glory	pohuehue	Ind
Convolvulaceae - Morning glory	*Jaquemontia ovalifolia sandwicensis*		pā`ūohi`iaka, kākuaohi`iaka, kaupo`o	End
Crassulaceae - Orpine	*Kalanchoe pinnata*	Air plant	ʻoliwa kū kahakai	Int
Euphorbiaceae - Spurge	*Aleurites moluccana*	Kukui nut		Int
Euphorbiaceae - Spurge	*Chamaesyce celastroides var. celastroides*		`akoko, koko, `ekoko, kōkōmālei	End
Euphorbiaceae - Spurge	*Chamaesyce celastroides var. stokesii*		`akoko, koko, `ekoko, kōkōmālei	End
Euphorbiaceae - Spurge	*Codiaeum variegatum*	Croton		Int
Euphorbiaceae - Spurge	*Euphorbia hypericifolia*	Graceful spurge		Int
Euphorbiaceae - Spurge	*Euphorbia serpens*	Matted sandmat		Int
Euphorbiaceae - Spurge	*Euphorbia thymifolia*	Spurge		Int
Euphorbiaceae - Spurge	*Pedilanthus tithymaloides*	Slipper flower		Int
Euphorbiaceae - Spurge	*Phyllanthus debilis*	Niruri		Int
Euphorbiaceae - Spurge	*Ricinus communis*	Castor bean		Int
Fabaceae - Pea	*Acacia koa*		koa, koaiʻa	End
Fabaceae - Pea	*Canavalia cathartica*		maunaloa	Int
Fabaceae - Pea	*Chamaecrista nictitans*	Partridge pea		Int
Fabaceae - Pea	*Crotalaria incana*	Fuzzy rattle pod		Int
Fabaceae - Pea	*Desmanthus pernambucanus*	Slender mimosa		Int
Fabaceae - Pea	*Desmodium incanum*	Spanish clover		Int
Fabaceae - Pea	*Desmodium triflorum*	Tick clover		Int
Fabaceae - Pea	*Leucaena leucocephala*	Lead tree	ēkoa, haole koa, koa haole, lilikoa	Int
Fabaceae - Pea	*Mimosa pudica*	Sensitive plant, sleeping grass	pua hilahila	Int
Fabaceae - Pea	*Neonotonia wightii*	Glycine		Int
Fabaceae - Pea	*Senna pendula*	Pendant senna		Ind

Family	Scientific Name	Common Name	Hawaiian Name	Status
Fabaceae - Pea	*Vigna marina*	Beach pea	nanea, mohihihi, lemuoma-kili	Ind
Goodeniaceae - Goodenia	*Scaevola sericea*		naupaka kahakai, huahekili, naupaka kai	Ind
Lamiaceae - Mint	*Hyptis pectinata*	Comb hyptis		Int
Lamiaceae - Mint	*Stachys arvensis*	Staggerweed		Int
Malvaceae - Hibiscus	*Abutilon grandifolium*	Hairy abutilon		Int
Malvaceae - Hibiscus	*Hibiscus rosa-sinensis*	Hibiscus		Int
Malvaceae - Hibiscus	*Hibiscus tiliaceus*	Sea rosemallow	hau	Pol?
Malvaceae - Hibiscus	*Malvastrum coromandelianum subsp. Coromandelianum*	False mallow		Int
Malvaceae - Hibiscus	*Sida acuta*	Sida		Int
Malvaceae - Hibiscus	*Sida ciliaris*	Red ilima		Int
Malvaceae - Hibiscus	*Sida fallax*		ʻilima	Ind
Malvaceae - Hibiscus	*Sida rhombifolia*	Cuban jute		Int?
Moraceae - Mulberry	*Ficus elastica*	Rubber tree		Int
Moraceae - Mulberry	*Ficus microcarpa*	Chinese banyan tree		Int
Myoporaceae - Myoporum	*Myoporum sandwicense*	Bastard sandalwood	naio, naeo, naieo	Ind
Myrtaceae - Myrtle	*Metrosideros polymorpha*		ʻōhiʻa lehua	End
Myrtaceae - Myrtle	*Psidium cattleianum*	Strawberry guava		Int
Myrtaceae - Myrtle	*Psidium guajava*	Common guava	kuawa, kuawa keʻokeʻo, kuawa lemi, kuawa momona, puawa	Int
Myrtaceae - Myrtle	*Syzygium cumini*	Java plum		Int
Nyctaginaceae - Four-o'clock	*Boerhavia coccinea*	Boerhavia		Int
Nyctaginaceae - Four-o'clock	*Boerhavia repens*	Alena	alena	Ind
Nyctaginaceae - Four-o'clock	*Bougainvillea sp.*	Bougainvillea		Int

Family	Scientific Name	Common Name	Hawaiian Name	Status
Nyctaginaceae - Four-o'clock	*Mirabilis jalapa*	Four-oclock		Int
Oleaceae - Olive	*Noronhia emarginata*	Madagascar olive		Int
Oxalidaceae - Wood sorrel	*Oxalis corniculata*	Yellow wood sorrel	ʻihi ʻai, ʻihi ʻawa	Pol?
Passifloraceae - Passion flower	*Passiflora edulis*	Passion fruit, purple granadilla	liliko‘i	Int
Passifloraceae - Passion flower	*Passiflora foetida*	Love-in-a-mist	lani wai, pōha-pōha	Int
Passifloraceae - Passion flower	*Passiflora laurifolia*	Yellow granadilla		Int
Phytolaccaceae - Pokeberry	*Rivina humilis*	Coral berry		Int
Plantaginaceae - Plantain	*Plantago lanceolata*	Narrow-leaved or English plantain		Int
Plantaginaceae - Plantain	*Plantago major*	Broad-leaved or common plantain	laukahi, kūhēkili	Int
Portulacaceae - Purslane	*Portulaca lutea*		ʻihi	Ind
Portulacaceae - Purslane	*Portulaca oleracea*	Pigweed	ʻākulikuli kula	Int
Portulacaceae - Purslane	*Portulaca pilosa*		ʻākulikuli	Int
Primulaceae - Primrose	*Anagallis arvensis*	Scarlet pimpernel		Int
Primulaceae - Primrose	*Ardisia elliptica*	Shoebutton ardisia		Int
Rhizophoraceae - Mangrove	*Rhizophora mangle*	American mangrove, red mangrove		Int
Rosaceae - Rose	*Osteomeles anthyllidifolia*		ʻūlei	Ind
Rubiaceae - Coffee	*Morinda citrifolia*	Indian mulberry	noni	Pol
Rubiaceae - Coffee	*Richardia brasiliensis*			Int
Rutaceae - Rue	*Citrus x latifolia*	Tahitian lime		Int
Sapindaceae - Soapberry	*Cupaniopsis anacardioides*	Carrot wood		Int
Sapotaceae - Sapodilla	*Chrysophyllum oliviforme*	Satin leaf		Int
Scrophulariaceae - Figwort	*Bacopa monnieri*	Water hyssop	ʻaeʻae	Ind
Solanaceae - Nightshade	*Lycium sandwicense*		ʻōhelo kai, ʻaeʻae	Ind
Solanaceae - Nightshade	*Nicotiana tabacum*	Tobacco	paka	Int
Solanaceae - Nightshade	*Physalis peruviana*	Cape gooseberry	pohā, paʻina	Int
Solanaceae - Nightshade	*Solanum americanum*	Glossy nightshade	pōpolo, ʻolohua polopolo	Ind?
Solanaceae - Nightshade	*Solanum seaforthianum*	Vining solanum		Int

Family	Scientific Name	Common Name	Hawaiian Name	Status
Sterculiaceae - Cacao	*Waltheria indica*		ʻuhaloa	Ind?
Urticaceae - Nettle	*Cecropia obtusifolia*	Guarumo, trumpet tree		Int
Urticaceae - Nettle	*Pilea microphylla*	Artillery plant, rockweed		Int
Verbenaceae - Verbena	*Lantana camara*	Lantana	lāʻau kalakala, lākana, mikinolia hihiu, mikinolia hohono, mikinolia kukū	Int
Verbenaceae - Verbena	*Stachytarpheta dichotoma*		ōwī, oī	Int
Verbenaceae - Verbena	*Verbena litoralis*		ōwī, oī, haʻuoi	Int
Verbenaceae - Verbena	*Vitex rotundifolia*	Beach vitex	kolokolo kahakai, hinahina kolo, mānawana wa, māwanawana, pōhinahina	Ind
Monocots				
Agavaceae - Agave	*Cordyline fruticosa*	Ti	kī	Pol
Araceae - Philodendron	*Epipremnum pinnatum*	Golden pothos, taro vine		Int
Araceae - Philodendron	*Philodendron sp.*	Philodendron		Int
Araceae - Philodendron	*Syngonium sp.*	Syngonium		Int
Arecaceae - Palm	*Chrysalidocarpus lutescens*	Areca palm		Int
Arecaceae - Palm	*Cocos nucifera*	Coconut palm	niu, ololani	Pol
Arecaceae - Palm	*Dypsis decaryi*	Triangle palm		Int
Arecaceae - Palm	*Pritchardia thurstonii*	Fiji fan palm		Int
Arecaceae - Palm	*Veitchia merrillii*	Manila palm		Int
Asparagaceae - Asparagus	*Asparagus densiflorus*	Asparagus fern		Int
Asparagaceae - Asparagus	*Dracaena marginata*	Money tree		Int
Asparagaceae - Asparagus	*Sansevieria trifasciata*	Mother in law's tongue		Int
Cannaceae - Canna	*Canna indica*	Indian shot, canna	aliʻipoe	Nat
Commelinaceae - Spiderwort	*Commelina diffusa*	Honohono grass		Int

Family	Scientific Name	Common Name	Hawaiian Name	Status
Cyperaceae - Sedge	*Cyperus involucratus*	Umbrella sedge		Int
Cyperaceae - Sedge	*Cyperus javanicus*		ʻahuʻawa, ʻehuʻawa	Ind
Cyperaceae - Sedge	*Cyperus phleoides*	Cyperus		End
Cyperaceae - Sedge	*Cyperus polystachyos*			Ind
Cyperaceae - Sedge	*Cyperus rotundus*	Purple nut sedge		Int
Cyperaceae - Sedge	*Fimbristylis cymosa*		mauʻu ʻakiʻaki	Ind
Cyperaceae - Sedge	*Kyllinga brevifolia*	Green kyllinga		Int
Liliaceae - Lily	*Crinum asiaticum*	Spider lily		Int
Liliaceae - Lily	*Hippeastrum striatum*	Barbados lily		Int
Pandanaceae - Screw Pine	*Pandanus tectorius*	Pandanus	hala, pū hala	Ind
Poaceae - Grass	*Andropogon bicornis*	West Indian foxtail		Int
Poaceae - Grass	*Bothriochloa pertusa*	Pitted beardgrass		Int
Poaceae - Grass	*Chloris barbata*	Swollen fingergrass		Int
Poaceae - Grass	*Chrysopogon aciculatus*	Golden beardgrass	mānienie ʻula, piʻipiʻi	Ind?
Poaceae - Grass	*Cynodon dactylon*	Bermuda grass	mānienie, mānienie haole	Int
Poaceae - Grass	*Digitaria ciliaris*	Henry's crab grass	kūkaepuaʻa	Int
Poaceae - Grass	*Digitaria insularis*	Sourgrass		Int
Poaceae - Grass	*Eleusine indica*	Wiregrass	mānienie aliʻi	Int
Poaceae - Grass	*Eragrostis pectinacea*	Carolina lovegrass		Int
Poaceae - Grass	*Melinis minutiflora*	Molasses grass		Int
Poaceae - Grass	*Panicum torridum*		kākonakona, hākonakona	End
Poaceae - Grass	*Paspalum conjugatum*	Hilo grass	mauʻu	Int
Poaceae - Grass	*Paspalum dilatatum*	Dallis grass		Int
Poaceae - Grass	*Paspalum vaginatum*	Seashore paspalum		Int
Poaceae - Grass	*Pennisetum clandestinum*	Kikuyu grass		Int
Poaceae - Grass	*Setaria parviflora*	Yellow foxtail		Int
Poaceae - Grass	*Sporobolus africanus*	Smutgrass, African dropseed		Int
Poaceae - Grass	*Sporobolus pyramidatus*	Dropseed		Int
Poaceae - Grass	*Stenotaphrum secundatum*	St. Augustine grass, buffalo grass	ʻakiʻaki haole, mānienie	Int

Family	Scientific Name	Common Name	Hawaiian Name	Status
Poaceae - Grass	*Urochloa maxima*	Guinea grass		Int
Poaceae - Grass	*Urochloa mutica*	California grass		Int
Ferns				
Nephrolepidaceae - Sword fern	*Nephrolepis brownii*	Asian sword fern		Int
Polypodiaceae	*Phymatosorus grossus*	Maile scented fern	lauae	Int

INVERTEBRATES

Order	Family	Scientific Name	Common Name	Hawaiian Name	Status
Gastropoda					
Stylomattophora	Achatinidae	*Achatina fulica*	Giant African snail		Int
Insecta					
Odonata	Aeschnidae	*Anax junius*	Green darner	pinao	Ind
Lepidoptera	Cosmopterigidae	*Trissodoris honorariella*	Pandanus hole cutter moth		Int
Lepidoptera	Crambidae	*Mestolobes sp.*			End
Lepidoptera	Crambidae	*Omiodes blackburni*	Coconut leaf roller		End
Lepidoptera	Crambidae	*Spolodea recurvalis*	Beet webworm moth		Int
Lepidoptera	Hesperiidae	*Hylephila phyleus*	Fiery skipper butterfly		Int
Lepidoptera	Lycaenidae	*Lampides boeticus*	Bean butterfly		Int
Lepidoptera	Lycaenidae	*Strymon bazochii*	Lesser lantana butterfly		Int
Lepidoptera	Lycaenidae	*Zizina otis*	Lesser grass blue butterfly		Int
Lepidoptera	Pieridae	*Pieris rapae*	Cabbage butterfly		Int
Lepidoptera	Sphingidae	*Agrius vanillae*	Passion vine butterfly		Int
Hymenoptera	Apidae	*Ceratina cf. dentipes*	Small carpenter bee		Int
Hymenoptera	Apidae	*Ceratina smaragdula*	Indian bee		Int
Hymenoptera	Chalcidae	*Megastigmus transvaalensis*	Christmasberry seed feeding wasp		Int
Hymenoptera	Colletidae	*Hylaeus connectens*	Hawaiian yellow-faced bee		End
Hymenoptera	Colletidae	*Hylaeus sp.*			Int
Hymenoptera	Formicidae	*Anoplolepis gracilipes*	Long-legged ant (crazy ant)		Int
Hymenoptera	Formicidae	*Monomorium floricola*			Int

Order	Family	Scientific Name	Common Name	Hawaiian Name	Status
Hymenoptera	Formicidae	*Pheidole megacephala*	Big-headed ant		Int
Hymenoptera	Formicidae	*Plagiolepis alluaudi*			Int

REPTILES & AMPHIBIANS

Family	Scientific Name	Common Name	Hawaiian Name	Status
Cheloniidae	*Chelonia mydas*	Green sea turtle	honu	Ind, T
Bufonidae - True Toads	*Bufo marinus*	Cane toad		Int
Ranidae - True Frogs	*Rana catesbeiana*	American bullfrog		Int

BIRDS

Family	Scientific Name	Common Name	Hawaiian Name	Status
Diomedeidae - Albatrosses	*Phoebastria immutabilis*	Laysan albatross	mōlī	Mig
Diomedeidae - Albatrosses	*Phoebastria nigripes*	Black-footed albatross	ka‘upu	Mig, C
Procellariidae - Petrels & Shearwaters	*Fulmarus glacialis*	Northern Fulmar		Mig
Procellariidae - Petrels & Shearwaters	*Pterodroma neglecta*	Kermadec petrel		Mig
Procellariidae - Petrels & Shearwaters	*Pterodroma sandwichensis*	Hawaiian petrel	‘ua‘u	End, Mig, E
Procellariidae - Petrels & Shearwaters	*Pterodroma hypoleuca*	Bonin Petrel		Mig
Procellariidae - Petrels & Shearwaters	*Bulweria bulwerii*	Bulwer's petrel	‘ou	Mig
Procellariidae - Petrels & Shearwaters	*Puffinus pacificus*	Wedge-tailed shearwater	‘ua‘u	Mig
Procellariidae - Petrels & Shearwaters	*Puffinus griseus*	Sooty shearwater		Mig
Procellariidae - Petrels & Shearwaters	*Puffinus nativitatis*	Christmas shearwater		Mig
Procellariidae - Petrels & Shearwaters	*Puffinus auricularis newelli*	Newell's (Townsend's) shearwater	‘a‘o	End, Mig, T
Phaethontidae - Tropicbirds	*Phaethon lepturus*	White-tailed tropicbird	koa‘e kea	Mig
Phaethontidae - Tropicbirds	*Phaethon aethereus*	Red-billed tropicbird		Mig
Phaethontidae - Tropicbirds	*Phaethon rubricaudai*	Red-tailed tropicbird	koa‘e ula	Mig
Sulidae - Boobies	*Sula dactylatra*	Masked booby	‘ā	Mig
Sulidae - Boobies	*Sula leucogaster*	Brown booby	‘ā	Mig
Sulidae - Boobies	*Sula sula*	Red-footed booby	‘ā	Mig

Family	Scientific Name	Common Name	Hawaiian Name	Status
Fregatidae - Frigatebirds	*Fregata minor*	Great frigatebird	ʻiwa	Mig
Fregatidae - Frigatebirds	*Fregata ariel*	Lesser frigatebird		Mig
Ardeidae - Herons	*Bubulcus ibis*	Cattle egret		Int
Ardeidae - Herons	*Nycticorax nycticorax*	Black-crowned night-heron	ʻaukuʻu	Ind
Anatidae - Geese & Ducks	*Chen carulescens*	Snow goose		Mig
Anatidae - Geese & Ducks	*Branta hutchinsii*	Cackling goose		Mig
Anatidae - Geese & Ducks	*Branta sandvicensis*	Hawaiian goose	nēnē	End, E
Accipitridae - Hawks & Eagles	*Pandion haliaetus*	Osprey		Mig
Accipitridae - Hawks & Eagles	*Circus cyaneus*	Northern harrier		Mig
Accipitridae - Hawks & Eagles	*Aquila chrysaetos*	Golden eagle		Mig
Accipitridae - Hawks & Eagles	*Haliaeetus albicilla*	White-tailed eagle		Mig
Falconidae - Falcons	*Falco peregrinus*	Peregrine falcon		Mig
Phasianidae - Pheasants & Chukars	*Gallus gallus*	Red junglefowl	moa	Int
Phasianidae - Pheasants & Chukars	*Francolinus francolinus*	Black Francolin		Int
Phasianidae - Pheasants & Chukars	*Phasianus colchicus*	Ring-necked pheasant		Int
Charadriidae - Plovers	*Pluvialis fulva*	Pacific golden-plover	kōlea	Mig
Scolopacidae - Sandpipers & Waders	*Tringa incanus*	Wandering tattler	ʻūlilī	Mig
Scolopacidae - Sandpipers & Waders	*Numenius tahitiensis*	Bristle-thighed curlew	kioea	Mig, C
Scolopacidae - Sandpipers & Waders	*Arenaria interpres*	Ruddy turnstone	ʻakekeke	Mig
Scolopacidae - Sandpipers & Waders	*Calidris alba*	Sanderling	hunakai	Mig
Laridae - Gulls & Terns	*Stercorarius pomarinus*	Pomarine jaeger		Mig
Laridae - Gulls & Terns	*Larus delawarensis*	Ring-billed gull		Mig
Laridae - Gulls & Terns	*Larus hyperboreus*	Glaucous gull		Mig
Laridae - Gulls & Terns	*Sterna lunata*	Gray-backed tern	'pākalakala	Ind, Mig
Laridae - Gulls & Terns	*Sterna fuscata*	Sooty tern	ʻewaʻewa	Ind, Mig
Laridae - Gulls & Terns	*Anous stolidus*	Brown noddy	noio kōhā	Ind
Laridae - Gulls & Terns	*Anous minutus melanogenys*	Black (Hawaiian) noddy	noio, 'eki'eki	End
Laridae - Gulls & Terns	*Gygis alba*	White tern	manu-o-kū	Ind

Family	Scientific Name	Common Name	Hawaiian Name	Status
Columbidae - Pigeons & Doves	*Columba livia*	Rock dove		Int
Columbidae - Pigeons & Doves	*Streptopelia chinensis*	Spotted dove		Int
Columbidae - Pigeons & Doves	*Geopelia striata*	Zebra dove		Int
Tytonidae - Barn Owls	*Tyto alba*	Barn owl		Int
Strigidae - Typical Owls	*Asio flammeus sandwichensis*	Hawaiian short-eared owl	pueo	End
Sylviidae - Bush-warblers	*Cettia diphone*	Japanese bush-warbler		Int
Turdidae - Thrushes	*Copsychus malabaricus*	White-rumped shama		Int
Timaliidae - Babblers	*Garrulax canorus*	Hwamei (Melodious laughingthrush)		Int
Zosteropidae - White-eyes	*Zosterops japonicus*	Japanese white-eye		Int
Mimidae - Mockingbirds	*Mimus polyglottos*	Northern mockingbird		Int
Sturnidae - Starlings & Mynas	*Acridotheres tristis*	Common myna		Int
Emberizidae - Sparrows	*Paroaria coronata*	Red-crested cardinal		Int
Cardinalidae - Cardinals	*Cardinalis cardinalis*	Northern cardinal		Int
Icteridae - Meadowlarks	*Sturnella neglecta*	Western meadowlark		Int
Fringillidae - Finches	*Carpodacus mexicanus*	House finch		Int
Passeridae - Old World Sparrows	*Passer domesticus*	House sparrow		Int
Estrildidae - Waxbills & Mannikins	*Lonchura cantans*	African silverbill		Int
Estrildidae - Waxbills & Mannikins	*Lonchura punctulata*	Nutmeg mannikin		Int
Estrildidae - Waxbills & Mannikins	*Lonchura atricapilla*	Chestnut munia		Int
Estrildidae - Waxbills & Mannikins	*Padda oryzivora*	Java sparrow		Int

MAMMALS

Family	Scientific Name	Common Name	Hawaiian Name	Status
Muridae - Mice, rats, voles	*Mus musculus*	House mouse	ʻiole liʻili'i	Int
Muridae - Mice, rats, voles	*Rattus exulans*	Polynesian rat	ʻiole	Pol
Muridae - Mice, rats, voles	*Rattus norvegicus*	Norway rat	ʻiole-poʻo-wai	Int
Muridae - Mice, rats, voles	*Rattus rattus*	Black rat	ʻiole-nui	Int
Vespertillionidae -	*Lasiurus cinereus*	Hawaiian hoary bat	ʻōpeʻapeʻa	End, E

Family	Scientific Name	Common Name	Hawaiian Name	Status
Vesper bats	*semotus*			
Felidae - Cats	*Felis catus*	Cat	pōpoki	Int
Canidae - Dogs, foxes, jackals	*Canis lupus familiaris*	Dog	ʻīlio	Int
Phocidae - Earless seals	*Monachus schauinslandi*	Hawaiian monk seal	ʻīlio-holo-i-kauaua	End, E
Suidae - Pigs, hogs, boars	*Sus scrofa*	Common wild boar	puaʻa	Int
Balaenopteridae - Rorqual whales	*Megaptera novaeangliae*	Humpback whale	koholā	Mig
Delphinidae - Dolphins	*Stenella longirostris longirostris*	Spinner dolphin	nai'a	Ind
Delphinidae - Dolphins	*Tursiops truncatus gillii*	Pacific bottlenose	nai'a	Ind

Appendix K. Public Comments and Service Responses

K.1 Introduction

The U.S. Fish and Wildlife Service (USFWS or Service) received comments from over 70 entities during the 44-day public comment period held from February 12, 2015, through March 27, 2015, for the Kīlauea Point National Wildlife Refuge (NWR or Refuge) draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA). All written comments were reviewed, analyzed, and addressed. A summary of the comments and our response to each is presented in this appendix.

Each original piece of correspondence was identified with the commenter's last name and first initial and a number. Note that for simplicity's sake, we use the word "letter" to refer to any comment or reference document we received, whether by letter, phone call, e-mail, or in person. Multiple correspondences from a commenter are counted as one comment letter.

To help us analyze the comments, a number of themes and subthemes were identified within the letters, and similar comments were grouped together under a theme. Our responses apply to the comments grouped under a theme. Comments that fell outside the scope of the CCP were also considered and responded to as appropriate.

K.2 Changes Made to the Final CCP

The CCP planning team reviewed and evaluated all of the comments we received during the draft CCP/EA comment period. In some cases, the management direction was either modified or clarified based on the comments. These changes are described in Section K.3. For additional information on the management direction under the final CCP, see Chapter 2 and Figures 2-1 and 2-2.

K.3 Summary of Comments Received and Service Responses

Integrated Pest Management

1. **Comment:** The CCP should analyze the impacts of the Integrated Pest Management (IPM) use of herbicides and pesticides on adjacent waters and coastal habitats. The Service should adhere to a precautionary principle and use alternative methods for controlling invasive species rather than herbicides or pesticides on the Refuge.

   Response: The control of nonnative and invasive species on the Refuge is proactive and receives high priority. Incidental damage to native species caused by control efforts must be determined before implementing IPM techniques. A cost-benefit analysis of native species' health and population plays a critical role in determining the most effective method to control invasive species with the least harm to native species. Decisions and criteria to use particular tools and techniques are based on numerous factors and considerations (particular species being targeted, associated natural history characteristics, proximity to sensitive resources and nontarget species, etc.). See Appendix G, Integrated Pest Management, for more information.

   The goal of IPM is to use the minimal control methods to achieve a desired objective. IPM methods on the Refuge will be adaptive, based on information about effectiveness and

impacts. Alternative methods to herbicides or pesticides include mechanical treatments (e.g., weed pulling or digging, suffocation, cutting or mowing). The Service seeks to encourage expanded volunteer-driven mechanical removal efforts. However, mechanical removal is highly labor-intensive and can create site disturbance, which can lead to rapid reinvasion if not handled properly. Thus, the Service will need to balance increasing volunteer efforts with efficiency and the potential for disturbance.

2. **Comment:** In order for this plan to be successful, effective control of invasive predators that prey on native wildlife must be a top priority for Refuge management.

   Response: We recognize that IPM is critically important and agree this must be a high priority over the life of the plan. However, additional staff will be needed to more adequately implement the control of introduced predators and other invasive species on the Refuge (see Appendix C, Implementation).

3. **Comment:** Due to vast differences in survey efforts, the comparison of shearwaters found preyed upon by owls in 2009 and 2010 (5 vs. 75 shearwaters) is not appropriate. There was no biological staff at the Refuge in 2009, therefore survey effort was minimal.

   Response: For a more objective comparison to 2010, other years of owl kill data have been evaluated. From 2011 to 2014, native bird carcass recoveries with owl kill signs were 4.2, averaged over the 4 years. The rationale for Objective 1.1 has been edited with the additional information.

4. **Comment:** Effective fencing to exclude introduced mammalian predators is paramount in achieving the Refuge purpose of protecting, restoring, and managing native ecosystems. Current fences are inadequate to protect native wildlife. A predator-proof boundary fence should be a high priority.

   Response: Strategies for the control of introduced mammalian predators at the Refuge are aimed at minimizing predator entry using exclusion (e.g., fences), habitat modification, and direct control/eradication. The Service agrees that effective fencing is key to a successfully integrated control program. Under the CCP, fencing-related strategies include (1) mapping the type and status of all fences and gates, (2) maintaining or replacing 2.7 miles of existing boundary hogwire fence, (3) maintaining the 0.45-mile Nihoku Ecosystem Restoration Project (NERP) predator-proof fence, (4) exploring the possibility of expansion of or separate additions to the NERP predator-proof fence, and (5) replacing the existing fence at the base of Mōkōlea Point with a predator-resistant fence.

   Immediate priorities include mapping, inspecting, and maintaining existing fencing; replacing the fence at the base of Mōkōlea Point; and managing the NERP to be successful. At Nihoku, efforts to establish or re-establish breeding populations of threatened or endangered species using passive or assisted restoration techniques (e.g., translocation of threatened ʻaʻo and endangered ʻuaʻu or outplanting of rare and endangered plants) are dependent upon maintaining fence lines, monitoring and eradicating predators within the fence line, and restoring native habitat.

   Longer-term priorities include replacing the boundary perimeter fence and evaluating expansions of or separate additions to the NERP predator-proof fence. Planning for fencing

entails analyzing trade-offs between cost, fragmentation, mitigating the risk of catastrophe, effects to resources, and other impacts. Since funding is limited and dependent upon Congressional allocations, public and private partnerships, and grants, building a single, large predator-proof perimeter fence may not be feasible. A multiple-fence system ensures that the entire population is never threatened by a single incursion (Helmstedt et al. 2014). However, multiple fences increase management costs and may fragment populations and habitats (e.g., nēnē nesting and foraging grounds).

Subsequent planning and design efforts will evaluate these and other site-specific considerations (e.g., ground preparation, slope, stream crossings, use of natural barriers, avoidance of sensitive biological or cultural features, and minimizing impacts on public access). All activities will undergo appropriate review and consultations, and permits and clearances will be secured as necessary to comply with legal and policy requirements.

5. **Comment:** Fences, although an important management tool, can also harm some bird species. The fence around the lighthouse is an entrapment hazard. Also, predator-proof fencing could divide nēnē nesting and foraging grounds. If nēnē are attracted to the Nihoku predator-proof fenced area for nesting, there needs to be enough habitat and forage to sustain the growing goslings and adults within the fence until the young are ready to fledge; otherwise there is an increased risk for gosling loss caused by abandonment and/or starvation.

   Response: Measures to potentially reduce the entrapment hazard of fences include keeping the area under the chain-link fence at the Point free from weeds and working with adjacent landowners to manage vegetation to minimize negative effects of fencing. An additional strategy has been added to Objective 1.1 reflecting these measures. The potential for nēnē gosling loss due to abandonment and/or starvation was addressed in the Environmental Assessment for the Nihoku Ecosystem Restoration Projection (Anden Consulting 2014). Mitigating options for any loss include monitoring the families with goslings to ensure sufficient food supplies, providing native forage plants that are used by nēnē as part of habitat restoration within the fenced unit so that overall food sources increase, and allowing nēnē to depart through the gate.

6. **Comment:** Fencing and native ecosystem restoration can harm cultural resources and uses, particularly at Mōkōlea-Kāhili area.

   Response: Prior to implementation, all ground-disturbing projects, including fencing and restoration, will undergo a review (including, but not limited to, archaeological and cultural surveys) under Section 106 of the National Historic Preservation Act (NHPA). We will also coordinate and consult with the State Historic Preservation Division and seek assistance from Native Hawaiians on issues related to cultural resources.

Seabird Management

7. **Comment:** Consider human and wildlife functional values of nonnative trees when selecting areas for vegetation management. Ironwoods, a nonnative invasive tree species, serve as historic windbreaks in certain areas and should not be removed. Native wildlife have adapted to nonnative invasive tree species, requiring careful consideration in when and where these species will, if at all, be controlled.

Response: As stated in the rationale for Objective 1.1: "While most seabirds exhibit some flexibility in their habitat requirements, features of the plant community (species and structural characteristics) favor or limit populations. Thus, control or eradication of pest plants will be focused mainly on areas where they have a negative effect on seabird survival and reproduction."

For example, given the criteria in the rationale, the Refuge will trim or remove ironwood trees at the northern end (ocean bluff) of Mōlī Hill where these trees are obstacles within primary mōlī flight corridors. However, if nonnative species in a given location are not negatively affecting seabird survival and reproduction and are providing value (e.g., nesting platforms, shade and nesting substrate, or bank stabilization), then these plants will not be controlled. Both ironwoods and christmasberry fall under the category of control, not eradication. Ironwoods along the southern boundary of the Refuge serving as windbreaks will not be removed unless they are hazards to human or wildlife safety. The reduction of pest ironwood and other species will be timed to avoid impacts to native wildlife.

8. **Comment:** In addition to native adult birds, include eggs and chicks when evaluating predation rate tolerances.

   Response: Predation rate tolerances were included as attributes of Objectives 1.1 and 1.2. In conjunction with other monitoring systems (e.g. rodent tracking tunnels, trail cams, rat bait take, cat captures), we will use these numbers to indicate if our control efforts are improving conditions for breeding birds or trigger a need to adapt our control strategies.

   In predation events, the loss of eggs or chicks may serve as an early detection index for the predation of adults. Adults within the colony may be killed upon their return if the predator (e.g., pig, cat, dog) is still present. Since mōlī are an intensively monitored species onsite, the Refuge will explore the use of an index for albatross eggs and chicks, based on a 5-year average. Exploration of this additional attribute has been added as a strategy under Objective 1.1.

9. **Comment:** No obstacle or light hazards should occur onsite.

   Response: An additional clarification has been made to an attribute of Objective 1.1: "Safe flight corridors free of obstacles (e.g., pest trees, signs, and antennas) and light hazards."

10. **Comment:** The Refuge should reconsider being a donor site for the Pacific Missile Range Facility (PMRF) mōlī egg swap program.

    Response: From 2005 to 2012, 4–21 viable eggs from PMRF were exchanged for inviable eggs from the Refuge each year as part of the mōlī egg swap program, resulting in approximately 3 additional fledglings per year. In recent years, 300–500 birds have been released at the base of Mōlī Hill annually as part of the PMRF's Bird-Aircraft Strike Hazard program. From 1988 to 2013, the number of mōlī breeding pairs on-Refuge has increased fourfold (32 in 1988, 125 in 2013). Likewise, PMRF's mōlī population has continued grow at similar rates. In 2015, there was a 52 percent increase in the number of breeding pairs (169) over the previous 5-year average (111). Although 2015 provided optimal ocean conditions, we expect the positive population growth trend to continue on Kauaʻi.

Mōlī are considered a species of conservation concern by the Refuge and a near-threatened species by the International Union for Conservation of Nature. However, the Refuge has higher priority listed species, including federally endangered nēnē and threatened ʻaʻo, with planned translocations of federally endangered ʻuaʻu beginning in 2015. In addition, monitoring of programs to control introduced predators that prey on all native birds, including successfully breeding adults, continues to demonstrate the need for the Refuge to dedicate more resources to address these problems. Nonetheless, the Refuge will continue to closely monitor and band its breeding mōlī population annually to detect any new threats or changes in their population.

In summary, the Service will continue to work with partners to re-evaluate PMRF programs and seek long-term conservation solutions.

11. **Comment:** The range of threatened and endangered species should not be extended (e.g., via translocation) to areas of cultural, historic, recreational, or subsistence-gathering areas.

    Response: The purposes for which a refuge was established or acquired form the foundation for management decisions. One of the several purposes for Kīlauea Point NWR includes the following: "... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants …" Additionally, under the biological integrity, diversity, and environmental health policy (601 FW 3), "Where practical, we support the reintroduction of extirpated native species. We consider such reintroduction in the context of surrounding landscapes. We do not introduce species on refuges outside their historic range or introduce species if we determine that they were naturally extirpated, unless such introduction is essential for the survival of a species and prescribed in an endangered species recovery plan, or is essential for the control of an invasive species and prescribed in an integrated pest management plan."

    While the Refuge promotes threatened and endangered species recovery, we will also take cultural, historic, and other factors into consideration when siting passive and active restoration projects. Specific projects related to translocation will undergo additional detailed planning, including an effects assessment under NEPA, surveys and consultation under Section 106 of NHPA, evaluation and consultation under Section 7 of ESA, and compliance with other applicable laws and policies.

12. **Comment:** Chick translocations are expensive, time-intensive endeavors. Instead, the Refuge should cross-foster eggs using ʻuaʻu kani as foster parents, which was successfully implemented in 1978–1980 (Byrd et al. 1984). Social attraction is another economical, effective method of attracting birds into new or safer habitat and should be considered as the primary method when appropriate.

    Response: In subsequent planning, the Refuge and partners will evaluate a range of alternative management measures, including the use of social attraction and/or translocations, in combination with fencing, artificial burrows, habitat restoration, predator control, and monitoring, for preventing the extirpation of threatened and endangered seabird species such as ʻaʻo.

    We agree that chick translocations are expensive, time-intensive endeavors that require species- and site-specific considerations. Currently, there are no suitable foster parents

(existing breeding seabirds with similar life history characteristics) within the Nihoku Ecosystem Restoration Project site for egg cross-fostering. However, even if ʻuaʻu kani occurred on the project site, the use of this species as foster parents could result in initial interspecific competition for nesting space at the new colony, similar to that observed between ʻuaʻu kani and ʻaʻo at Kīlauea Point proper. Although the egg cross-fostering project resulted in high hatching and fledging rates and a small protected colony, recruitment appears to have occurred at a lower rate than is desirable for declining taxa. Only a few pairs bred in the area during the first two decades until the advent of a social attraction system in 2007, when the number of breeding and prospecting pairs nearly tripled from 4 to 11, indicating that once ʻaʻo occur on or near the site, social attraction is a major component of colony establishment.

As referenced in Objective 2.1, "there is evidence that colony establishment can occur faster at a considerably cheaper rate using fencing and social attraction versus fencing and chick translocations, and that chick translocations may be required at some locations but not others (Courtot et al. 2014, Sawyer 2014)." Gummer et al. (2014) recommend using social attraction for one or more years, before the more costly translocation operation is undertaken. However, when birds are highly unlikely to colonize an area with social attraction alone, translocation may be the only way to start a new colony, and social attraction techniques can be used in combination with other measures, including chick translocation. We agree that the range of alternatives should be fully analyzed to determine the best use of conservation dollars.

13. **Comment:** Effects on other federally or State-listed species (e.g., nēnē) should be evaluated during development of projects to restore and enhance breeding populations of threatened and endangered seabirds.

    Response: Effects on other federally or State-listed species (e.g., nēnē), best management practices, and measures to avoid impacts will be detailed in subsequent compliance (e.g., NEPA, ESA Section 7) documents for projects to restore and enhance breeding populations of threatened and endangered seabirds. Best management practices to minimize disturbance to nēnē may include limiting the numbers of vehicles and people accessing the project area, limiting driving access, and using alternative access points.

14. **Comment:** Support for increased habitat restoration at the Refuge for the benefit of seabirds.

    Response: Specific actions related to increased habitat restoration for the benefit of seabirds include strategies in Objective 1.1, such as small-scale outplanting of native plants that provide suitable habitat structure and function for seabirds. Additionally, in Objective 2.2, we will ensure that habitat restoration activities are timed and conducted to minimize disturbance to breeding birds.

Nēnē and Grassland Management

15. **Comment:** Outplanting and maintaining nonnative Kikuyu-Spanish clover grassland is contrary to the biological integrity, diversity, and environmental health policy and may outcompete native plant species. Native grasses such as mahiki should be planted for nēnē forage. If nonnative shrubs and trees are removed at Crater Hill, they should be replaced with native plants that provide similar functions for nēnē nesting and brooding.

Response: The biological integrity, diversity, and environmental health (BIDEH) policy (601 FW 3) directs refuges to move toward historic conditions unless (1) this would conflict with refuge purposes; (2) no feasible alternative exists for accomplishing refuge purposes other than management for nonhistoric conditions; or (3) management for nonhistoric conditions would make a greater contribution to BIDEH at a larger landscape scale (Schroeder et al. 2004).

Therefore, while it is Service policy to move toward historic conditions, there are no known native grasslands that could be restored to provide the same nutrition as Kikuyu-Spanish clover grasslands. Mahiki (*Sporobolus virginicus*) is a wiry, hard grass which may not be as palatable to nēnē. See the rationale under Objective 1.2 for more details.

Under the CCP's management direction, nonnative shrubs and trees at Crater Hill and elsewhere will eventually be replaced by native plants such as naupaka, ʻakoko, and nehe, which will provide food and cover for nēnē.

16. **Comment:** There has been a decline in the quality and amount of Kikuyu grass within the coastal grasslands on Crater Hill and the Mōkōlea plateau due to competition from weed species. Better management of the existing 27 acres of grassland should be a priority, rather than increasing the habitat acreage.

    Response: Kikuyu grass was introduced to Crater Hill for cattle forage prior to acquisition by the Refuge. The Refuge will manage Kikuyu-Spanish clover grasslands in large, contiguous patches (>3 acres) interspersed with native shrublands for nēnē foraging, breeding, and roosting (Objective 1.2). Strategies to enhance and manage the Kikuyu-Spanish clover grasslands include mowing and use of IPM strategies to control pest/undesirable plants. Current management includes the use of these strategies within 27 acres. Management of these areas will remain a high priority. However, IPM methods will be used to remove pest christmasberry, lantana, and other aggressive weeds on an additional approximately 5–7 acres of degraded (i.e., less functional) grassland adjacent to the currently managed areas. This will lead to a total of about 32–34 acres of Kikuyu-Spanish clover grassland that will support nēnē and other species.

17. **Comment:** Given the risk of nēnē crossing into areas that would be dangerous or undesirable (e.g., Kīlauea Road or neighboring properties), various options should be considered, including construction of a corridor between the Point and Crater Hill, fencing, and capture and relocation. Additionally, to specifically reduce the risk of vehicle strikes on Kīlauea Road, speed-calming devices and signage should be considered.

    Response: In conjunction with the step-down transportation planning, we will evaluate the feasibility of redesigning the Overlook area in order to provide a corridor for nēnē transiting between the Point and Crater Hill. The objectives are to provide a better connection for nēnē adults and their young to travel for forage and to reduce the risk of vehicle impacts while crossing Kīlauea Road. An additional strategy has been added under Objective 1.2.

    We will work with DLNR DOFAW, the county, and others on sign design and placement, as well as explore the use of speed-calming or -reducing devices to lessen vehicle strikes on Kīlauea Road. Strategies for both actions described have been added under Objective 4.2.

18. **Comment:** The Service should consider a catchment system and cistern for rainwater on Crater Hill that could provide water for the plants and, perhaps, for making water available for nēnē. A consistent water source at the Point should also be considered.

    Response: An irrigation system at Crater Hill will be rehabilitated and maintained for native plant establishment. However, in lieu of artificial water features for nēnē, the Refuge will improve mowing regimes to manage short grasslands with high moisture and enhance areas with native shrubs such as naupaka, which provide moisture in berries.

19. **Comment:** Territorial, aggressive behavior by nēnē is problematic for seabirds such as the mōlī; therefore, these species should be prevented from existing in the same geographic area on the Refuge.

    Response: Available evidence suggests that before and during Polynesian colonization (around 1,600 years before present), nēnē and seabirds, including mōlī, likely occupied overlapping geographic areas during various parts of their life histories, and thus encountered one another. Fossil and subfossil remains of both species been found on Kauaʻi (Olson and James 1982, Olson and James 1991, Burney et al. 2001). Details on the current nēnē population on the Refuge can be found in Section 4.4.2 and on the mōlī population Section 4.5.1.

    As the use areas of nēnē and seabirds, including mōlī, likely overlapped historically, the BIDEH policy and ESA support the Refuge's current management of these species.

Wildlife Disturbance

20. **Comment:** In addition to reducing human disturbance to wildlife by limiting the location and timing of public use activities, the Service should also consider strategies such as reducing road noise, minimizing sight lines between nesting birds and visitors wherever possible through the use of vegetative or temporary barriers, and educating visitors about behavior around nesting birds.

    Response: Minimizing human disturbance to native birds and other biological resources is a priority for the Refuge at Kilauea Point NWR. We acknowledge the recommended measures. Specific guidelines and practices for minimizing disturbance will be developed either in step-down planning or during implementation of the CCP. Road conditions, including traffic and surface type, will be evaluated as part of implementing the transportation/transit strategies. Landscaping and screening will be taken into account during site planning. The Refuge will continue to incorporate messages about minimizing or avoiding impacts to wildlife in environmental education and interpretation programs.

Native Plants and Restoration

21. **Comment:** When revegetating areas on the Refuge, the Service should source appropriate native plants from appropriate Kauaʻi regions and not from other islands.

    Response: As referenced under Objectives 1.1, 1.2, and 2.2, we will finalize a Plant Restoration Strategy for native plant community restoration within 2 years of CCP completion. The guidelines for restoration include the following:

The Refuge will restore only those plant species that naturally occur on Kauaʻi or were historically known to occur on Kauaʻi. Species are chosen based upon existing records and other available information on the composition of intact native plant communities on Refuge lands, similar plant communities in the region, and from paleoecological studies.

All propagation material will originate from the nearest geographic area of record, unless the taxon has been extirpated from this area or is so reduced in abundance that inadequate material is available. The order of priority for propagation material will be (1) coastal areas of Kauaʻi for Kīlauea Point, (2) elsewhere on Kauaʻi, and then (3) other islands in the Hawaiian archipelago.

22. Comment: There are errors and omissions in the rare and endangered plant species that need to be addressed by the Service within the Refuge. The Refuge may host the same assemblage of rare and endangered plant species as in the designated Kauapea critical habitat immediately west of the Refuge.

Response: A partial list of plant species found on Kīlauea Point NWR is available in Appendix J. All threatened and endangered plants known to occur on the Refuge have been outplanted. These include pokulakalaka (*Munroidendron racemosum*), alula (*Brighamia insignis*), dwarf naupaka (*Scaevola coriacea*), loʻulu (*Pritchardia aylmer-robinsonii*), and loʻulu (*Pritchardia napaliensis*). Under Objective 2.2, the Refuge will restore and/or enhance and manage native coastal plant communities, including outplanting additional endangered plants.

Target plant communities for the Plant Restoration Strategy, which will be finalized within 2 years of CCP completion, are ʻilima coastal dry mixed shrub and grassland, naupaka coastal dry shrubland, kawelu coastal dry grassland, ʻilima coastal dry shrubland, hala coastal mesic forest, and loʻulu coastal mesic forest. The community descriptions are based on the classification of Hawaiian plant communities by W. Gagné and L. Cuddihy in the Manual of the Flowering Plants of Hawaiʻi (1990). Recovery species identified within each plant community are listed in Table K-2.

Table K-2. Recovery Species for Kīlauea Point NWR.

Plant Community –ʻIlima (*Sida*) Coastal Dry Mixed Shrub and Grassland					
Species	**Common Name**	**Federal Status***	**Habit**	**Life span****	**#s in Wild (population, individuals)**
Scaevola coriacea	dwarf naupaka	E	vine	short	4,<300
Sesbania tomentosa	ʻohai	E	shrub	short	10,2500
Solanum nelsonii	popolo	E	vine	short	10,<3000
Plant Community - Naupaka (*Scaevola*) Coastal Dry Shrubland					
Species	**Common Name**	**Federal Status***	**Habit**	**Life span****	**#s in Wild (population, individuals)**
Centaurium sebaeoides	ʻawiwi	E	herb	short	8,80–110
Ischaemum byrone	Hilo ischaemum	E	grass	very short	17,<3000

Scaevola coriacea	dwarf naupaka	E	vine	short	4,<300
Sesbania tomentosa	ʻohai	E	shrub	short	10,2500
Solanum nelsonii	popolo	E	vine	short	10,<3000
Plant Community – ʻIlima (*Sida*) Coastal Dry Shrubland					
Species	**Common Name**	**Federal Status***	**Habit**	**Life span****	**#s in Wild (population, individuals)**
Centaurium sebaeoides	ʻawiwi	E	herb	short	8,80–110
Cyperus pennatiformis ssp. *pennatiformis*	none	E	grass	short	1,100
Scaevola coriacea	dwarf naupaka	E	vine	short	4,<300
Sesbania tomentosa	ʻohai	E	shrub	short	10,2500
Solanum nelsonii	popolo	E	vine	short	10,<3000
Plant Community - Hala (*Pandanus*) Coastal Mesic Forest					
Species	**Common Name**	**Federal Status***	**Habit**	**Life span****	**#s in Wild (population, individuals)**
Brighamia insignis	alulu	E	shrub	short	5,60–70
Munroidendron racemosum	none	E	tree	long	15,200
Plant Community - Loulu (*Pritchardia*) Coastal Mesic Forest					
Species	**Common Name**	**Federal Status***	**Habit**	**Life span****	**#s in Wild (population, individuals)**
Brighamia insignis	alulu	E	shrub	short	5,60–70
Pritchardia remota	loulu	E	palm	short	2,680

*Federal Status:

E = Endangered, imminently likely to become extinct in the foreseeable future if no actions are taken to alleviate threats.
T = Threatened, likely to become endangered in the foreseeable future if no actions are taken to alleviate threats.

**Life Span:
Long = Long-lived, an individual likely to survive for at least 10 years.
Short = Short-lived, an individual likely to survive 2–10 years.
Annual = An individual that survives for 1 year.

23. Comment: Maintenance of restoration efforts should be a priority. Otherwise, restoration efforts revert back to weedy, nonnatives due to lack of sustained management.

Response: We agree that restoration is a long-term process that requires maintenance. To adequately support restoring and maintaining Refuge habitats, we identified operational

(recurring) costs, staffing needs, and partnering opportunities in Appendix C, Implementation.

Erosion Stabilization

24. Comment: Erosion stabilization should not involve major reconstruction or re-engineering of the Point. The amount of disturbance by construction equipment and use of cement/concrete should be limited.

Response: A strategy to stabilize areas of accelerated erosion along roads and trails is included under Objective 1.3. Sea cliff habitat is characterized by nearly vertical or vertical topography (>45 percent slope) and highly erodible soils that are exposed to wind and sea. Some Refuge roads and trails, such as the paved walking trail connecting parking areas at the Point with visitor facilities and the Daniel K. Inouye Kīlauea Point Lighthouse, are located adjacent to unstable substrates and sea cliff faces. Hundreds of visitors come to Kīlauea Point NWR each open day; erosion stabilization measures are needed to provide slope stability for public safety along road and trail sections that have experienced slope erosion, undermining, and settlement. Compliance with Occupational Safety and Health Administration (OSHA) regulations is paramount to maintaining a safe environment for visitors and staff alike.

Specific projects related to erosion stabilization will undergo additional detailed planning, including effects assessment under NEPA, surveys and consultation under Section 106 of NHPA, evaluation and consultation under Section 7 of ESA, and compliance with other applicable laws and policies. Best management practices (BMPs) for erosion control during and after construction to reduce negative effects on soils, drainage, and water quality and to minimize human and wildlife disturbance will then be identified as appropriate. Examples of BMPs include avoiding the use of heavy equipment in steeper and more erosion-prone portion areas, phasing construction to reduce exposed ground areas, minimizing the length and steepness of disturbed areas, avoiding earthwork in inclement weather, using vegetative buffers for erosion control and soil stabilization, incorporating culverts to allow water to easily pass through during heavy rain events, and revegetating bare areas with native coastal plants. We will also seek to limit the use of hardened surfaces and evaluate methods (e.g., porous or semi-permeable surfaces) to reduce the volume and rapidity of surface runoff from storms, thereby reducing the rate of soil erosion in adjacent areas.

Habitat Mapping

25. Comment: Land use mapping and the habitat acreages associated with the alternative maps are arbitrary and capricious unless substantiated with field surveys.

Response: Land use and habitat mapping for the draft CCP/EA was performed using image interpretation of 2004 1-meter resolution Ikonos satellite imagery and on-screen digitization. The boundaries between current land use and habitat types were manually delineated based on features, such as vegetation type and condition, that can be identified in the image. Field accuracy assessment was not performed; however, expert knowledge of the Refuge and local habitat types provided informal validation.

Within the CCP, ranges of acreages were provided for some of the wildlife and habitat management objectives (e.g., Objectives 1.1 and 1.2). The specific locations and sizes for

habitat enhancement activities as described in these objectives will be further refined during more detailed step-down or implementation planning.

Monitoring

26. Comment: Increase monitoring and collaborative research programs. Priority should be given to developing monitoring protocols that minimize disturbance.

Response: We are committed to using sound science in decision-making and providing the public with information of the highest quality possible. Expanded Refuge inventory, monitoring, and research programs, including collaborative research, are addressed under Objectives 3.1 and 3.2. Funding, staffing, and the Kauaʻi National Wildlife Refuge Complex's (Refuge Complex) information needs priorities will dictate which surveys will be accomplished in any given year.

As described within the attributes of Objectives 3.1 and 3.2, data collection techniques will minimize animal mortality, habitat destruction, or long-term or cumulative impacts on resources of concern.

27. Comment: The interval for monitoring native avian species should be shortened to once every 5 years as opposed to once every 10 years, if funding allows.

Response: A step-down Inventory and Monitoring Plan (IMP) will be developed following the completion of the CCP. The IMP will describe the inventory and monitoring activities needed to fulfill the Refuge's resource objectives as identified in the CCP and other planning documents and legal mandates. An important aspect of IMP development is the opportunity to receive input from other Service programs and partners. We will take into consideration the recommended interval for monitoring native avian species in our IMP process. All birds are counted annually during the Audubon Society's Christmas Bird Count.

Facilities and Transportation

28. Comment: Comments regarding the feasibility, coordination, and information needs related to the facilities and transportation strategies follow:

- Lack of funding and staffing will prohibit the implementation of aspects of either Alternatives C or D, such as new or expanded facilities, land acquisition, a transit system, and/or an offsite hub.
- Transportation planning activities should include other nearby partners and multi-modal developments (e.g., Kauaʻi bus, the Kauaʻi bike path, and others).
- The CCP does not adequately address parking and traffic issues within Kīlauea Town, including highway access.
- The CCP does not provide enough detail on site plans for facilities and trails or on the shuttle system design.

Response: While the CCP provides tangible descriptions of the affected environments and resources and provides guidance in the form of goals, objectives, and strategies, it is considered conceptual for facilities and transportation issues. Thus, before any actions related to facilities or transportation can be taken, more detailed land acquisition planning, facility

and transit design, and appropriate evaluations will need to be undertaken. Evaluations include additional effects assessments in compliance with NEPA, evaluation and consultation under Section 7 of ESA, and surveys and consultation under Section 106 of NHPA.

The Refuge Complex was awarded a Federal Transit Administration Paul S. Sarbanes Transit in Parks (TRIP) grant that will fund a post-CCP transportation study to evaluate the feasibility of implementing transportation elements of the selected alternative. This study will include a transit service plan for the Refuge Complex The study will also incorporate issues and opportunities from an island-wide perspective. The planning process will include public involvement, stakeholder engagement, and the consideration of financial and staffing constraints.

If determined to be feasible and after all appropriate compliance is completed, actions will be implemented as funding becomes available. We will pursue funding through a variety of sources, including public and private partnerships and grants. The transportation study will assist in identifying and describing the viability of potential funding sources.

29. **Comment:** The Refuge should consider phasing the implementation of the facilities and transportation components of the CCP.

    Response: Within the CCP, we considered short-, medium-, and long-term strategies for addressing conceptual facilities and transportation issues. These strategies will be implemented in a phased manner. As referenced in Section 2.3 and Objective 4.1, in the short- to medium-term, the Refuge will adopt an incremental approach and experiment with small-scale operational and infrastructure improvements based on recommendations from the interagency Transportation Assistance Group (TAG). During the public comment period on the draft CCP/EA, support was expressed for several of these options, including a reservation system and/or shuttle service. These options will be analyzed more thoroughly as part of the TRIP-funded post-CCP transportation study.

    Strategies which will require a large capital investment and extensive planning process are considered medium- to long-term. These strategies, to relocate welcome and orientation and non–site-dependent functions (e.g., bookstore, administrative functions, fee collection, parking) off the Point, include options to construct a new visitor welcome and orientation center, modify an existing facility, or co-locate the Refuge welcome and orientation center with a partnering conservation organization within 1 mile of the Refuge boundary. Associated actions may include the development of a transit hub and mandatory shuttle system. The success of short- to medium-term strategies may preclude implementation of the described medium- to long-term strategies. The rationale for Objective 4.1 has been revised to provide additional clarification.

30. **Comment:** The Service should determine the carrying capacity of the Refuge and establish a limit on the number of visitors per day, taking into account the ecological health of the Refuge, the quality of visitor experience, and impacts on the local community. The Service should consider implementing a reservation system

    Response: Kīlauea Point National Wildlife Refuge is a very popular destination for visitors to Kauaʻi. Associated with that popularity are issues related to traffic, conflicts with resource management, and the quality of visitor experience. The CCP addresses those issues through

improved wildlife and visitor use management strategies meant to reduce wildlife-visitor conflicts and enhance the quality of the visitor experience. Thus, rather than looking at how many visitors the Refuge can handle, the CCP focuses on how to achieve desired conditions. As management actions are implemented, responses will be monitored and management can be revised to achieve desired results.

In the near term, the Refuge will adopt an incremental approach to addressing some of the issues related to congestion at the Point, including evaluating the possibility of a reservation system. The post-CCP transportation study will also assess a shuttle system as well as other infrastructure options meant to alleviate congestion, improve visitor experience, and reduce wildlife conflicts.

31. **Comment:** The Service should consider offsite parking and coordination with partners and surrounding landowners when determining offsite parking locations. The Service should consider phasing in a shuttle system before instituting a mandatory shuttle. The Service should consider using a nonpolluting (electric) and low-noise shuttle and providing interpretation on the shuttle.

    Response: Options for offsite parking and a shuttle system are among the recommendations provided by the TAG and will be examined as part of the post-CCP transportation study. This study will also include a long-term transit service implementation plan, which will evaluate specific options for the shuttle system including type, cost, services (e.g., frequency and timing), and offsite parking. The Service will coordinate with partners, neighbors, and the community throughout the transportation planning process.

    Development of a mandatory shuttle system may or may not be associated with the relocation of non–site-dependent functions to an offsite location (Objective 4.1). The shuttle system may serve various park-and-ride locations instead of one Refuge welcome and orientation center.

32. **Comment:** Improve and add signage at the Overlook and Point, including nēnē awareness signs and signs at the entrance gate regarding the prohibition of pedestrian access.

    Response: Strategies under Objective 4.2 address signage needs. The Refuge Complex was awarded funding from the TRIP program in 2011 for a transportation study. The scope of work for this study includes development of a sign plan, which is intended to guide the improvement of way-finding and traffic-calming. Upon completion of the study, the Refuge will implement recommendations accordingly, as funding allows.

33. **Comment:** Comments regarding building use on the Point follow:

    - The building that currently houses the bookstore should be more focused on environmental education and interpretation, which would be more aligned with its original intent.
    - The bookstore should remain on the Point rather than moved to an offsite location. The bookstore is a primary source of funding for the Kilauea Point Natural History Association (KPNHA), which supports Refuge programs. Visitors would be more inclined to make purchases if the bookstore is located onsite.

- The historic buildings on the Point should be restored and include more interpretation and historic education.
- The existing visitor center at the Point should include greater environmental education opportunities as well as space for staff and others to hold meetings and workshops.
- The existing contact station is not a historic building and does not serve any good purpose and should be demolished.

Response: Under Objective 4.2, the site layout at the Point will be re-examined and evaluated for non–site-dependent functions (e.g., bookstore, administrative and maintenance functions, equipment storage, fee collection, parking); the long-term intent is to move as many of these functions off the Point as feasible. Public use and access to the Point will then be focused on wildlife observation and photography, environmental education, and environmental and cultural resources interpretation.

If a new offsite visitor welcome and orientation center is developed, bookstore operations will be moved to the new location, while the current facilities at the Point will be remodeled for either environmental education or new environmental or cultural interpretive exhibits and displays.

As referenced in Section 2.3, the Refuge is committed to preparing a Master Site Plan as a step-down plan to the CCP, which will further evaluate and detail proposed building use and remodeling/maintenance needs. A strategy has been added under Objective 6.1 to restate the commitment for preparing a Master Site Plan.

34. Comment: Comments specific to transportation issues at the Overlook follow:

- Do not expand access to the Overlook by adding parking spaces due to environmental (e.g., habitat loss and wildlife disturbance) and overcrowding concerns.
- None of the alternatives adequately address the issues (e.g., traffic volume, pedestrian and vehicle safety, inadequate turn radius, sanitation) that exist leading to and at the Overlook; these issues are likely to worsen in the future.
- Reconfiguration of the Overlook, such as a wildlife corridor that could allow for nēnē movement, should be considered to reduce wildlife disturbance.

Response: Objectives 4.1 and 4.2 include strategies to make the Overlook area safer and less congested and confusing. The TRIP-funded post-CCP transportation study will evaluate the feasibility of and provide recommendations for implementing these strategies. For example, a sign plan will be developed to guide the improvement of way-finding and traffic-calming. To address traffic volume and safety at the Overlook, the study will evaluate short-, medium-, and long-term solutions including redesign, reconfiguration of the traffic flow, and integration with shuttle services.

We will also evaluate redesigning the Overlook area in order to provide a corridor for nēnē transiting between the Point and Crater Hill. We will work with DLNR DOFAW, the county, and others on sign design and placement, as well as exploring the use of speed-calming devices to reduce vehicle strikes on Kīlauea Road. Strategies for both actions described have been added under Objective 4.2.

35. Comment: Comments related to the siting of new Refuge facilities follow:

- Moving facilities offsite is the best way to mitigate disturbances to wildlife and overcrowding on the Point. There are several location options in the surrounding area that may fit the needs of the Refuge, such as Lighthouse Village, Anaina Hou, along the proposed bypass road, and the proposed agriculture park.
- The new visitor welcome and orientation center should not be located on Crater Hill; if it has to be, it must minimize disturbance to the landscape and habitat.
- Some maintenance facilities should be left onsite. For example, the southwest corner of Crater Hill could be used for a small maintenance baseyard.
- Do not move the current visitor center or construct a new visitor center; it is unnecessary. The current center should be renovated.

Response: Based on management direction in the CCP, the construction of a new visitor welcome and orientation center and maintenance facilities at Crater Hill has been eliminated as an option because of disturbance to wildlife and habitats. As stated in the CCP, the conceptual construction of a new offsite visitor welcome and orientation center, modification of an existing offsite facility, or co-location with a partnering conservation organization located within 1 mile of the current Refuge boundary (e.g., in Kīlauea Town, near the proposed Kīlauea Town Bypass) are associated with several actions that would need to occur prior to or in conjunction with the actual relocation of functions offsite. Those actions could include any or all of the following: (1) completion of a transportation study; (2) expansion of the Refuge boundary to encompass the new site; (3) land acquisition, easement, or interim lease; (4) complete design of the new building and associated infrastructure; and (5) complete development of an associated transportation system. As such, the relocation of specific visitor services and non–site-dependent functions to an offsite location is considered a long-term strategy, which may be precluded by the success of short- or medium-term strategies.

Regarding maintenance facilities, strategies are in Objective 6.1. We will seek to develop a new maintenance baseyard (storage sheds, bays, pole barns, nursery) offsite. Options include leasing, purchasing, or co-locating with another entity. The new maintenance facilities will need to be proximate to the Refuge but not necessarily coupled with the new welcome and orientation center.

36. Comment: Pedestrian and/or bicycle access should be allowed from the Overlook at the end of Kīlauea Road onto Kīlauea Point.

Response: Due to safety concerns surrounding heavy traffic and visibility, as well as habitat protection for nēnē, ʻaʻo, and ʻuaʻu kani, pedestrian and/or bicycle access will not be allowed from the entrance gate down to the Point in the short term. The road from the entrance gate down to the parking areas is narrow with blind, steep curves (approximately a 70-foot drop in elevation, 12 percent slope). In addition, endangered nēnē, threatened ʻaʻo, and ʻuaʻu kani nest along the roadway in hala-naupaka forest. If pedestrians or cyclists go off-road into the hala-naupaka forest, they could easily crush chicks or burrows or flush a nēnē brood or bird off its nest.

Any road-widening or construction of a pathway adjacent to the current road bed to accommodate pedestrians or bicyclists will likely adversely affect ESA-listed birds. Therefore, in order to potentially allow pedestrian and/or bicycle access, it would have to occur along the existing two-way road. In the long term under the CCP, the road will be closed to private vehicles and a transit system will provide the primary means for public

entrance to the Point. Once the Refuge has a better understanding of how the transit system will operate, we will re-examine the feasibility of allowing pedestrian and/or bicycle access from the Overlook into the Point. A new strategy under Objective 4.1 has been added to reflect this.

Pedestrians will still be able to access the Overlook and bike parking at the Overlook will be provided.

37. **Comment:** The Service should not acquire and gate a portion of Kīlauea Road since it would inconvenience neighboring landowners and restrict access leading to the Overlook, which is utilized daily by the local community for wildlife and landscape viewing.

    Response: Based on public feedback, the strategy under Objective 6.1 regarding acquiring and gating a portion of Kīlauea Road has been removed. Methods to encourage the use of the shuttle system will be explored through the transportation study and in any subsequent transit options.

38. **Comment:** Sections of current parking areas should be restored and replanted.

    Response: In the long term, a mandatory shuttle may be implemented that would prohibit public parking in the current parking areas. During planning for the shuttle system, the Refuge will evaluate the potential for restoration of some portion of the parking areas based on the requirements for the transportation components (e.g. space needed for shuttle pick-up/drop-off). Restoration would be focused on shrubland revegetation and providing habitat primarily for shearwaters since they are less sensitive to disturbance compared to ʻā and nēnē. An additional strategy has been added to Objective 4.1.

39. **Comment:** The planning and implementation of strategies related to facilities and transportation should take into account public safety (e.g., pedestrian safety and safety of bikes locked at the Overlook).

    Response: As part of the TRIP-funded transportation study, traffic-calming strategies and signage will be examined to address transportation safety. Additionally, using strategies listed under Objective 6.2, Service law enforcement officers will continue to promote public safety.

40. **Comment:** The leach fields for the current septic system at the Point cause sewage backup, water quality, and air quality (odor) issues. The siting and implementation of the septic system should be re-evaluated.

    Response: Redesigning the current Refuge septic system will be taken into consideration at the time of replacement or significant upgrade to the current system. The current septic system, when properly maintained, operates sufficiently but is prone to periodic electrical problems involving the automatic float valve activated pumping system. These problems can cause overflow and unpleasant odor. Periodic inspection and maintenance of the system's electrical system has reduced the incidence of malfunction.

    The current septic system at the Refuge (EPA-mandated and State Department of Health approved) was built to Service design standards that include percolation tests to determine

the appropriateness of both soil type and quantity for use with the constructed leach field. Based on approved design and construction, the leach field should be able to facilitate adequate bio-filtration such that the fragile surrounding waters of the Pacific Ocean habitat are not detrimentally affected by this effluent.

We have received no indication or evidence that this effluent (which may be absorbed and remediated in the soil) has any detrimental effect to marine organisms or their habitat.

41. **Comment:** High foliage at the Point should be trimmed or removed in order to improve visibility for wildlife observation and photography. Unsightly objects (e.g., rusted propane cylinders) should be removed and unsightly areas (e.g. the maintenance area) should be screened by native plants. Trimming naupaka and other related landscaping should be performed during times which create the least amount of disturbance to wildlife.

    Response: Striking the balance between minimizing disturbance to nesting seabirds and brood-rearing nēnē along with the necessity of vegetation trimming at the Point is challenging. A "maintenance window" has been established through close coordination between the maintenance and biological staff to allow vegetation trimming only once per year around the Point and parking areas for both public safety and visibility purposes. This late-winter time window allows nēnē goslings to mature to the stage where they are less likely to be separated from their parents, yet early enough that prospecting wedge-tailed shearwaters have yet to return from their migration or are yet to use their burrows. The one-and-a-half month maintenance window (typically February–mid-March) allows for sufficient trimming of naupaka and other vegetation in a manner that is sufficient to last the entire year.

    Historically (1991–2011), naupaka trimming at the Point was conducted every 3–4 months in a staggered manner and trimming was much less dramatic. Starting in 2012, we changed the trimming schedule to once per year, based mainly on the need to minimize disturbance to brood-rearing nēnē. This means that currently the naupaka which is left to grow throughout the remainder of the year grows to such heights around the northern portion of the Point that it significantly impairs visibility to the north, east, and west. Dramatic trimming is required to avoid the unacceptable condition (to both the general public and our volunteers) of significantly impaired views at any time throughout the year.

    Unsightly propane tanks on Crater Hill are being addressed with the owners of the building.

42. **Comment:** In the construction and operation of Refuge facilities, BMPs should be used to conserve natural resources, improve water quality, manage stormwater runoff, and reduce reliance on nonrenewable energy. The Service should also comply with all applicable regulations and requirements regarding water quality.

    Response: As referenced in Section 2.3, for any projects that identify either new building or enhancements to existing structures or the transportation system, we will use, to the extent possible, sustainability measures, for example alternative transportation options, reusing materials, utilizing renewable technology such as solar power, and acquiring goods and services in the most environmentally friendly way possible in order to minimize our footprint and effects to climate change as outlined in Executive Order 13514.

Techniques to reduce effects on water quality, such as porous/semi-permeable paving or through the design and installation of stormwater swales, will be evaluated in subsequent detailed planning. We intend to facilitate rainwater seeping into the ground, reduce the volume and rapidity of surface runoff from storms, and reduce discharge of vehicle-related contaminants (e.g., petrochemicals and metals) into surface drainages and potentially the near-shore marine environment. For construction projects, BMPs will be incorporated to minimize the potential for erosion and encourage normal runoff patterns.

Prior to implementation, all activities will undergo appropriate reviews and consultations, and permits and clearances will be secured, as necessary, to comply with legal and policy requirements.

43. **Comment:** In conjunction with the CCP, the Refuge should support the development of a Kīlauea Town bypass road and examine its feasibility.

    Response: As stated in Chapter 1, planning for a Kīlauea Town bypass road is outside the scope of the CCP. The lead for such an initiative falls under the authority and jurisdiction of the State Department of Transportation and the county. As the Refuge moves toward implementing the CCP, any community developments that may affect implementation will be considered.

Public Use at Kāhili Quarry

44. **Comment:** Comments regarding the Refuge-owned portion of Kāhili Quarry Road included the following:

    - No gate should be placed along Kāhili Quarry Road.
    - The road should not be improved.
    - The road should be passable only by 4-wheel drive vehicles.
    - The road should be passable and repaired to a standard approved by the county.

    Response: The comments and suggestions we received regarding the Kāhili Quarry Road, as well as public uses occurring in the Quarry area, resulted in a re-evaluation and revision of the management direction regarding the road and Quarry access and use (see Response 46). Section 2.3 and Objective 4.6 have been revised to reflect that the Refuge will continue to work with the Kīlauea community to maintain a passable road to the beach and shoreline. The road will be repaired and maintained to a standard approved by both the Refuge and the County of Kauaʻi (e.g., using crushed coral). No gate will be placed at the entrance to Kāhili Quarry.

45. **Comment:** As a traditional community use, 24-hour fishing access to Kāhili Quarry and Mōkōlea Point should be allowed.

    Response: As referenced in Section 2.3, Kīlauea Point NWR will remain open for recreational fishing per Refuge-specific regulations for hunting and fishing at 50 CFR 32.30. Fishing by the general public on the Refuge occurs in the ocean at Kāhili Quarry and in the estuary of Kīlauea River. Fishing will be allowed on a 24-hour basis in accordance with State regulations and include harvest via hook and line, throw net, spear, and shellfish- gathering. Fishing is not limited to any designated location. However, entrance to the most northern

portion of Mōkōlea Point will be via foot access because the most sensitive bird nesting areas will be closed to vehicles. Facilities related to fishing are not provided at the Refuge.

46. Comment: The Service received comments in favor of no longer allowing general access to Kāhili Beach, Kīlauea Bay, and the Kīlauea River for stream, beach, and ocean uses through the Kāhili Quarry area. Comments also favored allowing access by permit only, or continuing to allow access as-is. Comments in favor of continuing to allow public access and use at Kāhili Quarry follow:

- Access to Kāhili Beach, Kīlauea Bay, and the Kīlauea River through the Kāhili Quarry area should not be limited to 6 a.m. to 5 p.m. daily. Support expressed for either 24-hour, 7-days-per-week access or sunrise-to-sunset access. The hours restriction proposed in the draft CCP/EA would adversely affect the local community while providing negligible positive impacts to wildlife.
- There should be no restrictions on uses that have traditionally occurred at the Quarry, except for illegal uses. Overall, the restriction of uses would adversely affect opportunities for the local community to recreate while providing negligible positive impacts to wildlife.
- Via community stewardship partnerships, the community, including groups such as the Kīlauea Neighborhood Association, ʻĀina Hoʻokupu o Kīlauea, KPNHA, and the Kauaʻi branch of Hawaiian Islands Land Trust, would help the Refuge manage traditional community uses of this area through education regarding responsible behaviors and uses, monitoring, and discouraging uses that endanger people and wildlife or compromise the area. A strong cooperative effort between the Refuge and the community would effectively minimize negative impacts to wildlife and habitat.
- Refuge management at the Quarry should be consistent with neighboring Land Trust and DLNR lands.
- Signage regarding regulations and ways to avoid or minimize wildlife disturbance should be added. The signage and messaging should be culturally sensitive and positive.
- Comments regarding camping included no camping on Refuge lands due to lack of infrastructure, no camping except for overnight fishing camps, and providing a limited number of camping spots. The rationale for limiting or not allowing camping included the lack of associated infrastructure (e.g., bathrooms and trash cans) and limited space. The rationale for allowing camping included that it was an existing use of the Quarry prior to Refuge acquisition and was required to facilitate fishing.

Response: Kāhili Quarry is an important buffer area for wildlife resources on Mōkōlea Point and Crater Hill, including breeding sites for nēnē, mōlī, ʻuaʻu kani, koaʻe ʻula, as well as roosting or foraging sites for pueo and ʻiwa. The studies cited in the compatibility determinations (Appendix B) show that public use activities can and do disturb wildlife. A primary concern in allowing any public access and use at the Quarry is to maintain adverse impacts within acceptable limits. Specific concerns about allowing public access and use at the Quarry include evening and nighttime disturbance from light, noise, human occupation, traffic, and dogs to seabirds nesting on Mōkōlea Point; ground fires spreading to vegetation; impacts to environmental quality from trash and pollution; and illegal uses such as squatting that may occur during the nighttime.

Based on the comments and suggestions received on the draft CCP/EA related to Kāhili Quarry access and use, the Service determined that the reduction of potential adverse impacts

would be effectively realized through a combination of increased community participation and stewardship and Refuge management actions. The feedback resulted in a re-evaluation and subsequent revision of the management direction (Objective 4.6) and several associated appropriate use findings and compatibility determinations. A summary of the changes to Objective 4.6, as well as rationale, follows; see Chapter 2 for more information.

The following strategies have been added:

- Work in partnership with local nonprofit organizations and community leaders of Kīlauea on promoting community stewardship of the Quarry through habitat protection, monitoring and managing threats to natural and cultural resources, outreach, and environmental, cultural, and historical interpretation.
- Partner with community groups to develop welcome and orientation, educational, and interpretive signage and messaging.
- Explore opportunities for an overnight site-host program through a special use permit to provide resource protection, outreach and interpretation, and compliance monitoring.
- Work with the community stewardship partnership to explore opportunities for providing camping. Stipulations would need to ensure that camping opportunities are compatible.
- Install bollards at the northeast end of the Quarry area to protect seabird nesting areas.
- Additional strategies for increasing the awareness and appreciation of native wildlife and cultural resources through interpretation at Kāhili Quarry have been also added under Objective 5.1.

The following strategies were modified or removed:

- Change from "General public access to Kāhili Beach, Kīlauea Bay, and the Kīlauea River through the Kāhili Quarry area would be allowed from 6 a.m. to 5 p.m. daily" to "General public access to Kāhili Beach, Kīlauea Bay, and the Kīlauea River through the Kāhili Quarry area will be allowed 24 hours a day."
- Change from "Anglers would be allowed to erect temporary shelters (protections from the sun and rain) in the quarry area during daylight hours only" to "Visitors will be allowed to erect temporary shelters (protections from the sun and rain) in the quarry area during daylight hours only."

We believe the modified strategies in the CCP will limit adverse impacts to wildlife and habitats. However, we reserve the right to re-evaluate permission for these non–wildlife-dependent uses if individuals violate Refuge rules or regulations, if unacceptable impacts occur, or for other legitimate reasons.

47. Comment: Due to the concerns about negative impacts to wildlife (e.g., disturbance, mortality) comments regarding dogs included support for requiring all dogs to be on a short leash and support for not allowing dogs at the Quarry.

Response: The Code of Federal Regulations states that no dog shall be permitted to roam at-large on refuge lands (50 CFR 26.21(b)). Kauaʻi County ordinance requires dogs to be on-leash when off the owner's property (Kauaʻi County Code Leash Law Section 22, Article 2:

"Dogs must be under control of the owner by a leash (not more than 8 feet long) when off the owner's property").

As stated in a compatibility determination (Appendix B), dog walking in the Kāhili Quarry area of the Refuge has the potential to cause disturbance to seabirds, seals, and turtles. However, replacing the existing fence with a predator-resistant fence down the cliffs defining Mōkōlea Point, limiting dog walking to the western portion of the Quarry area, and requiring dogs be on-leash and under direct control at all times will limit potential disturbance to seabirds roosting or nesting in cliff-side vegetation. Additionally, visitors will not be allowed within 50 yards of seals or turtles.

Signage will be placed to advise visitors that dogs must be on-leash using a short (8-foot maximum) leash, under control at all times, and that dog feces must be picked up and removed from the Refuge. The northeastern end of the main Quarry area will also be signed and blocked using bollards to indicate that dogs are not allowed.

Overall, impacts from dog walking at the Quarry can be contained effectively, mitigating the overall effect on Refuge wildlife and on visitors engaged in wildlife-dependent uses, by ensuring that dogs are always on-leash, under direct control, and remain in designated areas. The Refuge will enforce these regulations through warnings and ticketing by the Refuge Complex law enforcement officer. Periodic evaluations will be done to ensure that dog walking does not interfere with compatible, wildlife-dependent uses or impact wildlife resources. Violations or disturbance may further restrict or eliminate dog walking at the Quarry.

48. Comment: Refuge law enforcement officers should be culturally sensitive and use proper discretion in the handling of their duties. New officers and Refuge managers should have an initial meeting with community leaders to better understand the community they will be working in.

Response: A new strategy has been added to Objective 6.2: "Orient new Refuge staff, including law enforcement officers, Refuge managers, and volunteers to the local culture and community." Regular communication between the Refuge law enforcement officer and representatives of the community of Kīlauea will be encouraged and scheduled through the Kīlauea Neighborhood Association.

49. Comment: Kāhili Quarry Road, including the portion on the Refuge, is part of the ala loa trail system and therefore, per the Highways Act of 1892, should be in the public domain with public access allowed.

Response: As referenced in a previous comment response, the Refuge will not close public access to the area, and thus not affect access to the ala loa trail; general public access will be allowed 24 hours per day.

Kāhili Quarry Road and shoreline are not listed as one of the trails currently protected by the Nā Ala Hele Trails & Access Program (hawaiitrails.ehawaii.gov/island.php?island=Kauai). Resolving the issue of whether the Quarry is part of the ala loa is outside of the scope of the CCP.

50. Comment: Restricting uses or parking at the Quarry would increase visitor pressure on the Wailapa Road side of Kāhili Beach, which would adversely affect the sensitive dune habitats.

Response: We recognize that Kāhili Quarry Road provides the Kīlauea community more convenient access to Kāhili Beach, Kīlauea Bay, and the Kīlauea River. Visitors from Kīlauea Town would not need to travel on the highway and also have safer options for either walking or biking. Additionally, the Service acknowledges that Kāhili Quarry could provide an additional parking option when the Wailapa Road parking is congested or full. As referenced in a previous comment response, the Service would not close public access to the area; general public access would be allowed 24 hours per day.

Public Use at Crater Hill

51. Comment: Access to Crater Hill should not be limited to guided interpretive tours.

Response: Public access to Crater Hill is available in two ways. Access to the "donut" (i.e., area adjacent to the western cul-de-sac of Makana Ano Place) by foot or bicycle is allowed during daytime hours per Seacliff Plantation access rules; visitors need to access via the Seacliff Plantation entrance gate and roads. The other way to access areas of Crater Hill, determined by this planning process and including public comments, is in the form of limited, guided, and interpretive hikes. Certain stipulations, including requiring Refuge staff or a trained volunteer guide, minimum age, maximum group size, and limited frequency, are required in order to provide an appropriate, high quality public use experience while preventing or minimizing the impacts of disturbance to nesting birds and their habitats and to other sensitive biological resources.

Public safety concerns are paramount for Refuge staff; therefore, a safe and properly managed public hike program must be well-considered. Uneven terrain, loose soils, steep and tall cliffs, and hidden seabird burrows combine for a potentially dangerous hiking environment. The length of the trail needs to be moderate to accommodate an average level of physical ability, as many visitors to the Refuge are ill-prepared for the heat, humidity, and physical exertion of a hike to Crater Hill. An adequate number of well-trained park rangers and volunteers are needed, trained in both interpretation of the biological resources and in basic emergency situation response (including first aid/CPR/AED).

In addition to reasons of public safety, unlimited access to Crater Hill will not be allowed because of human-caused wildlife disturbance or mortality. One example of the large, negative impact that could occur from unlimited public access to Crater Hill is the deaths of nesting albatross and/or shearwaters (this has happened numerous times on Crater Hill and Mōkōlea Point since those portions of the Refuge were established in 1983) due to uncontrolled dogs and cats. Owner negligence and uncontrolled pets are too often the root of the cause.

Controlled access (i.e., limited guided interpretive hikes) is being adopted in order to reach a suitable balanced approach for both biological resource protection and priority public use, given adequate staffing and funding. This approach is designed to protect nesting migratory seabirds along with nesting and brood-rearing endangered nēnē and to provide a safe and high-quality wildlife-oriented recreational opportunity.

52. Comment: A trail for additional access to Crater Hill, originating from the southwest corner of Crater Hill, should be built.

Response: The specific layout of the hiking trail on Crater Hill has yet to be determined. The hiking trail layout will consider use of the Refuge gate on the southwest corner of Crater Hill for ingress and egress. Factors to consider for the hiking trail layout are length of trail for public safety, emergency vehicle access, impacts to nesting migratory and endangered birds and their habitats, available parking, and courtesy to surrounding neighbors, including Seacliff Plantation landowners.

53. Comment: Access to Crater Hill for sunset viewing should be made available through a Refuge entrance.

Response: As referenced in Section 2.2, sunset viewing is not a priority public use or an activity that aligns with the purpose and mission of the Refuge System, nor does it contribute to the fulfilment of Refuge purposes. However, the general public is allowed to access Crater Hill by foot or bike during daytime hours via the Seacliff Plantation entrance gate. We considered but did not develop alternatives for a Refuge entrance for accessing the "donut" at the west end of Makana Ano Place due to concerns about adverse impacts to wildlife or their habitats.

54. Comment: Individuals should fulfill specific prerequisites (e.g., training, physical fitness evaluation, work/volunteer requirement) before being allowed to participate on guided interpretive Crater Hill hikes. Hiking at Crater Hill should be evaluated for accessibility for the disabled.

Response: As guided hikes to Crater Hill get scheduled, an overview of the hike will be relayed to participants, including information about steep inclines and unstable terrain. A route and safety plan will be established and relayed to staff and volunteers leading, accompanying, and on standby during the hike.

As the specific layout of the hiking trail has not yet been determined, the Refuge is amenable to considering ways for the disabled to be able to access Crater Hill. There will be additional needs to consider, including the installation of ramps to platforms and possibly vehicular access to a certain point.

55. Comment: Comments related to guides for Crater Hill hikes follow:

- Guides for Crater Hill hikes should be staff, not volunteers.
- Guides for Crater Hill hikes should be trained volunteers and staff.
- Locals should not need a guide to access Crater Hill.

Response: Trained volunteers are capable of leading guided tours of Crater Hill and will also be trained to handle a variety of emergency safety situations. Having trained volunteers, in addition to Refuge staff, leading hikes will provide more opportunities for guided hikes.

Everyone leading a tour or visiting Crater Hill (outside of the "donut" area) needs to be trained or with someone who has received training. The training requirement is intended to

ensure that guides and participants understand the issues related to wildlife or resource management, safety, sensitivity, and culture of a specific location.

56. **Comment:** Hiking at Crater Hill has the potential to cause wildlife disturbance. Stipulations including group size limits, timing, frequency, noise limits, biosecurity measures, and siting to avoid sensitive areas should be identified.

    Response: Hiking on Crater Hill will have the potential for wildlife disturbance. Properly designing hikes, including sensitivity to location, time of year, and number of participants will be incorporated to minimize disturbance to wildlife. Stipulations are included in the compatibility determinations (Appendix B).

57. **Comment:** Access to Crater Hill hikes should be via shuttle and have minimal impact to Seacliff Plantation residents. Measures should be taken to reduce mud, dirt, and gravel from coming onto the privately maintained roads within the development.

    Response: Impacts to Seacliff Plantation residents and their roads will be considered as access options for Crater Hill hikes are reviewed. A strategy under Objective 4.5 has been edited for clarification.

Open Days at the Point

58. **Comment:** The Service received comments in favor of opening Kīlauea Point 7 days a week and in favor of remaining closed at least 2 days a week.

    Response: Beginning in February 2014, we reduced the days that Kīlauea Point was open from 7 to 5 days a week due to budget cuts. While visitation days will be reassessed to see if it will be possible to reopen on a 6- or 7-day-a-week schedule, closures will continue to be a management option depending upon the availability of staff and resources.

59. **Comment:** The focus should be on adequate staffing and support and remaining open to the public rather than land acquisition.

    Response: Eighty percent of the fees collected at the Refuge are used to pay for visitor services-related expenditures, including staff and maintenance. Funding for land acquisition would likely come from appropriations under the Land and Water Conservation Fund Act (primarily from outer continental shelf Federal oil and gas revenue), and the Migratory Bird Conservation Fund (Federal Duck Stamp sales). These are public funds and programs that were established to benefit conservation of fish, wildlife, and habitats. These land acquisition funds will be dedicated for such purpose and are not a factor in budgets for staffing.

60. **Comment:** The decision of days open to the public should be based on wildlife response as well as on budget.

    Response: One of the purposes of Kīlauea Point NWR is to provide fish and wildlife-oriented recreation. Wildlife observation and photography, environmental education, and interpretation are all compatible uses on the Point given adherence to certain stipulations. The Refuge will monitor wildlife and habitat disturbance and other potential impacts to determine if these stipulations are resulting in expected and desirable outcomes. The Refuge will apply

adaptive management principles to modify stipulations or adjust objectives, as necessary, to achieve desirable results. For example, if monitoring the adherence to stipulations demonstrates unacceptable levels of violation of Refuge rules or regulations, or unacceptable impacts to native fish, wildlife, plants, their habitats, cultural resources, Refuge facilities, other Refuge visitors, or for other legitimate reasons, the Refuge reserves the right to change stipulations (e.g., closing areas or changing timing of use) or terminate permission for these uses.

Outreach and Interpretation

61. Comment: Support for expanded interpretation and outreach regarding all Refuge resources and increasing limited access to the interior of the Lighthouse.

Response: Expanded interpretation and outreach regarding all Refuge resources is described under Objectives 4.3 and 4.7. Additionally, we will expand opportunities to provide limited access to the interior of the lighthouse (Objective 4.3, e).

62. Comment: The proposed outreach is focused on out-of-state visitors rather than Kīlauea or Kauaʻi residents.

Response: A variety of outreach strategies in Objective 4.7 target the Kīlauea and Kauaʻi communities as well as many others. Additional outreach and interpretation efforts focused at the Quarry, which will include targeting the local community, have been added Objectives 4.3, 4.6, and 4.7.

Environmental Education

63. Comment: Environmental education (EE) should be a high priority with more programs held on- and offsite; however, onsite programs should be the focus. Closure days at the Point should provide the Refuge the opportunity to focus on providing EE.

Response: EE is one of the Service's priority public uses. Through strategies in Objective 4.4., the Refuge is committed to providing a high-quality EE program, which will include both on- and offsite components. A balanced approach in the management of the Refuge, taking into account budgets, visitors, wildlife, EE and interpretation, and impacts is key in determining the location, number, length, timing, and methods with which the Refuge conducts EE.

64. Comment: Comments regarding EE materials and curricula follow:

- Additional staff is required to support EE and work regularly with local schools. There should not be any age limit for volunteers.
- Classroom materials should be provided in advance of field trips, which should occur outdoors.
- Topics for EE should include nēnē and migratory bird conservation.

Response: The number and quality of education programs are, in part, dependent upon trained staff and volunteers. Additional staff to support EE is identified in Appendix C, Implementation. Additionally, by enhancing current partnerships and exploring new ones, the Refuge seeks to increase the effectiveness and efficiency of the EE program, thereby

reaching more students and community groups. We will also conduct trainings and outreach (e.g., through the website) for staff, volunteers, teachers, and other educators in order to promote the EE program. There currently is no age limit for volunteers. Volunteers who are minors need to have an authorized parent or guardian approve of their Volunteer Service Agreement with the Refuge.

Many aspects of Objective 4.4 address a variety of methods and partnerships in developing and reviewing materials for classroom and field trip visits. Standards-compliant Refuge-based curricula for all ages and abilities will be developed and/or updated to complement the Service's mission and Refuge's purposes and goals. Several Refuge EE programs currently contain information about nēnē and migratory birds.

65. **Comment:** What are the impacts of school group visits?

    Response: General impacts of the EE program, including school group visitation, to natural and cultural resources as well as other wildlife-dependent uses are described in the compatibility determination (Appendix B). When conducted with adherence to the specified stipulations contained in the compatibility determination, EE will not materially interfere with or detract from maintenance of the Refuge's biological integrity, diversity, and environmental health; fulfillment of Kīlauea Point NWR's purposes; or the Refuge System's mission.

Wildlife Observation and Photography

66. **Comment:** Expand noncommercial opportunities for wildlife observation and photography, like workshops.

    Response: Under Objective 4.5, the Refuge will seek to expand program offerings, including workshops, activities, and exhibits used to teach and enhance wildlife viewing and photography skills and ethics.

Traditional Cultural Practices

67. **Comment:** Cultural practitioners and traditional users should have access to Refuge lands for traditional cultural practices. Traditional cultural practices should not be restricted based on ties to specified ahupua‘a. A special use permit (SUP) is not an adequate method for managing traditional and cultural uses.

    Response: The Refuge supports cultural practitioners and traditional users of Kīlauea Point NWR lands. To clarify access to Refuge lands for traditional cultural practices, changes have been made to the CCP. Requests for access to closed areas for nonconsumptive traditional cultural practices (e.g., oli and hula) have been infrequent in the past and therefore will be administered on a case-by-case basis. Access to closed areas are defined as specialized uses and typically require an SUP. In this case, unless the cultural practitioner is accompanied by official Refuge personnel, an SUP will be required. Stipulations within the SUP will take into account impacts to wildlife resources, including timing, place, and limits on construction of structures during nesting season. The practice of nonconsumptive traditional cultural activities in open areas (e.g., Kāhili Quarry) will not require a permit.

Consumptive traditional cultural practices include fishing with hook and line, throw net, spear, or shellfish-gathering at Kīlauea (East) Cove; and collection of plant materials, feathers, and possibly other natural resources (e.g., stone, shells, bone) from areas of the Refuge that are open to public use. Unless accompanied by official Refuge personnel, participants of these uses will be issued and need to sign an annual SUP.

Access to Kīlauea (East) Cove for fishing or shellfish-gathering will be restricted to those who have genealogical ties to the local community, that is, the Kīlauea and Kāhili Ahupuaʻa or surrounding ahupuaʻa, including Namahana, Kalihiwai, Kalihikai, Waiakalua, and Pīlaʻa (Wilson and Jay 2010). This restriction is based on a list of Kīlauea sugar plantation families who were previously allowed to fish on Refuge land. No more than five individuals at a time will be allowed to use the East Cove, and use will be restricted when ʻīlio-holo-i-ka-uaua or honu are present.

In the absence of specific authorization, regulations within 50 CFR 27.51 ("Disturbing, injuring, and damaging plants and animals") prohibit the collection of plant materials and other natural resources on refuges. Through permit or accompanied by Refuge personnel, we will allow such collections by individuals of Native Hawaiian heritage as an element of traditional cultural practices. The collection and use of materials from native plants or canoe plants, feathers, and possibly other natural resources for traditional subsistence, ceremonial, decorative, medicinal, or other purposes will not be restricted to specific ahupuaʻa.

Participating in traditional cultural practices on the Refuge for commercial purposes is prohibited. Additional stipulations for these uses are listed in the compatibility determination (Appendix B).

Commercial Activities

68. Comment: Restrict and regulate commercial activities including photography, surf schools, and food concessions on the Refuge.

Response: Regulations at 50 CFR 29.1 require that the Service only authorize an economic use of a Refuge when a determination has been made that the use contributes to the achievement of Refuge purposes or the Refuge System mission. The regulations define an economic use to include "operations that facilitate approved programs on national wildlife refuges." Commercial uses evaluated in the CCP include commercial wildlife and landscape filming and photography and commercial tours (ecotourism), which are both determined to be compatible given adherence to specific stipulations intended to minimize the possibility of damage to cultural or natural resources or interference with other visitors. These stipulations include the requirement for an SUP, which will be reviewed on a case-by-case basis, and an associated fee. Permits may be approved or denied based on the availability of Refuge staff and resources to administer the use. Permission to access Refuge-closed areas for commercial filming and photography or commercial tours (ecotourism) will be designed to minimize effects on biological and cultural resources and visitors (e.g., use of a guide to access Crater Hill).

Surf schools and food concessions are not allowed on the Refuge. These uses do not enhance the Refuge visitor's knowledge and enjoyment of the natural resources or support the mission

of the Refuge or the Service, and they may affect uses otherwise determined appropriate and compatible.

Volunteers

69. Comment: Support for an expanded volunteer program, community work days, and continued coordination with KPNHA.

Response: Volunteers are key components of the successful management of Refuge lands and are vital to the implementation of the Refuge's biological and public use programs and projects (e.g., interpretation, environmental education, invasive species control). The strategies under Objective 4.8 are intended to increase, support, and appreciate the Refuge volunteer program.

Refuge Visitation

70. Comment: Refuge visitation numbers are inflated and should only account for those passing the fee booth. Statistics on wildlife viewing should include Kāhili Quarry as well.

Response: A large majority of Refuge visitation occurs at the Point and/or Overlook.

Refuge visitation numbers include estimates for visitors to the Overlook since the Overlook is Refuge-owned and managed. Overlook visitors partake in wildlife-dependent activities such as wildlife observation and photography. Refuge volunteers are occasionally stationed at the Overlook to provide outreach and interpretation. Estimates for number of visitors to Kāhili Quarry are unavailable but are assumed to be orders of magnitude smaller than the visitation at the Point and/or Overlook.

71. Comment: Long-range Refuge planning should not consider an increase in visitation.

Response: As described in Chapter 5, visitation to Kīlauea Point NWR is related to total visitation to the island of Kauaʻi. Tourism on the island is sensitive to global macro-economic conditions and natural disaster events. Over the analysis period, annual visitation to Kauaʻi peaked in 2007 at about 1.3 million visitors. The latest short-term forecasts by the State of Hawai'i Department of Business, Economic Development, and Tourism (DBEDT) projected that visitor arrivals statewide would grow between 2.5 and 1.7 percent annually from 2015 to 2018 (DBEDT 2015). Hawaiʻi's visitor arrivals are expected to grow at a slower rate in the future (DBEDT 2012). However, given that the overall visitor arrival trend in the long term is positive, Refuge planning should assume growth in interest compared to the present.

Cultural and Historic Resources

72. Comment: Support for implementing a proactive cultural resource management program to increase appreciation of native wildlife which is important in Hawaiian culture and folklore.

Response: Additional strategies for increasing the awareness and appreciation of native wildlife and cultural resources through interpretation at Kāhili Quarry have been also added under Objective 4.6.

73. Comment: The Service should consider the recommendations of the 1989 Archaeological Inventory Survey of Kīlauea Point NWR and follow through on nomination of both the Crater Hill radar station (State Historic Site 50-30-04-1810), and sugar loading complex (State Historic Site 50-30-04-1811) to the National Register of Historic Places.

Response: The Refuge has added the following strategy under Objective 5.1: Re-inventory and reevaluate for designation to the National Register of Historic Places the Crater Hill radar station (State Historic Site 50-30-04-1810) and Mōkōlea Point sugar loading complex (State Historic Site 50-30-04-1811).

74. Comment: The Refuge should initiate consultation under Section 106 of the National Historic Preservation Act (NHPA) with the State Historic Preservation Office and relevant consulting parties.

Response: Consistent with how the Service has completed CCPs for all refuges, including CCPs for other refuges in the Hawaiian Islands, we will initiate the NHPA Section 106 process with the Hawai‘i State Historic Preservation Division, Native Hawaiian Organizations, and other interested parties when we commit funds, with specific plans, to an identified project or activity identified in the CCP and subject to Section 106.

Planning Process

75. Comment: Public outreach and coordination surrounding the draft CCP/EA was inadequate. The comment period for the draft CCP/EA should be extended.

Response: Under Service policy for Comprehensive Conservation Planning (602 FW 3), the Service is required to provide a minimum of 30 days for public review of a draft CCP with an EA. For the Kilauea Point draft CCP/EA the public was provided 44 days for public review and comment. We held public open houses on February 24, 2015, and February 25, 2015, which were announced through direct mailings, newspaper articles, radio interviews, and website postings. Over 900 individuals and organizations received a planning update via mail or e-mail describing the draft CCP/EA and ways to provide comments. Additionally, we provided a series of briefings at the request of State, county, and local agencies and stakeholders. See Appendix I for more information about public involvement throughout the CCP process.

Based on the extent of public opportunity and involvement throughout the planning process and the volume and specificity of the comments received, the Service believes that the amount of time for the public and other agencies to review and comment on the draft CCP/EA was adequate.

76. Comment: The Refuge should focus on protecting wildlife, not on providing visitor services.

Response: Kīlauea Point NWR is managed for wildlife conservation and, when compatible, public recreation. The CCP focuses on balancing the needs and impacts of both goals. For more information on the Federal laws, Executive orders, international treaties, Service policies, and Refuge purposes that guide Kīlauea Point NWR management, see Chapter 1; for more information on public uses, such as visitor services, determined to be appropriate and compatible on the Refuge, see Appendices A and B.

77. **Comment:** How is "sound professional judgment" defined when applied to the determination of compatible Refuge uses?

    Response: "Sound professional judgment" is defined in Service Compatibility policy 603 FW 2 as "a finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of applicable laws."

78. **Comment:** The CCP does not consider impacts of Refuge management to kamaʻaina who may be disproportionately affected.

    Response: While a large majority of Refuge visitation occurs at the Point, 95 percent of that visitation is comprised of visitors who do not live in the local area (almost all are visitors to Hawaiʻi) (Sexton et al. 2012). Although not scientifically sampled, the profile of visitors to the Kāhili Quarry area is likely different. Comments received during the draft CCP/EA comment period indicated that the majority of visitors to the Quarry are local.

    As evidenced by Goals 4 and 6, we are committed to providing safe and high-quality opportunities for recreation, while limiting impacts to wildlife, habitats, and cultural and historic resources, Refuge visitors, and kamaʻāina of all ages and abilities. Comments we received on the draft CCP/EA related to the importance of the Kāhili Quarry area to kamaʻāina resulted in a reevaluation and subsequent revision of several appropriate use findings, compatibility determinations, and management direction (Objective 4.6). These changes are detailed in the comment response 46.

Realty

79. **Comment:** The Service should acquire lands identified in the Kīlauea Point National Wildlife Refuge Expansion Act of 2004 (Expansion Act), such as the lower valley of Kīlauea Falls and areas along the coastline east of Mōkōlea Point, in order to protect natural and cultural resources as well as to allow public use.

    Response: In 2004, Congress passed the Expansion Act which allowed the Secretary of the Interior to acquire by donation, purchase with donated or appropriated funds, or exchange, all or a portion of approximately 234 acres of land adjacent to the Kīlauea Point NWR. The land is to be managed for the protection and recovery of endangered Hawaiian water birds and other endangered birds, including nēnē, and the conservation and management of native coastal strand, riparian, and aquatic biological diversity. All acquisitions of land or waters under the Expansion Act "shall be made in a voluntary manner and not be the result of forced takings."

    The Service has the authority to acquire land or negotiate agreements on behalf of the National Wildlife Refuge System only within an approved refuge boundary. Following the Expansion Act, a Land Protection Plan and Environmental Assessment were completed by the Service in 2007 which expanded the approved Refuge boundary by 202 acres. The expanded boundary included the lower valley of Kīlauea Falls as well as some portions of coastline east of Mōkōlea Point. To date, no land in the expanded boundary area has been acquired by the Refuge. Based on the availability of funds, the Service will continue to negotiate with willing sellers to acquire lands within the approved Refuge boundary.

80. Comment: The Service needs to clarify the locations and rights associated with the easement areas on Crater Hill.

Response: Tract 12 and easements 12C, 12R, and 12R-1 were donated by Pali Moana Corporation (which is now Seacliff Plantation) through the Trust for Public Lands. Seacliff Plantation retains the right to use the easement areas for pedestrian and equestrian access within the Refuge boundary. The easements are 20 feet wide, with only 10 feet allowed for improvements of an unpaved surface. The easements enter the Refuge from a gate at the northeast end of Makana Ano Place and continue to the eastern boundary of Tract 12. The pedestrian easement, for practical reasons, physically ends at the upper overlook. The Service accepts that the existing road (which passes the World War II bunkers) will serve as the pedestrian access route through Tract 12 until a mutually agreed upon change to the pedestrian easement is made. There is also an exclusive easement for the Seacliff Plantation residents for ingress and egress and for picnicking and passive recreational use over and across an area within Tract 13a. See Figure K-1 for the location of existing easements.

According to the deed, Seacliff Plantation, at its expense, may relocate the pedestrian, equestrian, and picnicking easements as long as they are relocated in proximity to existing easement, relocation would not interfere with the Refuge, and relocation is approved by the Service. Relocation of or development within these easements would need to comply with applicable Federal, State, and local laws, including but not limited to the Endangered Species Act, the Migratory Bird Treaty Act, and Hawaii Revised Statute Chapter 195D (HRS §195D-1-32).

81. Comment: The Service should use its easement (12R-1) for access to the Nihoku area.

Response: The Service has a right of "ingress and egress for emergency and maintenance purposes only" over portions of Seacliff Plantation's property. The Refuge currently uses the easement to access the Nihoku Ecosystem Restoration Project for maintenance purposes. If the Refuge were to use these easements for other purposes, such as visitor access, Seacliff Plantation and landowners would need to approve the use.

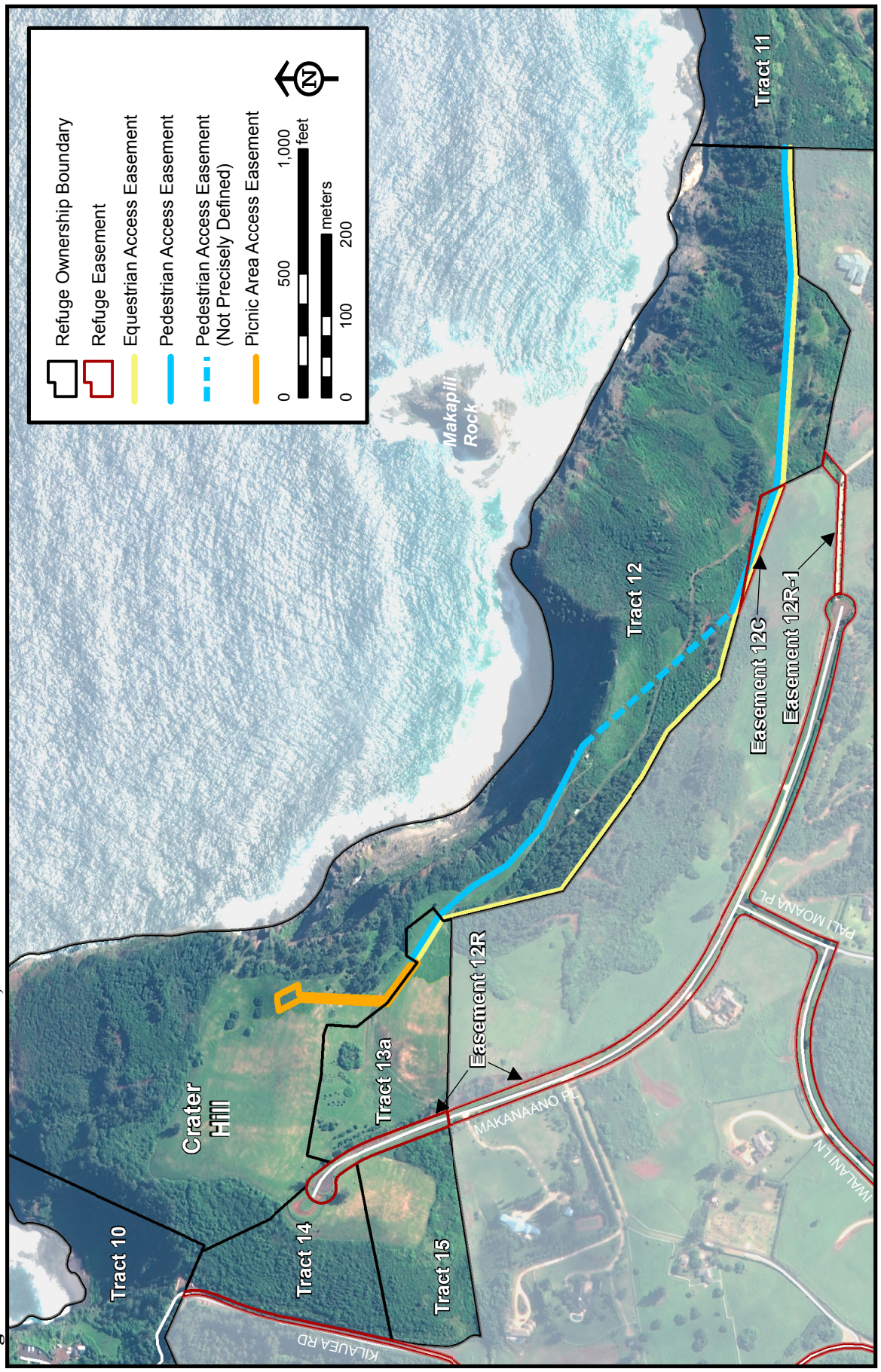

Figure K-1. Easements on Crater Hill, Kīlauea Point NWR.

Map Date: 11/25/2015 File: 16-006-3.mxd Data Source: USFWS, 2015
USFWS R1 Refuge Information Branch

The refuge boundary and land ownership information depicted on this map was compiled from 1:24000 source data. It reflects the current refuge land status according to documents and information available in the U.S. FWS Division of Realty. It may be incomplete and/or contain errors. (Land Status Maps 2003)

The back sides of maps are blank to improve readability.

Outside of the Scope of the CCP

82. Comment: It is unclear in the draft CCP/EA whether the Service manages Mokuʻaeʻae, Makapili, Kīlauea Falls Ranch, or the 5-acre Kauaʻi/Hawaiʻi Islands Land Trust adjacent to the Refuge.

Response: The Service does not manage these lands. The CCP only addresses lands that have been acquired in fee title, conservation easement, and management agreement as part of Kīlauea Point NWR. Both Mokuʻaeʻae and Makapili are under State jurisdiction and are not considered inholdings. Kīlauea Falls Ranch and the 5-acre Kauaʻi/Hawaiʻi Islands Land Trust land adjacent to the Refuge are in private ownership and considered inholdings.

83. Comment: Kalo is a key component of the biological integrity, diversity, and environmental health of the Hanalei Valley.

Response: As this CCP applies only to Kīlauea Point NWR, kalo farming at Hanalei NWR is considered outside of the scope of this CCP. A concurrent but separate CCP process is underway for Hanalei and Hulēʻia NWRs. The Kauaʻi NRW Complex will continue to engage with interested parties regarding kalo farming both within and outside the context of the Hanalei and Hulēʻia NWRs CCP process.

84. Comment: What are the Service's plans for Kilauea Point NWR if seabird breeding colonies on the islands and atolls of the Papahānaumokuākea Marine National Monument are threatened by sea level rise?

Response: As sea levels rise over the next century, protected areas on high islands, including the Refuge, will become increasingly important for seabirds that currently nest primarily on low islands and atolls of the Northwestern Hawaiian Islands (Arata et al. 2009, Young 2010). We plan to maintain, enhance, and restore habitats on the Refuge to provide a high-island refugium for seabird populations potentially displaced by climate change or other stressors. As habitat components are managed and threats are controlled, the Refuge could take on the role of passive or assisted restoration and enhancement of seabird populations. However, it is beyond the scope of this CCP to specifically address actions regarding seabird breeding areas and populations in the Northwestern Hawaiian Islands.

85. Comment: Nēnē are causing crop depredation, health hazards, and are a nuisance to neighboring off-Refuge lands. The Service should compensate for crop losses, set up management agreements with DLNR and private landowners, and provide technical assistance, including advice regarding programs with monetary support for fencing and other options, to private landowners who provide habitat to endangered birds. Nēnē recovery criteria should be on an island-by-island basis.

Response: The CCP acknowledges that nēnē will likely use both the Refuge and nearby off-Refuge lands for breeding, foraging, and roosting. However, it is outside of the scope of the CCP to evaluate mechanisms for addressing off-Refuge issues (e.g., via Safe Harbor Agreements, Habitat Conservation Plans) or for determining recovery criteria. There is an ongoing effort between the Service's Ecological Services office, DLNR DOFAW, and private landowners to facilitate the completion of an island-wide Habitat Conservation Plan (HCP) addressing the take of endangered nēnē on Kauaʻi. The HCP process will include the

release of National Environmental Policy Act/Hawai‘i Environmental Policy Act (NEPA/HEPA) compliance documents as well as stakeholder/public meetings.

Corrections and Editorial Comments

Corrections and clarifications for improving readability and accuracy were noted by the commenters. These factual and/or editorial changes were made in the final CCP.

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1 800/344 WILD

May 2016

Front cover: Aerial photo of Kīlauea Point Lighthouse and surrounding area.

Adult Nēnē.