



Mission Critical Administrative Aviation Plan and Environmental Assessment

February 2014



Plume at Halema'uma'u Crater, the summit of Kīlauea Volcano (Photo courtesy of Jesse Tunison)

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Executive Summary

Hawai‘i Volcanoes National Park (Hawai‘i Volcanoes) is a 333,000 acre park which includes two of the most active volcanoes in the world, unique native species and ecosystems, and the evidence of 700 years of human occupation. The park includes rift zones and the summits of Kīlauea and Mauna Loa volcanoes, a native flowering plant flora, insect and bird fauna, ninety percent of which are found native nowhere else in the world, and archeological remains of Hawaiian settlement and numerous historic structures. National Park Service (NPS), U.S. Geological Survey (USGS), and other cooperating agencies use helicopters approximately 250 hours per year over the park to respond to eruptive activity, monitor and study Kīlauea and Mauna Loa volcanoes, control invasive species, recover rare species, restore degraded ecosystems, protect cultural resources, and conduct wildland fire, search and rescue, and law enforcement operations.

Hawai‘i Volcanoes is preparing this *Mission Critical Administrative Aviation Plan and Environmental Assessment* (plan/EA) to provide a decision-making framework for managing the administrative use of aviation over the park. The purpose of this plan/EA is to provide for operational use of aviation by the park staff and cooperating agencies in a safe, timely, and efficient manner while avoiding or minimizing impacts to the park’s natural and cultural resources, soundscapes, wilderness, and visitor experience.

The scope of the EA is the administrative use of aviation by NPS staff and cooperating agencies. The scope does not include management of commercial air tours, general aviation, or military overflights. Commercial air tours over the park are being addressed through a separate planning process to develop an *Air Tour Management Plan and Environmental Impact Statement* (ATMP/EIS). The lead agency for the ATMP/EIS is the Federal Aviation Administration and Hawai‘i Volcanoes is a cooperator.

The *Mission Critical Administrative Aviation Plan and Environmental Assessment* outlines project alternatives, including a no action alternative and a preferred alternative. Under the no action alternative, park staff and cooperating agencies would continue to use aviation as needed. Informal practices developed to minimize impacts on park resources, visitors, and adjacent communities are implemented by some flight managers or pilots but have not been formalized and are not universally followed. Under the preferred alternative, aviation would be used for the health and safety of visitors, employees, and island residents and for park resource protection and restoration activities. Under this plan, formal best management practices (BMPs), area closures, and flight restrictions would be instituted to minimize impacts to park resources, soundscapes, wilderness, visitors, and adjoining landowners.

Resource types evaluated in detail in the plan/EA include park soundscapes, visitor use and experience, park operations, wildlife, and special status species. Minor to moderate impacts are anticipated in the no action alternative. Impacts are expected to be reduced by implementation of the preferred alternative because of prescribed implementation of BMPs, area closures, and other flight restrictions.

How to Comment On This Plan

Comments on this Mission Critical Administrative Aviation Plan / Environmental Assessment are welcome and will be accepted for 30 days after this document is published and distributed. Comments and responses may be submitted either via the Internet or in writing. Commenters are encouraged to use the Internet if at all possible. Please submit only one set of comments.

To be sure that you are on our mailing list, please include your name and address on any correspondence.

Internet comments can be submitted at <http://parkplanning.nps.gov/havo>.

Written comments may be sent to:

Superintendent
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Before including your address, phone number, e-mail address, or other personal identifying information with your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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ACRONYMS AND ABBREVIATIONS

AGL	Above ground level
AMP	Aviation Management Plan
ATMP	Air Tour Management Plan
BMP	Best Management Practice
CFR	Code of Federal Regulations
dBA	Decibels (A-weighted scale)
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
GMP	General Management Plan
Hawai‘i Volcanoes HVO	Hawai‘i Volcanoes National Park USGS Hawaiian Volcano Observatory
L ₅₀	Refers to the sound level exceeded for fifty percent of the day
Low-level	Refers to flights that are below 500’ above ground level (AGL)
MRDG	Minimum Requirement Decision Guide
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
PIERC	Pacific Island Ecosystem Research Center
P.L.	Public Law
U.S.C.	United States Code
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service

CHAPTER 1: PURPOSE AND NEED

Introduction

Hawai‘i Volcanoes National Park (Hawai‘i Volcanoes) located on the Island of Hawai‘i (figure 1), is a 333,000 acre park which includes two of the most active volcanoes in the world, Mauna Loa and Kīlauea (figure 2). Kīlauea has been continuously erupting since 1983. Volcanic activity presents hazards to park visitors, staff, and surrounding communities, and the rugged new volcanic terrain presents special hazards to park visitors and staff. Hawai‘i Volcanoes includes a wide diversity of ecosystems from shoreline to alpine and desert to rain forest. The highly endemic flora and fauna in those ecosystems are threatened by invasive species. Management of the park requires the use of aviation for monitoring of volcanic activity and for volcanic research, conducting search and rescue and law enforcement, controlling invasive species, restoring native species and ecosystems, and inventorying, monitoring, and preserving cultural resources.

Project Background

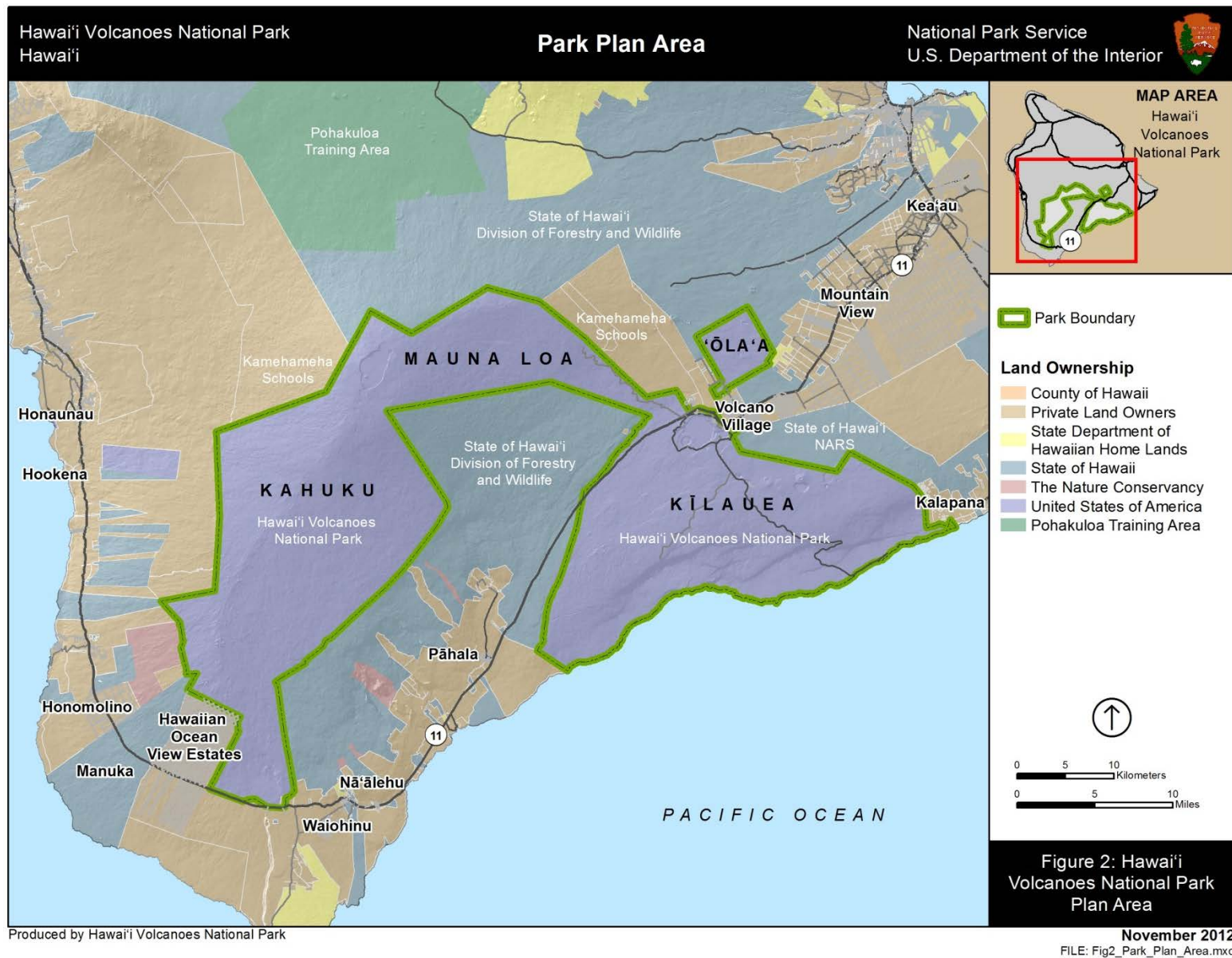
The administrative use of aviation is currently limited to helicopters, which are hired on a contract basis. Helicopters are used to transport passengers, supplies, and equipment for a wide range of tasks, as well as conducting aerial reconnaissance, search and rescue, wildfire suppression, eruptive response, and other management activities. Almost all aviation contract work is carried out by Type III helicopters, such as the Bell Hughes 500D or the A-Star. Approximately 250 flight hours per year are conducted in Hawai‘i Volcanoes by National Park Service (NPS) and the United States Geological Survey Hawaiian Volcano Observatory (HVO) staff, based on available data from 2004-2010. An additional 20 flight hours per year are estimated to originate and/or terminate in the park by county, state, and federal law enforcement and emergency service cooperating agencies.

Safety and operational guidance of park administrative helicopter flights are regulated by an internal document, the park’s *Aviation Management Plan* (NPS 2011a). The *Aviation Management Plan* is a procedural manual rather than a plan; therefore, it does not specifically address the environmental compliance of administrative aviation. Within the park, some best management practices (BMPs; Appendix 1) have been documented and others have been informally articulated and implemented in park helicopter operations of the last decade. This plan/Environmental Assessment (EA) will formalize all BMPs, including specific mitigation measures to reduce the impact of flights, preferred flight routes, and recommended minimum above ground level (AGL) for flights.



Produced by Hawai'i Volcanoes National Park

November 2012
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Purpose and Need

The purpose of the project is to develop a comprehensive management plan for administrative use of aviation. The plan will provide for operational use of aviation by the park staff and cooperating agencies in a safe, timely, and efficient manner to monitor and research volcanic activity, carry out search and rescue and law enforcement operations, and manage park ecosystems and cultural resources, while avoiding or minimizing impacts to park natural and cultural resources, soundscapes, and visitor experience. To do so, the plan will specify BMPs to be followed by administrative flights.

Scope of Environmental Assessment

This EA outlines project alternatives, including an action alternative and a no action alternative. It describes existing conditions in the project area, and analyzes impacts of each alternative on the human and natural environment. The EA was prepared pursuant to the *National Environmental Policy Act* (NEPA) of 1969 (42 United States Code [U.S.C.] 4341 et seq.), as amended in 1975 by Public Law (P.L.) 94-52 and 94-83. Additional guidance includes NPS Director's Order (Dir. Order) 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* which implements Section 102(2) of NEPA and the regulations established by the Council on Environmental Quality (40 CFR 1500-1508). The project must comply with requirements of NEPA as well as other legislation that governs land use, natural resource protection, and other policy issues within the park.

The scope of the EA is the administrative use of aviation by NPS staff and cooperating agencies. To date, helicopters have been used for all administrative aviation needs. However, the EA also applies to potential future use of fixed wing or other modes of aviation. The scope does not include management of commercial air tours, general aviation, or military overflights. Commercial air tours flying over the park are being addressed through a separate planning process to develop an *Air Tour Management Plan and Environmental Impact Statement* (ATMP/EIS). The lead agency for that plan/EIS is the Federal Aviation Administration and Hawai'i Volcanoes is a cooperator.

Related Laws, Legislation and Management Guidelines

National Park Service Organic Act

The NPS *Organic Act* of 1916 (16 U.S.C. I, 2-4) and the *General Authorities Act* (16 U.S.C. Ia-8) direct the NPS to conserve the scenery, natural and historic objects, and wildlife; and to provide for the enjoyment of those resources in such a manner to leave them unimpaired for future generations. The *Redwood Act* of 1978 (16 U.S.C. Ia-I) explicitly applies the *Organic Act* to all NPS units. It mandates that the authorization of management activities in parks "shall be construed and the protection, management, and administrations of these areas shall be conducted in light of the high public value and integrity of the national park system and shall not be exercised in derogation of the values and purposes for which these various areas have been established."

The 1916 enabling legislation establishing Hawai‘i National Park (later to become Hawai‘i Volcanoes National Park) (P.L. 95-635) directs the Secretary of Interior to:

make and publish such rules and regulations as he may deem necessary and proper for the care and management of the same. Such regulations shall provide for the preservation from injury of all timber, birds, mineral deposits, and natural curiosities or wonders within said park, and their retention in their natural condition as nearly as possible.

Purpose and Significance of Hawai‘i Volcanoes National Park

Hawai‘i Volcanoes was established in 1916 because of its accessible volcanic scenery and its value for research of geological processes. Park purpose and significance have been most recently articulated in the general management plan (GMP) process (NPS 2011b).

Park Purpose:

- Hawai‘i Volcanoes National Park protects, studies, and provides access to Kīlauea and Mauna Loa, two of the world’s most active volcanoes; preserves endemic Hawaiian ecosystems; and perpetuates the traditional Hawaiian culture connected to these landscapes.

Park Significance:

- Hawai‘i Volcanoes National Park preserves, protects, and interprets the largest and most continuously active volcanoes in the U.S., and provides the best physical evidence of island building processes that created the 2,000 mile long Hawaiian archipelago.
- Hawai‘i Volcanoes National Park’s active volcanoes serve as a living laboratory for scientific investigations that began over a century ago and continue to advance global understanding of volcanic processes.
- Hawai‘i Volcanoes National Park protects unique and diverse ecosystems that are the result of the active volcanic landscape, wide climate variation, and extreme isolation of the Hawai‘i Islands.
- Hawai‘i Volcanoes National Park encompasses the largest and most ecologically diverse wilderness in the Pacific Islands.
- Hawai‘i Volcanoes National Park interprets the traditions and embraces the spiritual significance of the Native Hawaiian culture.
- Hawai‘i Volcanoes National Park encompasses a vast array of cultural resources that documents over 600 years of human lifestyles and activities on an active volcanic landscape.
- Hawai‘i Volcanoes National Park, an internationally recognized destination, provides all visitors diverse opportunities to approach two of the most active volcanoes in the world

and to understand and appreciate the distinctive geology and natural and cultural adaptations to the land.

Management Policies 2006

NPS *Management Policies 2006* (NPS 2006) provide specific guidance for park managers in implementing current laws, executive orders, and regulations to manage historic and natural landscapes in the national park system. Management policies address many topics relevant to administrative use of helicopters including wilderness use and stewardship, management of natural resources and cultural resources, and protection of soundscapes.

Hawai'i Volcanoes National Park Plans

The *Hawai'i Volcanoes National Park Master Plan* (NPS 1975a), the *Proposed Wilderness Final Environmental Statement* (NPS 1975b), and the *Resource Management Plan* (NPS 1999) for Hawai'i Volcanoes addressed use of helicopters for controlling invasive species and restoring park ecosystems. The *Final Plan/Environmental Impact Statement for Protecting and Restoring Native Ecosystems by Managing Non-Native Ungulates* (2013) more specifically addresses use of helicopters to manage invasive ungulates in Hawai'i Volcanoes. A GMP is being prepared and is expected to be completed in 2015. The *Fire Management Plan* (NPS 2007) requires suppression of most wildland fires, even from natural ignition sources, except in isolated instances where there is low probability of fire spread. This plan also encourages the use of prescribed fires in research and plant community restoration for coastal grasslands and dry 'ōhi'a woodlands. These policies necessitate intensive use of helicopters in fire suppression, prescribed burning, and monitoring. The *Aviation Management Plan* (AMP; NPS 2011a) is a procedural manual and addresses safety and operational procedures. The AMP outlines the procedures and guidelines for aviation operation once the required environmental compliance has been completed. Currently the park completes the environmental compliance on a project basis, rather than in a comprehensive document, as this park administrative aviation plan/EA will do.

Director's Orders

The NPS has prepared detailed written guidance for day-to-day decision making in its Director's Orders. Guidance from the most relevant Director's Orders are briefly summarized below and will be described in more detail in Chapter 3 within each impact topic.

Director's Order 41: Wilderness Stewardship

Outlines operational policies for managing wilderness in national parks. Lands that are determined to be eligible for further wilderness study will also be managed as wilderness, as per the wilderness provisions in *Management Policies 2006* (NPS 2006), until a final determination is made that the lands will become designated wilderness or released. This affects 121,015 acres in the Kahuku area of the park that are deemed eligible for a wilderness study. The park also contains 130,950 acres of designated wilderness.

Director's Order 47: Soundscape Preservation and Noise Management

Articulates operational policies for protecting, maintaining, and restoring the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. It states that

natural soundscapes are inherent elements of “the scenery and the natural and historic objects and the wild life” afforded protection by the NPS *Organic Act*. Natural soundscapes are vital to the natural functioning of many parks and park ecosystems. Intrusive sounds are of concern to the NPS because they may impede the Service's ability to accomplish its mission. Surveys in national parks indicate that intrusive sounds are of concern to park visitors who visit the parks not only for the natural scenery but also the natural sounds. Dir. Order 47: *Soundscape Preservation and Noise Management* requires park superintendents to address preservation of natural soundscapes in the planning process including management plans, e.g., for administrative flights. Parks are required to quantify and characterize the baseline natural ambient sound environment, identify inappropriate and intrusive noise sources, and prevent or mitigate those noise impacts.

NPS Guidelines on Impairment of National Park Resources

In addition to determining the environmental consequences of implementing the agency preferred and other alternatives, NPS *Management Policies 2006* 1.4 (NPS 2006) requires a determination that no implementation of any actions would impair a park’s resources and values. The fundamental purpose of the national park system, established by the *NPS Organic Act* and reaffirmed by the *NPS General Authorities Act* is conservation of park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on cultural and natural resources and park values. However, these laws also afford park managers discretion to allow impacts to occur when this is necessary and appropriate to fulfill the express purposes of the park. That discretion is constrained by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise. The prohibited impairment is any impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values (NPS 2006). Whether an impact has such a result depends on the particular resources that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question combined with other impacts.

As further noted in NPS *Management Policies 2006* section 1.4.7 (NPS 2006), in addition to the above potential environmental consequences, the NPS manager also takes into consideration consultations required under section 106 of the *National Historic Preservation Act* (NHPA), relevant scientific information, pertinent information from subject matter experts, and results of related civic engagement and public involvement activities. The superintendent’s determination of nonimpairment for the alternative selected following consideration of all public review comments will be provided as an attachment to the approved decision document (anticipated to be a “Finding of No Significant Impact”).

Issues and Impact Topics

Scoping

Scoping is designed to be an open process to gather early input in the NEPA process, particularly to identify environmental issues and alternatives in the EA. An internal scoping meeting of park

and cooperator staff took place on February 8, 2011 to identify purpose and need, resource issues, and current as well as proposed BMPs and mitigation for administrative helicopter use over the park. The interdisciplinary team was comprised of Hawai'i Volcanoes staff members from park management, planning, environmental protection, resources management, protection, interpretation, and maintenance, as well as representatives from HVO, the park's chief cooperator conducting administrative flights in the park.

Work on the plan began in spring 2011. After public scoping was conducted in February/March 2012, the NPS planning team began developing alternatives and writing the plan and its accompanying EA. Several key elements have shaped the development of the *Mission Critical Administrative Aviation Plan*, many of which have been identified earlier in this chapter (e.g., laws and policy, park purpose and significant statements, comments from the public, consultations with the park's Kupuna group). Information on the details of the consultation and coordination that has occurred during this planning process is provided in "Chapter 4: Consultation and Coordination."

Issues and Impact Topics Identified for Further Analysis

Issues are problems, possible environmental effects, or opportunities that might occur if a plausible range of potential action alternatives or a no-action alternative were implemented. The purpose of identifying impact issues in the scoping stage of the NEPA process is to help frame reasonable preliminary alternative actions. The issues identified below are analyzed in detail in the "Affected Environment and Environmental Consequences" chapters of this plan/EA.

Soundscapes

Natural soundscapes are the audio equivalent of the natural scenic qualities of a national park. Natural sounds making up the soundscape of Hawai'i Volcanoes include surf at the shoreline, wind blowing over land forms and vegetation, lava fountaining and explosive eruptions of the volcano, methane explosions associated with lava flows, rain falling on tree and tree fern canopies, birds vocalizing, and crickets in the rain forest. Mechanical noises of helicopters can mask these kinds of natural sound and possibly affect organisms and natural processes dependent on these sounds, as well as affect visitor experience and expectations of natural sound. Soundscapes related to wilderness are discussed under the "Wilderness" topic.

Visitor Use and Experience

Administrative flights may disturb visitors in designated wilderness, park backcountry, front country trails, or even park developed areas with expectations of experiencing natural sounds or solitude. Visitor health and safety could be compromised if helicopters cannot be used for search and rescue, law enforcement purposes, and eruption monitoring. Visitors may also be affected by remote facility conditions or park scenery, landscapes, or ecosystems not managed for control of invasive species or restoration of native ecosystems without the assistance of helicopters. Monitoring of historic sites and ruins, and documentation of new sites enhances the knowledge of past human use of the land. Visitor use and experience related to wilderness are discussed under the "Wilderness" topic.

Park Management and Operations

Helicopters are used administratively for monitoring eruptive activity and geological hazards, and for research, removal of invasive species and restoration of native ecosystems, recovery of rare special status species, suppressing wildland fires, and for search and rescue, law enforcement, and maintenance of backcountry facilities and the park radio system, monitoring and assessing the condition of cultural resource sites, and conducting inventory survey of cultural resource sites, particularly in remote locations. Park operations may be affected by changes in policy on administrative flights.

Wilderness

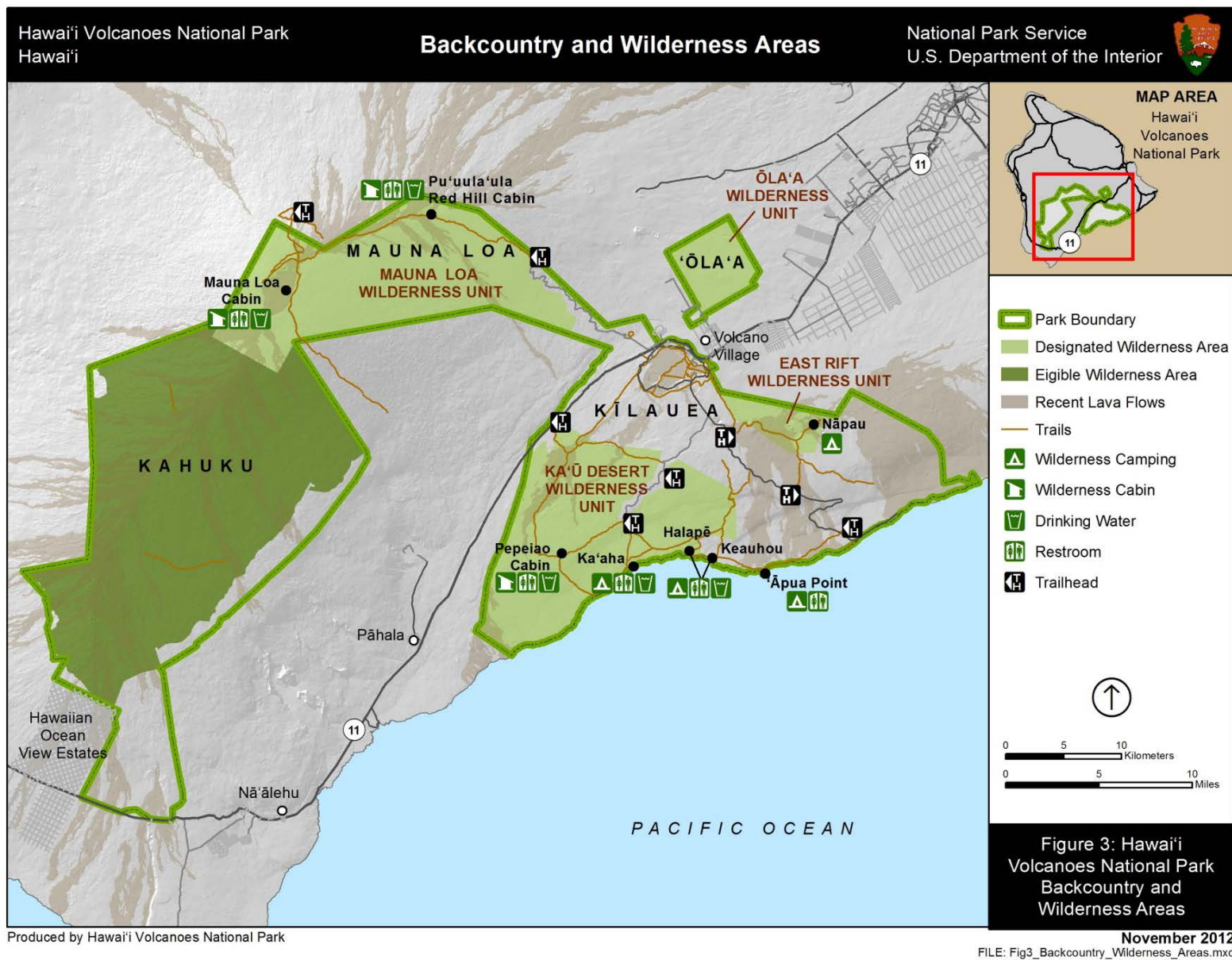
In Hawai‘i Volcanoes, a total of four disjunct units, comprising 130,950 acres, are designated wilderness. An additional 121,015 acres in the 2003 Kahuku acquisition have been determined to be eligible to be studied for future wilderness designation (figure 3). Aircraft are a mechanized visual and auditory intrusion on wilderness and wilderness users and thus impact wilderness values. Helicopters are used as tools by park resource managers to maintain and restore natural conditions in wilderness by removing invasive species, non-historic administrative shelters, and rubbish left by campers, and by restoring native species and ecosystems. Aviation support is also used for conducting inventory survey of cultural resource sites, as well as monitoring and assessing the condition of cultural resource sites. Currently, minimum requirement decision guides (MRDGs) are prepared on a project or programmatic basis for utilizing helicopters in wilderness. An example of a programmatic MRDG was completed for the Restoring Native Ecosystems by Managing Non-native Ungulates Plan/EIS (NPS 2013).

Wildlife

Terrestrial wildlife in Hawai‘i, with its paucity of native mammals, include the native bat, monk seal, birds, turtles, and arthropods. Forest birds may be particularly impacted because of their utilization of the forest canopy closer to flight paths of helicopters. Although no systematic studies have been conducted on the effects of aviation on Hawaiian birds, ornithologists in Hawai‘i report observing birds stopping normal activities or fleeing when disturbed by overflights.

Special Status Species

Observational evidence indicates temporary disturbance of the Hawaiian goose (nēnē) by low level helicopter flights. There are no other published accounts of the responses of threatened and endangered bird species in Hawai‘i. Disturbance of some threatened and endangered bird species by low-level aviation has been documented in the continental US. Threatened and endangered forest birds in Hawai‘i occur in small populations, restricted ranges, and remote locations.



Impact Topics Considered but Dismissed

The following impact topics were not analyzed in this EA and are dismissed from further evaluation for one or more of the following reasons:

- They do not exist in the analysis area, or
- They would not be affected by the proposal or alternatives, or the likely impacts are not reasonably expected, or
- Through the application of mitigation measures, there would be minor or less (i.e., no measureable) effects from the proposal or other alternatives, and there is little or no controversy on the subject or reasons to otherwise include the topic.

Geology and Soils

According to the *NPS Management Policies 2006* (NPS 2006, 4.8.2), the NPS will preserve and protect geologic resources and features from adverse effects of human activity, while allowing natural processes to continue. These policies state that the NPS will strive to understand and preserve the soil resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.

Although helicopters may land temporarily for mission critical work and temporary helispots may be improved for emergency situations by removing vegetation under the direction of a resource advisor, there is little or no ground disturbance, resulting in negligible impacts on geology and soils. In addition, temporary helispots are restored after use. Impacts from dust, which was identified as a potential issue of concern in a previous letter received by the park from the United States Fish and Wildlife Service (USFWS) with regards to commercial air tours (USFWS 2011a), is expected to be low. Sparsely vegetated areas are primarily pāhoehoe and ‘a‘ā lava flows that contribute little to dust. Large areas of exposed soil are uncommon and, along with cinder areas, are avoided for landing, staging, and low-level flights due to safety concerns with dust.

The proposed action would not disturb any geologic features, including lava tube caves, tree molds, spatter ramparts, and cones, or any soils in the park resulting in negligible (or less) impact to geology and soils. Further, such impacts would not result in any unacceptable impacts; the proposed actions are consistent with 1.4.7.1 of *NPS Management Policies 2006* (NPS 2006). Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Vegetation

NPS policy for vegetation is to maintain native plants by preserving and restoring the natural abundance, diversities, dynamics, distributions, and habitats of native plant populations and the communities and ecosystems in which they occur. Further, the NPS will minimize human impacts on native plant populations, communities, and the ecosystems and processes which sustain them (NPS 2006, 4.4.2).

Temporary helicopter landings, particularly if clearing of plants is carried out to establish safe helispots for emergency situations, may potentially impact park vegetation. However, the majority of the temporary helispots used in the park have been selected because they are devoid of vegetation. In locations where an area needs to be cleared, resource advisors check the site for sensitive, rare, threatened and endangered species and the site is not used if any are found. The proposal would have negligible to minor impacts on vegetation due to the occasional need to clear vegetation, but the clearing is completed in consultation with resource advisors to ensure minimal impact to vegetation. Helicopter crashes could increase wildland fire risk and impact vegetation. However, based on past occurrence, the likelihood of crashes from administrative use of helicopters is very low. There is no history of a wildfire generated from an administrative helicopter crash in the park. NPS staff adhere to the park's Aviation Management Plan that provides safety standards and response procedures in the event of an aviation emergency, and a Fire Management Plan that specifically minimizes the impact of wildfires on park resources.

Lightscaapes

In accordance with NPS *Management Policies 2006* (NPS 2006, 4.10), the NPS strives to preserve natural ambient lightscaapes, which are natural resources and values that exist in the absence of human caused light. The proposed action would not change or add to existing lighting in the park. Flying between dusk and dawn would be avoided. The effects of the proposed action on the lightscape would be less than negligible. Such impacts would not result in any unacceptable impacts; the proposed action is consistent with 1.4.7.1 of *Management Policies 2006* (NPS 2006). Because these effects are less than negligible and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Air Quality

The *Clean Air Act* of 1963 (42 U.S.C. 7401 et seq.) establishes specific programs that provide special protection for air resources and air quality related values associated with NPS units. Section 118 of the *Clean Air Act* requires a park unit to meet all federal, state, and local air pollution standards.

Hawai'i Volcanoes is a designated Class I Airshed. Although industrial sources of air pollution are negligible, emissions of sulfur dioxide and other gases from Kīlauea interact chemically with sunlight, oxygen, water, and dust to form acidic volcanic smog or "vog."

Because the air quality would not be affected by the proposed action, there would be no unacceptable impacts and the proposal is consistent with 1.4.7.1 of *Management Policies 2006* (NPS 2006). Because there would be negligible or less effects on air quality and the proposal would not result in unacceptable impacts, this topic is dismissed from further analysis in this document.

Water Resources, Wetlands, and Floodplains

NPS policies require protection of water quality consistent with the *Clean Water Act*. NPS Dir. Order 77-1: *Wetland Protection* and Executive Order (Exec. Order) 11990: *Protection of Wetlands* provide guidelines for the protection of wetlands within NPS units. It states a policy of no net loss of wetlands and provides a process for evaluating actions that have the potential to have adverse effects on wetlands. Exec. Order 11988: *Floodplain Management* requires an

examination of impacts to floodplains and potential risk involved in placing facilities within floodplains. *Management Policies 2006* (NPS 2006); Dir. Order 2: *Planning Guidelines*, and Dir. Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* provide guidelines for proposed actions in floodplains.

Hawai'i Volcanoes is located on the porous volcanic surfaces of two young volcanoes, Mauna Loa and Kīlauea. The only natural surface waters are a short, intermittent stream segment in Kahuku and brackish anchialine pools along the park coast. There are three constructed reservoirs in the pastures at Kahuku and two at the rainshed area near park headquarters. Although a formal wetland survey has not been conducted, there may be some small temporary wetlands in rain forest areas. These probably total less than one acre. There are no floodplains in Hawai'i Volcanoes.

The proposed actions in this plan would result in less than negligible effects to water resources, wetlands, and floodplains. Further, such impacts would not result in any unacceptable impacts; the proposed action is consistent with 1.4.7.1 of *Management Policies 2006* (NPS 2006). For these reasons, these topics are dismissed from further analysis in this document.

Wild and Scenic Rivers

The purpose of designating a river as "Wild and Scenic" is to protect its free flow, water quality, and "outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values" (16 U.S.C. 1271). These rivers and others eligible for this designation must be managed to avoid impacts on the values for which they were designated (NPS 2006, 2.3.1.9). There are no designated wild and scenic rivers or rivers eligible for this designation in the analysis area. Therefore this topic is dismissed from further consideration.

Prime and Unique Farmlands

The *Farmland Protection Policy Act* of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of Agriculture Natural Resources Conservation Service, and is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts.

A 1973 soil survey conducted for the Island of Hawai'i, which included Hawai'i Volcanoes National Park, identified some soils in Hawai'i Volcanoes that could be classified as prime or unique farmland soils. They are as follows (USDA-NRCS 2009c): Alapai hydrous silty clay loam consociation; Mauna'iu-'Akelelu complex; Ha'a-Ke'amoku complex; Ki medial loam consociation; and Manu medial silt loam consociation. However, areas containing these soils are not currently in active production, nor does the potential exist for them to be converted or developed, thereby precluding their potential use as productive areas in the future. As a result, prime and unique farmlands are not carried forward for further analysis.

Archeological Resources

NHPA, as amended in 1992 (16 U.S.C. 470 et seq.), NEPA, NPS *Organic Act, Management Policies 2006* (NPS 2006), Dir. Order 12: *Conservation Planning, Environmental Impact*

Analysis, and Decision-making, and Dir. Order 28: *Cultural Resources Management Guidelines* require consideration of impacts on cultural resources, including archeological resources. The process and documentation required for preparation of this EA will be used to comply with Section 106 of the NHPA.

Prehistoric archeological features and sites are evident in most areas of the park not covered by recent lava flows. Both prehistoric and historic sites have been documented. Prehistoric features and sites at Hawai'i Volcanoes include petroglyphs, trails, fossil footprints, burials, caves with cultural deposits, and stone structures such as agricultural mounds, rock shelters, and house platforms. Historic features include rock walls, roads, trails, and trash disposal sites.

The actions described in this EA would avoid archeological resources. For example, landing of helicopters would avoid stacked rock features and the rotor downwash would not be strong enough to damage or disturb features. Therefore the actions would have no adverse effect on archeological resources, resulting in no unacceptable impacts; the proposed actions are consistent with 1.4.7.1 of *Management Policies 2006* (NPS 2006). Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Historic Structures

The NHPA, as amended in 1992 (16 U.S.C. 470 et seq.), NEPA, NPS *Organic Act*, *Management Policies 2006* (NPS 2006), Dir. Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*, and Dir. Order 28: *Cultural Resource Management* requires consideration of impacts on cultural resources, including historic structures, either listed in or eligible to be listed in the National Register of Historic Places. The process and documentation required for preparation of this EA will be used to comply with Section 106 of the NHPA, in accordance with section 800.8(3)(c) of the *Advisory Council on Historic Preservation* regulations (36 C.F.R. Part 800).

Historic structures are constructed works that are architecturally designed or engineered to serve a human activity. These include many buildings in the Kīlauea summit area, some backcountry cabins and shelters, and some roads and trails. The actions described in this EA would have no adverse effect on historic structures, resulting in no unacceptable impacts; the proposed actions are consistent with 1.4.7.1 of *Management Policies 2006* (NPS 2006). Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Ethnographic Resources

The NPS Dir. Order 28: *Cultural Resource Management* defines ethnographic resources as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, ceremonial, or other significance in the cultural system of a group traditionally associated with it. The decision to call resources “ethnographic” depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways. According to Dir. Order 28: *Cultural Resource Management* and Exec. Order 13007: *Indian Sacred Sites*, the NPS should try to preserve and protect ethnographic resources.

Flights disturbing cultural practitioners, particularly in the Kīlauea summit area and particularly at dawn and dusk were identified as a resource issue by NPS cultural resource staff and the park Native Hawaiian Kupuna advisory group. BMPs in the proposed plan restrict flying in areas and places when being used by cultural practitioners, as much as possible, due to the proposed outreach/notification that would occur for planned flights.

The Kalapana Extension area was added to the park in 1938. The legislation authorizing the addition of this land also included provisions for Native Hawaiian fishing access and short-term leases for homesites for Native Hawaiians from the Kalapana community. Currently there are no Native Hawaiian homesites in the Kalapana Extension. The area is used by Native Hawaiians from the Kalapana community for fishing access. The BMPs include avoidance and minimization of impacts that will apply to this area and its special uses. In addition, the park will continue to consult with the Kalapana community about issues in the Kalapana Extension related to the community, including potential impacts from administrative aviation.

The actions described in this EA would have no adverse effect on ethnographic resources, resulting in no unacceptable impacts; the proposed actions are consistent with 1.4.7.1 of *Management Policies 2006* (NPS 2006). Because these effects are negligible or less in degree, would not result in any adverse unacceptable impacts, and impacts on cultural practitioners would be avoided to the extent practicable, this topic is dismissed from further analysis in this document.

Cultural Landscapes

According to Dir. Order 28: *Cultural Resource Management*, a cultural landscape is a reflection of human adaptation and use of natural resources, and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. *Management Policies 2006* (NPS 2006) section 5.3.5.2 states, “cultural landscapes will preserve significant physical attributes, biotic systems, and uses when those uses contribute to historical significance.” The three designated cultural landscapes of Hawai‘i Volcanoes include ‘Āinahou Ranch and Gardens, Crater Rim Historic District, and the Kīlauea Historic District.

The actions described in this EA would have no adverse effect on cultural landscapes, resulting in no unacceptable impacts; the proposed actions are consistent with 1.4.7.1 of *Management Policies 2006* (NPS 2006). Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Indian Trust Resources

Secretarial Order 3175: *Departmental Responsibilities for Indian Trust Resources*, requires that any anticipated impacts to Indian trust resources from a proposed project or action by the Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights. It represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.

There are no Indian trust resources in Hawai'i Volcanoes. The lands comprising the park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. For these reasons, this topic is dismissed from further analysis in this document.

Environmental Justice

Exec. Order 12898: *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities.

The proposed actions in this plan would not disproportionately affect any group because of race or income, and would not have disproportionate health or environmental effect on minorities or low-income populations or communities as defined in the *Final Guidance for Incorporating Environmental Justice Concerns* in EPA's *NEPA Compliance Analysis*. Because the actions would not have any disproportionate effects and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Socioeconomics

Council on Environmental Quality regulations for implementing NEPA, 40 C.F.R. 1500, direct economic analyses of federal actions that will affect local or regional economies. The policies and rationale associated with the retention of socioeconomic impacts for evaluation as an impact topic are found in 1.4.7.1 of *Management Policies 2006* (NPS 2006) pertaining to gateway communities. The proposed action would have negligible effects on gateway communities, land use, local business or other agencies. The impacts to gateway communities/adjoining landowners would be minimized through the implementation of the BMPs. Implementation of the actions proposed in this plan would not increase or decrease the local or regional workforce or revenues for local businesses or governments.

The proposed actions would not result in any unacceptable impacts; the proposed actions are consistent with NPS *Management Policies 2006* (NPS 2006). Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Climate Change and Greenhouse Gas Emissions

Recent reports by the U.S. Climate Change Science Program, the National Academy of Sciences, and the United Nations Intergovernmental Panel on Climate Change provide evidence that climate change is occurring and could accelerate in the coming decades. While climate change is a global phenomenon, it manifests differently depending on regional and local factors. Increasing average temperatures have been documented for Hawai'i, particularly at higher elevations. Climate models for Hawai'i predict increasing severity and frequency of *El Niño* drought events and changes in the mean elevation level of the inversion layer. However, predicting the specific effects of global climate change at a regional level is in a preliminary stage.

There is strong evidence linking global climate change to human activities, especially greenhouse gas emissions associated with the burning of fossil fuels (IPCC 2007). The use of administratively necessary aviation does involve fossil fuel consumption. However, greenhouse gas emissions associated with the plan would be negligible in comparison to park-related, local, and regional greenhouse gas emissions. Furthermore, the implementation of the preferred alternative could result in beneficial impacts to local greenhouse gas levels because the restoration of native plant species would act as a “sink” for greenhouse gases. Therefore, the issue of the contribution of administrative aviation activities to climate change through greenhouse gas emissions was dismissed from further analysis.

CHAPTER 2: ALTERNATIVES

Introduction

NEPA requires federal agencies to conduct a careful, complete and analytical study of the impacts of proposals that have the potential to affect the environment and consider alternatives to that proposal, well before any decisions are made. Hawai‘i Volcanoes developed the following alternatives based on key environmental issues, park purpose and significance, federal legislation, and NPS Management Policies and Director’s Orders. An interdisciplinary team of park managers, resource specialists, and Hawai‘i Volcanoes aviation specialists, with public input from scoping, formulated the alternatives while concurrently formalizing BMPs, mitigation measures, air space closures, and other flight restrictions to reduce the impacts of administrative aviation.

A no action alternative evaluates the existing use of aviation for administrative purposes. An action alternative is also proposed. Other alternatives, considered but dismissed as impractical, unfeasible, or inconsistent with the objectives of the project, are characterized at the end of this chapter.

Administrative Use of Aviation at Hawai‘i Volcanoes

Based on data from 2004-2010, an average total of 250 hours of administrative flights per year were flown by NPS, HVO, and other park cooperating agencies. Flights over Hawai‘i Volcanoes airspace account for most of these hours; however, flights conducted by NPS and other cooperating agencies may originate or terminate in the park but may also include flight paths over adjoining areas.

Response to the volcanic activity of the on-going eruption of Kīlauea at both the summit and along Kīlauea’s East Rift, both inside and outside the park, accounted for nearly half of HVO’s annual average of 94 flight hours. The eruption on the East Rift of Kīlauea has been on-going since 1983; the summit eruption has been continuous since 2008. About one-third of HVO’s flight hours are allocated to deploying or maintaining instruments to monitor earthquakes and deformation or to conduct global positioning system (GPS) surveys or research. The research and monitoring of Kīlauea and Mauna Loa volcanoes, supported by aviation, is conducted for the health and safety of the Hawai‘i Island community and residents, as well as the health and safety of park visitors and staff.

Invasive species control, ecosystem restoration, and rare species recovery by NPS account for approximately 100 hours of flight time per year. Controlling invasive species, restoring native ecosystems, and recovering rare species requires the use of helicopter support in building and repairing nonnative ungulate-proof fences, locating and controlling nonnative ungulates and invasive plants, and supporting staff and volunteers in recovering endangered species.

Hawai‘i Volcanoes has extensive backcountry with over 125 miles of hiking trails and six historic backcountry shelters that include catchment systems for drinking water. Approximately

50 hours per year, on average, were flown by park staff for search and rescue, maintenance of backcountry facilities and trails, inventory, monitoring, and preservation of cultural resources. Approximately two-thirds were in emergency response to search and rescue, and suppression or monitoring of wildland fire.

Cooperating agencies besides HVO are responsible for an estimated 20 hours per year of flight time over the park, in addition to the 250 hours flown by the NPS and HVO. The principal cooperating agencies are Hawai'i County Fire Department for search and rescue missions or wildland fire missions and Hawai'i County Police Department, U.S. Drug Enforcement Agency, and Hawai'i Department of Land and Natural Resources on marijuana surveillance and eradication. These missions are carried out for the most part in adjoining lands but the flights originate, end, or refuel at the park helibase near headquarters.

Volcano monitoring

Helicopters are used to maintain long-term fixed volcano monitoring stations, some of which are located in wilderness. "Campaign" GPS stations are temporary setups of GPS instruments for measuring the contraction, extension, or movement of the volcanoes to complement the fixed stations. The "campaign" GPS stations require two brief landings per year, a few days apart to install and remove a GPS instrument. The flights to the various "campaign" GPS stations must be completed in a four week period and are thus clustered in time. The telemetered seismometers, GPS receivers, tilt meters, cameras, and gas sensors, on average, require one annual maintenance visit involving typically a single landing. Many of the volcanic monitoring instruments are located in extremely remote and/or hazardous areas not accessible by roads.

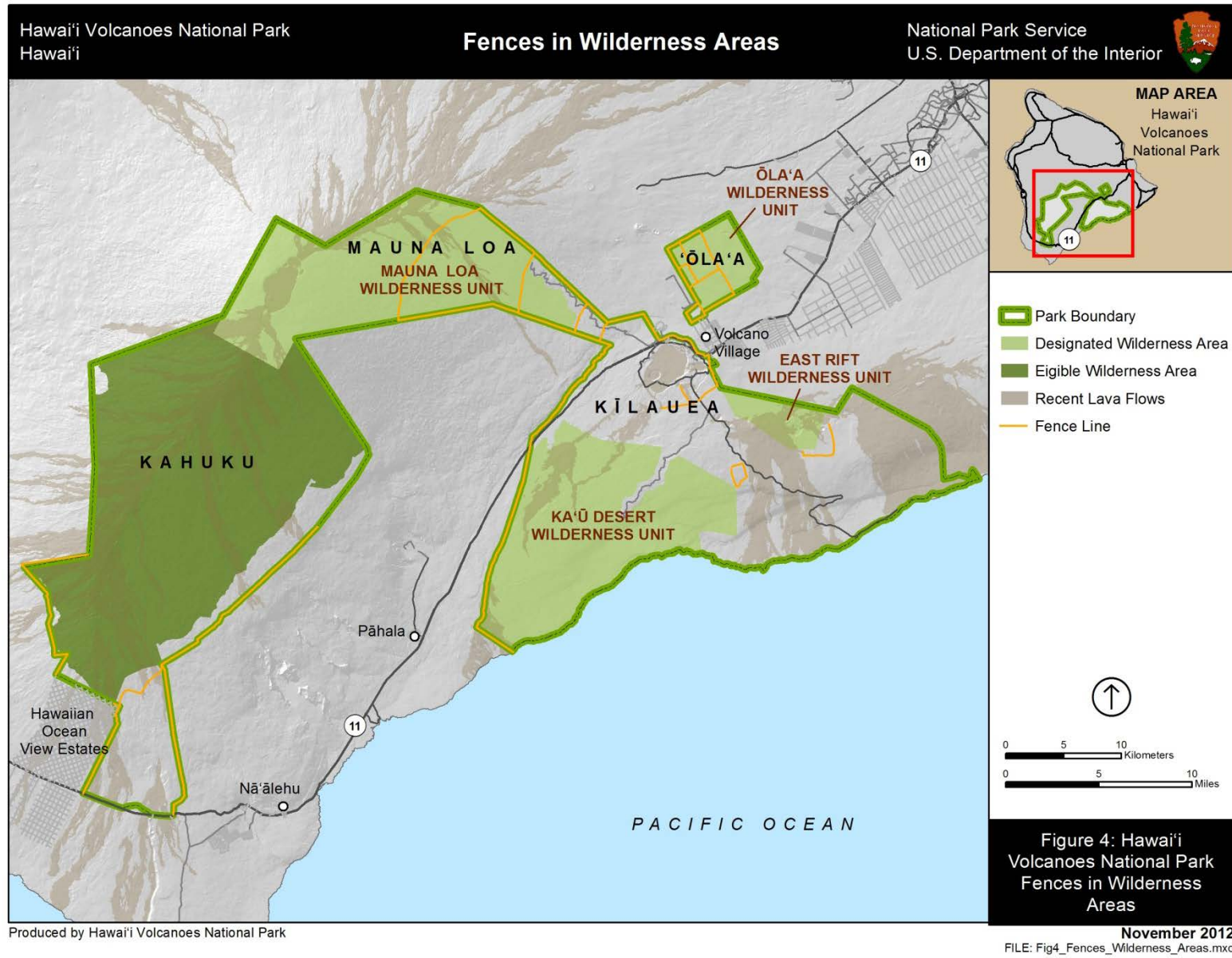
Communications Equipment

On average, one flight per year over the Mauna Loa Wilderness Unit, including a landing in wilderness, is required to maintain the park's radio repeater on Mauna Loa at 12,500 foot elevation. An average of one flight and landing per year is also necessary to maintain the fire monitoring webcam at Pu'u Keokeo in the Kahuku Unit, in the area considered eligible for further wilderness study. HVO webcams typically require at least one flight and landing per year but cameras need to be moved as eruptive activity changes, requiring more flights.

Invasive Ungulate Control

Fences are critical for protecting and restoring native ecosystems, which is a critical part of the natural character of wilderness. There are currently 140 miles of ungulate exclusionary fence. This includes 52 miles of fence located inside or along the boundaries of the four designated wilderness units (figure 4), plus five miles on the boundary of eligible wilderness in Kahuku, with additional boundary fencing planned. These fences require periodic repair and replacement.

Helicopters are used to transport fencing material and camp supplies for fence construction, repair, and replacement, involving low level flights, sling loads, and landings. Work is project-based work, with use of helicopters clustered over several hours in a day. Most fences last for 15-35 years so replacement involving intensive sling loading is highly infrequent. Staging areas



outside wilderness are typically selected for efficiency of the operation so that flights are relatively short but may occur over wilderness. The frequency of flights supporting fence construction decrease greatly after initial construction until fence replacement two or three decades later in most cases. Fence inspection is conducted on foot and repairs may require minimal and highly infrequent aviation support.

Helicopters are also used to supplement ground control of invasive ungulates. There is an average of one to two hours of flight time per year required to locate and aerially shoot invasive ungulates penetrating exclusionary fences. Flights are conducted during the early morning to increase effectiveness of searches. Ingress into fenced units typically occurs with feral goats into the Ka'ū Unit but occasionally also with mouflon sheep entering the fenced Mauna Loa Unit.

Helicopters are currently used quarterly to supplement ground control of mouflon sheep in the Kahuku unit. Flights typically last less than two hours and are conducted during the early morning to increase effectiveness of searches. A population census has been conducted four times in the last eight years to count animals, assess control effectiveness, and locate animal concentrations. Census work involves very low level flying on a systematic grid pattern. The 2011 census involved eight hours of flying, approximately half of which was in or near what is now eligible wilderness in Kahuku.

Invasive Plant Control and Plant Community Restoration

Over ninety percent of the native flowering plants, insects, and forest birds in Hawai'i are endemic to the islands. The unique native species and ecosystems of Hawai'i Volcanoes are threatened by the spread of invasive species which require intensive management. For example, introduced ungulates (including feral cattle, goats, sheep, and pigs, as well as mouflon sheep and axis deer) severely browse and deplete native vegetation and encourage the spread of invasive plant species. Invasive plants displace native vegetation, alter plant communities, and degrade native ecosystems. As a result, many endemic species have become very rare in the park. Two mammal, nine bird, two reptile, three invertebrate, and 24 plant species in Hawai'i Volcanoes are listed as endangered or threatened by the USFWS.

Surveys for localized populations of invasive plants (e.g. fountain grass, faya tree) are conducted semi-annually with low-level flying in a systematic fashion over the Ka'ū Unit and intermittently (four times between 2004 and 2011) over portions of the eligible wilderness in Kahuku. Landings are made to drop off control crews to work on detected weeds, or specific invasive plants are treated in inaccessible sites by hovering and applying herbicide focused on the plant with a remotely controlled ball sprayer. The twice annual invasive plant surveys require approximately a yearly total of 20 hours in the Ka'ū Unit.

On occasion helicopters are used to transport nursery grown native plants and tools to restore and revegetate burned sites in wilderness. For example, in 2005, several thousand plants were flown to the Pepeiao Burn site in the Ka'ū Unit.

Threatened, Endangered, and Rare Species Recovery

Flights are conducted in wilderness to support honu‘ea (hawksbill turtle) and ‘ua‘u (Hawaiian petrel) recovery efforts by supplying camps for volunteer staff and field technicians. Typically, a helicopter is used at the beginning and end of the nesting season to supply turtle recovery camps at Halapē and ‘Āpua Point, with less than five minutes of flight over wilderness (to Halapē) and a landing for internal loads or hovering for external loads. A resupply of drinking water is typically required mid-season. Annually, six to ten helicopter trips to 9,000 feet on the Mauna Loa Strip to supply camps and transport personnel for ‘ua‘u recovery may involve five to 10 minutes of flight time over wilderness, depending on the staging area, plus landing for internal loads or hovering for external loads. Very occasionally flights are conducted to transport nursery grown rare plants to restoration sites in wilderness, e.g. plants were flown into a planting site along the Nāulu Trail in the East Rift Unit in 2011, resulting in five minutes of flying to drop an external load in wilderness.

Cultural Resource Preservation

Documentation and inventory of archeological features in wilderness takes place largely in the coastal areas of the Ka‘ū Unit, or occasionally in some upland areas such as the southwest rift zone of Mauna Loa in Kahuku. Often these missions are integrated with natural resource management and facilities maintenance projects and involve little or no extra flying.

Trail Maintenance

Helicopters are used to assist park trail crews in clearing trails and maintaining backcountry trails, cabins and shelters. In some cases, trail crews will improve tent pad sites and remove invasive plants at backcountry camps. Helicopters transport tools, supplies, and occasionally crews to work sites. A substantial majority of the average of 10 hours per year of flying is carried out over wilderness because much of the trail system and related facilities to be maintained are located there. If the park livestock program is not available, then the average per year could increase to 20 hours, depending on project work in a given year.

Stock Use for Trails Maintenance and Resources Management

Stock use is not viewed by park management as a viable alternative to aviation support because of recent loss of aging animals, high maintenance efforts for stock, and lack of trained stock handlers. However, the stock program may be revitalized and could play a larger role in protecting and managing wilderness resources. Stock animals can be used on trails for many areas of the park, except at the higher elevations and in East Rift rain forest. In most off-trail areas they are not a feasible option due to hazardous terrain caused by earth cracks, fragile lava surfaces, and dense vegetation.

Emergency Response

Helicopters are used for a range of emergency response operations in the park. They are used to monitor and assess eruption activity, both on the East Rift, the locus of almost all lava flow activity in the last 30 years, and at the summit of Kīlauea since the formation of the lava lake in Halema‘uma‘u in 2008. The typical HVO flight path for assessing eruptive activity in the east rift avoids all wilderness units. It parallels the north boundary of the East Rift Unit as helicopters travel from Halema‘uma‘u to Pu‘u ‘Ō‘ō, then to the lower East Rift, returning on a parallel flight path but well away from wilderness. Typically, HVO flights over the East Rift and Halema‘uma‘u are made every 1-2 weeks. Changes in the pattern and location of the eruption require more intensive monitoring and more frequent flights until the new eruption pattern stabilizes. Between 2007 and 2010, annual flight hours allocated to eruption response of Kīlauea Volcano within the park averaged 15 hours and ranged from 12 to 17 hours.

Helicopters are used in wildland fire management, mostly in suppression operations, transporting suppression crews and equipment and using water bucket drops to directly suppress flaming fronts or assist ground crews in mop-up operations. Helicopters are also used to detect ignitions and evaluate fuels and fire activity in order to develop fire suppression strategies. For the last two decades, most wildland fire activity, ignited by lava flows, along with associated helicopter use has been within or adjacent to East Rift Unit. There were major periods of fire activity lasting weeks or months in 1992, 2002-2003, 2007, and 2010. Administrative aviation activity associated with fire may potentially affect the drier portions of Mauna Loa and Kīlauea where extensive, continuous fuel beds and persistent dry weather make them vulnerable to wildland fires. For example, the 1,000 acre Broomsedge Fire in 2000 occurred across the lower portion of the Mauna Loa Strip Road, and since 1987 the 11,000 acre Uila Fire and two other large wildland fires have occurred in the Pepeiao Cabin area have occurred almost exclusively in the Ka‘ū Desert Wilderness Unit on Kīlauea.

Helicopters are used for search and rescue operations in the backcountry, locating lost hikers or removing injured visitors. Search and rescue emergency response may also involve wilderness since many of these operations involve remote areas. Typically low elevation flights and landings would be involved for search and rescue. Finally, helicopters are used on occasion for law enforcement. For example, twice-yearly surveys to detect marijuana cultivation typically involve two helicopter searches lasting about one hour. These concentrate on accessible areas near Mauna Loa Strip Road, Hilina Pali Road, and ‘Ōla‘a. Selected areas of the park are searched twice per year to detect marijuana cultivation. Between 2006 and 2010, annual flight hours allocated to emergency response for wildland fire, search and rescue, and law enforcement activities averaged 40 hours and ranged from 18 to 88 hours.

Description of Alternatives

Actions Common to All Alternatives

Continue to use the current park helibase near park headquarters as no other suitable sites are available that can be used year-round. All administrative aviation users will follow the park procedure to request, receive approval, and report flights in the park, as outlined in the park’s Aviation Management Plan. Use formally designated landing zones; the temporary helispots formally designated in the park’s AMP may be used on a routine basis. These sites are typically

used infrequently for emergency and non-emergency purposes (i.e. once a year or less). For non-designated temporary helispots, natural openings may be used for authorized non-emergency aircraft landings, but no site markings or permanent improvements of any kind may be installed to support non-emergency use. Temporary landing sites may be used to meet the minimum requirements of emergency situations. Site improvements determined to be essential for safety reasons during individual emergency situations may be authorized and supervised by a resource advisor, but the site will be restored to natural conditions after the emergency has ended. No permanent heliports or helipads will be allowed in wilderness.

In accordance with Section 7 of the Endangered Species Act, the NPS will notify the USFWS by telephone or facsimile of the emergency situation. The USFWS may recommend measures to minimize effects of the response. As soon as practicable after the emergency is under control, the action NPS will initiate formal consultation with the USFWS if listed species or critical habitat have been adversely affected by the emergency response.

To comply with Section 106 of the NHPA, emergency actions will notify the State Historic Preservation Office (SHPO) as described under Emergency Actions in the Programmatic Agreement (NPS 2008b). The Superintendent will notify the SHPO within 24 hours of the emergency or as soon as conditions permit. Park staff will assess impacts and recommend actions necessary for stabilization or preservation, as soon as is practicable, and will consult with the SHPO for any undertakings necessary as a result of the emergency or emergency response.

No Action Alternative

Continue to use aviation for the health and safety of park visitors, staff, and island residents, for resource protection and restoration, geologic research, and maintenance of backcountry trails and shelters. Informal practices developed to minimize impacts on park resources, visitors, and adjacent communities are implemented by some flight managers or pilots but have not been formalized and are not universally followed.

Preferred Alternative

Use aviation for the health and safety of visitors, employees, and island residents for park resource protection and restoration, geologic research, and maintenance of backcountry trails and shelters, but institute formal BMPs, area closures, mitigations, and flight restrictions to minimize impacts to park resources, soundscapes, visitors, and adjoining landowners. Although impacts will be reduced compared to the no action alternative, they will not be eliminated due to the need to respond to emergencies (e.g. wildland fires, search and rescue, natural disasters), and because of changing weather conditions that may require helicopters to reroute (laterally or vertically) to meet safety requirements. However, based on past administrative activities, these are expected to be infrequent and of short duration.

Table 1 summarizes the BMPs (see Appendix 1 for complete description) including mitigation measures, and area and time of year restrictions for sensitive wildlife to be implemented or followed in administrative use of aviation, under the preferred alternative.

Table 1. Summary of Best Management Practices to be followed under the Preferred Alternative (see Appendix 1 for complete description)

Activity/Resource	Prescribed Practices
Approvals for Flights	Approved Project Aviation Safety Plan required.
Scheduling of Missions	Consolidate planned flights on same days as much as possible (for example, HVO combines eruption overflights with station maintenance missions).
No Fly Days for Routine Work	Do not conduct planned missions on Saturday and Sunday (does not apply to emergencies).
Scheduling Around Weather	Reschedule flights, when feasible, if weather forces low-level* flights over visitors or adjacent landowners.
Use of Helibase Near Park Headquarters	Training missions with repeated take-offs and landings will not be conducted at current helibase.
Selection of Staging Areas, Landing Zones, AGL, and Flight Paths	Select to minimize impacts on visitors, adjoining landowners, soundscapes, wilderness, and other park resources.
Staging Areas	Use staging areas nearest to the work site based on these priorities: 1) safety, 2) impact concerns, and 3) cost/efficiency.
Helispot Selection	Select in priority order: 1) helispots listed in AMP, 2) no clearing needed (e.g., roadways, bare lava), 3) other sites with resource advisor approval.
Wilderness (including eligible, recommended, and designated wilderness)	Fly outside wilderness boundaries and over roads whenever possible. Follow prescribed actions and mitigation measures in prepared wilderness MRDG.
Backcountry Campsites and Trails	Avoid low-level flights over campsites and trails.
Visitor Use Concentrations	Avoid areas where visitors concentrate.
Cultural Practitioners	Avoid flights at sunrise and sunset; consult with park liaison on areas and times to avoid.
HVO and NPS Ground Crews	Avoid low-level flights above crews on ground.
Clearing of New Landing Zones	Natural and cultural resources specialists will be consulted prior to clearing of new landing zones, and impacts to sensitive species, sites, and features will be avoided.

Activity/Resource	Prescribed Practices
Pilot Education	Pilots will receive a copy of the BMPs and be required to adhere to them while conducting contract work for NPS and cooperating agencies.
Helicopter Manager Training	Helicopter managers will receive regular training in implementation of the BMPs, mitigations, and flight restrictions.
Visitor Education	If visitor concentrations cannot be avoided, post notices or directly notify visitors prior to flights to allow visitors an opportunity to select other sites if desired. Explain purpose of the flights.
Helicopter Selection	Select type of helicopter to reduce impacts, e.g. use quieter helicopters near wilderness; use larger helicopters for heavy loads if it reduces the number of flights. Contract helicopters with quiet technology would be considered.
Temporary Flight Closures and Restrictions - Special Events and Ceremonies	Airspace closures for administrative flights will be in effect for special ceremonies and events, with a mandatory five mile standoff distance.
Sensitive Wildlife, including Federally Listed Species	Flight managers will use maps and species' information for sensitive wildlife and habitat to determine species-specific avoidance distances to avoid those areas during sensitive periods. Flight managers will consult with resource specialists to minimize impact when avoidance is not possible. The resource specialist will evaluate potential impacts to species and determine if further consultation with USFWS is needed.
Sites of Eruptive Activity	Anticipate and comply with any Temporary Flight Restriction around sites of eruptive activity.

*Low-level flights are considered flights <500' AGL.

Additional mitigation measures for wildland fires, in addition to ESA regulations, will include:

1. All personnel on the fire are informed about listed species and the importance of protecting their habitats and minimizing take. All personnel on the fire are informed about cultural resources in the area. This is best identified in the incident management objectives.
2. Resource Advisors are assigned to the incident to coordinate natural and cultural resource concerns and provide recommendations for minimizing impacts of response endorsed by the Incident Commander.
3. The effectiveness of suppression activities and mitigation measures should be documented and evaluated after a fire. Procedures should be revised as needed.

Responsive Management

Responsive management is an element of the preferred alternative. Conditions change in park resources, visitor use, or adjoining areas and require changes in practices, mitigation, and especially temporary flight closures or restrictions. For example, the range of sensitive bird species may change over time or with improved information and require an adjustment in temporary closure or AGL restrictions. As conditions change, the BMPs plan will be revised to address those changes.

Alternatives and Actions Considered but Dismissed

Two additional alternatives were considered but dismissed because they did not meet the objectives of the project or were not feasible. One alternative dismissed from further consideration was to prohibit all aviation use except for emergencies and eruption response. Aviation is essential for the safety of island residents, as well as park visitors and staff in the context of eruptive behavior of Kīlauea and Mauna Loa. Helicopters are essential tools in evaluating eruptive behavior and maintaining the network of instruments established throughout the park for monitoring and assessing hazards from volcanic activity. Helicopters are also an essential tool in the protection and restoration of park biological and cultural resources, as mandated by federal legislation and NPS management policies. Invasive species are the overriding natural resource issue in Hawai‘i. Intensive control of invasive species is required to protect federally listed species and designated critical habitat. Helicopters are needed, for example, to transport heavy fencing materials needed to control and exclude nonnative ungulates in remote roadless areas, suppress wildland fire that threaten rare species, and locate and control invasive plants established on extensive lava flows.

Another alternative considered but dismissed was to relocate the park helibase away from the park headquarters and Kīlauea Visitor Center area. One potential site, the abandoned park quarry near Kīpukapuauolu, was considered but rejected because the presence of threatened and endangered species there precluded or limited use of the facility for nine months of the year. Other locations in the park were also rejected because of the absence of required infrastructure and sensitive species in the area. Potentially available locations outside the park were dismissed because of unacceptable response time to emergencies.

How Alternatives Meet Project Objectives

Action alternatives selected for analysis must meet all objectives to a large degree. Action alternatives must also address the stated purpose of taking action and resolve the need for action. Alternatives that did not meet the plan objectives were dismissed from further analysis (see previous section). The preferred alternative will meet the following objectives of the project:

- Monitor eruptive events and volcanic, seismic, and gas emission hazards and conduct geological research.
- Carry out search and rescue and law enforcement actions.
- Support fire management activities including wildland fire suppression and monitoring.
- Maintain remote park facilities including radio repeaters.
- Control alien invasive plant and animal species.
- Rehabilitate or restore ecosystems degraded by fire or invasive species.
- Monitor and recover threatened, endangered, and rare species and their habitats.
- Carry out cultural and biological resources inventory, monitoring, and research.
- Protect natural wilderness quality.
- Minimize or avoid impacts to soundscapes, park visitors, and neighboring communities.
- Comply with NPS policies and federal laws and regulations.
- Maximize efficiency of flights and minimize costs to park operations whenever possible while accomplishing the higher priority objectives to protect resources, park visitors, and soundscapes.

Environmentally Preferred Alternative

The NPS is required to identify the environmentally preferred alternative in its NEPA documents for public review and comment. Guidance from the CEQ states that the environmentally preferred alternative is “the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources” (40 CFR 1500–1508). The CEQ NEPA regulations also indicate that the environmentally preferable alternative is the one that “will promote the national environmental policy as expressed in NEPA’s Section 101” (46 FR 18026, Q6a).

The NPS has identified the preferred alternative in the EA as also the environmentally preferred alternative: This alternative will use aviation for the health and safety of visitors, employees, and island residents for park resource protection and restoration, but will institute formal best management practices, area closures, and flight restrictions to minimize impacts to park natural and cultural resources, soundscapes, visitors, and wilderness.

Table 2. Summary of Environmental Consequences

Alternative A (No Action Alternative)		Alternative B (NPS Preferred Alternative)
Soundscapes	<p>Noise levels from administrative flights would continue to have a minor to moderate adverse effect on the soundscapes, but the impact would be short-term and transient.</p> <p>The past, current, and reasonably foreseeable actions, particularly the routine presence of multiple commercial air tours, would have a significant impact on the park soundscapes. The administrative aviation contributes minimally to these impacts due to the differences in the timing, location, and duration of the flights, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems.</p>	<p>Noise levels from administrative flights would have short-term, minor to moderate, adverse impacts on park soundscapes, but less impacts than those of the no action alternative, because of total reduced flying time, longer daily intervals of natural quiet and periods between days of routine administrative aviation operations, and avoidance of quieter soundscape areas of the park including wilderness when transiting to project sites. The impacts are considered minor to moderate because the noise generated from flight activities is detectable, but infrequent and temporary.</p> <p>The past, current, and reasonably foreseeable actions, particularly the routine presence of multiple commercial air tours, would have a significant impact on the park soundscapes. The administrative aviation contributes minimally to these impacts due to the much lower number of flights and wider dispersal of activities (less concentrated) across the landscape, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems.</p>
Visitor Use and Experience	The no action alternative would result in short-term, adverse negligible to moderate impacts on park visitors. The no action alternative would also result in beneficial, indirect, long-term impacts on visitor experience by providing a	Implementing the preferred alternative would result in short-term, adverse negligible to moderate impacts to the visitor experience. The preferred alternative would have less impact on visitor use and experience than the no action alternative. The

	<p>safe park environment, recovered native species or restored native ecosystems, as well as maintained backcountry trails and camps.</p> <p>The past, current, and reasonably foreseeable actions, particularly those of commercial air tours, would have a significant impact on the park visitor use and experience. The administrative aviation contributes minimally to these impacts due to the much lower frequency and duration of administrative flights. In addition to benefitting native species and ecosystems, as well as backcountry visitor use, administrative aviation has long-term beneficial impacts because it provides for the safety of park visitors, staff, and island residents through geological hazards monitoring.</p>	<p>preferred alternative would still have long-term beneficial effects for park visitors by providing timely warnings of geological hazards, emergency services, and restoration of native ecosystems and species.</p> <p>The past, current, and reasonably foreseeable actions, particularly the presence of high numbers of commercial air tours, would have a significant impact on the park visitor use and experience. Administrative aviation operations contributes minimally to these impacts due to the much lower number of flights, avoidance of high visitor use areas, and dispersal of activities (less concentrated) across the landscape, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems as discussed previously.</p>
Park Operations	<p>The no action alternative would have a long-term, negligible adverse impact on park operations.</p> <p>Past, present, and reasonably foreseeable actions, when combined with direct impacts of the alternative, would have a future minor to moderate impact on park operations. However, the no action alternative will have no additional impact on existing park operations; it is the current park practice.</p>	<p>The preferred alternative would have a long-term, negligible adverse impact on park operations.</p> <p>Past, present, and reasonably foreseeable actions, when combined with direct impacts of the alternative, would have a future minor or moderate impact on park operations. In short, the preferred alternative will not contribute significantly to the overall impact on park operations.</p>

Wilderness	<p>Administrative aviation under the no action alternative would have a direct, short-term, adverse minor to moderate impact on wilderness quality and wilderness users. The past, current, and reasonably foreseeable future actions, particularly the commercial air tours, would have a significant impact on the wilderness character and users. The administrative aviation contributes minimally to these impacts due to the differences in the timing, location, and duration of the flights, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems.</p>	<p>Administrative aviation under the preferred alternative would have a direct, short-term, adverse, minor to moderate impact on wilderness quality and wilderness users. The past, current, and reasonably foreseeable future actions, particularly the commercial air tours, would have a significant impact on the wilderness character and users. The administrative aviation contributes minimally to these impacts due to the differences in the timing, location, and duration of the flights, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems.</p>
Native Wildlife	<p>Under the no action alternative, administrative aviation would have short-term, adverse, minor effects on native wildlife. The possibility of moderate, long-term impacts is greater when cumulative impacts are combined with direct effects, particularly for forest bird species along or near the East Rift of Kīlauea where commercial air tours are concentrated.</p> <p>When past, present, and reasonably foreseeable future actions are combined with the no action alternative, administrative aviation may have minor and possibly even moderate adverse impacts on native wildlife in the park.</p>	<p>Under the preferred alternative, administrative aviation would have short-term, adverse, minor impacts on native wildlife. The possibility of moderate, long-term impacts is greater when cumulative impacts are combined with direct effects, particularly for forest bird species along or near the East Rift of Kīlauea where commercial air tours are concentrated. These adverse cumulative impacts are balanced by habitat restoration programs of the park benefitting native bird habitat and species.</p> <p>When past, present, and reasonably foreseeable future actions are combined with the no action alternative, administrative aviation may have minor and possibly even moderate adverse impacts on native wildlife in the park.</p>

Special Status Species	<p>Administrative flights would have negligible to moderate, short-term, adverse impacts and long-term major beneficial impacts to special status species under the no action alternative.</p> <p>Ecosystem restoration and rare species recovery programs have a balancing long-term, beneficial impact on special status species. Invasive plant and animal control projects directly restore habitat for these rare species. Targeted recovery programs monitor and specifically address limiting factors including introduced predators for rare species including nēnē and ‘ua‘u.</p> <p>The possibility of moderate, long-term impacts is greater when cumulative impacts are combined with direct effects, particularly for endangered wildlife species along or near the East Rift of Kīlauea where commercial air tours are concentrated.</p>	<p>Under the preferred alternative, administrative aviation would have adverse, negligible to minor, short-term impacts on special status wildlife species. These short-term impacts are offset by the major, long-term benefits to species that result from aviation-assisted habitat and rare species recovery and protection efforts. Invasive plant and animal control projects directly restore habitat for these rare species. Targeted recovery programs monitor and specifically address limiting factors including introduced predators for rare species including nēnē and ‘ua‘u.</p> <p>The possibility of moderate, long-term impacts is greater when cumulative impacts are combined with direct effects, particularly for endangered wildlife species along or near the East Rift of Kīlauea where commercial air tours are concentrated.</p>
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CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter provides a description of the affected environment for a park resource directly followed by an evaluation of the environmental consequences of the alternatives on that resource. The chapter is organized by the impact topics identified in Chapter 1: “Soundscapes,” “Visitor Use and Experience,” “Park Management and Operations,” “Wilderness,” “Wildlife,” and “Special Status Species.” The “Affected Environment” section describes the resources within Hawai‘i Volcanoes that could be affected by implementation of the alternatives of the EA. Sufficient detail is given to provide context for understanding potential impacts and a baseline understanding for analyzing changes in the resources with implementation of the alternatives. The environmental consequences portion of each impact topic analyzes both beneficial and adverse impacts that could result from implementing either of the alternatives described in Chapter 2. The analysis also includes, specific to each impact topic, a summary of relevant laws and policies, methods used to analyze impacts, definitions of impact thresholds, and an analysis of cumulative effects.

General Methods for Analyzing Impacts

The NPS based the impact analyses and conclusions on scientific literature, when available; information and insights provided by NPS experts, other agencies, and the public; and the best professional judgment of park staff.

The effects are based on analysis of the following factors for each impact topic:

- Type:* Whether the impact would be beneficial or adverse.
- Intensity:* Identify the intensity of the effect as negligible, minor, moderate, or major. The intensity level is only determined for adverse effects, not for beneficial effects.
- Duration:* Duration of impact is analyzed independently for each resource. Depending on the resource, impacts may last for the project period, a single year, or other time period. For purposes of this analysis, impact duration is described as short- or long-term as defined for each resource.
- *Short-term* impacts are temporary or transitional impacts associated with project activities.
 - *Long-term* impacts are typically those effects that would last several years or more or would be permanent.

Context: Context is the setting within which an impact would occur.

- *Local impacts* would generally occur within the immediate vicinity of the proposed project/activity.
- *Regional impacts* would occur on surrounding lands and/or in adjacent communities.

Impact: The following types of impact must be considered and examined for any park proposal and alternatives.

- *Direct Impact:* effects caused by an action and occur at the same time and place as the action.
- *Indirect Impacts:* effects are caused by an action and occurs later or farther away, but are still reasonably foreseeable.
- *Cumulative Impacts:* effects in conjunction with past, present, or reasonably foreseeable future actions.

Thresholds for Impact Analysis

The intensity and duration of effects vary by resource. Therefore, the definitions of intensity (negligible, minor, moderate, or major) are described separately for each impact topic. Clarification of the terms commonly used to characterize duration, typically short-term and long-term, will be provided for each impact topic or effect. Definitions of intensity and duration were formulated through the review of existing laws, policies, and guidelines; and with assistance from park and regional NPS staff, and other resource specialists.

Cumulative Impacts Analysis

The Council on Environmental Quality regulations for implementing NEPA requires the assessment of cumulative impacts in the decision-making process for federal actions. A cumulative impact is described in the *Council on Environmental Quality Regulation* 1508.7, as follows:

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

Cumulative impacts are considered for both the no action and the preferred action alternative. These were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions with the effects of the alternatives. Cumulative impacts are analyzed for each impact topic.

Geographic Analysis Area

The geographic area for the analysis of impact is Hawai'i Volcanoes; jurisdiction is limited to the park. However, the BMPs address potential soundscape impacts on neighboring communities and potential effects on wildlife and especially special status species in habitats immediately surrounding areas, with the intent of minimizing or avoiding impacts. Impacts on resources immediately outside the park may affect resources inside the park, and the park seeks to minimize sound impacts of administrative aviation on neighboring communities.

Soundscapes

Regulatory Framework

Natural soundscapes are recognized by the NPS as an integral park resource to be valued and protected. Direction for management of natural soundscapes is represented in *Management Policies 2006*:

The Service will restore to the natural condition wherever possible those park soundscapes that have become degraded by unnatural sounds (noise), and will protect natural soundscapes from unacceptable impacts...Using appropriate management planning, superintendents will identify what levels and types of unnatural sound constitute acceptable impacts on park natural soundscapes. The frequencies, magnitudes, and durations of acceptable levels of unnatural sound will vary throughout a park, being generally greater in developed areas. In and adjacent to parks, the Service will monitor human activities that generate noise that adversely affects park soundscapes, including noise caused by mechanical or electronic devices. The Service will take action to prevent or minimize all noise that through frequency, magnitude, or duration adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified through monitoring as being acceptable to or appropriate for visitor uses at the sites being monitored (NPS 2006, 4.9).

NPS policies also include direction regarding cultural soundscapes:

However the desired acoustic condition may also depend upon the resources and the values of the park. For instance, "Culturally appropriate sounds are important elements of the national park experience in many parks." In this case, "The Service will preserve soundscape resources and values of the parks to the greatest extent possible to protect opportunities for appropriate transmission of cultural and historic sounds that are fundamental components of the purposes and values for which the parks were established" (NPS 2006, 5.3.1.7).

Science of Sound and Definition of Key Terms

The NPS defines a soundscape as the “total acoustic environment of an area” (NPS 2009) which includes both natural and human-caused sounds. The natural soundscape excludes human-caused or anthropogenic sounds and includes all the natural sounds occurring in a park, including the physical capacity to transmit these natural sounds (NPS 2006, 4.9). Some common natural sounds in Hawai‘i Volcanoes are surf action at the shoreline, winds spilling across volcanic flows or rustling leaves, native Hawaiian birds calling and singing, rain falling on tree and tree fern canopies, and crickets vocalizing in the rain forest. Some of the park’s most notable natural sounds include those related to volcanic activity such as the hissing and crackling of new lava flows, clinking of glass-like surfaces of active lava flows, booming methane explosions or, more rarely, the roar of fountaining events. The natural quiet that occurs in the absence of human-caused sound is also defined as the “natural ambient” sound level of a park, however, sound levels in national parks can vary greatly, ranging from among the quietest that can be measured with monitoring equipment to extremely loud.

Noise is generally defined here as unwanted or intrusive human-generated sound. Human-made noise is defined in Director’s Order 47: *Soundscape Preservation and Noise Management*, as an “unwanted or undesired sound, often unpleasant in quality, intensity, or repetition, that adversely affects the natural soundscape.” Noise can adversely affect park resources and values such as natural soundscapes, wildlife, wilderness, and visitor experience. Noise can distract visitors from park resources, purposes, and values, and affect traditional cultural properties and the tranquility of historic park settings, and affect wildlife use patterns and daily life activities. Examples of noise at Hawai‘i Volcanoes are cars, buses, motorcycles, helicopters, fixed wing aircraft, mechanized equipment (for example, string trimmers or chainsaws), electronic devices (for example, cell phones or recorded music players), and people yelling (Lawson et al. 2007).

Humans perceive sound as an auditory sensation created by pressure variations that move through a medium such as water or air. Sound is measured in terms of amplitude and frequency. Amplitude, which refers to the sound pressure level or intensity, is the relative strength of sound waves which humans perceive as loudness or volume and is measured in decibels (dB). Decibels work on a logarithmic scale; an increase of 10 dB causes a doubling of perceived loudness and represents a ten-fold increase in sound level. Thus 20 dBA would be perceived as twice as loud as 10 dBA, 30 dBA would be perceived as 4 times louder than 10 dBA, 40 dBA would be perceived as 8 times louder than 10 dBA, etc. Sound levels in national parks can vary greatly due to factors such as vegetation, topography, atmospheric conditions, and human and other biological activity.

Frequency, sometimes referred to as pitch, is the number of times per second that a sound pressure wave repeats itself. The units of frequency are called Hertz (Hz). For example, a drum beat has a much lower frequency than a whistle. Humans can distinguish sounds with different frequencies, such that people can hear the rustle of leaves in the trees, low rumble of distant thunder, and a bird singing overhead simultaneously. Some frequencies may block out or mask other frequencies such as the low-pitched sound of thunder temporarily masking a high pitched bird song. Because the acoustical environment is made up of many sounds, the way we experience the acoustical environment depends on interactions between the frequencies and amplitudes of all the sounds. Sound levels are often adjusted (“weighted”) to match the hearing

abilities of a given animal. Humans with normal hearing can hear frequencies between 20 Hz and 20,000 Hz, and amplitude as low as 0 dB at 1,000 Hz. Sound levels adjusted for human hearing are expressed as dB(A) also shown as dBA. Sound levels are presented in units of A-weighted decibels (dBA). The A-weighting scale is commonly used to describe sound levels because it reflects the frequency range at which the human ear is most sensitive (see Table 3 for examples).

Table 3: Common Sound Levels and Their Effect on the Human Ear

Sources	Decibel Level (dBA)	Qualitative Perception
Normal breathing	10	Very low
Leaves rustling	20	Very low
Soft whisper, quiet library (at 15 feet)	30	Low
Crickets (at 15 feet)	40	Low
Light auto traffic (at 100 feet)	50	Medium
Hughes 500D helicopter overflight (at 500 feet)	54	Medium
Conversational speech (at 3 feet)	60	Medium
Vacuum cleaner	70	High
Off-road vehicles	70-90	High
Heavy truck or motorcycle (at 25 feet)	90	High
Military jet (at 330 feet)	120	High

Source: NPS 2013 and Lee 2012.

Affected Environment

The diversity of natural environments in Hawai'i Volcanoes provides a rich and varied array of natural sounds, largely free of human-generated noise. The volcanic landscape of the park is characterized by steep gradients of elevation, rainfall, and vegetation. Extending from the shoreline to the alpine, from desert scrub to rain forest, and young barren lava flows to older dense forest; the park encompasses 10 broadly defined ecological zones, providing a range of natural soundscapes.

The natural and existing ambient sound levels at Hawai'i Volcanoes were measured in 2002-2003 at 22 sampling sites in 8 of the 10 sampling zones thought to represent the most widespread

sound environments of the park (figure 5; table 3; USDOT-FAA 2006). These acoustic sampling zones largely match the natural ecological zones or broad ecosystems of the park. The natural ambient sound level—that is, the environment of sound that exists in the absence of human-caused noise—is the baseline condition, and the standard against which current conditions in a soundscape will be measured and evaluated as per *Management Policies 2006* (NPS 2006). The natural ambient sound levels, as measured in 2002, will serve as the baseline for analysis of the impacts of the various alternatives on park soundscapes.

From acoustical monitoring performed at locations throughout the park, average daytime soundscape sound levels ranged from 20 dBA in backcountry areas to 54 dBA along the shoreline and in the front country where visitors are more prevalent (Table 4). To understand how quiet those sound levels are, a soft whisper in a quiet library has a dBA of 30 at 15 feet; conversational speech at three feet is 60 dBA; a 500-ft overflight of a Hughes 500D helicopter has a dBA of 54; and a motorcycle at 25 feet is 90 dBA (table 3). Much of the administrative use of aviation is carried out utilizing Hughes 500D helicopters.

The shoreline zone (zone 1) has the highest natural ambient sound levels in the park, with dBA from 47-54 over fifty percent of the day (L50 values), a sound level similar to light traffic noise. Natural sounds in this zone are surf, strong winds, and birds. Human-caused sound results from vehicles and people at the lava viewing area at the end of the road and commercial air tour aircraft on the coastline. The frequencies and magnitude of the sound of the surf helps to mask the sounds of human-caused noise in this area.

The coastal lowlands zone (zone 2), characterized by gently sloped lands immediately above the shoreline zone including the steep pali or fault scarps inland of the coastal plain, has low natural ambient sound levels (L50 values of 28-33 dBA), equivalent to a soft whisper, with sounds originating from strong trade winds blowing through the grasses that dominate the vegetation of much of this zone and from insects. Acoustic modeling of air tours as part of the ATMP process in subsequent years determined that the pali appears to serve as a natural sound shield. The type of terrain in this area appears to shield or absorb the noise generated by air tours and vehicles (USDOT-FAA 2004). The more upland or mauka portions of this zone experience vehicle noise from Chain of Craters Road.

The sparsely vegetated zone (zone 3) mauka of the coastal lowlands zone, extending to the north and towards the eastern edges of Kīlauea Caldera, is dominated by low scattered native ‘ōhi‘a scrub or nearly barren, recent lava flows. Wind blowing through low trees and shrubs and over volcanic landforms is the dominant natural sound. Occasional aircraft activity accounts for human-caused noise. L50s range from 20-35 dBA with the higher sound levels in this range nearer to Kīlauea Caldera. The similarly arid dry ‘ōhi‘a woodlands zone (zone 6) also located on the leeward slopes of Kīlauea, above the coastal lowlands, has low natural ambient sound levels. L50s are 25-30 dBA for most of the zone, largely from wind blowing through tree canopies. Higher L50 values, 30-35 dBA, were measured at the site on the eastern portion of the sampling area. The increase in ambient level is attributed to commercial air tours viewing surface lava flows along the east rift during the monitoring period.

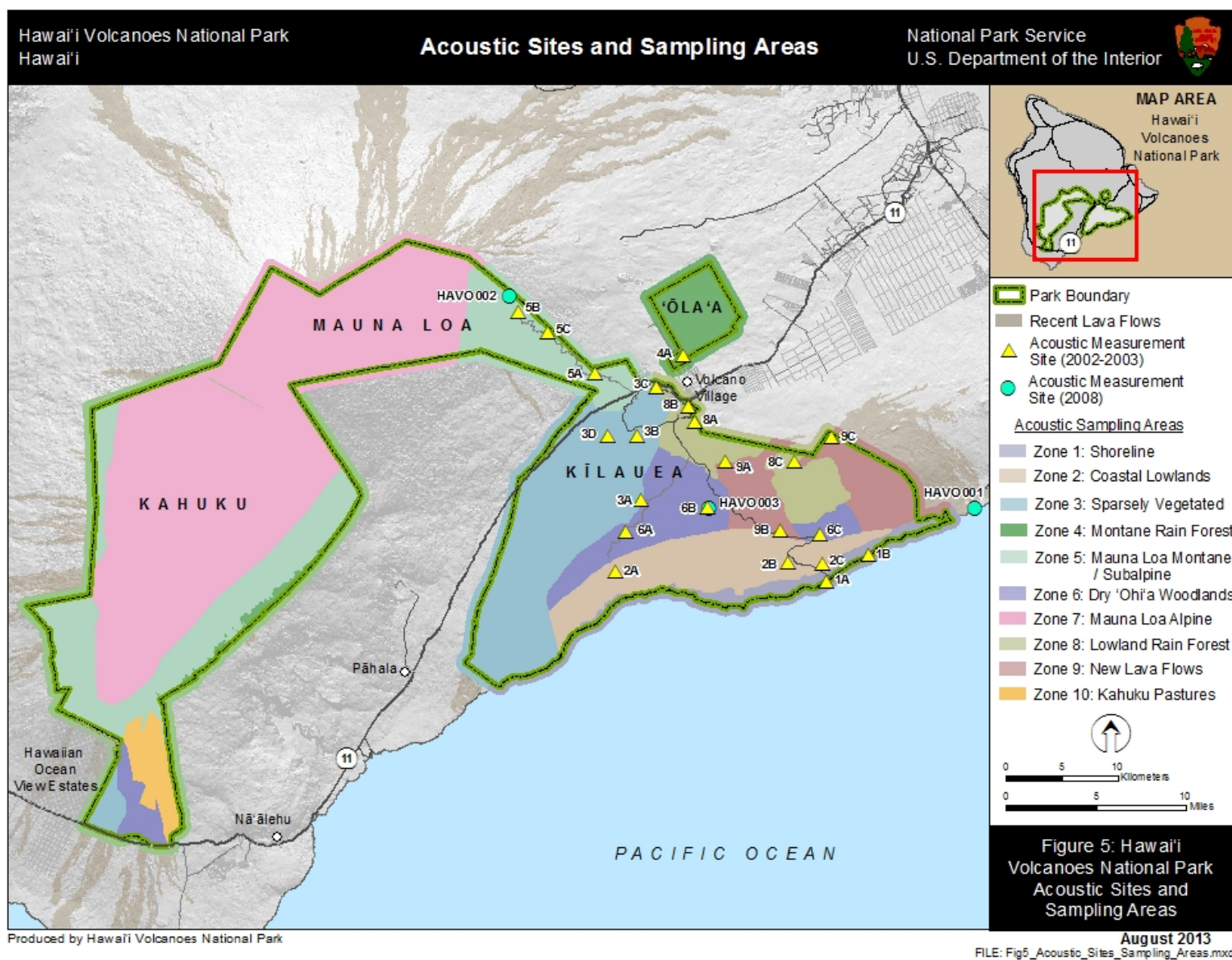


Table 4. Ambient Sound Levels (dBA) in Park Acoustic Sampling Areas

Acoustic Sampling Area	Measurement Sites	L ₅₀ ^a Natural Ambient Sound Level (dBA)
Zone 1 (Shoreline) ^b	1A	54.2
	1B	46.6
Zone 2 (Coastal Lowlands)	2A	28.3
	2B	32.7
	2C	29.1
Zone 3 (Ka‘ū Desert/Kīlauea Summit)-	3A	31.4
	3B	29.1
	3C	32.7
	3D	20.4
Zone 4 (‘Ola‘a Rain Forest)	4A	33.5
Zone 5 (Mauna Loa Forest)	5A	35.0
	5B	22.1
	5C	27.5
	HAVO002 ^c	18.1 ^c
Zone 6 (Dry ‘Ōhi‘a Woodlands)	6A	28.0
	6B	28.0
	6C	32.7
Zone 7 (Mauna Loa Alpine)	no data	no data
Zone 8 (Young Rain Forest)	8A	42.6
	8B	38.2
	8C	29.7
Zone 9 (New Lava Flows)	9A	28.6
	9B	28.6
	9C	25.4
Zone 10 (Kahuku Ranch)	no data	no data

^aL₅₀ refers to the sound level exceeded for fifty percent of a specific time period (daytime). L₅₀ data are based on USDOT-FAA 2006 and NPS 2008a.

^bDue to strong trade winds, the data for Zone 1 is contaminated with some wind noise and should be used with caution.

^cA single station was deployed in the subalpine zone on Mauna Loa at 7,300 foot elevation for 41 days in 2008 (NPS 2008a).

Natural sound levels in the montane rain forest zone (zone 4) had L50 values of 30-35 dBA. These relatively higher natural ambient sound levels are higher than the drier environments in the park because of frequent rains falling on the continuous canopy of tree ferns and scattered trees, as well as the sounds of abundant native crickets and localized bird vocalizations. Natural sounds of the young rain forest zone (zone 8), located along the wet, eastern edge of Kīlauea Caldera and the east rift zone of Kīlauea are also due to rain falling on the canopy and to high populations of native forest birds. Median sound levels (L50) of 25-30 dBA characterize much of this zone.

Higher L50 values of 35-40 dBA were detected at the monitoring site nearer to Nāpau Crater and are attributed to commercial air tour traffic. The subsequent air tour modeling also identified the pali as a location that offers terrain shielding of sounds from air tour noise occurring in this area (USDOT-FAA 2004). The new lava flows zone (zone 9), located adjacent to the young rain forest on the east rift of Kīlauea, includes recent lava flows with the sound of birds, insects, wind, and rocks falling on the slopes of cinder cones or walls of pit craters. Natural sounds of active flows include the crackling of the glass-like surfaces of rapidly cooling pāhoehoe flows, chunks of rock falling onto the surface of moving ‘ā‘ā flows, methane explosions, and trees falling on the edge of flows. Noise attributed to air tour traffic is suspected to be responsible for the doubling and tripling of noise audibility detected at mid-day at the monitoring site closest to Pu‘u ‘Ō‘ō. The median sound level for this sampling area is 25-30 dBA.

The Mauna Loa montane/subalpine zone (zone 5) is a broad elevational area from 4,000-8,000 foot elevation on the slopes of Mauna Loa, dominated by a wide range of vegetation types including forest, small grasslands, shrublands, and lava flows. Northern portions of this zone have very low L50 values of 20-25 dBA, values that increase during the day to 30-35 dBA in the southern portion of the zone, likely because of aircraft activity and other human-caused noise.

During the 2002-2003 acoustic study, no data on ambient sound levels from alpine areas (zone 7) on Mauna Loa were collected because inclement weather and accessibility impeded sampling. In 2008 additional acoustic monitoring was collected on Mauna Loa in the montane/subalpine zone (figure 5), but not in the alpine area. The acoustic equipment deployed in 2008 had the ability to record lower sound levels compared to the equipment deployed in 2002-2003. A single monitoring station was deployed in 2008 at the 7,300 foot elevation in the Mauna Loa subalpine. Sound levels were very low, 15.3 dBA at night and 19.1 in the daytime for existing ambient and 15.2 at night and 18.1 in the daytime for natural ambient. Elevations in daytime existing ambient sound levels were attributed to air tours. Audibility for a single helicopter event registered approximately 30 minutes (NPS 2008a).

The Kahuku Unit was not originally sampled because the acoustic baseline study was conducted prior to its acquisition by the park. Data was collected at four Kahuku sites in fall 2013, but data has not yet been fully analyzed. Therefore, information collected from other sections of the park was used to extrapolate the natural ambient sound levels in Kahuku based on similarity of vegetation and terrain. Most of Kahuku is a high elevation alpine environment located along the southwest rift zone of Mauna Loa and thus included in the Mauna Loa alpine zone. Kahuku also includes montane rain forest, wet forest, and dry ‘ōhi‘a woodlands, as well as extensive

abandoned cattle pastures. Kahuku pastures represent a tenth acoustic zone of the park, which was sampled in 2013, but data analysis is not complete.

On the whole, the soundscapes of Hawai‘i Volcanoes are characteristically quiet and dominated by natural sound. The majority of existing ambient sound levels do not exceed 55 dBA except near well-traveled roadways or in the presence of air tours. Common noise levels for visitor disruption include: dBA levels at or above 60 interfere with normal conversation; 55 dBA levels interfere with ranger-led talks and programs (NPS 2011c).

Most soundscapes in Hawai‘i Volcanoes are below 35 dBA or “library quiet” (30 dBA is a soft whisper). Buffered by adjoining protected natural environments or rural landscapes, the park is remote from urban development and its attendant anthropogenic noise. Park visitors are often concentrated along road corridors, and there is minimal military and general aviation in the air space over and adjacent to the park. The main sources of human noise are vehicles on paved roadways and aircraft from commercial air tours and less commonly from administrative activities of the NPS and its partners. Air tour noise is most prevalent near the Pu‘u ‘Ō‘ō lava viewing area at the end of Chain of Craters Road, near Nāpau Crater, above Āinahou Ranch and along the Mauna Loa Road. This is attributed to low-flying commercial air tours transiting to the East Rift near Pu‘u ‘Ō‘ō. Other human sources of noise are concentrated along road corridors in the visitor developed areas at the summit of Kīlauea Volcano, along Highway 11 or along Chain of Craters Road. However, very quiet sound environments can exist in otherwise noisy locations depending upon time of day. Very quiet soundscapes can also persist close to noisy environments due to masking of noise by winds, trees or insects or because of the shielding effects of terrain. Nighttime sounds in otherwise very noisy locations can also be very low. The lower range of natural sounds monitored in the 2002-2003 study often was at or below the lowest range capabilities of the monitoring equipment. It is likely that natural sound levels are actually lower at some sites than those recorded in 2002-2003. The sites on the higher elevations of Mauna Loa and along the Mauna Loa Road such as Kīpuka Kī are some of the quietest environments in the park sampled to date. Nāpau Crater in the East Rift Wilderness can also be very quiet in the absence of air tours. Locations in the Ka‘ū Desert within the sparsely vegetated sampling area also have some of the quietest natural soundscapes.

Two social science studies conducted at Hawai‘i Volcanoes also help to inform the park’s analysis of the effects of natural and human-caused sounds, including air tour sounds on visitor experience (Lawson et al. 2007; Holmes and Hollenhorst 2008). The findings of these studies, which help characterize park soundscapes from the perspective of visitor experience and response to aviation noise, are reported in the “Affected Environment” section of the “Visitor Use and Experience” impact topic below.

Environmental Consequences

The analysis of alternatives on the impact topic of soundscapes considers the effects of administrative aviation independently of how humans experience them or how they affect wildlife. These analyses will be addressed in the impacts topics of “Visitor Use and Experience,” “Wilderness,” “Wildlife,” and “Special Status Species.” Specific thresholds were derived from NPS peer reviewed soundscape thresholds commonly used in park settings and guidance from the NPS Natural Sounds and Night Skies Division and Department of Transportation

acousticians who are well-versed in human health and community based thresholds as well as those used in park settings. Soundscape impacts will be analyzed using the natural ambient sound levels, measured in 2002-2003 and 2008, as the baseline for determining potential impacts of the various alternatives on park soundscapes.

Thresholds of change for determining the intensity of an impact are defined as follows:

Negligible: Natural sounds are audible and discernible, although human-caused noise associated with proposed aviation operations may be audible very infrequently in local areas. When noise is present, it is at very low levels (mostly not measureable), fleeting, and rarely audible from a distance.

Minor: Natural sounds are audible and discernible, although human-caused noise associated with proposed aviation operations is present occasionally in local areas. When noise is present, it is measurable but at low levels, passing, and occasionally audible at a distance.

Moderate: Human-caused noise associated with proposed aviation operations is present occasionally across most of an area. When present, it is at medium levels that may mask natural sounds briefly, and may be audible at a distance. High noise levels may occur, but would be brief in duration.

Major: Human-caused noise associated with proposed aviation operations is commonly present throughout an area and masks natural sounds for extended periods of time at medium to high noise intensity levels. Noise is audible at a distance and may be of high intensity in close proximity to the source.

Sound data of administrative flight routes have not been specifically recorded, and flight paths of individual administrative missions have not been modeled. Much administrative aviation is project-based (e.g. installing new geologic monitoring instruments, constructing ungulate fences), or emergency response, and thus not always predictable in terms of duration or location. Similarly, aviation for fire and other emergency services cannot be precisely modeled. Many routine flights vary in terms of flight paths, frequency of flights, duration of flight, and even many routine flights (e.g. seismic monitoring equipment maintenance) vary over time due to differences in flight mission objectives and associated flight paths. Although there is an absence of modeling data, information that exists from initial analysis of commercial air tours was used as a reference where available. The analysis will emphasize a qualitative description of noise impacts on park soundscapes and compare the noise impacts and number of flights between the two alternatives.

Impacts of the No Action Alternative

Under the no action alternative, the park would continue current practices regarding park administrative aviation use, resulting in continuation of the current noise impacts on park soundscapes. Administrative flights would be undertaken to accomplish necessary management objectives of the park, e.g., controlling invasive species, monitoring the volcano, responding to eruptive activity, providing emergency services, with most flights occurring away from concentrations of visitors in the developed areas of the park. The determination of landing zones, flight paths, AGL, speed, and selection of aircraft type are largely based on the objectives of the mission, efficiency, and safety. The park does experience occasional temporary airspace closures or temporary flight restrictions related to volcanic activity or wildland fires. These restrict flights

in park airspace and limits most administrative flights except those related to volcanic monitoring and wildland fires. A temporary flight restriction at the Kīlauea Summit due to the presence of a vigorous gas plume containing variable amounts of ash rising from Halema‘uma‘u Crater has resulted in re-routing of air tours and restrictions on most administrative flights since 2008.

Administrative aircraft fly over the park approximately 250 hours annually and typically may occur short-term in any areas or soundscapes of the park depending on the purpose of the administrative need for the flight. With the exception of regular flights (every 1-2 weeks) by HVO to monitor the active volcanic vents, flights are typically dispersed across the park landscape and frequency determined by the type of activity. For example, aerial surveys to detect incipient invasive plants are done biannually over open terrain in the remote southwest portion of Kīlauea; reconnaissance for wildfire is done immediately following lightning storms; while helicopter transport to repair or replace a monitoring instrument may be done once and not revisited for several years. Flight activities related to various projects such as hovering, sling loading, landings, and take-offs inherent in administrative helicopter use result in increased noise levels during those specific activities. These can produce noise levels well above the baseline natural ambient sound levels of park soundscapes, and can be audible for distances of nearly five miles in some landscapes.

Noise levels from administrative flights have a minor to moderate adverse effect on the soundscapes, but the impact would be short-term and transient.

Cumulative Impacts

Past, present, and reasonably foreseeable actions that may contribute to cumulative impacts of administrative aviation on park soundscapes are flights by commercial air tours, administrative use of mechanized equipment at the ground level, increasing development on lands or communities adjoining the park and changes in park visitation patterns and development. The number of commercial air tours legally authorized to fly over the park is 28,441. In 2012, commercial air tours were estimated to be flying an average of 12,226 flights per year¹ over the park (2008-2011 fee data). These flights tend to be concentrated over visible volcanic activity at Pu‘u ‘Ō‘ō and along Kīlauea’s East Rift but also transit other areas of the park en route to lava viewing such as the Mauna Loa Road area. Currently these flights can have a significant impact on the park soundscapes, particularly when there is an active lava flow. The island’s large expanses of lava produce landscapes that offer little sound shielding, creating long “time audibles” for human or mechanized sounds. In these areas, noise has the potential for creating a greater acoustic impact on soundscapes. Park locations along the ocean shoreline areas, including the East Rift offer the highest natural ambient sound levels (50 dBA) and have the ability to mask some aircraft noise due to the sounds of the ocean surf. In 2008, acoustic modeling and observer logging revealed 86 overflights in a single day on Kilauea’s East Rift during a long-term eruptive period that included an ocean entry (NPS 2008a). Some of these flights may have been non-commercial flights or general aviation aircraft and included helicopters as well as fixed

¹ If calculated out, using 10 minutes of flight time in the park per tour, 12,226 flights per year would be the equivalent of 284,410 minutes of flight in the park per year. The mission critical administrative aviation averages 250 hours per year or 15,000 minutes.

wing aircraft but a majority are assumed to be commercial air tours. In the future, an ATMP may regulate the number and time of day of flights and/or the alignments (altitudes, flight routes) of aircraft or include flight route incentives such as quiet technology helicopters on flight routes which may reduce the level of this significant cumulative impact at some point in the future.

Mechanized equipment such as generators, drills, chain saws, and weed eaters are used by NPS and HVO staff in backcountry settings to construct fence, clear trails, maintain backcountry trails, and install geological monitoring instruments. Maintenance of front country facilities and grounds involves the administrative use of mechanized equipment. Lawnmowers and weed eaters are used to maintain landscaping in the developed areas; and power saws, nailers, and drills are used to maintain structures; and heavy equipment is used to maintain roads. The level of noise from ground-based machinery is not expected to change significantly in the future.

Park visitation levels and patterns of use have been relatively consistent over the last decade. However, changes in the number of visitors at the park or the way visitors use and travel in the park, with associated vehicle traffic and human conversation sounds, could possibly change in the future. For example, visitation and use of Kahuku will probably increase, although the role of vehicles has not been determined.

The future development of subdivisions and communities adjoining the park may result in increased noise in the park. Mechanized land clearing or landscape maintenance, higher human population, reduced forest cover to buffer sound propagation, and particularly increased vehicle traffic on Highway 11 may increase future noise penetrating park soundscapes and affecting visitor use and experience.

A future adverse cumulative impact on park soundscapes, especially in the wet and mesic forested or woodland wooded lowland and mid-elevation environments of the park, would result if there is a successful coqui frog invasion of the park. At lower elevations in wet environments of Hawai'i Island, populations of 23,000 frogs/acre have become established. This would contribute to the cumulative impact scenario for natural sounds. However, because almost all frogs call at night and administrative flights occur during day light hours, frog noise is largely separated temporally from administrative aviation noise.

A beneficial long-term impact on park soundscapes are aviation activities related to management programs to control the spread of invasive species. The past and current presence of invasive ungulates alters vegetation and impacts entire ecosystems which, along with other factors, have an influence on park soundscape properties. In some areas of the park, ungulate and invasive species control may increase the biomass of native forests and woodlands. Long-term restoration activities, such as those occurring in the degraded forests of the montane sampling area along the Mauna Loa Road have had a beneficial impact on park soundscapes. Reforestation is planned for the Kahuku pastures. After three decades, this area of restored native forests along Mauna Loa Road now contains some of the park's quietest soundscapes (NPS 2008a).

These past, present, and reasonably foreseeable future actions would have short-term minor to major adverse impacts on park soundscapes, particularly from commercial air tours, and long-term beneficial impacts on soundscapes from park restoration activities.

Conclusion

Under the no action alternative, administrative aviation will have short-term, minor to moderate, adverse impacts on park soundscapes. The past, current, and reasonably foreseeable actions, particularly the routine presence of multiple commercial air tours, have a significant impact on the park soundscapes. The administrative aviation contributes minimally to these impacts due to the differences in the timing, location, and duration of the flights, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems.

Impacts of the Preferred Alternative

Impacts to park soundscapes from administrative aviation operations will be reduced with the implementation of BMPs. These practices will particularly benefit visitor experience, wilderness, wildlife, and special status species by avoiding or reducing the exposure of these resources to administrative aircraft. BMPs may also reduce overall flight time in the park and allow for longer periods of natural quiet between days with administrative flights and avoidance of naturally quiet areas of the park, thus reducing impacts on park soundscapes. A formal procedure for flight approval will result in better planning, efficiency of flight time, and consolidation of flights among park divisions or partners. Saturday and Sunday will be recommended as “no fly” days, however, the park rarely flies more than one to two days per week, exceptions would include during wildfires and other emergency actions. Whenever possible, flights will be avoided in areas of the park identified with the lowest natural ambient sound. In addition, the BMPs recommend rescheduling if weather forces low-level flights. As future soundscape monitoring reveals more detailed patterns of natural sounds in the park, additional areas could receive increased protection for the low natural ambient soundscapes.

Cumulative Impacts

The cumulative impacts on soundscapes of the preferred alternative are the same as those of the no action alternative.

Conclusion

The preferred alternative will have short-term, minor to moderate, adverse impacts on park soundscapes, but less impacts than those of the no action alternative, because of total reduced flying time, longer daily intervals of natural quiet and periods between days of routine administrative aviation operations, and avoidance of quieter soundscape areas of the park including wilderness when transiting to project sites. The impacts are considered minor to moderate because the noise generated from flight activities is detectable, but infrequent and temporary. The past, current, and reasonably foreseeable actions, particularly the routine presence of multiple commercial air tours, have a significant impact on the park soundscapes. The administrative aviation contributes minimally to these impacts due to the much lower number of flights and wider dispersal of activities (less concentrated) across the landscape, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems.

Visitor Use and Experience

Regulatory Framework

Enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks. The Service is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks, and the Service will maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of American society. To provide for enjoyment of the parks, the National Park Service will encourage visitor activities that:

- are appropriate to the purpose for which the park was established; and
- are inspirational, educational, or healthful, and otherwise appropriate to the park environment; and
- will foster an understanding of and appreciation for park resources and values, or will promote enjoyment through a direct association with, interaction with, or relation to park resources; and
- can be sustained without causing unacceptable impacts to park resources or values (NPS 2006, 8.2).

Visitor opportunity for solitude and protection from human-caused noise is implied by management policies concerning wilderness and natural soundscapes:

The National Park Service will manage wilderness areas for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness. Management will include the protection of these areas, the preservation of their wilderness character...(NPS 2006, 6.1).

The National Park Service will encourage and facilitate those uses of wilderness that are in keeping with the definitions and purposes of wilderness and do not degrade wilderness resources and character. Appropriate restrictions may be imposed on any authorized activity in the interest of preserving wilderness character and resources or to ensure public safety (NPS 2006, 6.4).

The Service will take action to prevent or minimize all noise that through frequency, magnitude, or duration adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified through monitoring as being acceptable to or appropriate for visitor uses at the sites being monitored (NPS 2006, 4.9).

Affected Environment

Visitation to Hawai'i Volcanoes has averaged 1.37 million visitors per year over the last decade. Because of Hawai'i Island's year-round equable climate, visitation to the park is distributed fairly consistently throughout the year with peaks during eruptive events. Visitors have the opportunity to visit two of the world's most active volcanoes, view young dramatic landscapes, and learn about the geologic origins of the Hawaiian Islands and the distinct Native Hawaiian culture.

The Cooperative Park Studies Unit (CPSU) in Idaho routinely conducts visitor use surveys for the NPS to obtain information about park visitors and visitation patterns. The findings of a visitor use study by Holmes and Hollenhorst (2008) confirm that the primary stated reason for the great majority of visitors to visit the park is to view active lava flows which are intermittently accessible or at least visible at the eruption viewing area located at the end of Chain of Craters Road. The other most frequently visited front-country destinations in the park are the Kīlauea Visitor Center, Steam Vents, Thurston Lava Tube, and Kīlauea Overlook. A gas and ash plume has been visible at the summit of Kīlauea at Halema‘ūma‘u since March 2008 which now attracts crowds of visitors into the evening hours for nighttime viewing from Jaggar Museum.

Almost all park visitation is day-use, with most visitors staying in island lodging located outside the park. There are two small campgrounds accessible by vehicle and more than 36 miles of front-country hiking trails utilized by island residents, educational groups and off-island visitors in order to experience the park’s key features such as Thurston Lava Tube, Sulphur Banks, Kīlauea Iki and Pu‘u Loa Petroglyph Site. Most visitors enter the park by private automobile; however 35% of visitors participate in commercial tours arriving by bus or van. The CPSU study revealed that most of those surveyed had a length of stay of four to six hours, with many lingering until the evening glow of lava created premier viewing conditions. Finally, a very small number of day-use visitors access the Kahuku Unit of the park, currently open to the public only on weekends, but also for special events, service learning projects, and ranger-led hikes.

The park’s backcountry is lightly visited, even though there are about 136 miles of marked or maintained backcountry trails, with 72 miles of trail in designated wilderness. Overnight backcountry visitors average 4,700 per year based on records of those who register and obtain a free camping permit (NPS 2012b). The majority of backcountry permits are issued for coastal beach areas at Keauhou, Halapē, and Ka‘aha and, to a lesser degree, the hike to the summit of Mauna Loa. Coastal campsites can be at capacity during the spring season. During past eruptive periods of Pu‘u ‘Ō‘ō, the Nāpau camp in the East Rift Wilderness can also be at capacity, depending upon air quality and accessibility to lava viewing. The absence of permanent surface water, available from water catchment systems only at six backcountry cabins or shelters, inhibits use of the backcountry away from trails and established camps. The eruption sites on the lower East Rift see high numbers of cross-country day hikers that cross rugged lava landscapes to view and hear active lava flows. Other areas of the park have much lower levels of cross-country hiking due to the exposed rugged geological terrain that is difficult to traverse, dense vegetation in some areas and hiker unfamiliarity with park geography.

In a 1998 nationwide survey, in which the general public was asked to define the most important reasons for having national parks, seventy-two percent of respondents indicated that parks provide opportunities to experience natural peace and the sounds of nature (NPS 2009). In a 1995 soundscape survey of park visitors, ninety-one percent of respondents also reported enjoyment of natural quiet and the sounds of nature as compelling reasons for visiting national parks (McDonald et al. 1995).

As part of development of an ATMP for Hawai‘i Volcanoes, a 2007 study was conducted to examine the effects of natural and human-caused sounds, including air tour sounds, on visitor’s experiences of the park’s soundscape (Lawson et al. 2007). The study was partly conducted through attended listening surveys, in which study participants sat and listened to sounds near the

Kīlauea Overlook or on the side of the trail to Thurston Lava Tube. Participants then identified sounds heard and reported emotional responses to these sounds. Nearly all visitors reported hearing natural sounds particularly wind, the rustling of leaves, and birds calling. They overwhelmingly reported these as pleasing to hear or acceptable for this location, along with subdued sounds of other visitors conversing or walking. However, they did not like loud talking or noise from cell phones or other personal electronic devices. About one-quarter of visitors reported hearing aircraft noise. Approximately two-thirds to three-quarters of those reporting an emotion associated with aircraft sounds reported these as negative. The majority of participants reported aircraft noise as unacceptable or annoying in these two locations.

The Lawson study also looked at visitor response to simulated park soundscapes by evaluating participant response to five audiotapes containing various simulated park soundscapes (Lawson et al. 2007). These included an audiotape of a natural soundscape in the park (tape 1) and a series of four audiotapes (tapes 2-5) with increasing noise from helicopters added to the base natural soundscape. Soundscapes with no or less helicopter noise (tapes 1-3) were acceptable and the soundscapes with high levels of helicopter noise (tapes 4-5) were unacceptable to a substantial majority of participants. Most visitors reported pleasing natural sounds in tapes 1 and 2 and no pleasing sounds in tape 5. Approximately two-thirds of visitors surveyed reported that what they heard in the park resembled most closely tape 1 with all natural sounds and no helicopter noise. Participants' acceptance of helicopter noise was determined to be a function of the number of flights in a given period or the interval when natural sounds were again dominant. A majority (two-thirds) of participants reported that hearing a helicopter flight once per hour was acceptable but a majority of respondents also reported that hearing a helicopter every fifteen minutes was unacceptable. The most preferred scenario by those surveyed is to never hear helicopters.

It should be noted that the Lawson social science survey (2007) was conducted in areas of high visitation (i.e., Thurston Lava Tube and Steam Vents) which are characterized by relatively high levels of anthropogenic noise. Chain of Craters Road was closed during the sampling period due to an earthquake and subsequent road crack. Due to the road closure, visitor experience relative to park soundscapes and impacts of aviation noise was not sampled in designated wilderness or backcountry areas where expectations of experiencing solitude and natural sounds would undoubtedly be higher because of wilderness character. Wilderness is without permanent human development and control, and with natural ecosystems and opportunities for solitude. Park policy related to visitor opportunities for solitude and primitive and unconfined recreation in wilderness settings is included in the "Wilderness" impact topic below.

Environmental Consequences

The impacts of the alternatives on visitor use and experience were derived from social science research at Hawai'i Volcanoes and other park settings, scientific literature, and best professional judgment of park staff. Impacts to wilderness visitor experience, including opportunities for solitude and primitive forms of recreation, are included in the "Wilderness" impact topic.

Thresholds of change for the intensity of an impact are defined as follows:

Negligible: Human-caused noise associated with the proposed aviation operations is not detectable for a significant portion of the project area or for a significant amount of time.

If human-caused noise is present at all, it is only at very low levels compared with the natural soundscape and only for short duration in most of the area. Visitors would almost always have the opportunity to experience the natural soundscape free from human-caused noise, especially between sunset and sunrise.

Minor: Human-caused noise associated with the proposed aviation operations is occasionally audible and detectable and would affect some visitors for a short period of time lasting minutes. Administrative aircraft sounds would be heard on average no more than once per hour. The changes in visitor use and experience would be slight but detectable; however, visitors would almost always have the opportunity to experience natural sounds unique to the park, especially between sunset and sunrise.

Moderate: Human-caused noise associated with proposed aviation operations is detectable and readily apparent, affecting some visitors for minutes or up to several hours over one or two days. Administrative aircraft sounds would be heard more than once per hour. Visitor opportunities to experience natural sounds, unique to the park would be interrupted by aircraft noise. Visitors would have the opportunity to experience natural sounds unique to the park, primarily between sunset and sunrise. Changes in visitor use and experience might be measurably affected. Some visitors may choose to pursue activities in other areas of the park.

Major: Human-caused noise associated with proposed aviation operations is detectable and readily apparent, affecting some visitors for more than several hours over several days. Administrative aircraft sounds would be heard multiple times per hour, and multiple hours per day masking natural sounds for extended periods of time. The impact would affect the majority of visitors and visitor experience would be affected substantially. Visitor opportunities to experience natural sounds unique to the park would be interrupted multiple times per day by aircraft noise. Some visitors would choose to pursue activities in other areas of the park.

Impacts of the No Action Alternative

Aviation operations under the no action alternative, without consistent implementation of the park's BMPs, area restrictions, and mitigation measures, would have an adverse impact on park visitor use and experience because of noise and/or visual intrusion of aircraft, particularly affecting visitors in the park's remote backcountry or wilderness areas where expectations of solitude and natural conditions, including natural soundscapes are high and human noise has a disproportionate impact. The impact of administrative aviation operation noise on visitor experience in the no action alternative is a short-term moderate impact. As mentioned previously, aircraft sounds are characterized by many survey respondents at Hawai'i Volcanoes in front-country areas as unacceptable or annoying in a park setting. Sounds of administrative aviation may mask natural sounds in the park such as bird vocalizations, wind, leaves rustling, and rain and interfere with visitor enjoyment. These natural sounds have been identified by park visitors as pleasurable sounds or acceptable in the park setting.

The impact of administrative aviation noise on visitor experience has the greatest impact in the park's remote backcountry where visitor expectation for experiencing natural quiet and solitude is highest. The majority of administrative flight hours focus on project work in backcountry locations outside the areas of the park with high concentrations of visitors. For example, maintenance of volcano monitoring instruments involves flights to volcanically sensitive areas

that are remote from the road network in the park. Invasive species control emphasizes aerial detection over open terrain in remote roadless areas of the park, as well as intermittent project-based work to construct, repair, and replace ungulate exclusionary fence, largely occurring on park boundaries and now in the Kahuku Unit. Rare species recovery related flights include camp supply in the coastal area and flights upslope from the end of the Mauna Loa Road. The highly intermittent flights to support cultural resource documentation and protection typically involve remote lowland areas on Kīlauea and upland areas in Kahuku, and park maintenance flights emphasize backcountry trails and camp locations for trails, latrine, and water and cabin maintenance. Aside from twice annual flights to detect marijuana cultivation, law enforcement and search and rescue flights are unpredictable but typically involve remote areas not accessible by vehicles. All of the above described examples are of short duration except fence construction which may involve repeated flights in a day between the staging area and sling load sites. Fence construction or complete replacement for a particular fence segment occurs once every 15-35 years depending on environmental factors at the location, so the impact is very intermittent over time.

Administrative aviation operations do occur for brief periods at the Kīlauea summit. Many administrative flights stage from the park rainshed located one-quarter mile from the Kīlauea Visitor Center. These flights almost always approach and depart to the north, away from the visitor center. The typical flights every 1-2 weeks by HVO to monitor volcanic activity at Halema'uma'u and the East Rift, involve approximately 5-10 minutes of total flight time around the caldera area starting at the rainshed, flying over Halema'uma'u Crater and then to the east for Pu'u 'Ō'ō monitoring which includes flight time outside the park. The Kīlauea Caldera area is currently closed to general and commercial aviation because of the temporary flight restriction associated with the on-going eruption and the associated plume at Halema'uma'u.

Currently, the majority of administrative flights occur without notification to visitors and are an unexpected occurrence to the park visitors. These operational flights are most likely going to have the greatest effect on visitors in the backcountry concentrated on trails and camps. In the backcountry setting of the park with lower concentrations of visitors, natural sounds dominate and park visitors may have a higher expectation of experiencing natural sounds and solitude, particularly in designated wilderness areas. The impacts on these visitors may be disproportionately greater than those of visitors in developed areas or along roadways who are exposed to vehicle noise, sounds of other visitors. Moreover, many geologic monitoring and backcountry administrative flights are low level (300-500 AGL) and may involve hovering and landing, which generates higher dBA for short periods of time and is disruptive to visitors in the vicinity. However, these occur on an irregular basis for project work, and approximately every 1-2 weeks for HVO's eruption flights and about 1-2 times per year for maintaining remote instrument stations.

The short-term moderate impact of administrative aviation noise on visitor experience is also tempered by the beneficial, indirect effects of administrative actions supported by administrative aviation operations. Most of these results are long-term and broad in scope. Administrative aviation supports the network of monitoring instruments that provide timely warning of volcanic hazards not only to protect park visitors and park operations but also the surrounding island population. In addition, administrative aviation supports invasive species control and recovery of

native ecosystems and special status species. These actions are critical to the NPS mission and implementation of the NPS *Organic Act*. As a result, visitors are able to safely access and enjoy the world's most active volcanoes and observe intact native ecosystems, as integral to protection and perpetuation of park significance. Furthermore, administrative aviation supports maintenance of visitor facilities which also help protect park resources by defining and concentrating visitor impacts onto designated trails and campsites that require maintenance. Maintenance of visitor facilities in designated wilderness (within the guidelines of MRDG), include maintenance of water catchment systems, without which fewer visitors would choose to visit. The existence of a water catchment source for coastal backcountry hikers also protects the brackish water sources of the park's anchialine pools that is often utilized by hikers in the absence of other available drinking water. Finally, administrative aviation supports search and rescue, wildfire suppression activities, and law enforcement operations, all benefitting park resources and visitor safety.

Cumulative Impacts

Past, present, and reasonably foreseeable actions that may contribute to cumulative impacts of administrative aviation on park visitor use and experience are the ongoing numbers of commercial air tours, administrative use of mechanized equipment at the ground level, increased vehicle noise on Highway 11, increasing development in the surrounding communities or adjoining lands, and changes in park visitation patterns and development. Commercial air tours currently average 12,226 flights per year over the park (2008-2011 fee data) and legally have the potential to fly up to 28,441 flights annually. Past eruptive events offering surface lava flows visible near Pu'u 'Ō'ō and along the East Rift experienced 60-80 air tours daily (NPS 2008a). These flights tend to be concentrated over the Pu'u 'Ō'ō area and Kīlauea's lower East Rift but ingress and egress to this location occurs over other areas of the park and surrounding communities. Air tours transiting from the island's west side currently routinely cross the Mauna Loa Road area and during periods of poor weather can dissect the central part of Kīlauea at low altitudes of 500' AGL. Since 2008, the park airspace at Kīlauea Summit has been restricted for a radius of three miles at 4000' AGL and below due to the presence of ash and an eruption column typically heading west from the Summit (figure 6). Currently air tour noise can have a significant impact on park visitor use and experience for visitors on the ground in many areas of the park under commonly used flight paths, particularly when there is an active lava flow or poor weather forces low altitude flights. Certain areas of the park that exhibit large expanses of lava also produce landscapes that offer little sound shielding, creating long "time audibles" for human or mechanized sounds. In these areas, noise has the potential for creating a greater acoustic impact on soundscapes, which can impact the park visitor experience. A future ATMP is anticipated to help in addressing the number of commercial air tour flights and/or the locations of flight routes. This would reduce the level of this significant cumulative impact at some point in the future.

Existing administrative sources of noise other than use of aircraft include mechanized equipment used to maintain facilities and grounds in park developed areas, such as heavy equipment, power saws, nail guns, leaf blowers, lawn mowers, and weed eaters. In the backcountry or designated wilderness, as consistent with the MRDG, administrative noise also may include occasional use of weed eaters used for clearing deep grasses from trails and occasionally involves the use of rock drills and generators for constructing and repairing ungulate exclusionary and boundary

fences. It may also include the occasional use of firearms to control introduced ungulates, particularly in Kahuku. Mechanized equipment is also occasionally used to maintain backcountry cabins and related structures. A broad range of park administrative activities that create noise contribute to long-term, beneficial impacts on visitor use and experience and allow visitors to access and appreciate the park's spectacular diversity of resources, including active volcanoes, intact native forests and perpetuation of native species and native Hawaiian culture.

The future development of subdivisions and communities adjoining the park may result in increased noise in the park. Mechanized land clearing or landscape maintenance, higher human population, reduced forest cover to buffer sound propagation, and particularly increased vehicle traffic on Highway 11 may increase future noise penetrating park soundscapes and affecting visitor use and experience.

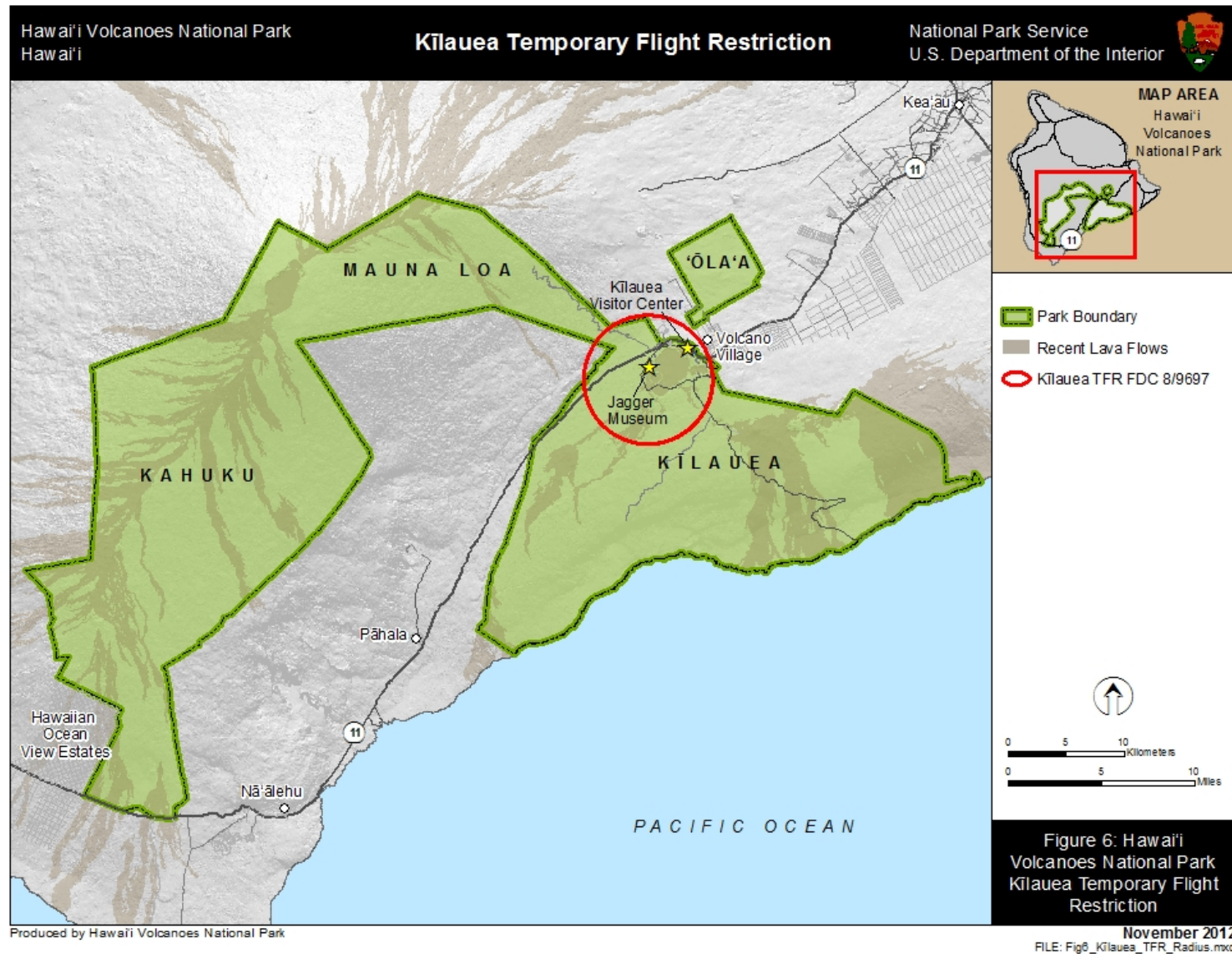
These past, present, and reasonably foreseeable future actions would have short-term minor to major adverse impacts on park visitor use and experience, particularly from the continuing pattern of use by commercial air tours, and long-term beneficial impacts on soundscapes from park restoration activities.

Conclusion

The no action alternative would result in short-term, adverse negligible to moderate impacts on park visitors. The no action alternative would also result in beneficial, indirect, long-term impacts on visitor experience by providing a safe park environment, recovered native species or restored native ecosystems, as well as maintained backcountry trails and camps. The past, current, and reasonably foreseeable actions, particularly those of commercial air tours, have a significant impact on the park visitor use and experience. The administrative aviation contributes minimally to these impacts due to the much lower frequency and duration of administrative flights. In addition to benefitting native species and ecosystems, as well as backcountry visitor use, administrative aviation has long-term beneficial impacts because it provides for the safety of park visitors, staff, and island residents through geological hazards monitoring.

Impacts of the Preferred Alternative

The impacts of the preferred alternative on visitor use and experience are similar in type but of lower intensity and shorter duration than those of the no action alternative. The BMPs in the proposed plan and preferred alternative will reduce the impacts of administrative aviation, including noise and mechanized intrusion, on park visitors in the following ways. Requiring an approved flight plan will improve coordination of flights among NPS divisions and among NPS, USGS, and other partners, potentially reducing flight numbers and encouraging doubling of efforts for work in the same vicinity. Other measures that will mitigate and reduce flight impacts include advance identification of flight paths to avoid known sensitive resources, e.g., nesting sites of special status species; the use of staging areas to reduce unnecessary transit over park areas; regular internal review of BMPs to minimize impacts on park visitors; and enhanced outreach to the public about flight occurrences and purpose. BMPs will require park staff at the Kīlauea Visitor Center and park backcountry permit office to post information and inform those obtaining a backcountry permit about planned aviation operations involving multiple flights, landings, if near visitor concentrations or in sensitive areas (e.g., visitors on backcountry or



wilderness trails and at campsites). Past social science research indicates that if visitors know the helicopter they are seeing is NPS mission-related then they were less likely to find the aircraft noise and intrusion to be offensive. Administrative aviation operations under the preferred alternative will help to lessen the impacts to visitor use and experience by increasing visitor outreach and provide for visitor self-selection in the event of backcountry project work. Through the BMPs of flight planning, transit flights can avoid front-country areas of high visitor concentrations, including Kīlauea Visitor Center, Jaggar Museum, Thurston Lava Tube, Steam Vents, Kīpuka Kī, and Kīpuka Puau. Minimal flying is currently done over the Kīlauea Summit Area as described in both alternatives, with short 5-10 minute eruption response monitoring flights over Halema'uma'u.

Implementing the preferred alternative and BMPs will reduce impacts on the visitor experience in the park backcountry and designated wilderness where most administrative flights take place. The BMPs recommend that flights avoid backcountry trails, cabins and camps as well as designated wilderness, where possible, by re-routing flights to wilderness boundaries and roads and, when feasible, landing outside wilderness and hiking or packing materials into wilderness. Flight paths located in areas with naturally higher soundscape dBA levels, such as near the ocean or in windy sites can help to mask overflight noise. The BMP related to avoiding flights at sunrise and sunset will reduce impacts on cultural practitioners visiting the park, as well as protecting some sensitive species which are related to protection of park significance and long-term visitor enjoyment and appreciation.

Administrative aviation operations under the preferred alternative continue to support the HVO program of evaluating eruptive activity and maintaining volcano monitoring instruments to provide warning of volcanic hazards to park managers, visitors and general public. Administrative aviation operations will also continue to play an essential role in control of invasive species, protection and restoration of native ecosystems, and recovery of special status species, as well as maintenance of backcountry visitor facilities and emergency response as discussed previously.

Cumulative Impacts

Cumulative effects of the preferred alternative are the same as those for the no action alternative.

Conclusion

Implementing the preferred alternative would result in short-term, adverse, negligible to moderate impacts to the visitor experience. The preferred alternative would have less impact on visitor use and experience than the no action alternative. The preferred alternative would still have long-term beneficial effects for park visitors by providing timely warnings of geological hazards, emergency services, and restoration of native ecosystems and species. The past, current, and reasonably foreseeable actions, particularly the presence of high numbers of commercial air tours, have a significant impact on the park visitor use and experience. Administrative aviation operations contributes minimally to these impacts due to the much lower number of flights, avoidance of high visitor use areas, and dispersal of activities (less concentrated) across the

landscape, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems as discussed previously.

Park Operations

Regulatory Framework

From *NPS Management Policies* 8.2.5 (NPS 2006), the saving of human life will take precedence over all other management actions as the Park Service strives to protect human life and provide for injury-free visits. The Service will do this within the constraints of the 1916 Organic Act. The primary—and very substantial—constraint imposed by the Organic Act is that discretionary management activities may be undertaken only to the extent that they will not impair park resources and values.

Under the *Stafford Act* (P.L. 93-288), the USGS has the federal responsibility to issue timely and effective warnings of potential volcanic disasters.

The Service will work closely with specialists at the U. S. Geological Survey and elsewhere, and with local, state, tribal, and federal disaster management officials, to devise effective geologic hazard identification and management strategies...park managers will strive to understand future hazards and, once the hazards are understood, minimize their potential impact on visitors, staff, and developed areas (NPS 2006, 4.8.1.3).

All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species...interferes with natural processes and the perpetuation of natural features, native species or natural habitats (NPS 2006).

The National Park Service will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems (NPS 2006, 4.4.1).

The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the *Endangered Species Act* (NPS 2006, 4.4.2.3).

The Park Service will provide for the long-term preservation of, public access to, and appreciation of the features, materials, and qualities contributing to the significance of cultural resources (NPS 2006, 5.3.5).

NPS Management Policies 2006 8.6 (NPS 2006) state that “The National Park Service will make reasonable efforts to provide for the protection, safety, and security of park visitors, employees, concessionaires, and public and private property and to protect the natural and cultural resources entrusted to its care.”

Affected Environment

Park operations refer to the quality and effectiveness of activities of park staff and partners, plus the associated infrastructure in the park, to protect, restore, and/or preserve natural and cultural resources and to provide for a quality visitor experience. Helicopters are used administratively in

the park for a broad range of park operations, including emergency response, monitoring geological hazards and research, removing invasive species, restoring native species and ecosystems, documenting and protecting cultural resources, and maintaining backcountry trails, shelters, and communications equipment. In the sections that follow, the descriptions of affected environment will emphasize those park operations utilizing aviation that might be the most affected by the alternatives. The descriptions will include a discussion of involved park resources or responsibilities to park visitors, as well as the role of aviation in managing those resources.

Park Divisions and Functions

All park operations, including those described involving the use of aviation, are carried out by seven divisions of park management. The park divisions and associated functions are briefly described here to provide context for potential effects of the alternatives on park operations that might require additional staff and funding to implement, thereby affecting unrelated park activities carried out by different administrative divisions of the park.

The Administrative Division oversees all budget operations, contracting, commercial business operations, human resources, and property. The Interpretation Division provides publications, public education and outreach, communication, and interpretive programs. The Maintenance Division is responsible for the maintenance of buildings, utilities, roads, trails, grounds, and backcountry cabins and shelters. The Natural Resources Division is responsible for the maintenance of native species and native ecosystems, including invasive species control, ecosystem restoration, and rare species recovery. The Cultural Resources Division is responsible for cultural resources including archeological, ethnographic, and historic resources, as well as museum collections and cultural landscapes. The Fire Management Division is responsible for fire management of all the parks in the Pacific Island network, including fire management plans, response to wildland fire, and management of hazardous fuels. The Visitor and Resource Protection Division provides for the protection of the visiting public and park resources through law enforcement, search and rescue, dispatch operation, and the Eruption Crew which manages the public relative to volcanic hazards.

Park Partnerships and Aviation in the Park

The main park partner involving the administrative aviation in Hawai'i Volcanoes is HVO, whose headquarters are located within the park. The main function of HVO is to assess and provide warning of volcanic and earthquake hazards to island residents and communities as well as park visitors and staff. Other partners or cooperating agencies include USGS Pacific Island Ecosystems Research Center, NPS Inventory and Monitoring Program, Research Corporation of the University of Hawai'i, and other universities' researchers who complete research and monitoring projects in the park to assist in park knowledge and management of resources. In addition, partners such as Hawai'i County Police Department, Hawai'i County Fire Department, and the US Drug Enforcement Agency, typically utilize the park helibase at the rainshed as a staging area for their operations, almost all outside the park, that include law enforcement, fire, search and rescue, or detection of marijuana cultivation.

Emergency Response

Helicopters are used for a range of emergency response operations in the park. They are used to monitor and assess eruption activity, for wildland fire management, for search and rescue operations, and for law enforcement (refer to Chapter 2 for detailed description of aviation actions). Between 2006 and 2010, annual flight hours allocated to these activities averaged 40 hours and ranged from 18 to 88 hours.

Volcano Monitoring

Hawai'i Volcanoes overlies the dynamic landscapes of two highly active volcanoes, Kīlauea and Mauna Loa. Kīlauea is the locus of a 30-year, on-going eruption, which currently is active at the summit and along the volcano's east rift zone. The volcanoes are monitored and studied by HVO, located inside the national park. The USGS has the responsibility of issuing effective and timely warnings of geological hazards, for the health and safety of island residents and communities, as well as park visitors and staff.

Volcano monitoring is continuously carried out through a network of more than 100 permanent and temporary instrument stations deployed inside and outside the park. The instruments are mostly out of the sight of park visitors and remote from roads. These instruments include GPS receivers, seismic sensors, tiltmeters, gas sensors, radio repeaters, and webcams. Many of the instruments are telemetered, with batteries, solar panels, and radio antennae. Helicopters are needed to deploy and maintain approximately half of the monitoring instruments. For example, maintenance of some of the instruments includes replacement of the 240-480 pounds of batteries approximately every 4-6 years. HVO staff drive to the other half of their monitoring stations near developed park roads or along the network of unpaved administrative (closed to the public) park roads. Between 2007 and 2010, annual flight hours allocated to these activities averaged 66 hours, and ranged from 61 to 75 hours.

NPS Communications

An NPS radio repeater is located in wilderness on Mauna Loa at approximately 12,500 foot elevation. This consists of a 35 square-foot boxed repeater unit and a solar panel. The Mauna Loa repeater serves large areas of the park including the developed area at Kīlauea summit. A webcam to detect fire is located in Kahuku at Pu'u Keokeo. Helicopter support is needed for annual maintenance for both these facilities.

Invasive Species Control and Native Species/Ecosystem Restoration

Island ecosystems are especially vulnerable to invasive species which displace native species and degrade native ecosystems. Hawai'i Volcanoes attempts to control the most disruptive invasive species including alien ungulates present in the park such as feral pigs, goats, cattle, and sheep, as well as mouflon sheep (NPS 2013). Approximately 100 miles of ungulate exclusionary fencing has been constructed in the Kīlauea, 'Ōla'a, and Mauna Loa Strip portions of the park (figure 4). Helicopters are used to construct, repair, and replace ungulate fences, transporting

fencing material (e.g. a roll of four-foot hog wire weighs 300 pounds) to remote, roadless sites inaccessible to stock animals due to earth cracks, fragile lava, and dense rain forest. Fence replacement is typically done at 15 to 30 year intervals depending on the environment and when funding is made available. The park is in the process of controlling a large population of mouflon in the Kahuku Unit through a combination of fencing and direct removal. Over 40 miles of fence has been built in Kahuku and more fencing is planned, mostly along the park boundary. Helicopters are also used to census population and distribution of mouflon, aerially control mouflon at Kahuku, and detect and control feral goats and mouflon that have breached park exclusionary fences.

Helicopters are also used for invasive plant control and native plant restoration in remote or difficult to access areas of the park. They are utilized to biannually search coastal and mid-elevations in the Ka'ū portion of the park; and intermittently used in upland areas of Kahuku to detect localized populations of invasive plant species, and, when access for follow-up ground crews is not available, to aerially spray target weeds. Helicopters are utilized, on an infrequent project-basis, to transport hundreds to thousands of nursery grown native plants to restore native vegetation in remote areas, e.g. burned areas.

Threatened, Endangered, or Rare Species Recovery

Helicopters are used to transport temporary camps, drinking water, predator traps, and personnel to remote colonies of the endangered 'ua'u or Hawaiian petrel which nests from 6,000-9,000 foot elevation on Mauna Loa. Management is needed to monitor and protect colonies from predators such as feral cats and mongoose. In addition, helicopters are also used to transport temporary camps, drinking water, predator control traps, and composting toilets to temporary coastal camps to support the monitoring and protection of honu'ea or hawksbill turtle. Finally, helicopters are occasionally utilized to transport nursery grown threatened, endangered, and rare plants to remote sites to stabilize vulnerable small populations or for reintroduction.

Cultural Resources Protection and Documentation

Cultural resources at Hawai'i Volcanoes reflect 600 years of human activity in the area of the park. Nearly half of Hawai'i Volcanoes is located in the Puna-Ka'ū Historic District. Cultural resources include pre-western contact archeological remains such as house sites, agricultural mounds, traditional trails, and petroglyphs, mostly located in coastal Hawaiian settlements but also occurring at higher elevations. Cultural resources also reflect archeological remains of the post-western contact period (e.g. rock walls built to exclude introduced cattle) or early park development (e.g. the historic Mauna Loa Truck Trail built by the Buffalo Soldiers. They also include more recent but historic backcountry cabins and shelters which are eligible for national register nomination).

Section 110 of the NHPA requires that federal agencies must establish a preservation program to identify, evaluate, nominate to the National Register, and protect its historic properties (Sec. 110[a][1], Sec. 110[a][2], Sec. 110[c], and Sec. 110[d]). The agency must also provide for the timely identification and evaluation of historic properties under agency jurisdiction or control and/or subject to effect by agency actions (Sec. 110[a][2][A], and Sec. 112). Helicopters are used

to access remote, roadless areas that are inaccessible to stock animals. Helicopters provide a cost-efficient means for transporting staff and equipment to and from these sacred and sensitive sites to complete mandated inventories, assessments, evaluations and updates.

Between 2007 and 2010, an annual average of approximately 100 hours (range from 65 to 139 hours) of aviation were needed for natural and cultural resources management functions, with the great majority of time allocated to natural resources management activities, particularly fence construction, replacement, and repair, invasive species control, and endangered species recovery.

Backcountry Trail and Camp Maintenance

Of the 155 miles of designated trails in Hawai'i Volcanoes, approximately 125 miles are backcountry trails whose maintenance is partly supported by administrative aviation operations (figure 3). Many of these trails penetrate the most remote parts of the park such as the Ka'ū Desert and coastline and the summit of Mauna Loa. Maintained trails are critical for visitors use at the park because of dense vegetation or rugged, young volcanic terrain that inhibits cross-country travel, especially for visitors unfamiliar with this kind of landscape. Some segments of backcountry trails are located on sparsely vegetated lava flows and require minimal maintenance. However, a significant number of miles of trail are located in dense grasslands or forest and require routine clearing. Other sections of trail are located on steep fault scarps with high erosion potential which require drainage structures that need routine maintenance. Because of the absence of permanent surface water, water catchment structures are provided for campers at six developed camps. Historic cabins are located at three camps and historic shelters at the other camps. These shelters and cabins require regular maintenance because of their historic resource value, age, exposure to salt spray at the coast, and the complexity of water catchment systems and composting toilet facilities. Occasionally, backcountry maintenance will also involve restoration of the environs of a camp or shelter/cabin, e.g., removal of invasive plants that invade tent campsites and degrade the general environment and visitor experience. Between 2006 and 2010, annual flight hours allocated to these activities averaged about 11 hours, and varied between 0 and 16 hours.

Environmental Consequences

The impacts of the alternatives on park operations and management were derived from park staff knowledge. Thresholds of change for the intensity of an impact are defined as follows:

Negligible: Park operations would not be affected.

Minor: Park operations would be affected, and the effect would be detectable, but current levels of funding and staff would be adequate and other park operations would not be reduced.

Moderate: Park operations would be affected, the effect would be readily apparent and increased staff and funding would be needed or other park operations would have to be reduced and/or priorities changed.

Major: Park operations would be affected, the effect would be readily apparent and increased staff and funding would be needed or other park programs would have to be eliminated.

Impacts of the No Action Alternative

Under the no action alternative, the park and its partners or cooperating agencies would continue current flight practices with administrative use of aviation. Helicopters would be used to respond to eruptive activity, carry out fire management, search and rescue, and law enforcement missions, monitor the volcano, research, manage invasive species, restore native plant communities and rare species, document and preserve cultural resources, and maintain backcountry trails and shelters. In carrying out these park operations, there would be no prescribed procedures for flight approval and planning, and coordination of flights from different operations, protection of wilderness, wildlife, visitor experience, and special status species. However, some flight managers and contract helicopter pilots are now implementing at least some of the BMPs, area restrictions, and mitigations articulated in the draft plan.

There would be no change in the amount of staff time or budget required to continue implementing these required actions articulated in the “Affected Environment” section above, and thus no impacts on park operations.

Cumulative Impacts

Other current and reasonably foreseeable future actions, plans, and program may place demands on staff time and park budget and thus contribute to cumulative impacts on park operations. Some actions that may involve reallocation of staff and budget within the park include the development of facilities and seven days per week visitation at Kahuku and other planned actions that may be prescribed in the GMP that is under development. Furthermore, some key park functions or operations are supported by project funding which can fluctuate greatly from year-to-year, affecting the functions and other park operations.

Conclusion

The no action alternative would have a negligible, long-term or continuous effect on park operations as described above. This impact may be characterized as beneficial in that the emphasis on efficiency of operations in the no action alternative utilizes the fewest possible staff and budget resources, thus protecting other park operations. Past, present, and reasonably foreseeable actions, particularly development and visitor access to Kahuku, along with other management actions that may be prescribed in the GMP, when combined with direct impacts of the alternative, may have a future minor to moderate impact on park operations. However, the no action alternative will have no additional impact on existing park operations; it is the current park practice.

Impacts of the Preferred Alternative

Under the preferred alternative, all flight managers and contract helicopter pilots for Hawai‘i Volcanoes and its partners would consistently implement the BMPs, area restrictions, and mitigation measures of the proposed plan. All of the required park operations utilizing aviation could still be implemented. In this regard, the preferred alternative would have negligible direct impacts on park operations. Implementing the proposed plan under the preferred alternative may involve extra flight time and staff time to avoid valued resources such as the interior of wilderness, backcountry camps, and trails. These kinds of actions may increase the cost of aviation and staff time in the park and thus affect other park operations. In addition, further time

will be spent on reviewing and updating the BMPs and in training project managers, helicopter managers, and pilots on the BMPs. On the other hand, improved planning with a flight plan approval process, careful selection of staging areas, and consolidation of flights to reduce ferry charges would tend to make the use of the helicopter flight time more efficient.

Cumulative Impacts

Other past, present, and reasonably foreseeable future actions are identical to those of the no action alternative.

Conclusion

The preferred action alternative may have a long-term, negligible adverse impact on park operations. Past, present, and reasonably foreseeable actions, particularly development and visitor access to Kahuku, along with other management actions that may be prescribed in the GMP, when combined with direct impacts of the alternative, may have a future minor or moderate impact on park operations. In short, the preferred alternative will not contribute significantly to the overall impact on park operations.

Wilderness

Regulatory Framework

Except as otherwise provided in this Act, each agency administering an area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall administer such areas for such other purposes for which it may have been established and also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use (*Wilderness Act* of 1964 [16 U.S.C. 1131]).

Except as necessary to meet minimum requirements for the administration of the area for the purposes of this Act, (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structures or installations within any such area (*Wilderness Act* of 1964 [16 U.S.C. 1131]).

All management decisions affecting wilderness must be consistent with the minimum requirement concept. This concept is a documented process used to determine if administrative actions, projects, or programs undertaken by the Service or its agents and affecting wilderness character, resources, or the visitor experience are necessary, and if so how to minimize impacts. The minimum requirement concept will be applied as a two-step process that determines:

- Whether the proposed management action is appropriate or necessary for administration of the area as wilderness and does not cause a significant impact to wilderness resources and character, in accordance with the *Wilderness Act*, and

- The techniques and types of equipment needed to ensure that impacts on wilderness resources and character are minimized (NPS 2006, 6.3.5)

Administrative use of motorized equipment or mechanical transport will be authorized only:

- If determined by the superintendent to be the minimum requirement needed by management to achieve the purpose of the area, including the preservation of wilderness character and values, in accordance with the *Wilderness Act*, or
- In emergency situations (for example, search and rescue, homeland security, law enforcement involving the health or safety of persons actually within the area) (NPS 2006, 6.3.5).

Scientific activities are to be encouraged in wilderness. Even those scientific activities (including inventory, monitoring, and research) that involve a potential impact to wilderness resources or values (including access, ground disturbance, use of equipment, and animal welfare) should be allowed when the benefits of what can be learned outweigh the impacts on wilderness resources or values. However, all such activities must also be evaluated using the minimum requirement concept and include documented compliance that assesses impacts against benefits to wilderness. This process should ensure that the activity is appropriate and uses the minimum tool required to accomplish project objectives (NPS 2006, 6.3.6.1).

Cultural resources that have been included within wilderness will be protected and maintained according to the pertinent laws and policies governing cultural resources using management methods that are consistent with the preservation of wilderness character and values. These laws include the *Antiquities Act* and the *Historic Sites, Buildings and Antiquities Act*, as well as subsequent historic preservation legislation, including the *National Historic Preservation Act*, the *Archeological Resources Protection Act*, and the *Native American Graves Protection and Repatriation Act* (NPS 2006, 6.3.8).

Affected Environment

Currently 130,950 acres of lands in the Kīlauea and Mauna Loa Volcano portions of Hawai‘i Volcanoes are designated wilderness and included in the National Wilderness Preservation System. The 150,865 acre² Kahuku acquisition (2003) was assessed by park staff for wilderness qualities in 2010-2011. It was concluded in the determination of eligibility that 121,015 acres of Kahuku are eligible for further study and possible inclusion in the National Wilderness Preservation System (figure 3; NPS 2012a). Wilderness eligible lands include the roadless, upland portions of Kahuku, upslope of the cattle pastures and 100 meters above and along the uppermost roads. Dir. Order 41: *Wilderness Stewardship* states that upon determination of

² For this section, acreages related to Kahuku and eligible wilderness are reported as an estimation generated by Geographic Information Systems (GIS) software that uses projections on the land to determine total acreage within geographically defined boundaries. Determining acreage at Hawai‘i Volcanoes National Park is a complex process in which varying sources provide different estimations of total acreage. Other acreages provided previously in this document have been determined from County/State Tax Map Key (TMK) maps, which have rarely been verified by cadastral surveys. The Kahuku acquisition was one entire TMK, so breaking out the eligible wilderness piece is not possible in TMK acreages. Therefore, it is reported in GIS acres.

eligibility, the park is required to manage the area as wilderness to preserve the wilderness characteristics until a final determination is made that either the lands will become designated wilderness or they are released.

Wilderness character is defined by these qualities:

- *Untrammeled.* Wilderness is essentially unhindered and free from the actions of modern human control or manipulation.
- *Natural.* Wilderness ecological systems are substantially free from the effects of modern civilization.
- *Undeveloped.* Wilderness retains its primeval characters and influence and is essentially without permanent improvement and modern human occupation.
- *Solitude or Primitive and Unconfined Recreation.* Wilderness provides outstanding opportunities for solitude and a primitive and unconfined type of recreation.

These elements of wilderness character imply the qualities of visitor experience and expectations in wilderness relative to natural soundscapes. Wilderness provides greater opportunities and expectations of hearing natural sounds or experiencing natural soundscapes and absence of human sources of noise.

Designated wilderness in Hawai'i Volcanoes consists of four highly diverse, disjunct units, remote from each other and from the visitor developed areas at the Kīlauea summit and the eruption viewing area at the end of Chain of Craters Road. These wilderness units vary in elevation, climate, vegetation, character of surface volcanic features, and visitor use. The Mauna Loa Unit preserves wilderness character of the southeastern face of Mauna Loa above 4,800 foot elevation to the summit (excluding the Mauna Loa Road corridor). This area is characterized by koa forest, subalpine and alpine shrublands and extensive barren lava flows at higher elevations. Trails lead to the summit caldera from the end of Mauna Loa Road, the weather observatory off Saddle Road, and the Kapāpala Forest Reserve. Developed camps and water are available at the historic Red Hill Cabin along the Mauna Loa Trail and the Mauna Loa Cabin at the summit.

The Ka'ū Unit preserves wilderness character of the Ka'ū Desert and coastal areas in the western part of Kīlauea. This area is characterized by 'ōhi'a woodlands, native shrublands, grasslands, and extensive recent lava flows. Trails provide access from the Kīlauea summit, Highway 11 near Footprints, the end of Hilina Pali Road, and the Chain of Craters Road. All of these trails connect to a coastal trail where use is concentrated at the beaches of Ka'aha and Halapē.

The East Rift and 'Ōla'a Units are much smaller parcels of wilderness. The East Rift Unit preserves wilderness character of the highly dynamic mosaic of recent lava flows, pit craters, rain forest, and pioneer vegetation reestablishing on recent lava flows on Kīlauea's active upper east rift zone. Trails in this unit lead from Mauna Ulu and Kealokomo along Chain of Craters Road to a primitive camp without water at the west edge of Nāpau Crater. The 'Ōla'a Unit preserves wilderness character of a dense, tree-fern dominated rainforest. No formal trails or camps are present in this wilderness unit, and wilderness use includes rare cross-country day hiking in the west half of the unit, fenced on the boundary and internally to exclude feral pigs. It may also include occasional illegal pig poaching in the eastern, unfenced portions of the Unit.

Almost all wilderness use occurs on marked or maintained trails and at the historic cabins at Mauna Loa Summit, Red Hill, and Pepeeiao or the historic shelters at Ka‘aha and Halapē. The rugged volcanic terrain and dense rain forest vegetation inhibits off-trail use. In addition, permanent surface water is not available on the porous volcanic landscape of the park. Rain water catchment and storage tanks provide seasonally available water at the cabins and shelters. Almost all of the average annual 4,700 backcountry overnight visitors camp in designated wilderness. The only designated backcountry camps outside wilderness are the shelter at Keauhou Landing and a camp without shelter or water at ‘Āpua Point.

The park’s wilderness units are located largely along or near the southwest and east rift zones of Kīlauea and the summit and southwest rift zone of Mauna Loa. These areas therefore contain a wide array of sensitive geological sites ideal for monitoring to provide warning of seismic and volcanic changes. Direct human impacts are largely confined to coastal areas in the Ka‘ū unit occupied for several hundred years by indigenous settlement, with archeological remains to be protected and preserved. However, human introduced invasive species have significantly modified native ecosystems and degraded the diversity of native plant and animal communities and thus natural wilderness conditions. With wilderness users highly dependent on trails and water catchments, there are 72 miles of designated trail and three historic cabins and two shelters in wilderness to maintain.

The characteristics of park wilderness can be affected by management activities including volcano monitoring, invasive species control, native ecosystem restoration, rare species recovery, cultural resource inventory and documentation, and trail and cabin/shelter maintenance to provide for public safety and use, restore and maintain natural wilderness character, and protect, preserve, or restore park natural and cultural resources.

In order to protect wilderness character, NPS policy dictates that all management decisions affecting wilderness must be consistent with the minimum requirement concept, which involves park staff completing a MRDG on potential actions in wilderness. The analysis enables managers to examine and document whether a proposed management action is appropriate in wilderness and, if it is, what is the least intrusive equipment, regulation, or practice (minimum tool) that will achieve wilderness management objectives. The completion of this process (MRDG) assists managers in making informed and appropriate decisions concerning actions conducted in wilderness, as per *NPS Management Policies 2006* (NPS 2006).

In wilderness, how a management action is carried out is as important, if not more important, than the end product. When determining the minimum requirement, the potential disruption of wilderness resources and character will be considered before, and given significantly more weight than, economic efficiency and convenience. If a compromise of wilderness resources or character is unavoidable, only those actions that preserve wilderness character in the long term and/or have localized, short-term adverse impacts will be acceptable (NPS 2006).

MRDGs are prepared as programmatic or for specific projects to determine the appropriate management action in wilderness (the MRDG template is included in Appendix 2); and may include the use of aviation if it is determined the minimum tool required to meet the

administrative needs in wilderness. Under current park procedures an MRDG must be completed beforehand for non-emergency helicopter landings and flights over wilderness areas.

Wilderness Users

Wilderness use is very light in the park, with backcountry overnight users involving less than one-half of one percent of park visitors. Therefore, administrative flights potentially affect relatively few of the visitors to Hawai'i Volcanoes. However, the impacts are disproportionately greater because of higher expectations of natural quiet. Many flights to support the maintenance of volcano monitoring instruments, repair and construction of ungulate exclusionary fencing, ungulate control, alien plant control, rare species recovery, and cultural resource documentation are dispersed throughout wilderness rather than concentrated near trails and camps where wilderness users are located. Flights to support trail and camp maintenance may affect wilderness users more directly than flights for other administrative reasons because they focus on trails and camps. The same is true of flights to Halapē for turtle recovery, which is also one of the most frequently used wilderness shelters.

Administrative aviation under the no action alternative has a direct, short-term, adverse minor impact on wilderness quality and wilderness users, most frequently lasting only minutes. It may on occasion have moderate adverse impacts in limited areas of wilderness for several hours over one day. Examples of moderate effects may be aerial census of mouflon sheep or supply of fence construction materials. Administrative aviation has a long-term beneficial effect on the park's overall ability to exist as a park and administer and protect wilderness by supporting geologic monitoring, search and rescue, fire, and law enforcement operations. Administrative aviation operations also have a long-term beneficial effect on restoration of natural conditions important for protection of wilderness character by supporting invasive species control, native ecosystems restoration, and rare species recovery as well as preservation of wilderness cultural resources.

Environmental Consequences

The impacts of the alternatives on wilderness were derived from NPS soundscape and wilderness experts, social science research, scientific literature, and park staff knowledge of wilderness and wilderness users. Thresholds of change for the intensity of an impact are defined as follows:

Negligible: There would be no discernible impacts of aircraft noise and visual intrusion on wilderness character or opportunities for solitude.

Minor: There would be slight impacts of aircraft noise and visual intrusion on wilderness character or the loss of opportunities for solitude in limited areas of wilderness for short periods of time lasting minutes.

Moderate: There would be readily apparent impacts of aircraft noise and visual intrusion on wilderness character or the loss of opportunities for solitude in limited areas of the park wilderness lasting up to several hours for one or two days.

Major: There would be readily apparent impacts of aircraft noise and visual intrusion on wilderness character or loss of opportunities for solitude would be noticeably reduced throughout the wilderness or in limited areas for one or more weeks.

Impacts of the No Action Alternative

Administrative flights over wilderness, even though necessary for the administration of wilderness and justified by the park's analyses of the minimum requirement, can degrade wilderness quality and wilderness user experience. Most of these flights are relatively close to the ground, 300-500 feet AGL. Some involve hovering at very low AGL for observation purposes, for dropping of sling loads, landing of personnel, aerial census and control of ungulates, or eradication of invasive plants. Flights over wilderness are a mechanized visual and auditory intrusion on the primeval character of wilderness and the wilderness users who are expecting opportunities for solitude.

An average of less than 250 hours per year of administrative flights occurs over the park or originates in the park. Approximately half of administrative aviation is estimated to take place within the four designated wilderness units or the area in Kahuku recommended by the park to be eligible for further wilderness study.

Cumulative Impacts

Past, present, and reasonably foreseeable actions that may contribute to cumulative impacts of administrative aviation on wilderness character and users are commercial air tours, administrative use of mechanized equipment at the ground level, increasing development in the surrounding communities, and changes in park visitation patterns. Commercial air tours currently average 12,226 flights per year over the park (2008-2011 fee data). These flights tend to be concentrated over the Pu'u 'Ō'ō area and Kīlauea's lower East Rift but may also transit other areas of the park en route to lava viewing such as the Mauna Loa Strip area and the 'Ōla'a Unit. Currently these flights can have a significant impact on the wilderness character and users, particularly when there is an active lava flow near or within a wilderness unit. The island's large expanses of lava produce landscapes that offer little sound shielding, creating long "time audibles" for human or mechanized sounds. In these areas, noise has the potential for creating a greater acoustic impact on soundscapes, which impacts the wilderness character and the wilderness user experience. Commercial air tour flights are more disruptive to the visitors because they do not anticipate seeing and hearing them, so it disrupts the expectation of solitude. In the future, an ATMP may regulate the number of flights and/or the alignments of flight routes which may reduce the level of this significant cumulative impact at some point in the future.

Other past, current, and future sources of noise in wilderness include generators and rock drills used in fence construction, repair, or replacement and weed eaters used in trail maintenance or occasionally power tools and generators used in shelter/cabin maintenance. Additional fence construction is planned for the park, particularly boundary fences at Kahuku and 'Ōla'a (NPS 2013). Most fence installation is occurring in areas that are far from visitors, particularly at Kahuku, so will have less impact on the wilderness users in those areas. HVO uses generators and power drills and other tools to maintain or install telemetered instruments at its monitoring sites. Additional instrumentation may be required in wilderness with changes in volcanic activity, funded projects, or new research projects. Noise from firearms discharge to control ungulates almost exclusively affects the Kahuku Unit; this occurs in areas closed to the public so does not impact the backcountry or wilderness users. An MRDG was prepared to address and

mitigate the impacts of fencing and ungulate control on wilderness quality in the eligible area in the Kahuku unit of the park (NPS 2013).

Vehicle noise from Highway 11 may be noticeable from portions of the Ka'ū Unit and the East Rift Unit. Vehicle noise will probably increase with the growing populations of Hawai'i Island, as well as increased population growth and house construction in Hawaiian Ocean View Estates adjacent to eligible wilderness in Kahuku.

These past, present, and reasonably foreseeable future actions would have short-term minor to major adverse impacts on wilderness, particularly from the continuing pattern of use by commercial air tours.

Conclusion

Administrative aviation under the no action alternative has a direct, short-term, adverse minor to moderate impact on wilderness quality and wilderness users. The past, current, and reasonably foreseeable future actions, particularly the commercial air tours, have a significant impact on the wilderness character and users. The administrative aviation contributes minimally to these impacts due to the differences in the timing, location, and duration of the flights, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems.

Impacts of the Preferred Alternative

Administrative flights over wilderness would still occur under the preferred alternative and impact wilderness character and wilderness user experience. However, with implementation of the BMPs there will be fewer flights and/or total less flying time over wilderness, resulting in less degradation of wilderness character and fewer impacts on wilderness users.

Implementation of BMPs will reduce the number of flights and/or total flight time over wilderness in some of the following ways. Requiring an approved flight plan will improve coordination of flights between NPS and HVO and among park divisions, planning of flight path, AGL of the flight, staging areas, enhanced outreach to the public (particularly the wilderness users that may be impacted), and review of the BMPs to analyze and reduce impacts on park visitors.

The BMPs recommend that flights avoid wilderness, where possible, by re-routing flights to wilderness boundaries and roads and, when feasible, landing outside wilderness and hiking or packing materials into wilderness. The BMPs also recommend that flights avoid trails and camps, when possible, thus distancing aviation from wilderness users who are almost exclusively on trails or at the cabins and shelters. The administrative aviation flights are planned in advance and the park can alert backcountry users ahead of time when wilderness areas cannot be avoided, which may result in a less adverse impact to their expectation of solitude. Also, the recommendation in the BMPs to use staging areas nearest the destination will reduce flight time over wilderness areas.

Administrative aviation under the preferred alternative will continue to indirectly benefit wilderness character and wilderness users. It will support the HVO program of monitoring eruption activity and maintaining instruments to provide warning of volcanic hazards to the

public. Administrative aviation under the preferred alternative will continue to help restore natural wilderness character by rectifying the impacts of human-introduced invasive species and by assisting in the restoration of native ecosystems and recovery of rare species, all of which benefit wilderness users. Furthermore, administrative aviation will benefit wilderness users by supporting the maintenance of backcountry trails and cabins/shelters, facilities the wilderness user is dependent on for travel and water, and by providing emergency response.

Administrative aviation under the preferred alternative has a direct, short-term, adverse, minor impact, typically lasting minutes, on wilderness quality and wilderness users. Some actions may have moderate adverse effects in limited areas of the park lasting one day (e.g., ferrying supplies for fence construction and replacement projects, mouflon census, or GPS surveys).

Administrative aviation under the preferred alternative has a long-term beneficial effect on public safety in wilderness by supporting volcano monitoring and eruption monitoring, search and rescue, fire, and law enforcement operations. Administrative aviation also has a long-term beneficial effect on restoration of natural conditions in wilderness by supporting invasive species control, native ecosystems restoration, and rare species recovery as well as preservation of wilderness cultural resources. These actions have a beneficial effect on wilderness users.

Cumulative Impacts

The impacts of past, present, and reasonably foreseeable future actions of the preferred alternative are identical to those of the no action alternative for wilderness.

Conclusion

Administrative aviation under the preferred alternative has a direct, short-term, adverse, minor to moderate impact on wilderness quality and wilderness users. The past, current, and reasonably foreseeable future actions, particularly the commercial air tours, have a significant impact on the wilderness character and users. The administrative aviation contributes minimally to these impacts due to the differences in the timing, location, and duration of the flights, and administrative aviation has long-term beneficial impacts from the restoration of park ecosystems.

Native Wildlife

Regulatory Framework

The Service will successfully maintain native plants and animals by minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them (NPS 2006, 4.4.1).

Affected Environment

Hawai'i Volcanoes protects a unique diversity of native wildlife species, over 90% of which are endemic to the Hawaiian Islands. All native mammals and reptiles in the park, as well as nine bird species in the park are listed as candidate, threatened or endangered by the USFWS. Impacts of the alternatives on these species will be analyzed under the "Special Status Species" impact topic. The analysis for the "Wildlife" impact topic will therefore focus on the more common

native wildlife species. There are no published or anecdotal observations of aviation impacts on invertebrates; therefore, only birds will be addressed in this impact topic.

Forest Birds

Information about ranges, habitat, foraging and nesting patterns of forest birds is largely derived from published accounts (Camp et al. 2009; Pratt et al. 2009; Stone and Pratt 1994; Tweed et al. 2007) or personal observations of resource specialists. ‘Apapane, a species in the Hawaiian honeycreeper family, is the most abundant forest bird in the park, occurring in high numbers in Kahuku and the Kīlauea/Mauna Loa Strip portions of the park. They are particularly noticeable in closed stands of ‘ōhi‘a such as the rain forest areas around Kīlauea Caldera and the East Rift. However, they occur over a wide range of habitats from the subalpine, mid-elevations, to occasionally near the coast. They forage primarily on nectar of ‘ōhi‘a flowers and travel, often in flocks, to follow the onset of flowering in different areas. They also feed on koa and māmane flowers as well as forage for insects and spiders. ‘Apapane appear to make daily flights to higher elevations in the warmer months, perhaps to evade mosquitoes carrying avian diseases. Breeding occurs from January to July with nests near the top of the ‘ōhi‘a canopy.

‘I‘iwi is a nectivorous honeycreeper with declining populations below 5,000 foot elevation because of their susceptibility to mosquito-borne avian diseases. At the higher elevations they tend to occur in mesic and wet high elevation forest and drier subalpine woodlands of the Mauna Loa Strip and Kahuku. They may also make forays into mid-elevation forests such as ‘Ōla‘a or Crater Rim to opportunistically feed on available flowers. Like ‘apapane, ‘i‘iwi primarily forage for nectar on ‘ōhi‘a flowers and make long-distance flights to follow the bloom. They also feed on koa and māmane but utilize a broader range of other species including understory shrubs. Also, like ‘apapane, they forage on invertebrates. ‘I‘iwi nest near the tops of the canopy in ‘ōhi‘a. Their breeding season is from February to September.

Hawai‘i ‘amakihi is a common, widely distributed omnivorous forest bird. While more abundant in upland mesic forest and subalpine woodland, they are also found in wet forest and lowland native scrub and alien species dominated forest in lowland areas. Their abundance at low elevations in wet environments suggests acquired resistance to avian diseases spread by mosquitoes. Hawai‘i ‘amakihi feed on arthropods, particularly caterpillars, true bugs, and spiders located in the small branches near the tops of trees. They also forage for nectar of ‘ōhi‘a and māmane as well as the fruits of a range of other plants. They nest near the tops of ‘ōhi‘a trees with the breeding season from November to May.

Hawai‘i ‘elepaio is an insectivorous flycatcher with declining populations in the leeward, lower mid-elevations and Kīlauea summit rain forest where it is now very rarely seen. However, it is still common in mixed mesic forest and native koa forest along the Mauna Loa Strip; birds are occasionally observed in wet forest at ‘Ōla‘a (Pratt 2012b). It is rarely observed at Kahuku in māmane-naio subalpine woodland but is widely distributed in mesic and wet koa-‘ōhi‘a forest makai of the park at Honomolino and Ka‘ū Forest. ‘Elepaio catch insects aerially and by foraging for a variety of arthropods along branches and foliage, and even on the ground. Breeding occurs from March through May. Nests are made in a wide range of species including ‘a‘ali‘i, koa, ‘ōhi‘a, māmane, and naio.

‘Ōma‘o is a predominantly fruit-eating Hawaiian thrush with stable populations in wet and mesic environments of the park. It is most abundant in mid-elevation rain forest of Kīlauea summit region and in the wet-mesic forests of Kahuku extending broadly makai into the Ka‘ū Forest Reserve, as well as the upper pastures. It is also common on the Mauna Loa Strip in mesic forest through subalpine shrublands. It forages primarily for fleshy fruits in both canopy and understory but also feeds on seeds and arthropods, even on the forest floor. Nests have been found in a variety of habitats including tree cavities, tree ferns, rock cracks, and lava tube openings. Breeding season is not well defined but thought to be spring and summer (Pratt 2012a).

Pueo or Hawaiian owl is observed occasionally in open habitats from the coast to subalpine in the Kīlauea and Mauna Loa Strip portions of the park. They forage largely on mice but also take small birds, insects, and rats. They nest on the ground.

Seabirds and Shorebirds

Noio or black noddy is a commonly observed tern that flies just offshore along the coastal bluffs. They catch small fish near the surface and nest in the coastal bluffs. Koa‘e kea or white-tailed tropicbird is a seabird that forages at sea for squid, small crustaceans, and fish. They nest during the summer months inland on the walls of craters such as Kīlauea Iki, Kīlauea Caldera, and the twin pit craters along the Mauna Iki Trail close to Hilina Pali Road. Kōlea or Pacific golden plover occur widely in open areas from sea level to 10,000 foot elevation in the park, including the pastures at Kahuku during the winter months.

Environmental Consequences

Although there was a recent survey for the distribution of Hawaiian bird species (DOA 2011) around proposed helicopter landing zones on Mauna Loa and Mauna Kea, there are no published reports and very few anecdotal accounts documenting disturbance of Hawaiian birds by low-flying helicopters. Potential effects of the typical low-level administrative aviation flights on Hawaiian birds are largely inferential, based on bird biology and life-history strategies (Hu 2012a; Pratt 2012a).

Studies of the effects of diverse kinds and levels of aircraft noise on birds have been published in a number of environments outside Hawai‘i. Many of these studies address the effects of frequent, intensive military over-flights, and emphasize seabirds, waterfowl, and raptors. Most of these investigations document and characterize disturbance responses and occurrence of habituation, and a few analyze population level effects. Of course, these studies focus on different bird species than the endemic species found in Hawai‘i. Effects of low-level aircraft overflight from non-Hawaiian study sites are highly variable in terms of response behavior and effects on population levels, a more difficult parameter to assess. Selected representative studies are summarized here to indicate the potential for impact to park birds and underscore the absence of similar studies on Hawaiian birds.

Seabirds, specifically crested tern were flushed at dBA levels greater than 85 with nearly all birds responding at lower levels by head turning (Brown 2003). Responses also seemed to be triggered at least in part by visual stimuli, rather than noise, as demonstrated by similar behavior

to overhead balloon flights. On the other hand, helicopters and fixed-wing aircraft flying higher than 330 feet AGL did not change the number of incubating and brooding seabirds in a mixed breeding colony of fulmars, shags guillemots and puffins (Dunnet 1977). Breeding wading birds in Florida responded to F-16 overflights 500 feet above the ground with sounds ranging from 55-100 dBA by looking up or changing to an “alert” position, with some birds not responding (Black et al. 1984). The time-activity budgets of four species of wintering ducks in North Carolina were not adversely affected to low-level military overflights because few birds responded and responding birds almost immediately resumed their previous activity (Conomy et al. 1998). As part of the same study, it was determined that with continued exposure to aircraft activity, black ducks habituated to the disturbance whereas wood ducks did not. Mexican spotted owls were flushed only when flights were within 330 feet; adults flushed nests only after juveniles had fledged (Delaney et al. 1999). There was significantly greater flushing of red-tailed hawks from the nest by low-level helicopter flights for birds previously not exposed to overflights than birds previously exposed to overflights, suggesting habituation to aircraft noise (Anderson and Rongstad 1989). A study of a passerine forest bird, California gnatcatchers, indicated that high levels of aircraft noise from military aircraft reduced the number of nest attempts and eggs laid were reduced. However, once eggs were laid, overflights had no influence on reproductive success (Aubrey and Hunsaker 1997). A follow-up study with California gnatcatchers about helicopter noise effects on reproductive success found that the best predictors were suitable nesting habitat, rather than noise levels (Hunsaker et al. 2007).

Thresholds of change for the intensity of an impact are also based largely on discussions with local resource specialists and are defined as follows:

Negligible: There would be no observable or measurable impacts to native bird species or impacts would be within natural fluctuations of disturbance or behavior.

Minor: Impacts on native birds would be detectable. Occasional responses to disturbance by some individuals could be expected, but without population level effects (e.g., effects on factors determining number of birds and sustainability of the population).

Moderate: Impact on native bird population size and structure would be detectable. Frequent responses to disturbance would be expected, with impacts on population size or demography of some species expected.

Major: Impacts on native species would be detectable and frequent responses to disturbance would be expected with effects on population levels and demography affecting population viability or sustainability.

Impacts of the No Action Alternative

Although there are no studies on the effects of aviation on native birds in Hawai‘i, it may be inferred that native forest birds may be vulnerable to the impacts of aviation because many species forage and nest in the forest canopy, often in the upper parts of or the periphery of the canopy (Pratt et al. 2009; Pratt 2012b). Birds may be most vulnerable to aircraft disturbance during the nesting season. Disturbance of aircraft may cause parents to be flushed from the nest and leave eggs or juvenile birds unattended and exposed to the elements. In addition, parent birds flushed from the nest may crack eggs. Finally, many Hawaiian bird species have a protracted breeding season, relative to temperate species, and are thus vulnerable for relatively long periods of the year. In general, aircraft noise is a stressor thought to interfere with the acoustical signals

birds rely on for mating, nurturing, predator protection, foraging, navigation, territory defense, or other behaviors. Noise stressors may also cause birds to avoid otherwise usable habitat.

The direct impacts from administrative aviation on wildlife are intermittent, short-term and minor to moderate depending on flight location and time of year.

Cumulative Impacts

Past, current, and future anthropogenic sources of noise that contribute to cumulative impacts of aviation on park wildlife include commercial air tours, currently at an average of 12,226 flights per year over the park (2008-2011 fee data). These flights tend to be concentrated over the Pu‘u ‘Ō‘ō area and Kīlauea’s lower East Rift but may also transit other areas of the park en route to lava viewing. In the future, an ATMP may regulate the number of flights and the alignments of flight routes. Also, administrative sources of noise or activities may be additive to the impacts of administrative aviation. These sources include heavy equipment to maintain roads, string trimmers and mowers to maintain trails or landscaping, and rock drills and generators used to construct ungulate exclusionary fences. For example, it was found that chainsaws were more disturbing to Mexican spotted owls than helicopters at the same distance (Delaney et al. 1999).

The remaining native bird species in Hawai‘i are limited by ecological factors that reflect their evolution in isolation and subsequent exposure to introduced organisms. Other important limiting factors for wildlife in Hawai‘i Volcanoes are avian diseases such as malaria and pox, transmitted by introduced mosquitoes, and predation by introduced mammals including mongoose, feral cats, rats, and mice. Some native bird species, while stable overall, may have declining populations in selected habitats in the park. These small populations make these species vulnerable to losses or extinction in those habitats from stochastic demographic or environmental events. Invasive species control and ecosystem restoration by Hawai‘i Volcanoes staff have long-term beneficial effects on populations of native species potentially impacted by aviation.

These past, present, and reasonably foreseeable future actions would have short-term minor to moderate adverse impacts on native wildlife, particularly from the continuing pattern of use by commercial air tours. If the commercial air tour traffic were to shift to the higher elevation forested areas, the impact levels to native wildlife could be major.

Conclusion

With the paucity of direct observation of impacts to Hawaiian avian wildlife, including population-level effects, conclusions about impacts are drawn from inferences about bird life-histories, ranges and habitats in the park, and the spatial occurrence and frequency of administrative flights. Short duration, adverse, minor effects might be expected, with the occasional overflight at low levels above the forest canopy where avian wildlife is concentrated such as in rain forest at the summit of Kīlauea or forests and woodlands below the subalpine in Kahuku. Many of the administrative flights take place in areas with low native bird populations such as the sparsely vegetated Ka‘ū area makai of Kīlauea Caldera. Administrative flights are rare in other areas, such as low-level flights along shore that could affect seabirds. The possibility of moderate, long-term impacts is greater when cumulative impacts are combined

with direct effects, particularly for forest bird species along or near the East Rift of Kīlauea where commercial air tours are concentrated. There are few administrative aviation flights where common native birds are concentrated on the Mauna Loa Strip and in the wet forest at the Kīlauea summit.

When past, present, and reasonably foreseeable future actions are combined with the no action alternative, administrative aviation may have minor and possibly even moderate impacts on native wildlife in the park. On the one hand, some additional anthropogenic sources of noise or disturbance may be additive to that of administrative aviation. On the other hand, wildlife habitat will be improved by park natural resource management programs, which will have long-term beneficial effects on wildlife.

Impacts of the Preferred Alternative

Similar types of aircraft impacts on wildlife in Hawai‘i Volcanoes can be expected from the preferred alternative. However, impacts on native bird species will be reduced by BMPs. For example, flight restrictions in forested areas of Kahuku upslope from the Ka‘ū Forest Reserve to protect endangered Hawaiian honeycreepers will also benefit common bird species found in that habitat. Restrictions, to be described in the following impact topic, on flights in the lower Mauna Loa Strip to protect nesting ‘io will also benefit ‘apapane, ‘elepaio, Hawai‘i ‘amakihi, and ‘ōma‘o utilizing this habitat. In addition, impacts on common birds may also be reduced with avoidance of flights at sunrise and sunset when there are peaks in forest bird activity. Finally, selection of staging areas and landing zones nearer to work sites, rather than at the park temporary helibase at Kīlauea summit with high abundance of forest bird species, will reduce noise impacts to native birds in the wet forests.

Cumulative Impacts

The cumulative effects of the preferred alternative are the same as those for the no action alternative.

Conclusion

With the preferred alternative, administrative aviation can be expected to have adverse, minor, short-term impacts on avian wildlife in Hawai‘i Volcanoes. The possibility of moderate, long-term impacts is greater when cumulative impacts are combined with direct effects, particularly for forest bird species along or near the East Rift of Kīlauea where commercial air tours are concentrated. These adverse cumulative impacts are balanced by habitat restoration programs of the park benefitting native bird habitat and species.

Special Status Species

Regulatory Framework

The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the *Endangered Species Act*. The Service will fully meet its obligations under the NPS *Organic Act* and the *Endangered Species Act* to both proactively conserve listed species and prevent detrimental effects on these species (NPS 2006, 4.2.3).

Affected Environment

Hawai‘i Volcanoes is home to 19 threatened, endangered, or candidate animal species (Pratt et al. 2011; 78 FR 64638). These species include two mammal, two reptile, nine bird, one crustacean, and five insect species. The “Wildlife” impact topic focused on the more common native forest bird species of the national park. The “Special Status Species” impact topic addresses the threatened, endangered, or candidate mammals, reptiles, and birds in the park. There are no published reports or anecdotal accounts about aviation impacts on insects or crustaceans. At Hawai‘i Volcanoes, the threatened and endangered invertebrate species are found in relation to specific host plant species or in anchialine pools (for the crustacean). The only potential impact would therefore be from landing and/or drop sites, which are avoided in the case of anchialine pools, or surveyed prior to use to ensure there are no host plant species found in the area.

Mammals

‘Ōpe‘ape‘a, the Hawaiian hoary bat, is an endemic subspecies of hoary bat found widely in North and South America; it is the only native land mammal in the Hawaiian Islands. Limited survey work conducted along main roads in the Kīlauea and Mauna Loa Strip areas of Hawai‘i Volcanoes indicated that bats are most likely to be detected along the Mauna Loa Road, particularly on the edges of mesic and dry forest (Fraser et al. 2009). ‘Ōpe‘ape‘a was less frequently detected at Nāhuku (Thurston Lava Tube), the edge of Kīlauea Caldera, ‘Āinahou Ranch, and along Highway 11 in the Ka‘ū Desert. Bats were not detected in coastal areas or along Hilina Pali or Chain of Craters Roads. Bats were also noticeably present in Kahuku in the mesic transition from forest to subalpine above the Ka‘ū and Kapāpala Forest Reserves and in the open degraded forests throughout the elevational range of the cattle pastures. ‘Ōpe‘ape‘a tend to forage at dusk and early dark hours, particularly on the edges of forest. They may also fly over closed canopy when traveling from one site to another. Favored daytime roosting habitat is any species of tree over 15 feet tall with deep shade in the interior.

The Hawaiian monk seal (‘ilio noho i ka uaua) has been observed on occasion to haul out on the park’s remote beaches. The population of monk seals on Hawai‘i Island has increased to 10 seals so these marine mammals are increasingly seen on park beaches, resting for up to several days, anytime of year (Gilmartin 2012a). For example, in 2011 two different seals utilized the beaches at Halapē, Keauhou, and ‘Āpua (Seitz 2012a).

Reptiles

The endangered honu‘ea or hawksbill sea turtle nests at three park beaches, mostly at ‘Āpua and at Halapē, but also at Keauhou. The nests are dug into the sand within strand vegetation above the tidal zone. Nesting season is from April to February. Nests and emerging hatchlings are vulnerable to mammalian predators including feral cats and mongoose. Other threats include invasive plant establishment in nesting sites, artificial lights, stranding of hatchlings, and incompatible visitor use at nesting beaches. Nest and hatchling emergence is monitored and honu‘ea is protected by an active park recovery program staffed largely by volunteer biologists.

The threatened honu or green sea turtle will occasionally bask on park beaches, most notably at Halapē Iki (Seitz 2012b). One instance of attempted nesting was documented at Halapē in 2011 (Seitz 2012a).

Birds

A small population of approximately 200 nēnē, the endangered Hawaiian goose, is distributed sporadically throughout the park and specific area use varies seasonally. Nēnē mostly utilize grasslands, shrublands, and sparsely vegetated lava flows, from the shoreline to over 8,000 foot elevation. Predation by introduced mammals, inclement weather, and inadequate nutrition are important limiting factors, especially for goslings, along with motor vehicle strikes for birds habituated to humans. The park has long had an active recovery program for nēnē, originally focused on captive breeding but now emphasizes monitoring, controlling predators around selected wild nest sites, enhancing grass forage at some intensively managed gosling brooding sites, and implementing measures to reduce highway mortality.

‘Io or Hawaiian hawk is an uncommon endangered raptor species widely dispersed in all forest areas of the park. It is most predictably found in Hawai‘i Volcanoes within the wet forest at the summit of Kīlauea and in mesic forest within the lower slopes of Mauna Loa (Pratt et al. 2011). They are regularly observed in the rain forest east of the caldera and Kīlauea Iki, as well as at Kīpuka Puauulu and Kīpuka Kī. ‘Io is uncommon and widely dispersed in Kahuku within mesic to wet forest above the Ka‘ū Forest Reserve, māmane-naio subalpine woodland on the west-facing slope of Kahuku, and in the open pastures at lower elevation (Tweed et al. 2007). Nesting occurs March through September, typically in the upper branches of ‘ōhi‘a trees but sometimes in other species.

‘Ua‘u or Hawaiian petrel is an endangered seabird that forages widely in the Pacific and nests only in the Hawaiian Islands. In Hawai‘i Volcanoes, ‘ua‘u nest in underground burrows at high elevation, above 5,500 foot elevation in sparsely vegetated terrain on the western slope of Kahuku and in upper subalpine and alpine habitat on the Mauna Loa Strip above 8,000 foot elevation. Adult petrels and fledglings are thought to leave and enter their underground nests at night but there are unpublished reports of flights at dusk, and from Haleakalā National Park, even at sunrise (Hu 2012a). Feral cats are the main threat to the Hawai‘i Volcanoes population. Additional hazards to ‘ua‘u include artificial lights which can cause petrel to become disoriented and artificial obstructions such as fences.

‘Akē‘akē or band-rumped storm petrel, a candidate threatened/endangered seabird, has been sighted repeatedly over time at low numbers in subalpine and alpine habitat used by ‘ua‘u on Mauna Loa, suggesting nesting; however, no nests have been directly observed (Swift and Burt-Toland 2009).

‘A‘o or Newell’s shearwater is a threatened seabird known to historically occur at Makaopuhi Crater on the East Rift zone and also known to nest historically in other areas of Hawai‘i in rainforest with an uluhe fern understory. In 2003 and 2011, lava-ignited wildland fires swept through much of the uluhe habitat. No birds were observed in the East Rift zone of Kīlauea in

2001-2005 surveys but incidental reports of vocalizations in potential ‘a‘o habitat along the Kalapana Trail suggests nesting may occur (Swift and Burt-Toland 2009).

Three endangered forest birds, all Hawaiian honeycreepers, ‘akiapōlā‘au, Hawai‘i creeper, and akepa, occur in Hawai‘i Volcanoes at low densities, only in Kahuku and the adjacent upper slopes of the Ka‘ū and Kapāpala Forest Reserves on state lands (Tweed et al. 2007). The chief threats to these species include loss of habitat from alteration by human development or disturbance by alien ungulates or invasive vegetation, avian diseases, and predation by introduced mammals. ‘Akiapōlā‘au and Hawai‘i creeper were formerly documented as present in the Kīlauea and Mauna Loa Strip portions of Hawai‘i Volcanoes but have been extirpated from those areas for many years (Pratt et al. 2011).

‘Akiapōlā‘au is extremely rare in the park and only found along the northeast boundary of Kahuku, close to Kapāpala Forest Reserve, in mixed ‘ōhi‘a-koa mesic to wet forest. They were more abundant in the adjacent Ka‘ū and Kapāpala Forest Reserves makai of Kahuku. ‘Akiapōlā‘au is an insectivorous species that forages preferentially on koa (Pratt et al. 2011). In its habitat in Kahuku and upper Ka‘ū Forest Reserve it will also forage on ‘ōhi‘a, kōlea, and ‘ie‘ie present in that habitat. It nests almost exclusively in the tops of ‘ōhi‘a trees or occasionally in the koa canopy. Unlike many other forest birds, ‘akiapōlā‘au breeds and fledges young throughout the year, although more predictably from March to July. ‘Akiapōlā‘au has been documented utilizing young planted koa in Kamehameha Schools Keauhou lands east of the Mauna Loa Strip. It has been speculated that they may eventually re-establish in the adjacent Mauna Loa Strip in which cohorts of young koa have become established after removal of feral goats (Pratt et al. 2011).

Hawai‘i creeper, concentrated in a small area in mesic to wet forest near the historic Civilian Conservation Corps Cabin in Kahuku, is also very rare in the park. It was more widely distributed and abundant in the adjacent Ka‘ū Forest Reserve. Based on presence in nearby areas, it may also be present in very low numbers on the southwest slope of Kahuku but has not been directly observed (Tweed et al. 2007). This insectivorous species forages primarily along the trunks and branches of ‘ōhi‘a and koa. Hawai‘i creeper tends to build nests at mid-canopy.

Akepa is more abundant and widely distributed than ‘akiapōlā‘au and Hawai‘i creeper in Kahuku. They were found sporadically in Hawai‘i Volcanoes along much of the boundary with Ka‘ū Forest Reserve, as well as in the adjoining forest reserve. Although no akepa were detected in surveys of the southwest slope of Kahuku, this area is within three miles of a known population of akepa in South Kona. Akepa forage almost exclusively on buds and the new flush of ‘ōhi‘a foliage in single trees or small stands within subalpine shrublands of Kahuku. The breeding season is March to late May. Akepa are known from other areas of Hawai‘i Island to nest in cavities of large ‘ōhi‘a, suggesting that they are not nesting in the subalpine woodland of Kahuku. Alternatively, it has been suggested but not verified that they may nest in subalpine woodlands in cup nests (Tweed et al. 2007).

In the future, another endangered forest bird species, ‘alalā or Hawaiian crow, may be reintroduced in the park or on adjacent lands and subject to potential impacts from administrative aviation. ‘Alalā were last observed in the park in the late 1970’s and became extinct in the wild

in Hawai‘i in 2002 (Pratt et al. 2011). It remains a captive breeding population at Keauhou Bird Conservation Center where propagation efforts have been successful. A management plan and EA has been prepared for the upper Ka‘ū Forest Reserve. This includes fencing, ungulate control, and habitat restoration in approximately 12,000 acres in the central portion of the reserve makai of the Civilian Conservation Corps cabin in Kahuku. Release of ‘alalā is being considered for this area and may involve park lands adjacent to the forest reserve (State of Hawai‘i 2012).

Environmental Consequences

There are no published reports of aviation impacts on Hawai‘i’s special status wildlife species or even common wildlife species, as described under the “Wildlife” impact topic. Only limited anecdotal observations are available. Aviation effects on park wildlife are derived from the experience and knowledge of USGS-BRD and NPS staff working with research or recovery of candidate, threatened, or endangered wildlife species in Hawai‘i Volcanoes and the Hawaiian Islands or resource specialists from the USFWS and National Marine Fisheries Service in Hawai‘i.

The following thresholds were used to determine the magnitude of effects on federally listed and candidate special-status species and their associated habitat, including designated critical habitat that would result from implementation of any of the alternatives.

Adverse

Negligible: There would be no observable or measurable impacts on federally listed species, their habitats, or the natural processes sustaining them in the proposed project area, resulting in a *no effect* determination.

Minor: Individuals may temporarily avoid areas. Impacts would not affect critical periods (e.g., breeding, nesting, denning, feeding, or resting) or habitat. Any change would be small and localized and of little consequence, and result in a *may affect, not likely to adversely affect* determination.

Moderate: Individuals may be impacted by disturbances that interfere with critical periods (e.g., breeding, nesting, denning, feeding, or resting) or habitat; however, the level of impact would not result in a physical injury, mortality, or extirpation from the park, and result in a *may affect, is likely to adversely affect* determination.

Major: Individuals may suffer physical injury or mortality or populations may be extirpated from the park. The change would result in a *may affect, is likely to adversely affect* determination.

Beneficial

Negligible: There would be no observable or measurable impacts on federally listed species; their habitats, including critical habitat designated under the ESA; or the natural processes sustaining them in a park site.

Minor: Impacts would result in slight increases to viability of the species in the park as species-limiting factors (e.g., habitat loss, competition, and mortality) are kept in check. Nonessential features of critical habitat in a park site would be slightly improved.

Moderate: Impacts would result in improved viability of the species, population structure, and species population levels in the park, as species-limiting factors (e.g.,

habitat loss, competition, and mortality) are reduced. Some essential features of critical habitat would be improved.

Major: Impacts would result in highly noticeable improvements to species viability, population structure, and species population levels in the park, as species-limiting factors (e.g., habitat loss, competition, and mortality) are nearly eliminated. All essential features of the critical habitat would be improved.

Impacts of the No Action Alternative

Mammals

It could be expected that aircraft noise may potentially interfere with foraging behavior of ‘ope‘ape‘a because of the effects on echolocation used in flying and foraging. On the Continental US, vehicle traffic noise has been documented to affect foraging behavior, causing bats to avoid areas with high, persistent noise levels (Schaub et al. 2008; Jones 2008). One published study on the impact of low flying military aircraft found no population-level effects (Maisonneuve et al. 2006). There is one local report of ‘ope‘ape‘a mortality from a rotor strike, but it was not within the park (Yuen 2012).

Foraging activity of ‘ope‘ape‘a is largely not vulnerable to the effects of administrative aviation. Foraging is conducted primarily in the first few hours of dark after sunset; administrative aviation is almost exclusively carried out during daylight hours. However, bat foraging usually begins at late twilight when bats may be exposed to administrative flights completing their missions for the day. Additionally, there is potential of aviation noise to disturb bats roosting during the day, with lactating females nurturing young being the most vulnerable. No published information of aircraft effects on roosting bats was found. No observations are available of roosting ‘ope‘ape‘a being affected by aviation noise. ‘Ope‘ape‘a roost singly, often within a dense forest canopy, and are rarely observed.

The endangered Hawaiian monk seal, while resting on beaches, is known to be disturbed by overflights, particularly hovering and low-level flights (Gilmartin 2012a). Population level effects of overflights are not possible to determine because of the small number of animals. Helicopter surveys to inventory the status of Hawaiian monk seals by National Marine Fisheries Service biologists, responsible for the recovery of this species, follow a guideline of 1,000 feet AGL (Gilmartin 2012b) for their helicopter population surveys of Hawaiian monk seal. Monk seals occasionally utilize park beaches, and there are low-level flights and landings near these beaches including ‘Āpua Point and Halapē, to supply hawksbill turtle recovery camps. There are also occasional nearby low-level flights to detect invasive plants or landings to support trail, shelter, and camp maintenance. These flights may have the potential to disturb monk seals.

Reptiles

Administrative aviation is not expected to impact honu‘ea which nest on park beaches; hatchlings emerge from nests and enter the ocean at night. Aviation impacts are also not expected on honu. This threatened species may rest on rare occasions on park beaches during the day, and flights to park beaches are of short duration and infrequent. In addition, basking turtles are inured to human presence and activities (Gilmartin 2012a).

Birds

There are no published studies documenting effects of aviation noise on Hawaiian birds of special status. However, published investigations in other environments indicate the potential for disturbance and even population-level effects as well as studies showing acclimation. Some example studies have been briefly described in the “Wildlife” impact topic above. There is one anecdotal report about disturbance of a species of special status by low flying helicopters (Ball 2012). An ‘*alalā* parent was observed to be disturbed and “hunkered down” on a nest when exposed to a helicopter hovering 500 feet above the dense canopy in which the nest was located. Roosting ‘*alalā* were agitated but not flushed by repeated low level flights in more open forest. Finally, an ‘*alalā* left a nest to investigate noise from a bulldozer 200 feet away. In contrast, ‘*alalā* abandoned nests at the Keauhou Bird Conservation Center, just outside Hawai‘i Volcanoes, in response to frequent low-level helicopter flights during the 2000 Broomsedge Fire when fire approached the center (Liebermann 2000). The responses of captive-reared and released birds may be similar to those described by Liebermann (2000) of captive breeding birds to frequent or prolonged low-level aviation.

Potential effects of the typical low-level administrative aviation on endangered Hawaiian birds is largely inferential, based on bird biology and life-history strategies (Hu 2012b; Pratt 2012). Endangered forest birds in the park are vulnerable to the impacts of aviation because many forage and nest in the forest canopy, often in the upper parts or the periphery of the canopy. Birds are considered to be most vulnerable to aircraft disturbance during the nesting season. Disturbance by aircraft may cause parents to be flushed from the nest and leave eggs or juvenile birds unattended and exposed to the elements. Furthermore, parent birds flushed from the nest may crack eggs. Many Hawaiian bird species have a protracted breeding season, compared to temperate species. In general, aircraft noise is a stressor thought to interfere with acoustical signals birds rely on for mating, nurturing, predator protection, foraging, navigation, territory defense, or other behaviors. Noise stressors may also cause birds to avoid otherwise usable habitat; alternatively, some birds may acclimate to noise – see “Wildlife” impact topic for more information.

There is no direct evidence that aircraft disturb nēnē (Hu 2012b). Based on the biology of this species, there may be the potential for aircraft noise to affect communication and flock and family interactions of this social species. For example, aircraft may disturb nesting birds, with the female tending the nest, the male standing guard, and the need for communication about predators. The park’s nēnē population is most vulnerable to aircraft impacts in areas when nesting and brood rearing is occurring.

There is potential for low-level administrative aviation to impact ‘*io* at Kīlauea summit and the lower Mauna Loa Strip where birds are regularly observed and nest, typically high in ‘*ōhi‘a* trees. However, the incidence of administrative flights over ‘*io* habitat is low. HVO flights from Halema‘*uma‘u* to the East Rift largely avoid forested habitat. Administrative flights over the lower Mauna Loa Strip are infrequent. Routine flying to shuttle personnel from the rainshed helibase to petrel colonies on Mauna Loa are limited to the nesting season (June through November) and typically include one to two trips per month.

The potential for disturbance or strikes on listed and candidate seabirds, the ‘ua‘u, ‘a‘o, and ‘akē‘akē is remote because they are flying at night when helicopters are not used. Also, there is no recorded incidence of bird strikes with low-level flights at dusk and dawn in the park.

Although never directly observed, the infrequent but typically low-level administrative flights in endangered bird habitat at Kahuku may potentially affect the three endangered Hawaiian honeycreepers, akepa, ‘akiapōlā‘au, and Hawai‘i creeper, found there and in the adjacent forest reserves. These include approximately quarterly, low-level flights to aerially control mouflon in open woodlands and scrub (possible akepa nesting habitat), as well as intermittent flights to census mouflon (five surveys conducted between 2004 and 2011), supply fence material, detect invasive plants, and maintain geological monitoring equipment (approximately annually). In addition, project work to construct boundary fences in portions of forest habitat was begun in 2010 and expected to continue through 2015 and includes low-level aviation to drop fence material along the fence line e.g. approximately 2 hours of aviation per mile of fence. Following informal consultation completed with USFWS (USFWS 2011b), efforts are made to minimize aviation activities during critical nesting periods; however, some short-term disturbance could be expected. Flight paths for these missions may also transit habitat for all three species in the upper elevations of the Ka‘ū and Kapāpala Forest Reserves. Mouflon populations are being reduced in these areas and fence construction completed within the next few years so that the frequency of flying can be expected to decrease over time. Given their unpredictability, impacts of administrative flights for emergency response activities (e.g. search and rescue, wildland fire suppression) are not projected in this analysis. The emergency response and any necessary consultations with USFWS to document and mitigate potential impacts would be done in accordance with 50 CFR 402.05 of the Endangered Species Act.

Cumulative Impacts

Additional anthropogenic sources of noise that now contribute to cumulative impacts of aviation on park special status species include commercial air tours, currently at an average of 12,226 flights per year over the park (2008-2011 fee data). These flights tend to be concentrated over the Pu‘u ‘Ō‘ō and Kīlauea’s lower East Rift but may also transit other areas of the park, including habitat for special status species, en route to lava viewing. Flight routes and frequency of flights may change in the future with implementation of an ATMP. Additional administrative noise may also combine with other noise including firearms from ungulate control measures and the use of heavy equipment, chain saws, generators, rock drills, and string trimmers to maintain roads, structures, and trails or control invasive species which may disturb sensitive species.

Most commercial air traffic is currently on the East Rift of Kīlauea where there is less potential for impact on special status species which are mostly absent from this area. However, commercial air tour routes in other locations in the park, including Kahuku and the lower Mauna Loa Strip may adversely impact endangered Hawaiian honeycreepers, ‘io, or nēnē. Currently, alternate weather routes may transit nēnē breeding and summer flocking areas or habitat. Ecosystem restoration and rare species recovery programs have a balancing long-term, beneficial impact on special status species.

The remaining native bird species in Hawai‘i are limited by ecological factors that reflect their evolution in isolation and subsequent exposure to introduced organisms. The most important limiting factors are avian diseases such as malaria and pox, transmitted by introduced mosquitoes, and predation by introduced mammals including mongoose, feral cats, rats, and mice. Special status species have very small populations. This makes them more vulnerable to loss or extinction due to random and unpredictable demographic or environmental events such as extreme weather or uncommon predation events.

Ecosystem restoration and rare species recovery efforts by Hawai‘i Volcanoes staff have long-term beneficial impact on populations of species of special status potentially impacted by aviation. These efforts include ecosystem and habitat restoration in special ecological areas, targeted recovery programs for honu‘ea, nēnē, and ‘u‘au, research on ‘ope‘ape‘a potentially leading to conservation strategies, and protection of honu and Hawaiian monk seals on park beaches.

Conclusion

Under the no action alternative, negligible to minor, short-term, adverse impacts might be expected to ‘io with the infrequent administrative flights in their habitats. Minor short-term impacts to endangered honeycreepers might be expected with disturbance of low-level, recurring flights at Kahuku, especially in the protracted breeding seasons of these forest birds. Minor short-term adverse impacts might be expected of administrative aviation on nēnē because of their vulnerability across the year at several areas of concentration. Rare disturbance may potentially occur to monk seals with low-level infrequent flights at the coast, to foraging bats at sunset, or to ‘ua‘u and ‘akē‘akē which are active almost exclusively at night. These short-term impacts are offset by the major, long-term benefits to species that result from aviation-assisted habitat recovery and protection efforts (rare species monitoring, habitat restoration, removal of non-native ungulates and predators).

Cumulative impacts, when combined with direct effects of administrative aviation may increase the intensity of impacts in this area. Most commercial air traffic is on the East Rift of Kīlauea with less impact on special status species. However, commercial air tours on alternate weather routes may transit nēnē breeding and summer flocking areas or other special status species habitat. Overall, administrative flights are expected to have negligible to minor, short-term, adverse impacts and long-term major beneficial impacts to special status species, which is equivalent to a determination of *may affect, but not likely to adversely affect*. The possibility of moderate, long-term impacts is greater when cumulative impacts are combined with direct effects, particularly for endangered wildlife species along or near the East Rift of Kīlauea where commercial air tours are concentrated.

Ecosystem restoration and rare species recovery programs have a long-term, beneficial impact on special status species. Invasive species control projects directly restore habitat for these rare species. These programs directly benefit endangered honeycreepers in Kahuku, for example. Targeted recovery programs monitor and specifically address limiting factors including introduced predators for rare species including nēnē and ‘ua‘u.

Impacts of the Preferred Alternative

Fewer impacts on special status species can be expected with the preferred alternative relative to the no action alternative. The BMPs and mitigation measures listed in Chapter 2 (Table 1) will reduce exposure of endangered bats, seals, and birds to the auditory and visual impacts of administrative aviation.

Implementation of BMPs will help avoid or reduce impacts on monk seals from low-level flights, on foraging bats in their most important habitat in the park on the Mauna Loa Strip, on ‘ua‘u, ‘a‘o and ‘akē‘akē during atypical sunset or sunrise flights, and on ‘io populations at Kīlauea Caldera and the lower Mauna Loa Strip. Negligible to minor short-term adverse impacts are expected for these species. Negligible to minor short-term adverse impacts may be expected to endangered honeycreepers and nēnē with restricted low-level flying in their habitat. Major long-term benefits would be derived through the use of aviation in support of targeted rare species recovery programs, invasive species control projects that assist recovery of habitat.

Cumulative Impacts

The cumulative impacts of the preferred alternative are the same as those for the no action alternative.

Conclusion

In summary, with the preferred alternative, administrative aviation can be expected to have adverse, negligible to minor short-term impacts on special status wildlife species in Hawai‘i Volcanoes, which is equivalent to a determination of *may affect, but not likely to adversely affect*. These short-term impacts are offset by the major, long-term benefits to species that result from aviation-assisted habitat and rare species recovery and protection efforts (e.g. rare species recovery programs, removal of non-native ungulates and predators). The possibility of moderate, long-term impacts is greater when cumulative impacts are combined with direct effects, particularly for endangered wildlife species along or near the East Rift of Kīlauea where commercial air tours are concentrated.

CHAPTER 4: CONSULTATION AND COORDINATION

Scoping

Throughout the development of this plan and EA, coordination efforts have been undertaken to provide information to and solicit information from other agencies, knowledgeable individuals, and the general public. This chapter summarizes outreach and coordination efforts.

Internal Scoping

Internal scoping sessions were held at the park February 8, 2011. In attendance were an interdisciplinary team of natural and cultural resource specialists from the park, aviation specialists, and park managers using aviation, as well as representatives from HVO, the main aviation cooperator in the national park. Internal scoping focused on defining uses of aviation in the park, methods of minimizing impacts of aviation, articulating purpose and need for the project, objectives of the project, NEPA compliance for aviation use at other parks, and determining environmental issues and impact topics to be analyzed in the EA. A meeting was held by the interdisciplinary team on November 22, 2011 to discuss alternatives for the EA. A summary of the results of this meeting are part of the administrative record for this EA.

Public Scoping

Public scoping on purpose and need and environmental issues occurred from February 23, 2012 to March 26, 2012. Scoping was initiated with a letter mailed to individuals, agencies, and organizations identified in the park scoping database for other park NEPA projects. The proposed plan was discussed with the Kupuna advisory group from Ka‘ū and Puna. Information about the plan/EA was posted on the park website and the NPS Planning, Environment, and Public Comment website.

Comments were received from officials at two public agencies and from two members of the general public responding the park’s February 23, 2012 scoping letter soliciting public comment on the proposed project. Hawai‘i County Police Department and Hawai‘i State Department of Health and one individual from the general public indicated they had no issues at this point but planned to follow development of the plan and may comment in the future. Only one respondent identified issues, primarily about the noise pollution in the surrounding communities and in the park caused by commercial air tour flights, park-related flights over surrounding communities, and flights in the park. Recommendations for BMPs were offered for air speed, AGLs, flight paths, and other elements of helicopter operations that affected noise levels.

Regulatory Compliance

Endangered Species Act Consultation

In accordance with the *Endangered Species Act* of 1973, informal Section 7 consultation was initiated with the USFWS Pacific Islands Fish and Wildlife Office on June 12, 2012 concerning potential impacts to candidate, threatened, or endangered species in the park. This letter outlined purpose and need, alternatives, BMPs, closures, and restrictions proposed in the preferred

alternative to protect Hawaiian forest birds, ‘io, and nēnē. A response was received on July 16, 2012 outlining information that should be considered and addressed in the draft EA. Further communication with USFWS regarding the consultation was through email in April and May 2013. Informal consultation with the USFWS and the National Marine Fisheries Service will occur during the public comment period for this environmental assessment.

National Historic Preservation Act - Section 106 Compliance

In accordance with Section 106 of the National Historic Preservation Act, the NPS initiated consultation on February 23, 2012. The NPS sent a letter and/or met with the following groups during initial scoping for the plan/EA.

- Advisory Council on Historic Preservation
- Department of Hawaiian Homelands
- Department of Land and Natural Resources, Chairman
- Department of Land and Natural Resources, State Historic Preservation Division
- Department of Land and Natural Resources, State Historic Preservation Division, Hawaii Island Burial Council
- Edith Kanaka‘ole Foundation
- Hale O Na‘ali‘i
- Historic Hawai‘i Foundation
- Ho‘oulu Lahui
- Hui Malama I Na Kupuna O Hawaii Nei
- Kalapana Community Organization
- Kalapana Fishing Council
- Kalapana ‘Ohana
- Kalauonaone O Puna Association
- Ka Ohana O Honuapo
- Kamehameha Schools
- Ka‘ū Preservation
- Kua o Ka La Public Charter School
- National Park Service, Associate Director for Cultural Resources
- The Nature Conservancy of Hawai‘i
- O Ka‘ū Kakou
- Office of Hawaiian Affairs
- Naki‘i Ke Aho
- Na Ohana O Kalapana

Formal written consultation will occur during the public comment period for this environmental assessment.

Native Hawaiian Consultation

The proposed plan was discussed with the Kupuna advisory group from Ka‘ū and Puna on March 16, 2012 and September 7, 2012; the meetings were held at the park. In addition, consultation letters were sent on February 23, 2012. Follow-up letters were sent on 4/10/2012 that included the purpose and need for the plan, as well as the draft BMPs. Overall in the meetings, the group considered administrative aviation as critical to accomplishing the purpose and objectives of the plan. One written response was received recommending mandatory annual training of helicopter operators with regards to sensitive cultural and natural resources. This is addressed in the BMPs by requiring that all contract pilots receive and adhere to the BMPs, and the project leader and flight manager will ensure the BMPs are adhered to.

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LIST OF RECIPIENTS OF NOTICE FOR EA AVAILABILITY

The following agencies, organizations, and businesses, as well as other entities and individuals, either received a copy of the draft plan/EA or were notified of the documents' availability on PEPC. A complete list of names on the NPS mailing list for this project is in the project file and is available from the issuing office.

FEDERAL DEPARTMENTS AND AGENCIES

- Advisory Council on Historic Preservation
- United States Department of Agriculture
 - Forest Service Institute of Pacific Islands Forestry
 - Natural Resources Conservation Service
- United States Department of Commerce
 - National Oceanic and Atmospheric Administration
 - National Marine Fisheries Service
- United States Department of Defense
 - Kilauea Military Camp
 - U.S. Army Garrison
- United States Department of the Interior
 - National Park Service
 - Ala Kahakai National Historic Trail
 - Haleakalā National Park
 - Inventory and Monitoring Program
 - Kalaupapa National Park
 - Kaloko-Honokohau National Historic Park
 - Pacific West Region–Honolulu Office
 - Pu‘uhonua o Honaunau National Historic Park
 - Pu‘ukohola Heiau National Historic Site
 - United States Geological Survey
 - Hawaiian Volcano Observatory
 - Pacific Island Ecosystems Research Center
 - United States Fish and Wildlife Service
 - Hakalau Forest National Wildlife Refuge
 - Pacific Islands Fish and Wildlife Office
- United States Department of Transportation
 - Federal Aviation Administration
- United States House of Representatives
 - The Honorable Tulsi Gabbard
- United States Senate
 - The Honorable Brian Schatz
 - The Honorable Mazie Hirono

HAWAI‘I STATE AGENCIES

- Department of Hawaiian Home Lands
- Hawai‘i Department of Health

- Office of Environmental Quality Control
- Hawai‘i Department of Land and Natural Resources
 - Division of Conservation and Resources Enforcement
 - Division of Forestry and Wildlife
 - Natural Area Reserves System
 - Historic Preservation Division
 - Land Division
 - Office of Conservation and Coastal Lands
- Office of Hawaiian Affairs
 - Hilo CRC
- Hawai‘i House of Representatives
 - Mark Nakashima, District 1
 - Clifton Tsuji, District 2
 - Richard Onishi, District 3
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 - Richard Creagan, District 5
 - Nicole Lowen, District 6
 - Cindy Evans, District 7
- Hawai‘i Island Burial Council
- Hawai‘i Office of the Governor
 - Honorable Neil Abercrombie
 - Honorable Shan Tsutsui
 - East Hawai‘i Governor’s Representative
- Hawai‘i State Library
 - Hilo Public Library
 - Honoka‘a Public Library
 - Kailua-Kona Public Library
 - Kea‘au Public Library
 - Kealahou Public Library
 - Laupahoehoe Public Library
 - Mountain View Public Library
 - Na‘alehu Public Library
 - North Kohala Public Library
 - Pahala Public Library
 - Pahoia Public Library
 - Thelma Parker Public Library
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 - Malama Solomon, District 4
- University of Hawai‘i
 - Botany Department
 - Cooperative Extension Services
 - Department of Zoology
 - Office of Mauna Kea Management

- Cooperative Ecosystem Studies Unit

COUNTY AND LOCAL AGENCIES

- Big Island Chamber of Commerce
- Big Island Visitors and Convention Bureau
- County of Hawai‘i Native Hawaiian Chamber of Commerce
- County of Hawai‘i Planning Office
- County of Hawai‘i Public Access, Open Space, and Natural Resources Preservation Commission
- County of Hawai‘i Research and Development
- Hawai‘i County Council

ORGANIZATIONS AND BUSINESSES

- Above It All
- Big Island Air
- Big Island Invasive Species Committee
- Blue Hawaiian Helicopters
- Call Air
- Edith Kanaka‘ole Foundation
- Friends of Hawai‘i Volcanoes National Park
- Hale O Na‘ali‘i
- Hawai‘i Audubon Society
- Hawaii Helicopters
- Hawai‘i Pacific Parks Association
- Hawaiian Ecosystems at Risk
- Hawaiian Silversword Foundation
- Historic Hawai‘i Foundation
- Ho‘oulu Lahui
- Hui Malama I Na Kupuna O Hawaii Nei
- Kalapana Community Organization
- Kalapana Fishing Council
- Kalapana ‘Ohana Association
- Kalauonaone O Puna Association
- Kamehameha Schools
- K & S Helicopters
- Ka Ohana O Honuapo
- Kapāpala Ranch
- Ka‘ū Chamber of Commerce
- Ka‘ū Preservation
- Keauhou Bird Conservation Center
- Kua o Ka La Public Charter School
- Kupuna Consultation Group (for HVNP)
- Makani Kai Helicopters
- Manuiwa Airways

- Maui Island Air
- Mokulele Flight Service
- Naki 'i Ke Aho
- Na Ohana O Kalapana
- National Park Foundation
- National Parks Conservation Association
- Native Hawaiian Legal Corporation
- Natural Resources Defense Council
- O Ka'ū Kakou
- Paragon Air
- Public Employees for Environmental Responsibility
- Queen Liliuokalani Trust
- Rainbow Pacific Helicopters
- Safari Aviation
- Sierra Club
- Sunshine Helicopters
- The Mountain Institute
- The Nature Conservancy of Hawai'i
- The Nature Sounds Society
- The Wilderness Society
- Three Mountain Alliance
- Volcano Art Center
- Volcano Community Association
- Volcano Golf and Country Club
- Wilderness Watch

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GLOSSARY

‘a‘a — These volcanic lava flows result in discontinuous lava surfaces; the hallmark of an ‘a‘a lava flow is the very rough surface it produces when it cools and solidifies.

makai — Oceanside, towards the sea.

mauka — Inland, upland, towards the mountain.

pāhoehoe flows — These volcanic lavas flows result in continuous surfaces. Pāhoehoe lavas are thin and they flow smoothly in tongues or lobes and are characterized by a glassy, plastic skin. When the pāhoehoe lava flow cools, it often solidifies to a smooth surface.

pali — Cliffs or ridges.

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**APPENDIX A: Best Management Practices Plan for Administrative
Aviation, Hawai'i Volcanoes National Park**

Aviation Best Management Practices for HVNP revised 01/30/2014

Background information: The average annual hours of administrative use of helicopters by Hawai'i Volcanoes National Park (HVNP) and park partners (primarily USGS-Hawaiian Volcano Observatory) that originate in the park is 250 hours (150 hours park, 100 hours park partners). This includes NPS emergency responses to monitor and suppress wildland fires, search and rescue missions, invasive species management, and protection of native ecosystems. For some, particularly Hawaiian Volcano Observatory (HVO), a lot of the flight time is outside of park boundaries (e.g. monitoring Pu'u 'Ō'ō). The amount of administrative helicopter use in a given year is influenced by project funding, eruptive and seismic activity, and other emergency responses. In a typical year, when wildland fire activity is low, monitoring an active volcano and actively protecting threatened and endangered species requires the majority of the helicopter use.

General Best Management Practices (BMPs)

A flight plan will be required and approved according to the procedures outlined in the current park Aviation Management Plan. Potential impacts can be minimized or resolved through discussions in the planning stage including consultation with resource specialists and other subject matter experts to result in the least impact.

Landing zones, staging areas, flight paths, time of flight, and above ground level (AGL) will be selected to avoid or minimize flight hazards as well as impacts on visitors, adjoining landowners, developed areas, wilderness, and park resources.

Low-level / low-flying is considered below 500' AGL.

Missions will be combined into a single flight or flight day to the extent possible.

Examples include: – HVO combines various missions into a single flight day, usually on the day an eruption reconnaissance flight is scheduled. – Work groups combine helicopter use with other work groups or projects, for example, coastal area sling loads for maintenance projects are done the same day as turtle operation sling loads.

Two days a week are currently 'no fly' days, Saturday and Sunday. Very rarely, routine work may be completed on these days, but enhanced outreach/education would be considered. This would not be applicable for eruptions, emergencies.

Wilderness values will be protected. Fly outside wilderness boundaries and over roads where possible (sling load flights cannot fly over roads). Avoidance distance will be determined based on project and location. Land/drop outside of wilderness and hike people/materials in when feasible. Minimum Requirement Decision Guide (MRDG) will be completed for all flights over or in wilderness (or suitable/eligible/recommended). Consider non-aviation modes of transport (like livestock) when feasible.

Avoid low-level flights over backcountry campsites and trails, particularly along or parallel to trails.

Avoid flights over high concentration visitor use areas. These areas include: Kīlauea Visitor Center, Jaggar Museum, end of Chain of Craters Road, Steam Vents, Thurston Lava Tube, Kīlauea Iki Overlook,

Kīlauea Caldera, Devastation Trail, Kipukapuaulu, Mauna Ulu – parking lot and trail to Pu‘u Huluhulu, Ka‘ū Desert Footprints area, Hilina Pali Shelter, Mauna Loa Road Lookout, and Puhimau hot spot.

When feasible, disperse helicopter operations within the park or to existing helispots outside the park to reduce concentrations of flights out of rainshed helibase at Kīlauea summit.

Minimize flights over the known quietest locations (natural ambient sound) in the park, including Kīpuka Kī, Mauna Loa, and Ka‘ū Desert. As additional soundscape monitoring occurs, incorporate the expanded data into the protection of quiet natural soundscapes.

Avoid low level flights over USGS and NPS personnel working on the ground due to the hazards of blowing cinders from rotor wash and noise and vibration interference with monitoring equipment.

Adhere to restrictions for threatened and endangered (T&E) and sensitive species and their habitats (see ‘Restrictions’ for more information).

Avoid sunrise and sunset flights as these are the most sensitive for cultural resources/ethnographic concerns.

Avoid flying over areas where traditional Native Hawaiian practices are known to occur.

Use the staging area (temporary helispots) nearest to the work site to disperse flights. Helispots will be selected by the priority order of: 1. Safety first, 2. Impact concerns (disturbed sites or bare lava selected first if possible), and 3. Cost/efficiency/closeness to job site (may have the temporary helispot further away from job site if it means less impact).

Utilize helispots in this order of preference: 1. List of temporary helispots from Aviation Management Plan (already cleared/surveyed/routinely used); 2. Sites that do not need a survey (e.g. bare ground (rock), roadway, existing helipads outside of park in proximity to project site); and, 3. Sites that need a survey (natural resources and cultural resources) prior to being cleared for use.

When possible, reschedule flights if weather forces low-level flights over visitors, adjacent landowners, T&E or sensitive species, or wilderness, and multiple flights are anticipated.

If a planned flight involves choices between impacts to T&E/sensitive species or visitors/adjacent landowners, then protection of T&E species will take precedence (due to legal requirements), with mitigation to reduce impacts on visitors and neighbors through notification and education.

When planning flights, anticipate 1-mile radius Temporary Flight Restrictions (TFRs) around new eruptive vents, within which all flights are suspended. Eruption monitoring and emergency response are authorized within the TFR by the Superintendent. HVNP or HVO will request from the Federal Aviation Administration (FAA) a temporary TFR upon new eruptive events.

Flight path out of the rainshed helibase will typically be to the north due to prevailing wind patterns. After departing the helibase, the flight path will avoid adjoining landowners and will be at least 500 AGL until project/mission work area is reached.

Mitigations

Airspace closures will be implemented for special ceremonies/events. There will be a mandatory 5 mile standoff distance for special events which could be impacted by administrative overflights, limited to the day of the event. These include the following: 1) Annual Park Cultural Festival; 2) Aloha Festival; 3) other park/partner programs or events with 2 months' notice; and 4) voluntary standoff for events not yet identified.

To increase visitor notification and education regarding administrative flights, the backcountry permit office will be notified of flights and will notify permit applicants when appropriate. When appropriate, notices will be posted (such as at visitor center, backcountry permit office, trailheads, etc.) prior to flights to allow visitors to select quieter places if desired, and educate visitors on purpose of flights.

The Public Affairs Officer will determine if a media advisory and public outreach is necessary based on the flight plan, but would typically be considered for intensive helicopter work near visitor use areas and adjacent communities. Examples of intensive helicopter work would be 2-3 hours of flight time per day or frequent flights over a 2 or 3 day period for a large fence replacement project, intensive volcanic monitoring, or equipment replacement. For intensive helicopter work, the flight managers would provide at least 3 days' notice of the upcoming flights to the appropriate park staff so the public notification and education can occur. Examples of those notified in a media advisory include, but are not limited to local media, park partners, park affiliates, social media, and the park website.

For all project planning and implementation, the project leader, or his designee, is responsible for ensuring that Best Management Practices (BMPs) are adhered to, and applicable Minimum Requirement Decision Guides (MRDGs) for wilderness flights are completed and implemented. He/she is also responsible for consulting with the appropriate subject matter expert to identify and mitigate potential resource concerns with proposed flights/landings. The project leader is responsible for communicating appropriate BMPs, MRDGs and resource mitigations to the flight manager. The flight manager will follow the project leader's instructions while ensuring that all aviation safety procedures and policies are followed.

Project and Flight Managers will ensure staff working with/on flights understand and adhere to the BMPs. This applies to all park and park partner project and flight managers (such as HVO, NPS Inventory and Monitoring, USGS-Biological Resources Division, etc.)

Contract helicopter pilots will receive a copy of the BMPs. Project and flight managers will ensure they are adhered to while conducting contract work for the park or its partners in the park.

The park's Cultural Anthropologist will contact cultural practitioners prior to flights in culturally sensitive or important areas.

Resource specialists will be contacted prior to vegetation clearing or potential resource concerns for landing site (vegetation, invertebrates/understory plants, birds, bats, cultural resources) and sites will be relocated to avoid impacts to resources. Tree trimming (for landing site improvements) will be avoided

during critical nesting and pupping periods. In cases where trimming during sensitive periods are unavoidable (e.g. in forest where multiple species co-occur), resource specialists will determine if sensitive wildlife are in the area and depending on the determination, consult USFWS.

The Avian Biologist would be contacted prior to low-level flights in the following areas:

Kīlauea summit - KMC to SW Rift and Keanakākoʻi to Puʻu Puaʻi

Kahuku - subalpine scrub along upper eastern boundary (Nēnē Cabin up to 8,500 feet).

The helicopter that is selected for the work would be the most effective for the mission (e.g., larger helicopter for fewer trips when appropriate, quieter helicopter for work near wilderness if available and cost effective). Contract helicopters with quiet technology would be considered.

During wildland fire and other extended emergency incidents:

1. As soon as possible, resource advisors are assigned to incidents to coordinate natural and cultural resource concerns and provide recommendations for minimizing impacts of response endorsed by the Incident Commander. Follow Endangered Species Act (ESA) regulations and any other US Fish and Wildlife Service (USFWS) guidance or instructions regarding the consultation process and notification of incidental take with USFWS.
2. As soon as possible, all personnel on the fire are informed about sensitive cultural features to avoid and sensitive and listed species and the importance of protecting their habitats and minimizing take. This is best identified in the incident management objectives.
3. The effectiveness of suppression activities and mitigation measures should be documented and evaluated after an incident. Procedures should be revised as needed.

Restrictions

Specific area and time of year restrictions, as prescribed by park resource specialists, will be followed to avoid impacts to sensitive, threatened, and endangered species and their habitat. Species and specific areas include, but are not limited to: Hawaiian goose, Hawaiian petrel, Hawaiian hawk, Hawaiian crow, black noddy and other seabirds, Hawaiian hoary bat, Hawaiian monk seal, and sensitive and endangered forest bird habitat. Restrictions are designed specifically to minimize disturbance to each species in that species' primary habitat and may include limitations, such as, specific times of day in specific areas, minimum AGL or lateral distances, no landing zones, and/or no rotor wash areas.

If the area and time of year restrictions cannot be followed, then the project manager needs to talk to the subject matter expert for the species/area to evaluate potential impact to species and determine if consultation with USFWS is needed. Consultation with USFWS can take 60+ days. For helicopter activities that are part of an emergency response (e.g. wildland fire, search and rescue, active eruptions, and catastrophic events) follow ESA regulations regarding the consultation process and reporting of incidental take with USFWS.

General species and/or habitat descriptions include:

Sensitive and Endangered Forest Bird habitat - Avoid low-level flights over forest habitat from February - May due to endangered and sensitive forest bird nesting.

Hawaiian hawk habitat - Low-level helicopter work will be scheduled before or after the breeding season (March thru September). If low-level flights are unavoidable during the breeding season, routes will avoid flying within 1,500 feet of known nests. In addition, year-round the helicopter crew and pilot will be informed of the importance of watching for circling hawks, and reroute to avoid collision.

Hawaiian petrel and band-rumped storm petrel - Avoid sunrise and sunset flights in subalpine habitat above 8,000' elevation on Mauna Loa and other areas birds are known to use in the park.

Newell's shearwater – Avoid sunrise and sunset flights over the east rift of Kīlauea.

Hawaiian hoary bat - Avoid sunset flights on Mauna Loa near forest edge for protection of Hawaiian hoary bat. Avoid removing or trimming trees >15 feet tall and helicopter work that would generate rotor wash in trees in forest below 5,000 feet elevation from June 1 – September 15 to protect breeding, roosting, and non-volant bats (e.g. avoid short haul, sling loading during that time period in that area).

Black noddy and other seabirds - Avoid flying low along coastal cliffs; for tropic birds, avoid flying directly over pit craters during breeding season (March through October).

Hawaiian monk seal - For flights near coastal beaches, if monk seals are present, flights and landings should be kept 1,000 feet from the animal (AGL and laterally).

Hawaiian crow - in the event that 'ālalā is introduced in the vicinity of the park – low-level flight and landing restrictions may apply.

Hawaiian goose - No flying below 2,000 feet AGL and no landing should occur in critical breeding and flocking areas.

APPENDIX B: Minimum Requirements Decision Guide Worksheets



ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

“ . . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act...”

– the Wilderness Act, 1964

Please refer to the accompanying MRDG [Instructions](#) for filling out this guide.

The spaces in the worksheets will expand as necessary as you enter your response.

The MRDG Instructions may be found at: <http://www.wilderness.net/mrdg/>

Project Title: _____

Step 1: Determine if any administrative action is necessary.

Description: Briefly describe the situation that may prompt action.
--

To determine if administrative action is necessary, answer the questions listed in A - F on the following pages by answering Yes, No, or Not Applicable and providing an explanation.

A. Describe Options Outside of Wilderness

Is action necessary within wilderness?

Yes: ☐ No: ☐

Explain:

B. Describe Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows or requires consideration of the Section 4(c) prohibited uses? Cite law and section.

Yes: ☐ No: ☐ Not Applicable: ☐

Explain:

C. Describe Requirements of Other Legislation

Is action necessary to meet the requirements of other laws?

Yes: ☐ No: ☐ Not Applicable: ☐

Explain:

D. Describe Other Guidance

Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☐ No: ☐ Not Applicable: ☐

Explain:

E. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including: Untrammeled, Undeveloped, Natural, Outstanding opportunities for solitude or a primitive and unconfined type of recreation, or other unique components that reflect the character of this wilderness area?

Untrammeled: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Undeveloped: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Natural: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Outstanding opportunities for solitude or a primitive and unconfined type of recreation:

Yes: ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Other unique components that reflect the character of this wilderness:

Yes: ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

F. Describe Effects to the Public Purposes of Wilderness

Is action necessary to be consistent with one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historical use?

Recreation: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Scenic: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Scientific: Yes: ☐ No: ☐ Not Applicable: ☐

Explain:

Education: Yes: ☐ No: ☐ Not Applicable: ☐

Explain:

Conservation: Yes: ☐ No: ☐ Not Applicable: ☐

Explain:

Historical use: Yes: ☐ No: ☐ Not Applicable: ☐

Explain:

Step 1 Decision: Is any administrative action <u>necessary</u> in wilderness?
--

Yes: ☐ No: ☐ More information needed: ☐

Explain:

If action is necessary, proceed to Step 2 to determine the minimum activity.

Step 2: Determine the minimum activity.

Please refer to the accompanying MRDG [*Instructions*](#) for information on identifying alternatives and an explanation of the effects criteria displayed below.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the wilderness resource and character.

Alternative # _____

Description:

Effects:

Wilderness Character

“Untrammeled”

“Undeveloped”

“Natural”

“Outstanding opportunities for solitude or a primitive and unconfined type of recreation”

Other unique components that reflect the character of this wilderness

Heritage and Cultural Resources

Maintaining Traditional Skills

Special Provisions

Economics and Timing Constraints

Additional Wilderness-specific Comparison Criteria

Safety of Visitors, Personnel, and Contractors

Comparison of Alternatives

It may be useful to compare each alternative's benefits and adverse effects to each of the criteria in tabular form, keeping in mind the law's mandate to "preserve wilderness character."

	Alternative A	Alternative B	Alternative C	No Action
Untrammeled				
Undeveloped				
Natural				
Solitude or Primitive Recreation				
Unique components				
WILDERNESS CHARACTER				

	Alternative A	Alternative B	Alternative C	No Action
Heritage & Cultural Resources				
Maintaining Traditional Skills				
Special Provisions				
Economics & Timing				
Additional Wilderness Criteria				
OTHER CRITERIA SUMMARY				

	Alternative A	Alternative B	Alternative C	No Action
SAFETY (PUBLIC AND WORKERS)				

Safety Criterion

Occasionally, safety concerns can legitimately dictate choosing one alternative which degrades wilderness character (or other criteria) more than an otherwise preferable alternative. In that case, describe the benefits and adverse effects in terms of risks to the public and workers for each alternative here but avoid pre-selecting an alternative based on the safety criteria in this section.

Documentation:

To support the evaluation of alternatives, provide an analysis, reference, or documentation and avoid assumptions about risks and the potential for accidents. This documentation can take the form of agency accident-rate data tracking occurrences and severity; a project-specific job hazard analysis; research literature; or other specific agency guidelines.

Step 2 Decision: What is the Minimum Activity?

Please refer to the accompanying MRDG [*Instructions*](#) before describing the selected alternative and describing the rationale for selection.

Selected alternative:

Rationale for selecting this alternative (including safety criterion, if appropriate):

Monitoring and reporting requirements:

Check any Wilderness Act Section 4(c) uses approved in this alternative:

- | | |
|---|--|
| <input type="checkbox"/> mechanical transport | <input type="checkbox"/> landing of aircraft |
| <input type="checkbox"/> motorized equipment | <input type="checkbox"/> temporary road |
| <input type="checkbox"/> motor vehicles | <input type="checkbox"/> structure or installation |
| <input type="checkbox"/> motorboats | |

Record and report any authorizations of Wilderness Act Section 4(c) uses according to agency procedures.

Approvals	Signature	Name	Position	Date
Prepared by:				
Recommended:				
Recommended:				
Approved:				

APPENDIX C: Agency Consultation and Public Scoping Letters



United States Department of the Interior

NATIONAL PARK SERVICE

Hawai'i Volcanoes National Park
Post Office Box 52
Hawaii National Park, Hawai'i 96718



IN REPLY REFER TO:
HAVO I.A.2 (N1621)

June 12, 2012

Dr. Loyal Mehrhoff, Field Supervisor
US Fish and Wildlife Service, Pacific Islands Ecoregion
300 Ala Moana Blvd, Rm 3108, PO Box 50088
Honolulu, HI 96850

Subject: Request for Informal Section 7 Consultation, Mission Critical Administrative Aviation Draft Plan/Environmental Assessment (EA) at Hawai'i Volcanoes National Park

Dear Dr. Mehrhoff:

Hawai'i Volcanoes National Park (HAVO) would like to initiate informal, interagency consultation under Section 7 of the Endangered Species Act for the preparation of a draft plan/environmental assessment for mission critical administrative use of helicopters overseen by park staff. The draft plan/EA will address the impacts of administrative use of helicopters on natural and cultural resources, visitor experience, wilderness, safety and park operations. Hawai'i Volcanoes National Park has an important mission that includes protecting and restoring park resources as well as providing visitor access to active volcanoes. In order to accomplish our mission, park staff and partners occasionally utilize aircraft to carry out the work. Helicopters are used because they are an essential tool for activities such as volcanic monitoring of eruptive activity and hazards, controlling invasive species, implementing endangered species recovery actions, suppressing wildland fires, and search and rescue operations in the backcountry.

The objectives of the draft plan/EA are to (1) ensure safety of park visitors and staff; (2) minimize any potential impacts to natural and cultural resources and the visitor experience from administrative aviation activities; (3) comply with the National Park Service policies and federal regulations; and, (4) maximize efficiency of flights and minimize costs to park operations. To this end, park staff and partners have started working on a plan to provide internal park guidance for administrative flights. This plan will formalize best management practices, define sensitive areas and times to avoid, and include mitigation measures to reduce any potential impact of the park's operational use of helicopters.

Background

Based on data from 2004-2010, an average of 250 hours of administrative flights per year were flown by NPS and USGS. Flights over HAVO airspace account for most of these hours, although flights conducted over adjoining areas are responsible for a small, non-quantified share of the total average flight hours. These latter typically occur when flights originate from one part of the park to another require flying over adjoining lands, or when working with cooperating agencies (the latter described below).

Response to the volcanic activity of the on-going eruption of Kīlauea at both the summit and along Kīlauea's East Rift accounted for nearly half of USGS's annual average 94 flight hours. The eruption on the East Rift of Kīlauea has been on-going since 1983; the summit eruption has been continuous since 2008. About one-third of HVO's flight hours are allocated to deploying or maintaining instruments to monitor earthquakes and deformation. The remaining flight hours were devoted to GPS surveys and geological research.

The monitoring of Kīlauea and Mauna Loa volcanoes, supported by aviation, is conducted for the health and safety of the Hawaiʻi Island community and residents, along with those of park visitors and staff.

Invasive species control, ecosystem restoration, and rare species recovery by NPS account for approximately 100 hours of flight time per year. Over ninety percent of the native flowering plants, insects, and forest birds in Hawaiʻi are endemic to the islands. The unique native species and ecosystems of HAVO are threatened by the spread of invasive species which require intensive management. For example, introduced ungulates such as feral cattle, goats, sheep, and pigs, as well as mouflon sheep or axis deer, severely browse and deplete native vegetation and encourage the spread of invasive plant species. Invasive plants displace native vegetation, alter plant communities, and degrade native ecosystems. As a result, many endemic species have become very rare in the park. Two mammal, nine bird, two reptile, three invertebrate, and 24 plant species in HAVO are listed as endangered or threatened by the US Fish and Wildlife Service (USFWS).

Controlling invasive species, restoring native ecosystems, and recovering rare species requires the use of helicopter support in building and repairing ungulate-proof fences, hunting ungulates, locating and controlling invasive plants, and supporting staff and volunteers in monitoring and recovering endangered species.

Hawaiʻi Volcanoes National Park has extensive backcountry with over 125 miles of hiking trails and six backcountry shelters that include catchment systems for drinking water. The spread of invasive, fire-promoting grasses has dramatically increased the size and frequency of wildfire in drier areas of the park. Approximately 50 hours were flown by park staff for search and rescue, maintenance of backcountry facilities, and suppression or monitoring of wildland fire.

Cooperating agencies besides HVO are responsible for an estimated 20 hours per year of flight time over the park. The principal cooperators are Hawaiʻi County Fire Department for search and rescue mission or wildland fire missions and Hawaiʻi County Police, U.S. Drug Enforcement Agency (DEA), and Hawaiʻi Department of Land and Natural Resources (DLNR) on marijuana surveillance and eradication. These missions are carried out almost exclusively in adjoining lands but the flights originate, end, or refuel at the park helibase near headquarters.

Administrative flights occur year round. In some cases early morning flights are necessitated to maximize effectiveness of detection and removal of invasive ungulates, emergency response operations (SAR, wildfire suppression) as well as accommodate availability of certified pilots for project work under tight time constraints (e.g. responding to predator live-trap triggers in high-elevation remote areas).

During HAVO internal scoping the following No Action and Action alternatives were identified:

No Action Alternative. Under the No Action alternative, park staff would continue to allow aviation as needed, use of the existing helibase at the Kīlauea summit area, and helicopter staging and landing areas as needed for the health and safety of park visitors and island residents, and for resource protection and restoration. Informal practices developed to minimize impacts on park resources, visitors, and adjacent communities are implemented by some flight managers or pilots but have not been formalized and are not universally followed.

Action Alternative. Under the Action alternative, park staff would continue to use aviation for the health and safety of visitors, employees, and island residents for park resource protection and restoration. Use of the existing helibase at the Kīlauea summit area would continue as well as use of helicopter staging and landing areas as needed. However, park staff would institute formal best management practices, area closures, and flight restrictions to minimize impacts to park resources, wilderness, soundscapes, visitors, and adjoining landowners.

The following summarizes the specific best management practices and mitigation measures identified to minimize impacts to federally-listed species under the action alternative. These actions were identified during internal discussions with NPS subject experts and incorporated information from previous consultations with USFWS that relate to helicopter for administrative work in the park (consultation received from USFWS for the draft plan/DEIS “Protecting and Restoring Native Ecosystems by Managing Non-Native Ungulates” 2011-I-0347, 2010-I-0118, 2008-TA-0159).

- Endangered Forest Birds and Hawaiian Hawk. Low-flying helicopter work would be minimized in sensitive wildlife habitat during critical nesting periods for endangered forest birds and Hawaiian hawk. If essential administrative aviation actions are required and can not be postponed, park staff would consult with the appropriate NPS resource specialist to determine if sensitive wildlife are in the area and depending on the determination, consult with USFWS.
- Nēnē. Minimum AGL of 2,000 ft and stand off of 1 mile at ‘Āinahou breeding pens, Ohaieka pens, Kīpuka Nēnē, Kīpuka Kahali‘i, and Kahuku Nēnē cabin. If essential administrative aviation actions are required and can not be postponed, park staff would consult with the appropriate NPS resource specialist to determine if sensitive wildlife are in the area and depending on the determination, consult with USFWS.
- Minimize sunrise and sunset flights to avoid disturbing birds during important activity periods. Avoid sunset flights on Mauna Loa at the forest edge to reduce potential impact to Hawaiian hoary bats. If early morning flying is required, wherever possible select routes to minimize flight time over forested areas.
- Helicopter landing/staging areas-

Staging areas would be located nearest to the work site and away from sensitive resources to minimize flight time and impacts to resources.

Wherever possible, previously disturbed areas would be used, including established helicopter landing /staging areas that have been previously surveyed for resource concerns, and roadside pullouts, or where no vegetation clearing is needed (e.g. open lava flows).

NPS subject experts would evaluate location of any proposed new helicopter landing/staging areas and sites would be relocated if potential impacts to federally listed and sensitive wildlife were identified.

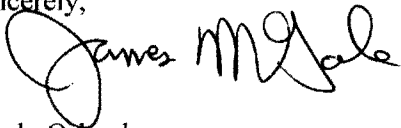
In the event that a new helicopter landing/staging area would require vegetation clearing, a botanical survey for rare plants would be conducted and rare plants would be avoided, or the landing/staging area relocated away from the rare plants. Plant removal would be limited to common understory vegetation, brush, and small trees less than 6 inches in diameter. For removal of larger trees during the breeding season of endangered forest birds and the Hawaiian hoary bat, an NPS resource advisor would be consulted prior to removal. To the extent practicable, no tree (>15 ft height) removal or trimming would occur when lactating or non-volant bats are present (May through August, ≤5,000-ft elevation).

- Quiet Technology. If available in the future and cost effective, preference would be given to aviation contractors with quiet technology and appropriate certifications for the specific flights.
- Pilot Education. Pilots will receive a copy of the best management practices and be required to adhere to them while conducting contract work for NPS or cooperating agencies.

Federally-listed threatened or endangered species could be temporarily disturbed during aviation activities. The use of helicopters would introduce unnatural noise in the park, temporarily disrupting and potentially displacing some sensitive species. Any activities, including monitoring, that involve low-flying aircraft may affect the behavior and ecology of wildlife both during and after overflights. Although measures would be taken to reduce flying in sensitive areas during critical times, impacts could occur during reproductive periods or in key habitat for native wildlife. The frequency of administrative flights is expected to be similar to past use (2004-2010) and remain steady over the life of this plan. Based on the past history of administrative flights in the park and the absence of incidences, the potential for bird and bat strikes are expected to be low. Impact from dust, which was identified as a potential issue of concern in a previous letter received by the park from USFWS with regards to commercial air tours (05/05/2011; 2011-TA-0234), is expected to be low. Sparsely vegetated areas are primarily pahoehoe and 'a'a lava flows that contribute little to dust. Large areas of exposed soil are uncommon and along with cinder areas are avoided as landing, staging and low flying areas due to safety concerns with dust.

We look forward to working with you and your staff in determining potential impacts of these proposed actions on federally listed species in the area. Please address any questions to Rhonda Loh, Chief of Resource Management, (rhonda_loh@nps.gov, 808-985-6098).

Sincerely,



for Cindy Orlando
Superintendent

cc:

Rhonda Loh
Danielle Foster



United States Department of the Interior

NATIONAL PARK SERVICE

Hawai'i Volcanoes National Park
Post Office Box 52
Hawaii National Park, Hawai'i 96718



IN REPLY REFER TO:
HAVO I.B. (L7617)

February 23, 2012

William J. Aila, Jr.
Department of Land and Natural Resources
Kalanimoku Building, 1151 Punchbowl St.
Honolulu, HI 96813

Aloha,

Hawai'i Volcanoes National Park, a unit of the National Park Service (NPS), has several planning efforts underway in 2012. In order to keep you informed about our projects, and in accordance with the National Historic Preservation Act of 1966, as amended, and the Advisory Council on Historic Preservation regulations, 36 CFR Part 800 Protection of Historic Properties, we are consulting with you on these undertakings. We would like to provide you with the following planning update and seek your comments on two new planning projects scheduled for the coming year.

New Projects

Mission Critical Administrative Aviation Plan/Environmental Assessment

Hawai'i Volcanoes National Park has an important mission that includes protecting and restoring park resources. In order to accomplish our mission, park staff and partners occasionally utilize aircraft to carry out the work. Helicopters are used in particular because they are an essential tool for activities such as volcanic monitoring of eruptive activity and hazards, controlling invasive species, suppressing wildland fires, and search and rescue operations in the backcountry.

The underlying purpose of all of these activities is to provide for public safety and health and for resource protection and restoration. Use of aircraft allows park staff and cooperators to accomplish these activities in a safe, timely, and efficient manner while minimizing the impacts to the park's natural and cultural resources and the visitor experience.

The park is developing a plan (Mission Critical Administrative Aviation Plan) and accompanying Environmental Assessment (EA) to document any potential impacts of its aviation operations. The objectives of the plan are to (1) ensure the safety of park visitors and staff and the public through monitoring of volcanic hazards and safe and timely response to eruptions, wildfires and backcountry emergencies; (2) ensure the ability to effectively protect and restore natural and cultural resources; (3) minimize any impacts to park resources and values such as soundscapes and visitor experience; (4) ensure compliance with the National Park Service policies and federal regulations; and, (5) maximize efficiency of flights and minimize costs to park operations.

To this end, park staff and partners have started working on a plan that will provide internal park guidance for utilizing aircraft to conduct our work where necessary. This plan will formalize best management practices, define sensitive areas to avoid, and include mitigation measures to reduce any potential impact of the park's operational use of aviation.



PLEASE NOTE: This plan/EA will guide internal NPS aviation activities occurring within the park and those of contract aircraft doing business for the park only, **not** the activities of commercial air tours or general aviation aircraft. An Air Tour Management Plan (ATMP)/EIS to address commercial air tours flying over the park is being developed through a separate process and is discussed below.

The public is invited to comment on the park's intent to develop a Mission Critical Administrative Aviation Plan/Environmental Assessment (plan/EA) for Hawai'i Volcanoes National Park. Your observations and suggestions are appreciated.

If you would like to provide comments or suggestions for us to consider during the development this plan/EA, you may submit comments on-line at: <http://parkplanning.nps.gov/havo>. You may also mail your comments to the park, Attn: Superintendent, PO Box 52, Hawaii NP, HI 96718-0052. Please send us comments by March 26, 2012.

Bicycle Use in Limited Areas at Kahuku Unit

The Palm Trail at the Kahuku Unit is currently used as a trail and has occasional administrative vehicle use. The park is proposing to allow bicycles to utilize the main road in Kahuku from the main park gate up to the Palm Trail parking area and then continue onto the Palm Trail/Road. If you would like to provide any comments on this proposed bicycle use at the Kahuku Unit on the main road and the Palm Trail/Road, please submit comments on-line at: <http://parkplanning.nps.gov/havo> or send your comments to the park, Attn: Superintendent at the above address by March 26, 2012.

Before including your address, telephone number, electronic mail address, or other personal identifying information in your comments on any of the projects, you should be aware that your entire comment (including your personal identifying information) may be made publicly available at any time. While you can ask us to withhold your personal identifying information from public review by checking the box "keep my contact information private," we cannot guarantee that we will be able to do so.

Ongoing Project Updates

General Management Plan/Wilderness Study/Environmental Impact Statement

In the fall of 2011, three preliminary action alternatives were presented for public review. Comments were also solicited as part of formal public scoping regarding wilderness as the GMP/EIS was expanded to include a Wilderness Study. The Wilderness Study will determine if any NPS-managed lands within the park should be recommended for inclusion in the National Wilderness Preservation System as part of the General Management Plan. During the five-month public comment period, the park received more than 300 comments via talk-story sessions, mail, email, and through the plan's website. A summary of the 2011 public comments is now available online at: <http://parkplanning.nps.gov/havogmp>. Click on 'Document List' to see the summary. We value your input as the park moves forward with refining alternatives for the plan, selecting a preferred alternative, and writing the draft General Management Plan, Wilderness Study, and Environmental Impact Statement.

Air Tour Management Plan/Environmental Impact Statement

The park has been working on an Air Tour Management Plan (ATMP) and Environmental Impact Statement to manage air tours at the park since 2005. The Federal Aviation Administration serves as the lead agency on this project. In the spring of 2011, the Federal Aviation Administration and the National Park Service presented four preliminary draft action alternatives for formal public review and comment. The park received 180 electronic or written comments (e.g. letters, website submissions and e-mails) and comments from 79 participants at three public meetings. A summary of 2011 ATMP public comments is available on-line at: <http://parkplanning.nps.gov/projectHome.cfm?projectID=36002> Click on

'Document List' to see the summary after March 15. We appreciate your continued involvement in the ATMP process as the FAA and the NPS move forward with refining alternatives, selecting a preferred alternative, and writing a draft Air Tour Management Plan and Environmental Impact Statement.

If you would like to be removed from our mailing list or if your contact information has changed, please let us know. You can mail us the updated information or submit it at the following website:

<http://www.nps.gov/havo/parkmgmt/plan.htm> Click on the link near the top for address update/removal.

Sincerely,

A handwritten signature in black ink, appearing to read 'Cynthia Orlando', written in a cursive style.

Cynthia L. Orlando
Superintendent



United States Department of the Interior

NATIONAL PARK SERVICE
Hawai'i Volcanoes National Park
Post Office Box 52
Hawaii National Park, Hawai'i 96718



IN REPLY REFER TO:
HAVO I.B. (L7617)

February 23, 2012

Dear Interested Party:

Hawai'i Volcanoes National Park has several planning efforts underway in 2012. In order to keep you informed about our projects, we would like to provide you with the following planning update and seek your comments on two new planning projects scheduled for the coming year.

New Projects

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Ongoing Project Updates

General Management Plan/Wilderness Study/Environmental Impact Statement

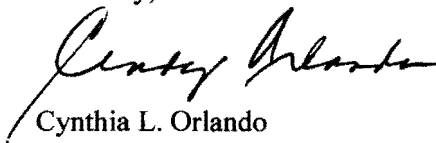
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Sincerely,



Cynthia L. Orlando
Superintendent



United States Department of the Interior

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

RECEIVED
JUL 06 2012



JUL 12 2012

In Reply Refer To:
2012-TA-0348

Ms. Cindy Orlando ^{6/16/12}
Superintendent
Hawaii Volcanoes National Park
P.O. Box 52
Hawaii National Park, Hawaii 96718

Subject: Preparation of a Draft Environmental Assessment for Mission Critical
Administrative Use of Helicopters at Hawaii Volcanoes National Park, Hawaii

Dear Ms. Orlando:

We received your letter on June 15, 2012, requesting our comments on the preparation of a Draft Environmental Assessment (DEA) for administrative use of helicopters at Hawaii Volcanoes National Park. The National Park Service's objectives are to: 1) ensure safety of park visitors and staff; 2) minimize impacts to natural and cultural resources and the visitor experience from administrative aviation activities; 3) comply with National Park Service policies and Federal regulations; and 4) maximize efficiency of flights and minimize park operation costs.

We reviewed the proposed project pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) and the Migratory Bird Treaty Act [16 U.S.C. 703-712]. Based on the project description and site location the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Hawaiian petrel (*Pterodroma sandwichensis*), Hawaiian goose (*Branta sandvicensis*), Hawaii akepa (*Loxops coccineus coccineus*), Hawaiian hawk (*Buteo solitaries*), Hawaii creeper (*Oreomystis mana*), and akiapolaau (*Hemignathus munroi*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*), may be affected by proposed administrative aviation activities.

The Action Alternative would continue use of aviation for administrative purposes within the park and institute formal best management practices, area closures, and flight restrictions to minimize impacts to park resources, wilderness, soundscapes, visitors, and adjoining landowners. We recommend the selection of the Action Alternative as the best management practices and mitigation measures called for in this alternative will minimize impacts to threatened and endangered species. In addition, based on recent research we recommend the avoidance dates for the Hawaiian hoary bat in your DEA be changed to June 1 to September 15.

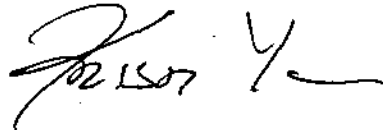
TAKE PRIDE[®]
IN AMERICA 

It is possible that the continuous use of helicopters may increase the likelihood of a crash. Helicopter crashes may result in additional impacts to sensitive species and habitats, especially from fire. The DEA should outline emergency landing information, fire risk assessment plans, and should avoid routes over sensitive areas where a crash would result in adverse impacts to listed species. In addition, potential impacts from noise and disturbance from take-offs and landing, including rotor-wash, should be analyzed in the DEA.

If, after the development of the DEA, it is determined that this project may affect federally listed species, then the National Park Service should consult with us pursuant to section 7(a)(2) of the ESA. We anticipate that the use of aviation for administrative purposes in the park may affect federally listed species.

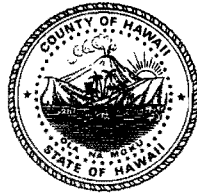
Thank you for your efforts to implement best management practices that will minimize impacts to threatened and endangered species. If you have questions regarding these comments, please contact Rachel Rounds, Fish and Wildlife Biologist, Consultation and Technical Assistance Program (phone: 808-792-9400, email: rachel_rounds@fws.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Loyal Mehrhoff", with a stylized flourish at the end.

~~for~~ Loyal Mehrhoff
Field Supervisor

William P. Kenoi
Mayor



[Handwritten signature]

Harry S. Kubojiri
Police Chief

Paul K. Ferreira
Deputy Police Chief

County of Hawai'i

POLICE DEPARTMENT

349 Kapiolani Street • Hilo, Hawai'i 96720-3998
(808) 935-3311 • Fax (808) 961-8865

March 19, 2012

3.22.12
Ms. Cynthia Orlando
Superintendent
National Park Service
Hawai'i Volcanoes National Park
Post Office Box 52
Hawai'i National Park, Hawai'i 96718

Dear Ms. Orlando:

SUBJECT: NEW PROJECT UPDATES

The Mission Critical Administrative Aviation Plan/Environmental Assessments for the "Bicycle Use in Limited Areas at Kahuku Unit," "General Management Plan/Wilderness Study/Environmental Impact Statement," and "Air Tour Management Plan/Environmental Impact Statement," contained in your letter dated February 23, 2012, have been reviewed. We have no concerns or objections at this time.

If there are any questions, please contact Captain Samuel Jelsma, Puna Patrol District Commander, at 965-2716.

Sincerely,

[Handwritten signature]
HENRY J. TAVARES JR.
ASSISTANT POLICE CHIEF
AREA II OPERATIONS

SJ:lli
120129



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:12-043

March 2, 2012

Cynthia L. Orlando
Superintendent
United States Department of the Interior
National Park Service
Hawai'i Volcanoes National Park
Post Office Box 52
Hawaii National Park, Hawai'i 96718

RECEIVED
MAR 06 2012
Initial: _____

Dear Ms. Orlando;

**SUBJECTS: Mission Critical Administrative Aviation Plan/Environmental Assessment
General Management Plan/Wilderness Study/EIS
Air Tour Management Plan/EIS**

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your letter, dated February 23, 2012. Thank you for allowing us to review and comment on the subject document. We have no comments at this time, but reserve the right to future comments. We strongly recommend that you review all of the Standard Comments on our website: www.hawaii.gov/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this application should be adhered to.

The same website also features a Healthy Community Design Smart Growth Checklist (Checklist). The Hawaii State Department of Health, Built Environment Working Group, recommends that State and county planning departments, developers, planners, engineers and other interested parties apply the healthy built environment principles in the Checklist whenever they plan or review new developments or redevelopments projects. We also ask you to share this list with others to increase community awareness on healthy community design.

If there are any questions about these comments please contact the Environmental Planning Office at 586-4337.

Sincerely,

Laura McIntyre AIOP

Manager
Environmental Planning Office