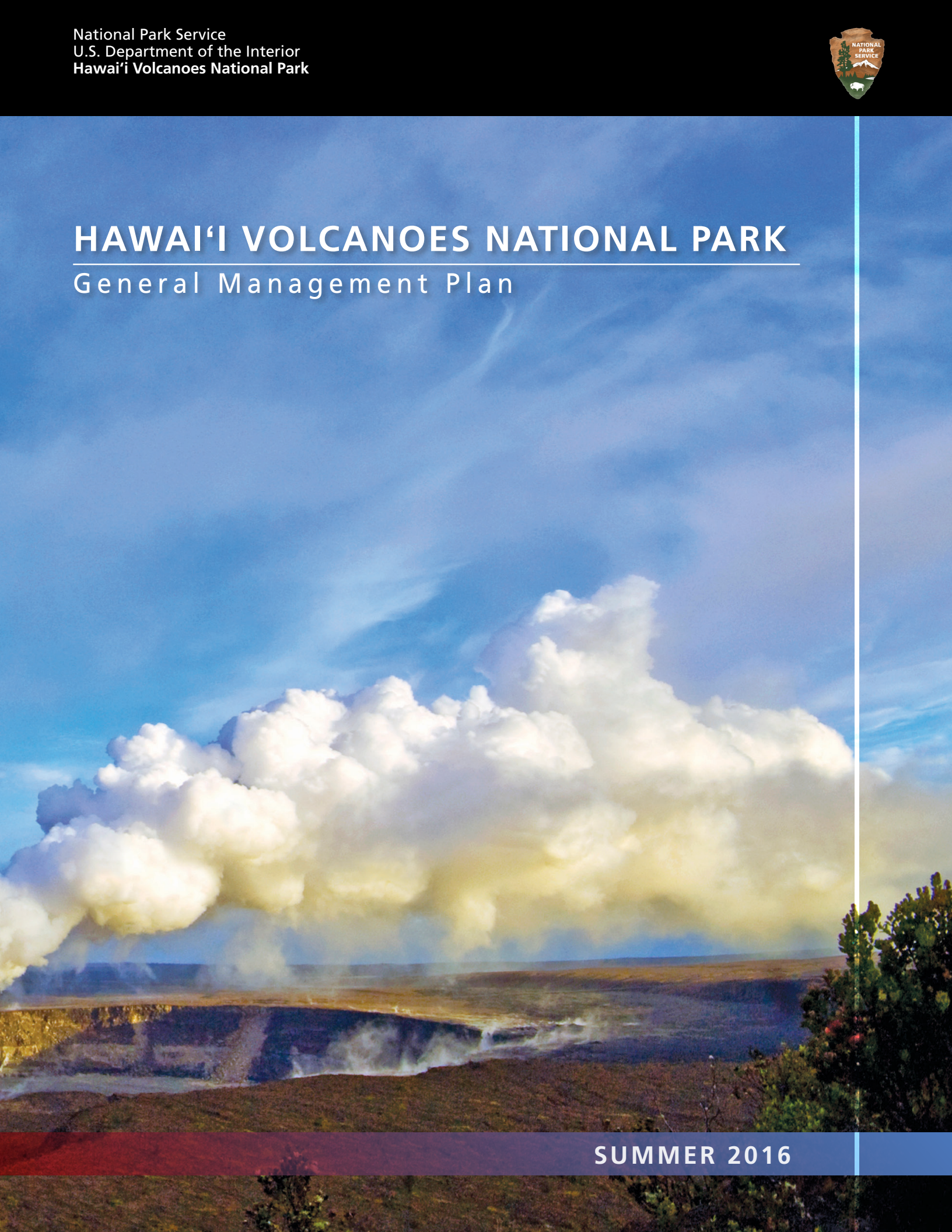




HAWAI'I VOLCANOES NATIONAL PARK

General Management Plan



SUMMER 2016

This General Management Plan (GMP) is Hawai'i Volcanoes National Park's overall management strategy for a 15 to 20 year period. This document summarizes the selected alternative as identified in the Record of Decision as Alternative 2 within *Hawai'i Volcanoes National Park Draft General Management Plan / Wilderness Study / Environmental Impact Statement* (May 2015) and as updated in the *Hawai'i Volcanoes National Park Abbreviated Final General Management Plan / Wilderness Study / Environmental Impact Statement* (Spring 2016). The Record of Decision (ROD), signed on May 24, 2016, includes a summary of the analysis within the environmental impact statement as well as public and interagency involvement throughout the planning process. The ROD is included in this document as Appendix A.



Hālau o Kekuhi at Halema'uma'u. NPS photo.

HAWAI‘I VOLCANOES NATIONAL PARK

General Management Plan

Hawai‘i Volcanoes National Park
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Hōlei Sea Arch. Photo by Peter Anderson.

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BACKGROUND

1



Halema'uma'u Trail. NPS photo by Stephen Geiger.



Newly emerged endemic Kamehameha butterfly. NPS photo by Jay Robinson.

CHAPTER 1: BACKGROUND

INTRODUCTION

Hawai‘i Volcanoes National Park is on the southernmost island of the Hawaiian Archipelago, more than 2,000 miles from the nearest continental land mass. It is a unit of the national park system in the Pacific West Region and is part of the Hawaiian High Islands Ecoregion. The park is within the Second Congressional District in Hawai‘i County, Hawai‘i.

BACKGROUND OF HAWAI‘I VOLCANOES NATIONAL PARK

Congress established Hawai‘i National Park (later to become, separately, Hawai‘i Volcanoes National Park and Haleakalā National Park) on August 1, 1916 “for the benefit and enjoyment of the people of the United States . . . [and to provide for] . . . the preservation from injury all timber, birds, mineral deposits, and natural curiosities or wonders within said park, and their retention in their natural condition as nearly as possible” (16 *United States Code* [USC] 391). The purpose of the park is to protect, study, and provide access to Kīlauea and Mauna Loa, two of the world’s most active volcanoes, and perpetuate endemic Hawaiian ecosystems and the traditional Hawaiian culture connected to these landscapes.

Today, Hawai‘i Volcanoes National Park protects approximately 330,086¹ (368,106)² acres of public

¹ The official, designated acreage of Hawai‘i Volcanoes National Park is 323,431 acres. However, the park also manages an area called ‘Ōla‘a, which is outside the park’s official designated boundary. Because this area has been managed by Hawai‘i Volcanoes National Park since federal acquisition in 1952 and continues to affect current management decisions in the park, this GMP includes ‘Ōla‘a within the total acreage that the park protects.

² Determining acreage at Hawai‘i Volcanoes National Park is a complex process by which varying sources provide different estimations of total acreage. Unless otherwise specified, acreage listed in this document includes two numbers: the first is the official acreage derived from deeds of conveyance to the United States and county/state tax assessor records, the sum total of which constitute the official NPS acreage for the park. (The official park acreage is maintained by the NPS Land Resource Division, WASO.) The second (listed in parentheses) is an estimation generated by geographic information systems (GIS) software that uses projections on the land to calculate acreage within geographically defined boundaries.

land, which includes some of the most unique geologic, biologic, and cultural landscapes in the world. Extending from sea level to the summit of Mauna Loa at 13,677 feet, the park encompasses the summits and rift zones of two of the world’s most active shield volcanoes—Kīlauea, representing the newest land in the Hawaiian Islands chain, and Mauna Loa, the largest mountain in the world.

While these two volcanoes are the primary features of the park and the principal reason for its establishment by Congress as a unit of the national park system, this volcanic topography also supports one of the most fascinating biologic landscapes in the world. As trade winds sweep across the eastern shores of Hawai‘i and up the vast alpine slopes of Mauna Loa, moisture from these winds creates large variations in precipitation that, in turn, sustain incredibly diverse populations of plant and animal communities across eight ecological life zones. Located more than 2,000 miles from the nearest continent, Hawaiian plants and animals evolved in almost complete isolation for the past 30 million years. As a result, over 90% of the native terrestrial flora and fauna in Hawai‘i are endemic to this small archipelago. The park provides habitat for 59 federally listed endangered or threatened species and nine species that are candidates for listing. Included among these species are the nēnē (Hawaiian goose), ‘io (Hawaiian hawk), and ‘āhinahina (Mauna Loa silversword). Considering this diversity of life and its distinction on the planet, Hawai‘i Volcanoes National Park is both a fantastic laboratory for the study of biogeography and evolution within the Pacific Islands and a cornerstone for recovery of native Hawaiian species found nowhere else in the world.

In addition to its geological and biological significance, the park also plays a unique role

When available and appropriate, both numbers are included in this GMP because deed/tax assessor estimates, which are used in legislation and policy for the park, do not exist for some areas in the park, such as those acres analyzed for wilderness eligibility in the Kahuku Unit.

in the history of human development on the Hawaiian Islands and remains an important home to living cultures in Hawai‘i. Just as the volcanic and biologic features of the land have shaped the landscape of Hawai‘i Volcanoes National Park, so too have the people who have been a part of its history. Over five centuries before the establishment of the park, Native Hawaiians lived, worked, and worshiped on this sacred ground. Later, in the 19th and early 20th centuries, adventurers, explorers, scientists, philanthropists, and individuals also left their mark on the landscape. Today, ancient petroglyphs, stone walls, and footpaths persist between massive lava flows, and historic housing districts, ranch buildings, and historic roads dot the developed corridors of the park, together revealing the diverse cultures and history that have been, and continue to play, an integral role on this landscape.

Because of these diverse landscapes, its own legislative history and political boundaries, and patterns of human use, Hawai‘i Volcanoes National Park is now geographically separated into four units: Kīlauea, Mauna Loa, ‘Ōla‘a, and Kahuku Unit (see *Figure 1: Existing Conditions, Full Park*).

The Kīlauea Unit is the most accessible and developed unit of the park. Located just off Māmalahoa Highway west of Volcano Village, this unit extends from approximately 4,000 feet elevation down to the coast between the east and southwest rift zones of Kīlauea (see *Figure 2: Existing Conditions, Crater Rim Drive*).

Characterized primarily by the volcanic, biologic, and cultural significance of this shield volcano and its crater, Halema‘uma‘u, this unit also sees the highest visitor and administrative use of any other unit in Hawai‘i Volcanoes National Park. The Kīlauea Visitor Center, Jaggar Museum, and Volcano House^{SM,3} a historic commercially operated hotel on the rim of Kīlauea caldera, are all in this unit, as are most of the NPS

administrative buildings, the Hawaiian Volcano Observatory (operated by the US Geological Survey), and Kīlauea Military Camp (operated by the US Army). The park’s primary entrance and two primary roads—Crater Rim Drive, which provides access around the Kīlauea summit area, and Chain of Craters Road, which provides access to the coast—are also in this unit.

The Mauna Loa Unit extends approximately 10,000 feet in elevation northeast from State Route 11 near Volcano Village to the summit of Mauna Loa. Characterized primarily by the diversity of life zones that span this volcanic landscape, this unit provides visitors with the opportunity to explore several volcanic, biologic, and historic features of the park, including the Tree Molds Area, the Kīpukapuauulu (Bird Park) Nature Trail, and the Mauna Loa Lookout. This unit also includes hiking access (with cabins and water catchment systems) along the southeast rift zone to Moku‘āweoweo, the caldera of Mauna Loa, for those willing to brave the 20 miles of ascending gradient, fluctuating weather conditions, and volcanic terrain. The Nāmakanipaio campground, the only frontcountry campground in the park, is also in this unit along the Māmalahoa Highway. The only other public vehicular access to this unit is along Mauna Loa Road, an 11.3-mile, one-lane paved road.

The ‘Ōla‘a Unit, donated to the National Park Service in 1952 via the Hawai‘i Territorial Executive Order 1540, is geographically separated from the other units of the park by Volcano Village and has therefore never been formally designated as part of Hawai‘i Volcanoes National Park. (Language in the 1938 legislation for the park stated that Hawai‘i Volcanoes National Park could acquire lands only if “adjacent and contiguous” to park boundaries.) However, the unit is managed by park administrators for its valuable forest habitat and presence of endemic and/or rare and endangered species. A large portion of the unit (9,329 acres) was designated as wilderness in 1978. Today, this unit remains undeveloped, with no formal trails or services provided to the general public.

³ The service mark (SM) inserted after “Volcano House” is associated with a legally registered name or designation used in the manner of a trademark to distinguish an organization’s services from those of its competitors.

Figure 1: Existing Conditions, Full Park
 Hawai'i Volcanoes National Park GMP/WS/EIS

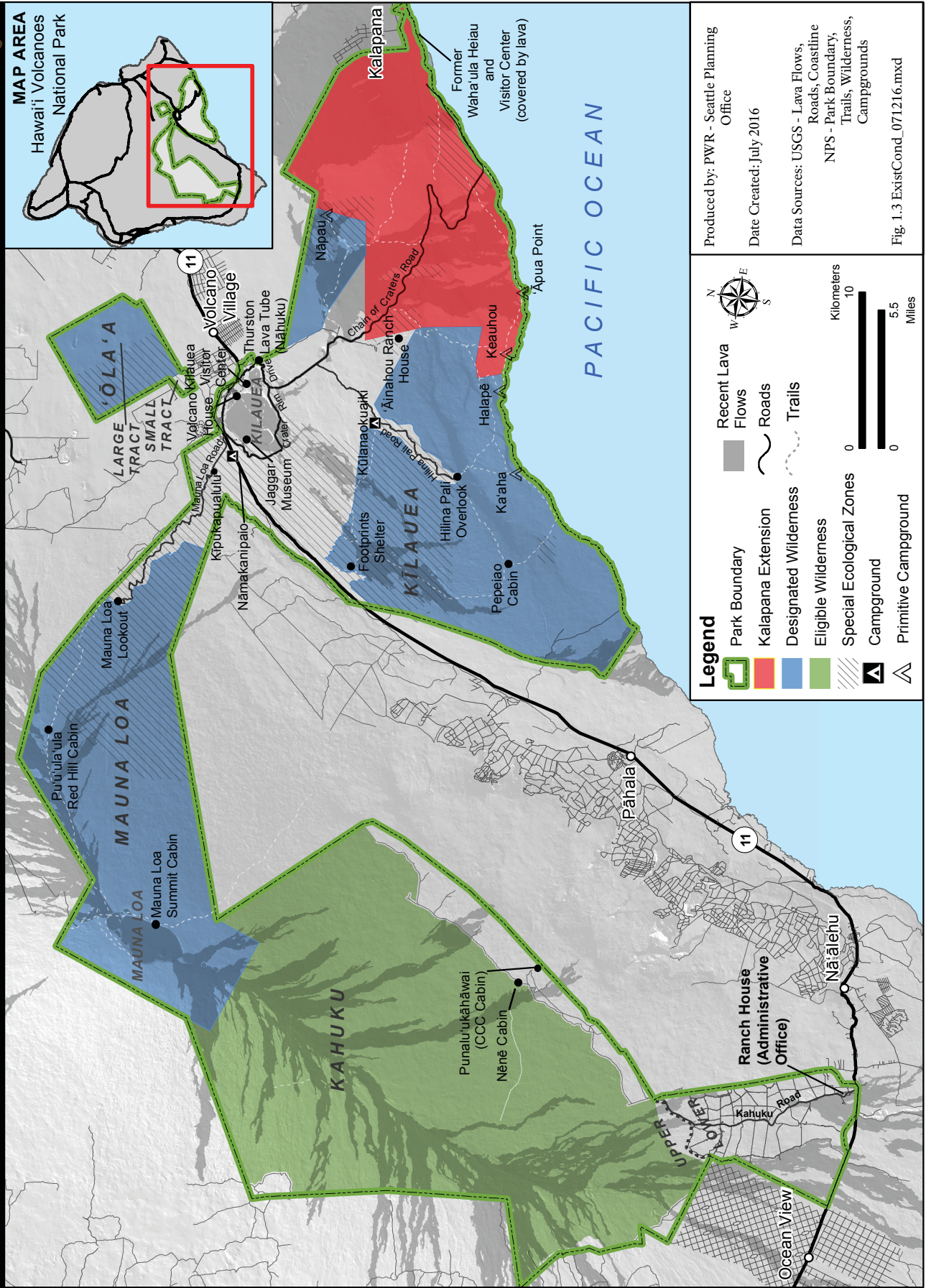
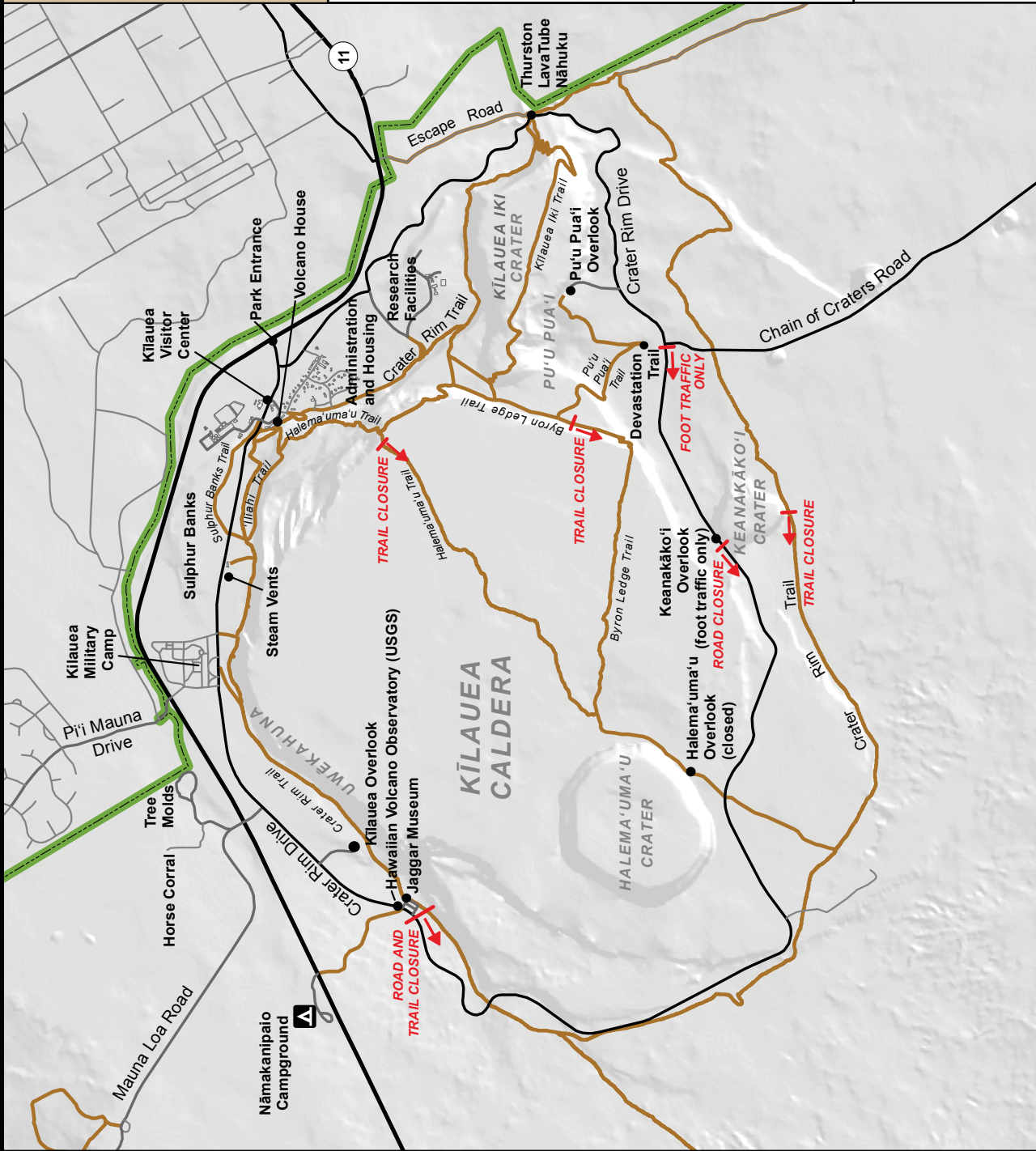


Figure 2: Existing Conditions, Crater Rim Drive
 Hawai'i Volcanoes National Park GMP/W/S/EIS



Legend

- NPS Boundary
- Campground
- Roads
- Trails

Note: Road and trail closures are currently in effect due to volcanic hazards. Check with park staff for current conditions.

0 1
 Kilometers

0 0.5
 Miles

Produced by: PWR - Seattle Planning Office
 Date Created: June 2014
 Data Sources: USGS - Coastline, Roads
 NPS - Campgrounds, Park Boundary, Trails

Fig. 1.4 ExstCondCraterRim_060414.mxd

As the newest addition to the park, Kahuku Unit, at 115,788 (150,865) acres in size, was acquired by the National Park Service in 2003 (see *Figure 3: Existing Conditions, Kahuku Unit*). Stretching from approximately 2,000 to 12,500 feet in elevation, this unit encompasses the southwest rift zone of Mauna Loa and extends across lava fields, pastures, forests, shrubland and mesic, subalpine, alpine, and desert environments. Prior to NPS acquisition, portions of Kahuku had been profoundly transformed by almost two centuries of resource use—most recently that of cattle ranching in the lower section of the unit. Although Hawai‘i Volcanoes National Park has begun restoration efforts by fencing and removing nonnative ungulates, controlling localized nonnative plants, and conducting restoration experiments over the last nine years, restoration of native forest will likely take decades. Currently, public access to this unit is limited to weekends

and special events and limited to the lower portion of the unit where several ranching roads provide vehicular, bicycling, and pedestrian access.

PURPOSE AND NEED FOR THE PLAN

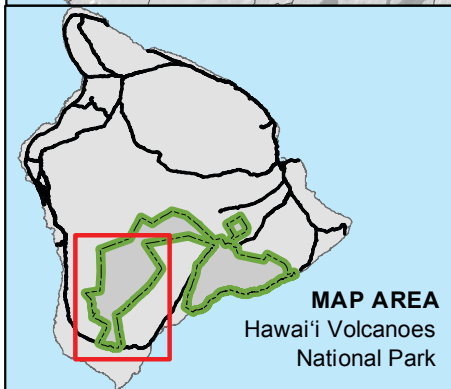
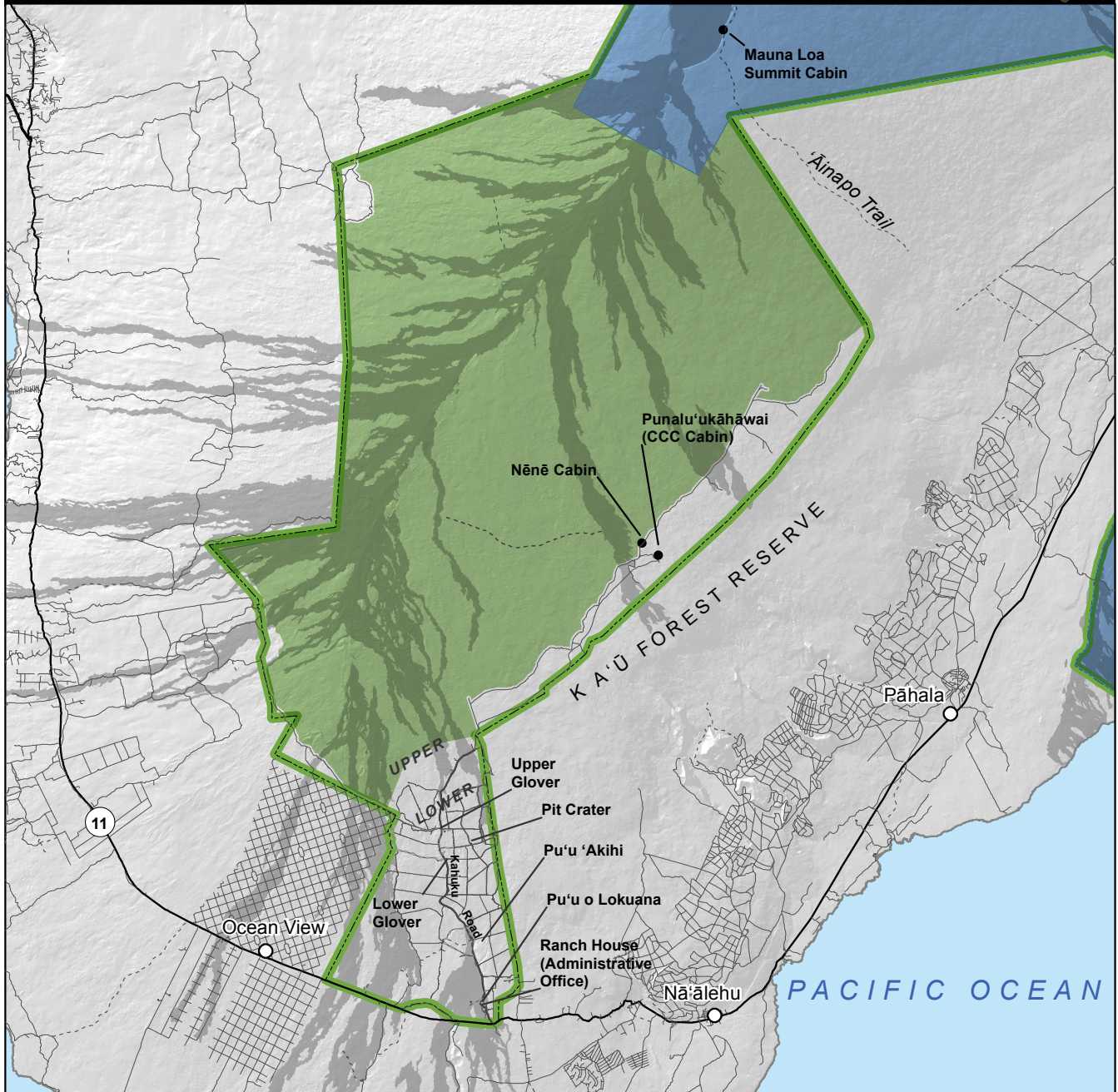
Purpose of the Plan

This general management plan (GMP) is the foundational document guiding management of Hawai‘i Volcanoes National Park for the next 15 to 20 years. To that end, this plan builds on the legislation surrounding the establishment and management of the park in order to provide a framework for managers to use when making decisions about how to best protect the park’s resources, how to provide quality visitor uses and experiences, how to manage visitor use, and what kinds of facilities, if any, to develop in the park (the park’s legislation can be found in



Hiking Palm Trail at Kahuku. NPS photo by Jay Robinson.

Figure 3: Existing Conditions, Kahuku Unit
 Hawai'i Volcanoes National Park GMP/WS/EIS



- Legend**
- NPS Boundary
 - Designated Wilderness
 - Eligible Wilderness
 - Cabins
 - Recent Lava Flows
 - Roads
 - Trails



Produced by: PWR - Seattle Planning Office
 Date Created: July 2016
 Data Sources: USGS - Roads, Coastline, Lava Flows
 NPS - Park Boundary, Trails, Cabins
 Fig. 1.5 ExistCond_Kahuku_071216.mxd

Appendix A of the *Hawai'i Volcanoes National Park Draft General Management Plan / Wilderness Study / Environmental Impact Statement* (draft GMP/WS/EIS).

This GMP is a programmatic document that provides conceptual guidance to National Park Service (NPS) managers as well as more detailed strategies and actions where appropriate. This general management plan does not describe how particular programs or projects will be implemented or prioritized. Those decisions will be deferred to more detailed implementation planning, which will follow the broad, comprehensive plan presented in this document. Actions directed by this GMP or in subsequent implementation plans are accomplished over time. Budget restrictions, requirements for additional data or regulatory compliance, and competing priorities may delay implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future. All future plans should be consistent with this GMP.

Need for the Plan

The last *Master Plan*⁴ for Hawai'i Volcanoes National Park was completed in 1975 and no longer provides adequate guidance to address the policy and operational issues now facing park management.

Many conditions in Hawai'i Volcanoes National Park and throughout the region have changed since the last *Master Plan* was completed in 1975, including: continuous eruptions at Pu'u Ō'ō on Kīlauea Volcano since 1983 and related impacts on resources and visitor opportunities; increased visitation and changing visitor patterns (approximately 1.6 million visitors annually) and resulting transportation conflicts and parking congestion; the loss of visitor facilities, cultural resources, and significant habitat for numerous federally listed threatened, endangered, and candidate species from volcanic activity; the continuing spread of introduced invasive species and avian disease; increased impacts to the soundscape and acoustic environment; expansion



[Top to bottom] 1. Kamoamo eruption (2011) with tree molds from previous eruptions in foreground. 2. Hiking through the Ka'u Desert. NPS photos by Jay Robinson.

⁴ Hawai'i Volcanoes National Park. 1975. *Master Plan*. National Park Service, Hawai'i Volcanoes National Park.

of the park; impacts on resources due to climate change; and new international designations including designation as a World Heritage Site and International Biosphere Reserve.

Specifically, Mauna Loa Volcano last erupted in 1984, and Kīlauea Volcano has been in nearly continuous eruption since 1983. Given the uncertainty of operating on a volcanic landscape, there is a great need for flexibility in management that would benefit from a general management planning process. Due in part to this volcanic activity, park visitation has also changed dramatically over the last 35 years. Both the demographics and size of visitation has changed and diversified, as have the ways in which people interact with park resources. These changes require creative strategies to connect visitors to the park, provide visitor services, and manage congestion and conflicts. In addition, these changes in visitation, along with ecological changes both at home and around the world, have created a number of natural

and cultural resource protection issues, such as the introduction of invasive nonnative species, that need to be addressed in the new general management plan. In 1978, 123,100 (130,950) acres of Hawai‘i Volcanoes National Park were also designated as wilderness. Two years later, Hawai‘i Volcanoes and Haleakalā National Parks were jointly designated as “Hawai‘i Island International Biosphere Reserve” by UNESCO, and eight years later, in 1987, the park was also declared a World Heritage Site by the World Heritage Convention of UNESCO. Then, in 2003, the park acquired 115,788 (150,865) acres of the Kahuku Ranch, creating the Kahuku Unit, located on the southwest rift of Mauna Loa summit down to State Route 11. This acquisition increased the park size by 50 percent and now provides unique opportunities and challenges for resource management and visitor use. These changes in lands and designations need to be integrated into park planning efforts, and the wilderness potential of these new lands needs to be assessed.



Hāpaimamo and the southwest rift of Mauna Loa. NPS photo by Jay Robinson.



Hula on crater rim by Halau Hula Kalehuaki'eki'e'ika'iu. NPS photo by David Boyle.



Hawksbill sea turtle hatchling. *NPS Photo.*

CHAPTER 2: THE PLAN

INTRODUCTION

The development of this GMP for Hawai‘i Volcanoes National Park was based on the purpose of the park, including providing access to Kīlauea and Mauna Loa volcanoes, preserving endemic Hawaiian ecosystems, and perpetuating the traditional Hawaiian culture connected to these landscapes. The GMP presents strategies for the protection, preservation, and management of shared values at Hawai‘i Volcanoes National Park.

It is intended that the GMP meet both the spirit and the intent of the laws establishing the park. In meeting this goal, the GMP provides for the long-term protection of the park’s resources and the public enjoyment of those resources in a way that is respectful of Native Hawaiian culture.

This chapter outlines the various elements of the GMP for Hawai‘i Volcanoes National Park, including: an explanation of management zones in the park, a description of site-specific actions in the plan, an analysis of potential boundary modifications, program-specific guidance, the estimated costs of implementing the plan, guidance for user capacity, and mitigation measures that will be taken to reduce impacts to resources from implementation of this plan.

OVERVIEW OF THE PLAN

The GMP seeks to strengthen and broaden opportunities to connect people with the volcanic world treasure, Hawai‘i Volcanoes National Park, and provide a wide range of high-quality visitor experiences based on different geographic areas. Through the implementation of this plan, Kīlauea summit will continue to be the most actively visited area of the park with the greatest concentration of services and amenities for park visitors. Along Chain of Craters Road and Mauna Loa Road, the park will strive to provide visitors with improved opportunities to experience and connect with park resources and values, including new opportunities at places like Mauna Ulu and Kealākōmōwaena, while dispersing use to create a less congested and more tranquil experience. At Kahuku, although

visitor access and recreation opportunities will be expanded from what is currently offered, infrastructure and development will be minimal, gradually phased in over time, and will remain rustic in design to allow for a more primitive visitor experience.

Natural and cultural resources will continue to be managed and protected with a high degree of integrity, consistent with direction provided by existing laws and policies. This GMP therefore emphasizes the park’s role as a refuge and haven for native biota, people, and cultures in a world constantly adapting to volcanic activity and island building processes. The GMP honors the Native Hawaiian people and culture by recognizing Native Hawaiian values such as *mālama ‘āina* (nourishing or taking care of the land) and *kuleana* (responsibility) and perspectives from Native Hawaiian land management such as *ahupua‘a* management (managing land from *mauka* (mountains) to *makai* (sea)) as important concepts in park stewardship of resources. Native Hawaiian traditional ecological knowledge will be used to enhance current scientific understanding to protect park resources and provide additional interpretive and educational opportunities for visitors.

Native Hawaiian Traditional Ecological Knowledge is a cumulative body of knowledge, beliefs, and practices that refer to the relationships and effects between living things and their environment which passes from one generation to the next through traditional practice, stories, chants and songs. The Native Hawaiian culture was an oral culture; therefore the stories, chants, and songs documented significant events, and documented and perpetuated their scientific understanding of the environment. The traditional land management system of the *ahupua‘a* is an example of the application of traditional ecological knowledge, which informed individuals of the appropriate uses, harvest times, and planting sequences from the ocean to the mountain tops. This knowledge was applied across each island

and managed by the people so that the resources from all environments within the ahupua'a will be sustainable for future generations.

Need for Flexibility

Situated on two active volcanoes, the need for flexibility in managing Hawai'i Volcanoes National Park is great. Nature is dynamic and volcanic eruptions are possible at any time. Planning for a national park unit in this type of unpredictable environment presents both challenges and opportunities and requires flexibility in how the park may respond to different scenarios.

Actual management decisions will likely be guided by the magnitude of an individual event. Rather than provide specific recommendations in this GMP for how the park may respond to a given event, the planning team developed some general guidance for managers facing volcanic activity in the future. The need for this type of flexible management guidance is most notable with respect to facilities and infrastructure in the park.

Continuing to replace facilities that could be destroyed within a few years of being rebuilt is not necessarily fiscally sound or a good public investment, especially when other options for replacing structures or the functions provided by structures exists. However, the park may choose to repair or replace a high value structure that incurs light damage. A lower value facility that sustains more significant damage may not be rebuilt or replaced. Decisions about individual facilities will in large part be guided by the park's asset management plan.

In addition to buildings, other infrastructure, such as roads, are vulnerable to volcanic and seismic activity. There are very few roads in the park and visitors rely on them for experiencing the park's various environments and features. Closing a road may result in measurable impacts to communities, visitors, and park operations; therefore, replacing a road or maintaining vehicular access to certain areas may be a viable and sound management decision.

Rather than identify potential scenarios that park management might undertake if a specific building or road is impacted by volcanic or seismic activity in the future, park management will consider three broad strategies to maximize flexibility.

- Design new facilities that could be mobile and moved out of harm's way (similar to the movable visitor contact station proposed near the end of Chain of Craters Road)
- Adaptively reuse existing buildings in the park to replace lost functionality so new construction may not be needed
- Determine that some buildings will not be rebuilt within the park if they are significantly damaged or destroyed

The park and its partners will strive to replace necessary functionality provided by lost facilities in less vulnerable or culturally sensitive locations outside the park.

MANAGEMENT ZONES

This GMP relies on the development of four management zones: Visitor Services, Transitional/Semi-primitive, Wild/Primitive, and Park Support to define specific resource conditions and visitor experiences to be achieved and maintained in each particular area of the park. Each zone applies to different geographic locations or areas of the park (see descriptions below and more specifically, *Figure 4: Management Zones, Full Park* and *Figure 5: Management Zones, Crater Rim Drive and Kahuku*) and each zone is associated with a general level of management guidance or direction, including the types of activities and facilities that are appropriate in that management zone.

In addition to the management zones, park managers would continue to use the Superintendent's Compendium (NPS 2016). The compendium is a list of designations, closures, requirements, and other restrictions imposed under the discretionary authority of the superintendent as provided in Title 36 of the *Code of Federal Regulations* (CFR).

Figure 4: Management Zones, Full Park
 Hawai'i Volcanoes National Park GMP/W/S/EIS

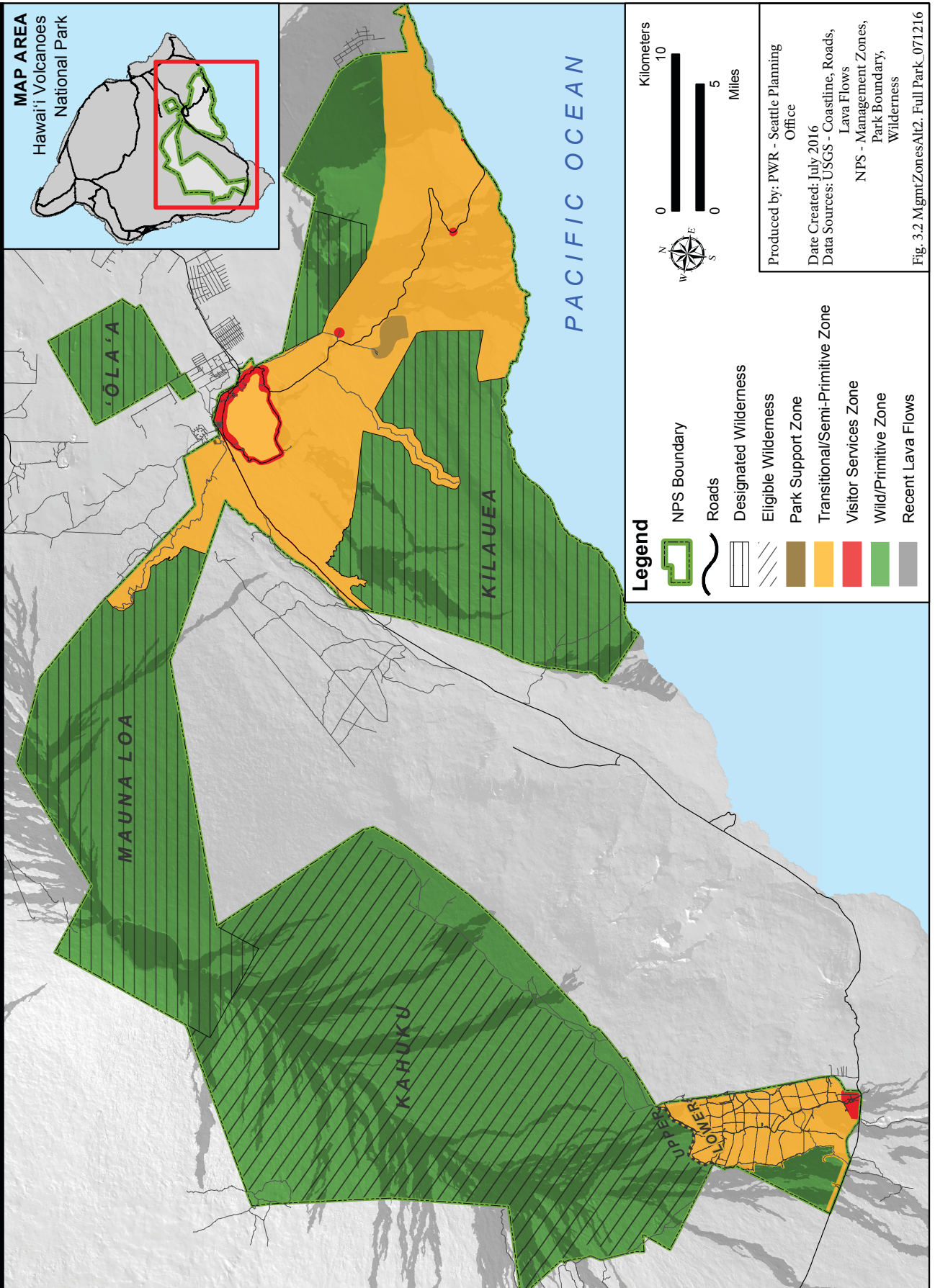
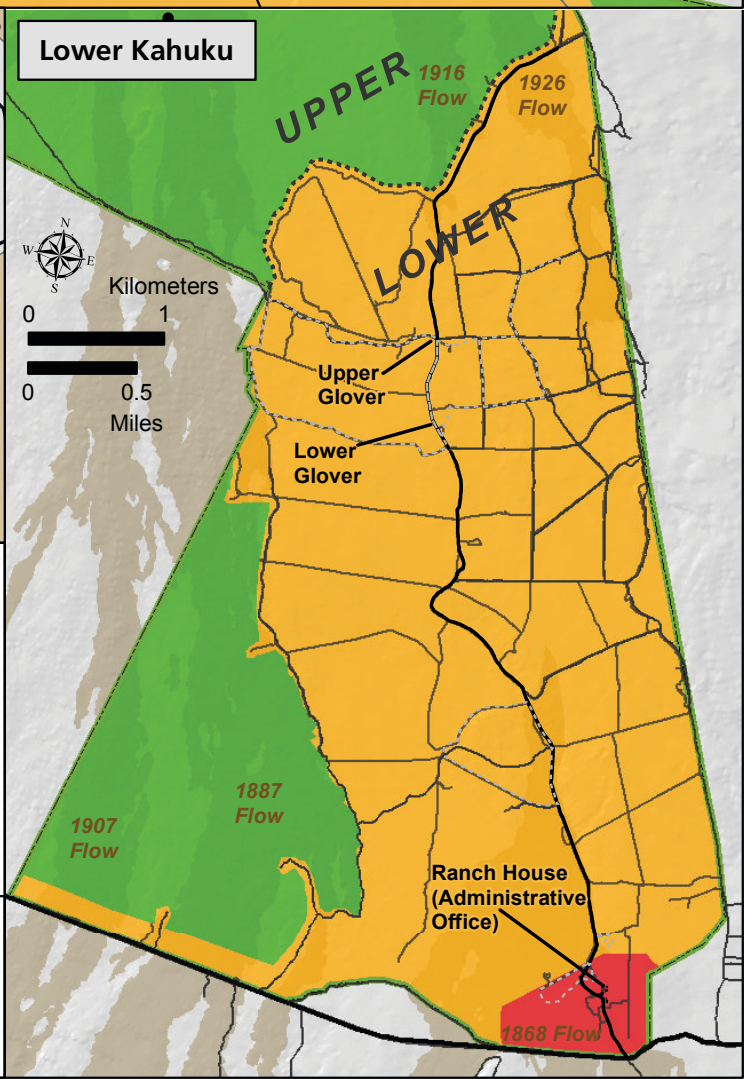
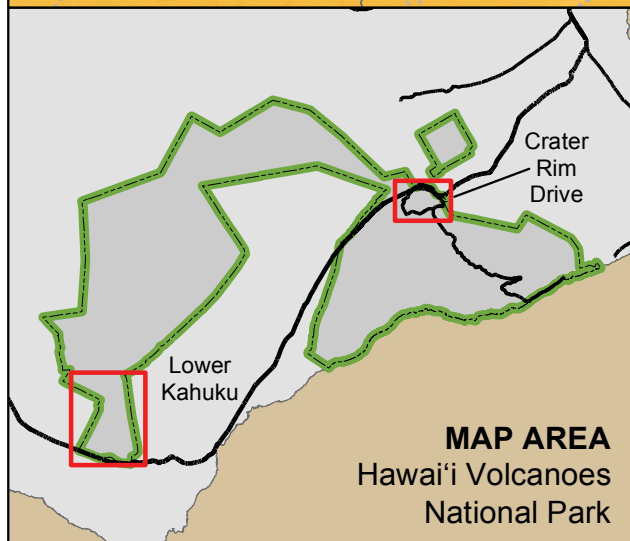
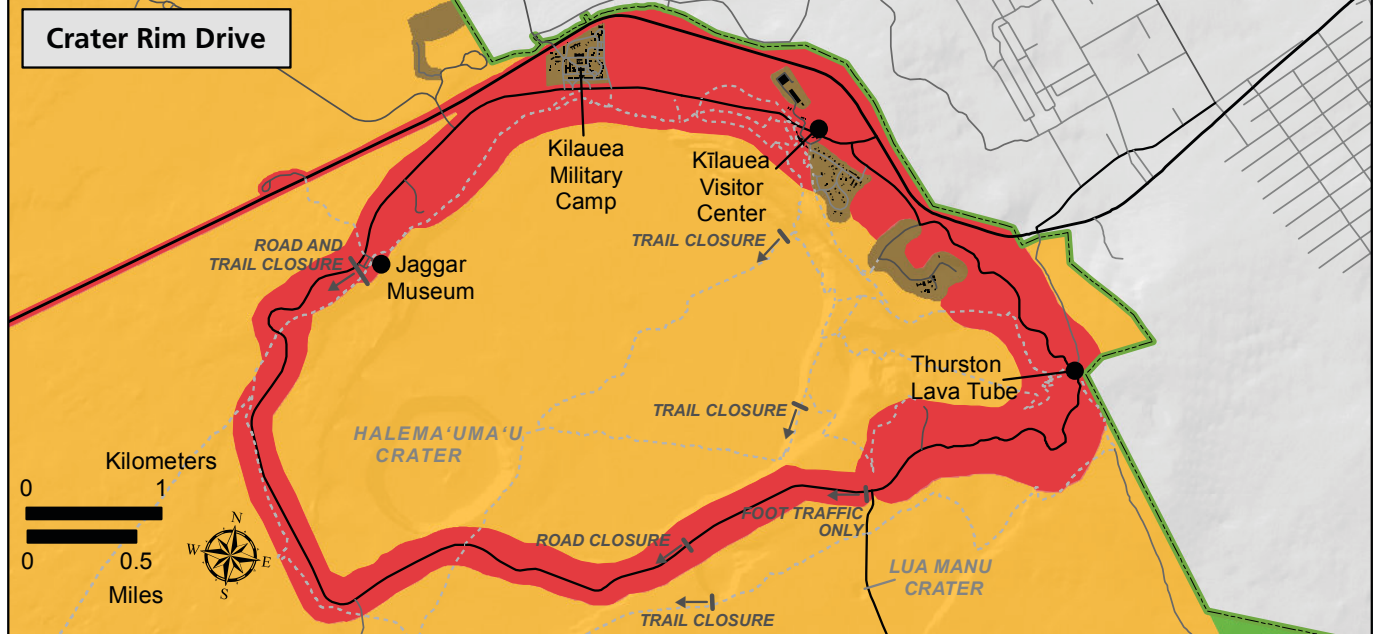




Figure 5: Management Zones, Crater Rim Drive and Kahuku
 Hawai'i Volcanoes National Park GMP/WS/EIS



- Legend**
- NPS Boundary
 - Roads
 - Trails
 - Park Support Zone
 - Transitional/Semi-Primitive Zone
 - Visitor Services Zone
 - Wild/Primitive Zone

Produced by: PWR - Seattle Planning Office
 Date Created: June 2014
 Data Sources: USGS - Coastline, Roads
 NPS - Management Zones, NPS Boundary
 Fig. 3.3 MgmtZones Alt.2 Crater_Kahuku_060914.mxd

Visitor Services Zone

The Visitor Services Zone includes the Highway 11 corridor through the park, all of Crater Rim Drive and surrounding visitor facilities, Mauna Ulu, Kealakomowaena, the end of Chain of Craters Road, and the vicinity around the existing development in lower Kahuku.

Around Crater Rim Drive, the Visitor Services Zone includes 0.1 mile on either side of the road between Jaggar Museum and the junction with Chain of Craters Road, along the southwestern section of the road, and extends 0.25 mile on either side of the northeastern section of the road between these two locations in order to accommodate higher volumes of traffic and multiple uses along this corridor. The Visitor Services Zone also includes high visitor use facilities/locations along Crater Rim Drive including Kīlauea Visitor Center and 1877 Volcano House, the ‘Ōhi‘a Wing and Volcano HouseSM, the Steam Vents, Kīlauea Overlook, Jaggar Museum, Halema‘uma‘u Overlook, Devastation, Pu‘u Pua‘i and Kīlauea Iki parking lots, and Thurston Lava Tube. Nāmakaniipao Campground, off Highway 11, is also included in this zone.

Along Chain of Craters Road, the Visitor Services Zone includes Kealakomowaena and the area surrounding the movable visitor contact station near the end of the current road that is intended to replace the current temporary structures. However, because this visitor contact station will be movable and likely relocated in response to future eruptions and sea-level rise, the zone in this area is intended to be flexible.

In Kahuku, the Visitor Services Zone encompasses all of the existing ranch buildings in lower Kahuku and the Pu‘u o Lokuana Trailhead, extending north to the far side of Pu‘u o Lokuana and west to the eastern edge of the Old Mamalahoa Highway.

Transitional/Semi-primitive Zone

The Transitional/Semi-primitive Zone includes areas that are dominated by natural conditions where visitor experiences focus on providing a sense of solitude, relaxation, and exploration in a relatively natural environment with limited interpretation. This zone includes the

nonwilderness area of the Mauna Loa Unit, a large portion of the Kīlauea Unit, and most of lower Kahuku.

In the Kīlauea Unit, the Transitional/Semi-primitive Zone includes all areas east of the Ka‘ū Desert wilderness unit to Chain of Craters Road (except the Park Support Zone around ‘Āinahou), including Hilina Pali Road. This zone then extends south to the coast along Chain of Craters Road and east to the East Rift wilderness unit, the vicinity of Pu‘u ‘Ō‘ō, and to the east boundary of the park. Around Crater Rim Drive, this zone includes all areas except those included in the Visitor Services and Park Support zones along Crater Rim Drive, including Kīlauea Caldera.

In Kahuku, the Transitional/Semi-primitive Zone includes the road corridors and surrounding lands in lower Kahuku, extending from the eastern



[Top to bottom] 1. Mauna Ulu eruption (1969–1974) covered Chain of Craters Road by Alanui Kahiko Overlook. NPS photo. 2. Observation deck at Jaggar Museum. NPS photo by Jim Gale.



[Top to bottom] **1.** Native old-growth rain forest in ‘Ōla‘a Unit. NPS photo. **2.** ‘Ainahou Ranch House. NPS photo by Jay Robinson.

edge of the 1887 flows north to the top of lower Kahuku and east to the eastern park boundary of lower Kahuku. The quarter-mile corridor on the north side of Highway 11 along the park boundary, beginning near the eastern edge of the rare dry land forest and extending westward, is also included in this zone.

Wild/Primitive Zone

The Wild/Primitive Zone includes all areas designated wilderness or eligible wilderness within Hawai‘i Volcanoes National Park, including the Hawai‘i Volcanoes Wilderness (which includes the East Rift, Ka‘ū Desert, ‘Ōla‘a, and Mauna Loa wilderness units). This zone also includes the small tract of ‘Ōla‘a and the lands extending east and south of the East Rift wilderness unit to 2.5 miles from the coast. All of upper Kahuku and the southwest corner of Lower Kahuku (including the 1887 flows west to the western boundary of Kahuku) minus the road corridors is also included within the Wild/Primitive Zone.

Park Support Zone

The Park Support Zone includes only those facilities and surrounding areas in the park used primarily for NPS administration, such as the research facilities, administration and housing area, the rainshed, the NPS horse corral, and Kilauea Military Camp. Both ‘Ainahou and Kilauea Military Camp are zoned Park Support Zone because they are not open to the general public.

The greatest proportion of Hawai‘i Volcanoes National Park (about 76.6 percent) is within the Wild/Primitive Zone. The Transitional/Semi-primitive Zone covers about 22.6 percent of the park, and the Visitor Services Zone covers approximately 0.7 percent. The Park Support Zone covers the smallest portion (less than 0.1 percent) of the park.

See *Table 1: Management Zones* for a comparison of the zone concept; desired natural and cultural resource conditions; shoreline and wilderness management practices; visitor opportunities; science, research, and learning opportunities; facility conditions; and access and transportation conditions of the proposed management zones.

TABLE 1: MANAGEMENT ZONES

| Category | | Visitor Services Zone | Transitional/ Semi-primitive Zone | Wild/Primitive Zone | Park Support Zone |
|--------------------------------|--|--|--|--|---|
| ZONE CONCEPTS | | | | | |
| | | <i>The Visitor Services Zone is managed primarily for a high level of visitor use, access, and interpretation with a wide range of media and facilities to support diverse visitor needs.</i> | <i>The Transitional/Semi-primitive Zone is managed as a transition between areas of high development and remote areas of the park. It focuses on natural and cultural resource protection with more rustic visitor facilities, experiences, and activities that encourage visitors to connect with the resource.</i> | <i>The Wild/Primitive Zone is managed primarily for natural and cultural resource protection and its wild character and wilderness values. Visitor experiences are consistent with wilderness character and provide opportunities for immersing visitors with the resource.</i> | <i>The Park Support Zone is managed primarily to support park operations and maintenance, including the operational needs of park partners. Access for visitors is primarily for limited visitor services (such as backcountry permitting), orientation, and organized meetings or events.</i> |
| NATURAL RESOURCES | | | | | |
| Overall Conditions | | Native species, communities, and ecological processes are perpetuated and restored in as natural a condition as possible. Specific areas are disturbed to accommodate visitor and administrative needs, but resources are protected elsewhere. If resource modification does occur, the goal is to avoid sensitive areas to the extent practical and feasible and focus development in less sensitive areas in this zone. | Native species, communities, and ecological processes are perpetuated and restored in as natural a condition as possible. Resource impacts or manipulation of resources for visitor or administrative purposes is generally avoided. | Native species, communities, and ecological processes are perpetuated and restored in as natural a condition as possible. Resource impacts or manipulation of resources for visitor or administrative purposes is rare and generally consistent with preserving wilderness character. | Native species, communities and ecological processes are perpetuated and restored in as natural condition as possible. Specific areas are disturbed to accommodate administrative and visitor needs, but resources are protected elsewhere. If resource modification does occur, the goal is to avoid sensitive areas to the extent practical and feasible and focus development in less sensitive areas in this zone. |
| Wildlife and Vegetation | | If development occurs, landscape and habitat areas elsewhere, preferably within the zone, are restored for a “no net green loss” policy. Habitat restoration to provide wildlife corridors could occur in this zone. | Modification or impacts to native wildlife and vegetation are avoided. Consider relocating or removing current and proposed development to restore wildlife and vegetation. Habitat restoration to provide wildlife corridors could occur in this zone. | Modification or impacts to native wildlife and vegetation are avoided. Consider relocating or removing current development to restore wildlife and vegetation. The minimum requirements analysis is required in designated and eligible wilderness. | If development occurs, landscape and habitat areas are restored elsewhere, preferably within the zone, for a “no net green loss” policy. |
| Geology and Soils | | Geologic features and soils are protected and geologic processes continue. Consider relocating or removing development (reroute roads, trails, and parking). Facilities and infrastructure provide visitor access to geologic resources and could impact those resources that are nonsensitive. Some nonsensitive areas are disturbed to facilitate visitor access, but resources are protected elsewhere in the zone. | Geologic features and soils are protected and geologic processes continue. Consider relocating or removing development (reroute roads, trails, and parking). | Geologic features and soils are protected and geologic processes continue. Consider relocating or removing development (reroute roads, trails, and parking). Some nonsensitive areas are disturbed to support park administration and facilitate visitor access, but resources are protected elsewhere in the zone. | Geologic features and soils are protected and geologic processes continue. Consider relocating or removing development (reroute roads, trails, and parking). Some nonsensitive areas are disturbed to support park administration and facilitate visitor access, but resources are protected elsewhere in the zone. |

TABLE 1: MANAGEMENT ZONES

| Category | Visitor Services Zone | Transitional/ Semi-primitive Zone | Wild/Primitive Zone | Park Support Zone |
|--|--|---|--|--|
| Soundscapes | Natural sounds are generally audible, but sounds from park activities and visitors dominate during the day. New facilities are sited and designed to minimize impacts on the acoustical environment. | Natural sounds dominate, but sounds from visitor and park operations may be heard. New facilities are sited and designed to minimize impacts on the acoustical environment. | Natural sounds dominate, but distant artificial sounds may be heard in some areas of the zone. New installations are sited and designed to minimize impacts on the acoustical environment. The minimum requirements analysis is required in designated and eligible wilderness. | Natural sounds are generally audible, but sounds from park activities and visitors dominate during the day. New facilities are sited and designed to minimize impacts on the acoustical environment. |
| Natural Lightscapes | A natural lightscape can be experienced at certain locations within this zone. Permanent artificial lighting is minimized and retrofitted to be Dark Sky compliant, which would restore views of night sky and minimize impacts to nocturnal wildlife . New facilities are sited and designed, and existing facilities retrofitted, to minimize intrusions to the night sky. | Natural lightscape is largely unobscured. Lighting from developed areas may be visible from certain locations. Permanent artificial lighting is minimal and would be Dark Sky compliant. Permanent artificial lighting is retrofitted to restore views of night sky and to minimize impacts to nocturnal wildlife. New facilities are sited, designed, and existing facilities retrofitted, to minimize intrusions to night sky. | The natural lightscape is unobscured, with the exception of personal lighting. No permanent lighting is present though distant lighting may be visible from certain locations. Public enjoyment and understanding of natural lightscapes is encouraged. The minimum requirements analysis is required in designated and eligible wilderness. | A natural lightscape can be experienced at certain locations. Permanent artificial lighting is minimized and would be Dark Sky compliant. Permanent lighting is retrofitted to restore views of night sky and minimize impacts to nocturnal wildlife. New facilities are sited and designed, and existing facilities retrofitted to minimize intrusions to the night sky. |
| Sensitive Species and Natural Resources | All sensitive species and resources are perpetuated and restored in as natural condition as possible. Visitor access may be limited as needed. If administrative/visitor facilities are destroyed by natural elements in sensitive areas, they may not necessarily be replaced in their existing location. | All sensitive species and resources are perpetuated and restored in as natural condition as possible. Visitor access may be limited as needed. If administrative/visitor facilities are destroyed by natural elements in sensitive areas, they may not necessarily be replaced in their existing location. | All sensitive species and resources are perpetuated and restored in as natural condition as possible. Visitor access may be limited as needed. If administrative or visitor facilities are destroyed by natural elements in sensitive areas, they may not necessarily be replaced in their existing location. The minimum requirements analysis is required in designated and eligible wilderness. | All sensitive species and resources are perpetuated and restored in as natural condition as possible. If administrative or visitor facilities are destroyed by natural elements in sensitive areas, they may not necessarily be replaced in their existing location. |

TABLE 1: MANAGEMENT ZONES

| CULTURAL RESOURCES | | Visitor Services Zone | Transitional/ Semi-primitive Zone | Wild/Primitive Zone | Park Support Zone |
|---|--|--|---|--|-------------------|
| Overall Conditions | <p>Cultural sites are protected and interpreted in a manner that reflects the high visitor use of this zone. Key cultural sites related to specific themes may be featured and actively interpreted.</p> <p>Traditional cultural practices are facilitated as allowed by NPS policy and regulations.</p> <p>Small-scale exhibits of cultural resources (temporary, low-impact facilities) are appropriate in this zone.</p> | <p>Cultural sites are protected and may be interpreted to facilitate public understanding and preservation. Key cultural sites related to specific themes may be featured and actively interpreted.</p> <p>Traditional cultural practices are facilitated as allowed by NPS policy and regulations.</p> | <p>Cultural sites are part of the wild character of this zone and are protected and interpreted consistent with wilderness values.</p> <p>Traditional cultural practices are allowed as by NPS policy and regulations.</p> | <p>Cultural sites are protected and interpreted in a manner that reflects the primary administrative and operational use of this zone.</p> <p>Traditional cultural practices are facilitated as allowed by NPS policy and regulations.</p> | |
| Archeological Resources | <p>Archeological resources are inventoried and protected, which is key to informing management decisions and determining a protection strategy that is consistent with the primary visitor use of this zone. Archeological sites are interpreted onsite, where appropriate. Archeological sites in areas of high visitation may require a higher degree of protection and monitoring to minimize impacts to those resources.</p> | <p>Archeological resources are inventoried and protected, which is key to informing management decisions and determining a protection strategy that is consistent with the transitional/semi-primitive use of this zone. Archeological sites are interpreted onsite, where appropriate. Archeological sites in areas of high visitation may require a higher degree of protection and monitoring to minimize impacts to those resources.</p> | <p>Archeological resources are inventoried and protected, which is key to informing management decisions and determining a protection strategy that is consistent with wilderness character and values. Archeological sites are primarily interpreted to visitors offsite. The minimum requirements analysis is required in designated and eligible wilderness.</p> | <p>Archeological resources are inventoried and protected, which is key to informing management decisions and determining a protection strategy that is consistent with the primary administrative and operational use of this zone. Archeological sites are primarily interpreted to visitors offsite.</p> | |
| Historic Structures and Features | <p>Historic structures and features are inventoried and monitored, and may be actively interpreted in place, compatible with the historic character of the site. Historic structures are adaptively reused for visitor and administrative use.</p> <p>Historic roads and trails are typically used and maintained for their historic and scenic values.</p> | <p>Historic structures and features are inventoried and monitored, and may be actively interpreted in place, compatible with the historic character of the site.</p> <p>Historic structures may be adaptively reused for visitor and administrative use. Historic roads and trails are typically used and maintained for their historic and scenic values.</p> | <p>Historic structures and features are inventoried and monitored, and are primarily interpreted offsite.</p> <p>Historic structures are maintained and may be adaptively reused, consistent with wilderness values.</p> <p>Historic routes may be maintained and used for their historic and scenic values, consistent with wilderness character. In designated and eligible wilderness, management actions are consistent with minimum requirements analysis.</p> | <p>Historic structures and features are inventoried and monitored and are primarily interpreted offsite. Historic structures are adaptively reused for visitor and administrative use. Historic roads and trails are typically used and are maintained for their historic and scenic values.</p> | |

TABLE 1: MANAGEMENT ZONES

| Category | Visitor Services Zone | Transitional/ Semi-primitive Zone | Wild/Primitive Zone | Park Support Zone |
|---------------------------------------|---|---|---|--|
| Cultural Landscapes | Cultural landscapes are inventoried, monitored, and maintained. Cultural landscapes may be actively interpreted in place, compatible with the historic character and features of the site. | Cultural landscapes are inventoried, monitored, and maintained. Cultural landscapes may be actively interpreted in place, compatible with the historic character and features of the site. | Cultural landscapes, though typically not prevalent in this zone, are inventoried and monitored. Cultural landscapes are primarily interpreted offsite. In designated and eligible wilderness, management actions are consistent with minimum requirements analysis. | Cultural landscapes are inventoried, monitored, and maintained. Cultural landscapes are primarily interpreted offsite. |
| Museum Collections | Museum collections are curated in this zone. They are accessible for research and exhibits for research and learning. | Small-scale exhibits of museum collections provide learning opportunities in this zone. | Museum collections are not compatible with this zone. | Museum collections are curated in this zone. They are accessible for research and exhibits and offer opportunities for research and learning. |
| Culturally Sensitive Resources | If natural elements destroy administrative or visitor facilities in sacred areas, they may not necessarily be replaced in their existing location. Further development is limited in recognized sacred areas based on consultation. Rehabilitate landscapes and screen or buffer facilities that are in sacred areas to protect resources and blend into landscape. | If natural elements destroy facilities in sacred areas, they may not necessarily be replaced in their existing location. Further development is limited in recognized sacred areas based on consultation. Rehabilitate landscapes and screen or buffer facilities that are in sacred areas to protect resources and blend into landscape. | If natural elements destroy facilities in sacred areas, they may not necessarily be replaced in their existing location. Further development is limited in recognized sacred areas based on consultation. Rehabilitate landscapes, and screen or buffer facilities that are in sacred areas to protect resources and blend into landscape. The minimum requirements analysis is required in designated and eligible wilderness. | If natural elements destroy administrative/visitor facilities in sacred areas, they may not necessarily be replaced in their existing location. Further development is limited in recognized sacred areas based on consultation. Rehabilitate landscapes and screen or buffer facilities that are in sacred areas to protect resources and blend into landscape. |
| WILDERNESS | | | | |
| | N/A | Wilderness character is preserved in areas that contain the qualities of wilderness character. | Wilderness character is preserved in designated and eligible wilderness and in areas that contain the qualities of wilderness character. Cultural sites are protected consistent with law and policy. The minimum requirements analysis is required for all management actions in designated and eligible wilderness. | N/A |

TABLE 1: MANAGEMENT ZONES

| Category | | Visitor Services Zone | Transitional/ Semi-primitive Zone | Wild/Primitive Zone | Park Support Zone |
|-----------------------------|--|--|---|---|-------------------|
| VISITOR EXPERIENCE | | | | | |
| Overall Conditions | <p>This zone is the primary visitor use zone. Visitor opportunities, experiences, and services are emphasized with high levels of access to features, resources, and personal services. This zone has capacity for a large number of park visitors and is an access point for park experiences and opportunities. There is high probability of contact with rangers, park staff, and other visitors. Commercial services and concession facilities are readily available in conjunction with the park mission.</p> <p>Appropriate stewardship opportunities (such as removal of kahili ginger and planting natives in and around facilities) may occur in this zone.</p> | <p>In this zone, visitors have more opportunities for less congested or solitary discovery, relaxation, and exploration in a relatively natural environment with limited interpretation, based on time of day. The visitor experience is primarily unstructured, including some self-guided interpretive trails and possibly some guided trails. Facilities are more dispersed. Visitors have the opportunity to be immersed in a particular natural or cultural resource setting. Appropriate commercial services and stewardship opportunities may occur in this zone.</p> | <p>Visitor experience in this zone affords opportunities for personal challenge, self-reliance, self-discovery, and solitude. Visitors experience a primitive and wild environment that can be hostile and dangerous. In designated wilderness, the visitor experience is consistent with wilderness character—a natural and untrammelled landscape and primitive and unconfined recreation. Visitors have the opportunity to be immersed in a particular natural or cultural resource setting. Stewardship opportunities may occur in this zone.</p> | <p>This zone is managed for limited visitor access to services such as permitting, organized meetings or events, and limited orientation.</p> | |
| Types of Visitor Activities | <p>This zone supports a wide range of visitor activities, opportunities, and services with easy access to recreation, education, and interpretation programming. Activities are available to visitors of all abilities and can include large groups. Typical activities include ranger-led programs, biking, hiking, picnicking, scenic driving, sightseeing, star gazing, camping and overnight stays, lava viewing, birding, educational and stewardship programs, cultural demonstrations, special events, and commercial visitor services activities.</p> | <p>Visitor activities in this zone are primarily self-guided activities with some ranger or commercially guided programs. A medium range of more dispersed activities is available to small and medium groups. Large group use is limited. Typical activities include biking, hiking, equestrianism, picnicking, scenic driving, sightseeing, stargazing, camping and overnight stays, lava viewing, birding, educational and stewardship programs, and cultural demonstrations.</p> | <p>Visitor activities are unstructured, self-guided, and human-powered. This zone supports small groups; large groups are limited. Activities do not degrade the integrity of resources or compromise wilderness values. Visitor use and activities could be controlled to ensure that activities and their intensities are compatible with protecting resource integrity and wilderness values. Typical activities include hiking, camping, backpacking, equestrian, lava viewing, route finding, exploring, and cultural demonstrations, and include some stewardship programs consistent with wilderness values.</p> | <p>This zone supports very limited visitor activities and use.</p> | |

TABLE 1: MANAGEMENT ZONES

| Category | Management Zones | | |
|---|---|---|--|
| | Visitor Services Zone | Transitional/ Semi-primitive Zone | Wild/Primitive Zone |
| Interpretation and Education Programming | <p>Visitors have opportunities to connect with the meanings and themes of the park. A wide variety of interpretive methods provide connections between the meanings and values of the resource being highlighted. This zone provides orientation and intensive interpretation that is programmatically accessible with a wide range of media and facilities to support diverse visitor needs.</p> <p>The focus is placed on interpreting, protecting, and preserving geologic, biologic, and cultural resources and emphasizing specific stories or themes.</p> | <p>Interpretation and education is focused, site-specific, and place-based in this zone. A moderate range of interpretive services, methods, facilities, and programs are available, in keeping with the surrounding environment. The focus is placed on interpreting, protecting, and preserving geologic, biologic, and cultural resources and emphasizing specific stories or themes.</p> <p>Facilities and interpretive infrastructure may primarily be clustered at trailheads and nodes.</p> <p>Waysides and self-guided interpretive trails are characteristic of this zone.</p> | <p>Interpretation and education is minimal, focused on wilderness values and is mostly self-directed, consistent with wilderness values and minimum requirements analysis. No facility-based interpretation occurs in the zone; however, interpretation and education may be provided through offsite materials, such as trail guides.</p> |
| Encounters with Other Visitors | <p>A high level of encounters with other visitors is expected, but concentrations of visitors are managed. Visitors can expect congested experiences during peak visitation hours. A wide range of group sizes, ages, and diverse populations may be accommodated.</p> | <p>A low to moderate level of encounters with other visitors is expected with occasionally high levels of encounters around key destinations or facilities, such as trailheads, or new volcanic activity. Visitors can easily avoid congested experiences, and opportunities for solitude are available with minimal effort in this zone. Small to moderate group sizes may be accommodated.</p> | <p>A low level of encounters with other visitors is expected.</p> <p>Encounters are primarily around facilities and services that do provide some visitor support (e.g., permitting offices).</p> |
| Safe Visitor Access to Volcanic Events | <p>This zone supports the highest level of visitor access that provides safe viewing. Access to volcanic events for visitors is made available as quickly as possible with an appropriate level of visitor orientation. This zone also supports the highest level of operational support.</p> | <p>This zone could support a high level of visitor access to volcanic events, depending on proximity to existing infrastructure such as roads and trails. New visitor access to volcanic events could be accommodated, though the level of access provided varies.</p> | <p>Visitor access that provides safe viewing for visitors could be accommodated in this zone.</p> |

TABLE 1: MANAGEMENT ZONES

| SCIENCE, RESEARCH, AND LEARNING | | Transitional/ Semi-primitive Zone | | | Wild/Primitive Zone | | Park Support Zone | |
|---------------------------------|---|---|--|--|--|--|--|--|
| Category | Visitor Services Zone | Transitional/ Semi-primitive Zone | Wild/Primitive Zone | Park Support Zone | Wild/Primitive Zone | Park Support Zone | Wild/Primitive Zone | Park Support Zone |
| Overall Condition | Research is encouraged and manipulative research or permanent structures may be allowed with appropriate orientation and consultation. Public safety hazard monitoring instrumentation and equipment could be in this zone. Learning occurs in indoor and outdoor classrooms, emphasizing a hands-on experience with the resource and including stewardship projects (field labs, outdoor classroom). Information sharing and collaborative efforts among disciplines and partners are focused and coordinated in this zone. | Research is encouraged and manipulative research or permanent structures may be allowed with appropriate orientation and consultation. Public safety hazard monitoring instrumentation and equipment could be in this zone. Learning occurs in outdoor classrooms away from high-density visitor use areas and emphasizes a hands-on experience with the resource, including stewardship projects (field labs, outdoor classroom). Information sharing and collaborative efforts among disciplines and partners are focused and coordinated in this zone. | Research that contributes to understanding and management of wilderness resources and public safety is permitted. Public safety hazard monitoring instrumentation and equipment could be in this zone. Learning occurs in wilderness in smaller groups and emphasizes a hands-on experience with the resource, including stewardship projects and opportunities to learn about wilderness (field labs, outdoor classroom). The minimum requirements analysis would be applied in designated and eligible wilderness. | Research is encouraged and manipulative research or permanent structures may be allowed with appropriate orientation and consultation. Public safety hazard monitoring instrumentation and equipment could be in this zone. Management of documents, research, and learning could occur in this zone. Limited learning opportunities occur in existing park offices and facilities. Information sharing and collaborative efforts among disciplines and partners are focused and coordinated in this zone. | TYPES OF FACILITIES | TYPES OF FACILITIES | TYPES OF FACILITIES | TYPES OF FACILITIES |
| Overall Conditions | Areas of high-density infrastructure occur in this zone. Facilities in this zone support concentrations of park visitors and their diverse needs, such as visitor centers, museums, interpretive waysides, picnic areas, developed campgrounds, parking lots, and staging areas, and include commercial facilities such as lodging, food services, gift shops, bookstores. Some administrative and park operational facilities may exist in this zone, such as administrative offices and curatorial storage. All facilities are mixed within open space and natural settings. Adaptive reuse of historic buildings and structures could occur. Alternative energy or water treatment facilities could also be used as interpretive elements in this zone. | Facilities in this zone support visitor interaction with resources such as trails, campgrounds with minimal services, picnic areas, wayside exhibits, water tanks, boardwalks, turnouts, storage sheds or caches, small transit shelters, overlooks, and benches. Temporary facilities needed to address changing conditions (e.g., new lava flows) could include ranger contact stations, emergency services, and research installations. Facilities conform to the natural surroundings and do not dominate the landscape. Facilities are limited and dispersed, predominately clustered at trailheads and nodes. Temporary, small-scale commercial facilities that support operational needs may be present, compatible with the visitor experience. Adaptive reuse of historic buildings and structures could occur. | Facilities are very minimal and are consistent with wilderness character. In designated wilderness, facilities must be consistent with the minimum requirements analysis. Types of facilities could include trails, composting toilets, water catchments, and temporary structures to support research and resource management activities. | Areas of high-density infrastructure occur in this zone. Limited visitor service facilities may exist in this zone, such as backcountry permitting. Facilities in this zone primarily support park operations, such as administrative offices, monitoring and research, maintenance, energy infrastructure, utilities, park housing, storage, and parking. Partner research facilities are part of this zone, as well as administrative aviation facilities (helipads). All facilities are mixed within open space and natural settings. Adaptive reuse of historic buildings and structures could occur. | Facilities are very minimal and are consistent with wilderness character. In designated wilderness, facilities must be consistent with the minimum requirements analysis. Types of facilities could include trails, composting toilets, water catchments, and temporary structures to support research and resource management activities. | Areas of high-density infrastructure occur in this zone. Limited visitor service facilities may exist in this zone, such as backcountry permitting. Facilities in this zone primarily support park operations, such as administrative offices, monitoring and research, maintenance, energy infrastructure, utilities, park housing, storage, and parking. Partner research facilities are part of this zone, as well as administrative aviation facilities (helipads). All facilities are mixed within open space and natural settings. Adaptive reuse of historic buildings and structures could occur. | Facilities are very minimal and are consistent with wilderness character. In designated wilderness, facilities must be consistent with the minimum requirements analysis. Types of facilities could include trails, composting toilets, water catchments, and temporary structures to support research and resource management activities. | Areas of high-density infrastructure occur in this zone. Limited visitor service facilities may exist in this zone, such as backcountry permitting. Facilities in this zone primarily support park operations, such as administrative offices, monitoring and research, maintenance, energy infrastructure, utilities, park housing, storage, and parking. Partner research facilities are part of this zone, as well as administrative aviation facilities (helipads). All facilities are mixed within open space and natural settings. Adaptive reuse of historic buildings and structures could occur. |

TABLE 1: MANAGEMENT ZONES

| TRANSPORTATION AND ACCESS | | Visitor Services Zone | Transitional/ Semi-primitive Zone | Wild/Primitive Zone | Park Support Zone |
|---------------------------|--|---|--|--|-------------------|
| Overall Conditions | <p>Access throughout this zone uses a full range of multi-modal transportation options (hiking, biking, equestrian, vehicles, and public transit (Hele-On)). Some areas in this zone may have limited or restricted access which may be temporary or permanent (i.e., for research, housing, sensitive resources, or administration). Roads are prevalent and accommodate a high density of travelers; roads are wider, typically a two-lane road, and provide a less-intimate driving experience (such as Crater Rim Drive or Highway 11). Paved and unpaved trails, including multi-use trails, allow for mechanized and non-mechanized use. This zone provides linkages to areas and transit outside the park. Aircraft use is allowed for administrative purposes for resource and visitor protection.</p> | <p>A range of multi-modal (foot, bicycle, motorized, transit) transportation options exist, but emphasis is on smaller vehicles and nonmotorized access (biking, hiking, pedestrian, equestrian). Roads, including administrative roads, are very limited in this zone and accommodate a lower density of travelers. The road character is narrow, sometimes one-lane, and creates an intimate driving experience (such as Hiliina Pali Road, Mauna Loa Road). Emphasis is on maintaining the historic character of the roads. Primarily unpaved trails and some paved trails (including multi-use trails) allow for mechanized and non-mechanized use. This zone provides linkages to areas and transit outside the park. Aircraft use is allowed for administrative purposes for resource and visitor protection.</p> | <p>Access throughout this zone is primarily by foot or on horseback (trails allow for nonmechanized use). No new roads are developed. Existing unpaved roads may be maintained for occasional administrative access including research.</p> <p>In designated wilderness, the maintenance of trails and existing roads must be consistent with the minimum requirements analysis. Unpaved, multi-use trails (equestrian, pedestrian) occur in this zone. Bicycles will not be allowed on trails, consistent with wilderness policy. Aircraft use is allowed for administrative purposes for resource and visitor protection, following minimum requirements analysis where necessary.</p> | <p>Access throughout this zone uses multi-modal (foot, bicycle, motorized, transit) transportation options and focuses on park employees and partners. Visitor access may be limited or restricted. Roads are prevalent in this zone. Road character may vary from typical two-lane roads to less developed administrative roads, possibly one-lane service roads. Paved and unpaved trails, including multi-use trails, are primarily for administrative use and allow for mechanized and nonmechanized use. Aircraft use is allowed for administrative purposes for resource and visitor protection.</p> | |

SITE-SPECIFIC MANAGEMENT GUIDANCE

The following section presents an overview of the management strategies for specific areas of Hawai'i Volcanoes National Park and some of the anticipated changes that will occur.

Kīlauea Visitor Center and Surrounding Area

The park will produce a site plan and site-specific interpretive strategy to integrate visitor experiences among the complex of buildings on the summit of Kīlauea. This integrated campus, or kauhale, includes the Kīlauea Visitor Center, 'Ōhi'a Wing, Volcano Art Center, pā hula (place reserved for hula dancing), and other buildings in the vicinity including those currently utilized by Kīlauea Military Camp and the Hawaiian Volcano Observatory. Individual building functions will be evaluated as part of a larger vision for the entire campus for improving visitor services. The priority will be to stay within the existing footprint of development; however modest expansion could be necessary to achieve the overall vision and to accommodate walkways, improve circulation, and reduce conflicts between vehicles and visitors.

KĪLAUEA VISITOR CENTER

Kīlauea Visitor Center (KVC) is one of two small visitor centers in Hawai'i Volcanoes National Park, with approximately 1,700 square feet of interior space for visitors, which includes exhibits, an auditorium, and a book sales area, and is one of the most visited sites in the park. The park will continue to use Kīlauea Visitor Center as one of two primary visitor facilities as well as park headquarters and administrative offices. Additional parking will be provided to address increased visitor use to the Kīlauea campus. The park will also install an HVAC (heating, ventilation, and air conditioning) system in the building to improve efficiency.

The covered outdoor lanai at Kīlauea Visitor Center offers 24-hour trip planning and orientation. To provide more interpretive space on the often crowded lanai, the park would consider either expanding the lanai itself or removing and replacing the current restroom with a facility of similar capacity behind the visitor center and closer to the 1877 Volcano House, where Volcano Art Center Gallery is located. Relocating the restrooms will lessen the noise level and reduce congestion in this visitor use area, improving the experience for visitors using the displays and attending interpretive programs and information



[Left] 1877 Volcano House. NPS photo. [Right] Visitor orientation information at Kīlauea Visitor Center lanai. NPS photo by Jim Gale.

sessions on the lanai. The relocated restrooms will also replace the restrooms near the 1877 Volcano House building and may include a covered walkway to provide a rain-free path to the restrooms. However, simply expanding the lanai may be less costly and require less ground disturbance than relocating the restrooms, while still accomplishing the goal to increase the interpretive space outside the visitor center. Considering the potential benefits and impacts from implementing these various alternatives, the park will assess these alternatives through the completion of the site plan for the complex of buildings on the summit of Kīlauea.

The park will also construct a 2.5-mile separate shared trail for both pedestrian and bicycle use from Kīlauea Visitor Center to Jaggar Museum. The new trail will help promote safe bicycle access between these two popular visitor destinations. The historic character of Crater Rim Drive and attributes of the existing Crater Rim Trail make it difficult to modify existing infrastructure for safe bicycling. However, if possible, the new trail

alignment will use portions of the existing trail and road that are safe for shared use, without compromising natural and cultural resources.

VOLCANO HOUSESM

Dating back to 1846, Volcano HouseSM is the oldest operating hotel in Hawai‘i. Volcano HouseSM will be managed as a great historical hotel, providing high-quality service, embodying traditional elegance, and expressing a true aloha spirit to visitors from entrance to departure. As a historical hotel, the park will continue to operate Volcano HouseSM as a concession operation for lodging, retail, and food and beverage services and will strive for environmentally sound and sustainable practices for the entire operation of Volcano HouseSM. Additional detail is provided in the commercial services strategy in Appendix F of the draft GMP/WS/EIS.

In addition, as part of the concession contract, the concessioner will work with the park to provide interpretive services.



Volcano HouseSM in the steam. NPS photo by Stephen Geiger.

If in the future, for any reason, the Volcano HouseSM is no longer operating as a commercial lodging facility, it could be adaptively reused for other park visitation and/or administrative functions.

If the Volcano HouseSM is destroyed or significantly damaged, the NPS will consider either rebuilding the lodging facility inside the park as close to the present location as is safe or not rebuilding Volcano HouseSM on the rim of the crater but rather relying on lodging outside the park in adjacent communities. Rebuilding the facility in the park would allow the NPS to continue to provide an overnight volcano experience to visitors and maintain the tradition of lodging at the summit of Kīlauea which dates back to 1846. Relying on lodging outside the park would reduce the amount of infrastructure the park needs to maintain and would provide more opportunities for the adjacent communities to benefit from the revenue generated by park visitors.

1877 VOLCANO HOUSE

The 1877 Volcano House was the first hotel on the rim of Kīlauea and was relocated in 1921 to its present site adjacent to the visitor center. Currently, the 1877 Volcano House is occupied by the Volcano Art Center, a nonprofit organization dedicated to arts and environmental education, who operates a fine art gallery under a historic lease with Hawai‘i Volcanoes National Park.

The park will continue to maintain the 1877 Volcano House in its present location and will evaluate accessibility improvements for the front entrance, lanai, and parking area. The park will also continue to interpret the historic structure and landscape, primarily through interpretive waysides, as one of the park’s early buildings providing lodging to visitors on the summit of Kīlauea. Inside the building, interior exhibits could include additional historic photos of the 1877 Volcano House to highlight historic uses of the building.

If the Volcano Art Center gallery were to relocate, the NPS would consider the following options for the 1877 Volcano House (not in priority order):

- Continue to maintain and adaptively reuse the building for continued visitor services, including potential commercial services
- Evaluate restoring the building to its original layout and developing a living history demonstration with period furnishings and interpretive programs and media
- Examine adaptively reusing the building for additional self-guided interpretive visitor services and as a staging area for educational groups
- Lease to or otherwise authorize the use of the facility by a noncommercial visitor service tenant, such as a nonprofit

‘ŌHI‘A WING (1932 ADMINISTRATION BUILDING)

Constructed in 1932, the ‘Ōhi‘a Wing served as the original park administration building. For many years it was used as a lodging wing of the Volcano HouseSM. The park will adaptively reuse the historic ‘Ōhi‘a Wing as a cultural museum and administrative offices. Adaptive reuse of the ‘Ōhi‘a Wing will in part replace the function of the Waha‘ula Visitor Center, which emphasized cultural exhibits but was destroyed by lava in 1989. This action will also complement the visitor functions of the Kīlauea Visitor Center and Jaggar Museum. Due to its associated costs, rehabilitating and adaptively reusing the ‘Ōhi‘a Wing may need to be phased over time.

KILAUEA MILITARY CAMP

Kilauea Military Camp is an Army-operated historic recreational complex that serves military branch personnel, including retired and inactive members, and their dependents and guests, in addition to serving nonprofit educational organizations in Hawai‘i Volcanoes National Park. Spanning 54 acres, this complex includes 90 rooms for overnight accommodations, a cafeteria, bar, grocery store, gas station, bowling alley, recreation room, exercise facility, conference rooms, theater, and bus and van tours for guests staying at Kilauea Military Camp, as well as other support programs and facilities.

Kilauea Military Camp will continue to operate as a military recreation facility using park-owned historic structures and land for the duration of its existing special use permit. The site will maintain its current function as a military morale, welfare, and recreation center—a self-supporting operation under a Non-Appropriated Funding Instrument, primarily for active duty military, military retirees, and their guests.

The park will continue to coordinate with Kilauea Military Camp on resource protection, particularly historic resources on the List of Classified Structures and those that are eligible for the National Register of Historic Places. The park will also coordinate with the camp to expand interpretation of the park's military history and the camp's history, including the World War II Japanese internment and POW history. This interpretation could include the placement of additional waysides and guided tours.

Kilauea Military Camp may continue to be used for parking during special events. When the special use permit expires, the NPS will review existing laws, policies, authorities, and park goals to (1) assess the appropriateness and/or necessity of the commercial services provided by Kilauea Military Camp and their alignment with the goals and strategies identified by the commercial services strategy (CSS) and this GMP, and (2) to determine the appropriate authority by which these commercial services should be authorized to operate, such as whether or not the operation could occur under a special use permit or lease or some other legal instrument.

If the permitted military recreation operations at Kilauea Military Camp are discontinued, the land will revert to the exclusive use of the NPS. Nonhistoric structures could be removed and areas of native forest and habitat restored. The NPS will prepare a site plan to explore options for the site such as:

- Adaptively reusing the site for the park's main visitor center or a multiagency research and education campus
- Converting the site to a commercial visitor services operation under a concession contract

- Leasing to, or otherwise authorizing the use of, the facilities by a noncommercial visitor service tenant, such as a nonprofit

Crater Rim Drive

Providing vehicular access along the entire rim of Kilauea Caldera, Crater Rim Drive is the most visited corridor in the park and provides access to a number of unique volcanic, scenic, and cultural features such as Thurston Lava Tube and Steam Vents. Since the eruptive activity beginning in 2008 in Halema'uma'u Crater and the resultant hazardous volcanic plume, the southern portion of Crater Rim Drive from Jaggar Museum to Chain of Craters Road intersection has been closed. As a result of this closure, most visitors exploring Crater Rim Drive usually drive from Kilauea Visitor Center to Jaggar Museum, which serves as the park's other main visitor center, but must double back again to view the remaining open portion of Crater Rim Drive.

The park will continue to manage the 2.8 miles of Crater Rim Drive between the entrance station and Jaggar Museum, consistent with the *Crater Rim Drive Rehabilitation Environmental Assessment* (May 2010).¹ Assuming eruptive activity ceases or changes in Halema'uma'u Crater and the park determines through active monitoring that air quality and other hazards are at a level that is consistent with general visitor use, the park will reopen the southern section of Crater Rim Drive and keep the road open to the public for two-way traffic, allowing a mix of private vehicles and smaller shuttles (nonmandatory). Allowing two-way vehicular access around Crater Rim Drive provides a number of benefits to park visitors and management, and is consistent with the rationale for designing the original road. Loop roads are popular with visitors, allowing them to approach the crater without having to back track along the same road on which they entered. Visitors can also approach the crater from two directions, helping disperse visitation. Further, when eruptions bring increased traffic, the road could be converted to one-way access for a temporary duration,

¹ Hawai'i Volcanoes National Park. 2010. *Crater Rim Drive Rehabilitation Environmental Assessment*. National Park Service, Hawai'i Volcanoes National Park.

increasing safety, especially at night. Finally, a loop road can provide an escape route in an emergency should lava block a portion of the road.

The historic character and historic alignment of the road will be preserved. As part of a pilot program, large commercial buses or vehicles over 98 inches in width and/or over 38 feet in length will be limited to one-way traffic between the Jaggar Museum and Chain of Craters Road junction, along the southwest portion of road. Administrative use of the road for two-way vehicle traffic will continue to be allowed.

The park will also continue to evaluate the pilot hydrogen shuttle technology. This includes the performance of the shuttles that will service proposed stops along Crater Rim Drive (scheduled to begin in 2017). Current proposed stops include Kīlauea Iki, Thurston Lava Tube, Pu‘u Pua‘i, and Devastation Trail. If this project proves successful, the shuttle operations could be extended to include other stops along Crater Rim Drive, such as Kīlauea Visitor Center, Steam Vents, Kīlauea Military Camp, and Jaggar Museum, or other areas of the park.

Prior to the 2008 closure of part of Crater Rim Drive, a ride around Halema‘uma‘u Crater was a popular riding loop for bicyclists. To improve safe bicycle access around Crater Rim Drive, the park will also improve signage along the road corridor, provide adjacent bicycle trails when feasible, and consider vehicular traffic closures during specific times of day or days of the week to encourage bicycle use.

HALEMA‘UMA‘U PARKING AND OVERLOOK

Considered by Native Hawaiians as the home of the deity Pelehonuamea, Halema‘uma‘u Crater is a culturally recognized sacred site. However, as an accessible crater of an active volcano, Halema‘uma‘u has also historically been one of the most highly visited locations in the park, with parking for 300 cars. Because of eruptive activity beginning in 2008 in Halema‘uma‘u Crater and the resultant hazardous volcanic plume, this area is currently closed to the public. Once the overlook is reopened to visitation, the parking lot will be maintained to accommodate the existing capacity

but the park could evaluate site modifications to address sensitive cultural issues and values and improve resource protection.

Jaggar Museum and Hawaiian Volcano Observatory

Jaggar Museum was the first park museum in Hawai‘i Volcanoes National Park and continues today as a interpretative visitor center located on the rim of Kīlauea Crater, overlooking Halema‘uma‘u. Considering its location, historic significance, and easy access for commercial buses, Jaggar Museum, like the Kīlauea Visitor Center, is another one of the most heavily visited locations in the park, especially when Kīlauea is active. However, its current exhibits, installed in the 1980s, are dated and worn and do not reflect the park’s interpretive themes. The park will rehabilitate and upgrade the interpretive exhibits at Jaggar Museum. Improved exhibits will enable Jaggar Museum to continue to serve as the premier location for visitors to learn about past and current volcanic eruptions and to view Halema‘uma‘u Crater. Connected to the museum is the Hawaiian Volcano Observatory (HVO) operated by the US Geological Survey. Hawaiian Volcano Observatory houses scientists, laboratories, offices, and monitoring equipment. As its mission, HVO provides timely and effective disaster warnings for emergencies to land managers and the affected population using hazard assessments, research, and monitoring.

Hawaiian Volcano Observatory will continue to operate adjacent to Jaggar Museum. Staying within the existing developed footprint around Jaggar Museum and HVO, the park will consider adding an outdoor seating area for about 30 people to allow for ranger demonstrations and programs, such as night programs for visitors viewing the current lava glow from Halema‘uma‘u Crater. The outdoor seating area will improve overall visitor experience and provide a venue for park programs to inform visitors about the cultural significance of the site. This addition will also make better use of the limited space on the rim with its views of the caldera. If an outdoor seating area is not feasible around Jaggar Museum, other locations that could be considered will be in the vicinity of the pā hula.



Congestion at Thurston Lava Tube Parking Area. NPS photo.

If Jaggar Museum and the Hawaiian Volcano Observatory facilities are destroyed or significantly damaged, the NPS will consider three options:

- Repair or rebuild Jaggar and HVO in the current location to the greatest extent possible. Keeping the facilities on the edge of Kīlauea Caldera and in close proximity to Halema‘ūma‘u Crater continues the link between science and visitor interpretation which has been instrumental at Hawai‘i Volcanoes National Park. Both buildings also have their own cultural significance with the site.
- Explore alternative locations, preferably inside the park and off the crater edge and Uwekahuna Bluff but still within Kīlauea Caldera, to maintain continuity for the historic visitor experience and scientific operations as much as possible.
- Remove all facilities from the edge of Kīlauea Caldera, and specifically Uwekahuna Bluff, restore the site as a sacred place to Native Hawaiians, and strive to rebuild the functions provided by Jaggar Museum and HVO in a less culturally sensitive location, outside the park. The park and USGS would maintain the minimum amount of instrumentation

and infrastructure necessary for monitoring volcanic activity, but offices and other components of HVO would be relocated outside the park. The visitor exhibits provided by Jaggar Museum would preferably be relocated to other buildings within the park, but could be combined with a new HVO facility, depending on location and proximity to the park.

Thurston Lava Tube and Surrounding Area

THURSTON LAVA TUBE (NĀHUKU)

As the only lava tube in the park that is open to self-guided visitation, Thurston Lava Tube is one of the most congested areas in the park. Transportation studies have been conducted recently to better understand and develop solutions to address this issue.

The park will maintain the current mix of parking for private and commercial vehicles at Thurston and use a suite of tools to address congestion and improve the visitor experience. These tools could include improved visitor information and outreach for trip planning (emphasizing less busy times of day to visit), increased ranger presence to direct traffic, the use of intelligent transportation systems (such as electronic message boards giving real-time



Visitors walking through Thurston Lava Tube (Nāhuku). NPS photo by Michael Szoenyi.

information), vehicle size limitations for parking, time-of-day restrictions on certain vehicles, and/or reservations for commercial vehicles only. Additional restriping and reconfiguration of parking at Thurston Lava Tube along the road may also be required. In addition, the park will consider developing a more specific site plan to integrate trails and parking areas from Kīlauea Iki to Devastation.

Large commercial buses will be able to load and unload at Thurston but these buses may be required to park at nearby underutilized lots such as Devastation Trail and Pu‘u Pua‘i. Some reconfiguration within the existing developed footprint of these parking lots may be needed to accommodate large buses, and improved signing and accessibility ramping will be needed. The park will continue to evaluate implications of implementing one-way traffic on Crater Rim Drive between Jaggar Museum and Chain of Craters Road junction for large commercial buses and requiring buses to only load and unload at Thurston as conditions change.

The park will also improve and increase interpretive opportunities and themes at Thurston while still protecting rainforest resources. Improvements could include a focused rain forest experience and interpretive rainforest trail and

interpretation of Hawaiian caves. Improved visitor information about the site’s unique geological and biological resources and the site’s significance to Native Hawaiian culture will be disseminated at Thurston to expand visitor appreciation. To improve the overall visitor experience as well as respect traditional Hawaiian regard for the area, signage could emphasize and encourage appropriate visitor behavior, such as use of soft voices and turning off cell phones, among others, so that bird sounds and other natural sounds could be heard.

The park will also continue ranger-guided tours of Pua Po‘o, as staffing and funding permits.

KĪLAUEA IKI, PU‘U PUA‘I, AND DEVASTATION

New or improved trail connections will be explored for pedestrians and bicycles from these parking areas and other locations in the park, such as trails linking Thurston to Pu‘u Pua‘i and Devastation Trail parking lots in order to create more pedestrian access to Thurston.

At Kīlauea Iki parking lot, there is an existing half-mile rainforest trail linking Kīlauea Iki to Thurston. The park will consider creating a return trail from Thurston to Kīlauea Iki on the other side of the road using part of the Escape Road to create a loop trail experience. Any new or renovated trail

will incorporate trail design features that protect rainforest resources and meet visitor capacity, such as adequate trail width and surface, improved signage, and better definition of the trail edge.

The park will explore the feasibility of establishing an educational covered pavilion in the vicinity of Devastation Trail or the 1974 lava flow for outdoor educational use. Ideally, this pavilion will be situated near the trail and users will park at the Devastation Trail parking lot located at the intersection of the park's two main roadways, however a final location will also be dependent on a site that will avoid disturbing nēnē in the area. The pavilion will provide an opportunity for student groups to observe and learn about the cinder outfall of the 1959 eruption of Kīlauea Iki. In addition, the park will update the environmental education curriculum and waysides in the Devastation Trail area.

ESCAPE ROAD

The Escape Road is an unpaved road off of Highway 11, near the junction with Old Volcano Highway that continues through the park past Thurston Lava Tube and down to Mauna Ulu on Chain of Craters Road. The Escape Road is made up of two historic routes, the upper portion of the Keauhou Trail/Road and Lee's Short Cut, and is primarily used as a multipurpose trail for nonmotorized use. It is also maintained as an escape route in the event that Chain of Craters Road is cut off.

The park will continue to maintain the historic road as an emergency egress route, but also improve the trail surface on the Escape Road to accommodate increased bicycle, equestrian, and pedestrian use and improve connections from the park to the Volcano community. The park will also consider linking the Escape Road with possible loop trail connections outside of wilderness and sensitive wildlife habitat.

Chain of Craters Road

The park will continue to maintain the character of Chain of Craters Road to NPS standards, ensuring a park-like feel for the driving experience, while providing for visitor safety. Chain of Craters

Road will continue to immerse people in the volcanic landscape and history of the area from mauka to makai.

The park will limit new development along Chain of Craters Road and will prioritize use and maintenance of existing trails, historic trails, turnouts, and waysides to improve the visitor experience, dispersing use and providing a more tranquil experience than in other areas of the park. The park will identify and clear over-vegetated turnouts to restore views/vistas and to encourage stops along the road. In order to limit informal turnouts and social trails, the park will improve signage of features and viewpoints at road turnouts. The park will also explore the option of locating an educational pavilion, in addition to a mobile visitor contact station, along Chain of Craters Road to orient visitors, communicate visitor safety information, and provide an alternative visitor experience when the summit is closed for safety reasons. The mobile contact station could be located at Mauna Ulu (around the developed area or the 1969 flows) or where the 1974 flows first cross Chain of Craters Road.

Chain of Craters Road to Mauna Ulu will continue to be used as a day-use area. In addition, around the 1974 lava flows near the Lua Manu Crater, the park will develop a site plan to create a more comprehensive and organized interpretive experience to improve visitor opportunities and connect visitors to the entire eruption story that stretches from the crater to the sea. The park will strive to work with existing trails and historic alignments and prioritize using those alignments first, before any new trail construction; however trail development will be needed at the 1974 flows to prevent trampling and protect geologic resources. The park will also explore options to locate an educational pavilion in the vicinity of Mauna Ulu or elsewhere along the 1974 flows as part of this new interpretive experience. The pavilion could be tied to the staging area for the mobile contact station, or could stand alone.

Mauna Ulu will continue to be maintained as a day-use area for viewing lava fields and associated lava features and will continue to provide trailhead parking for Pu'u Huluhulu and Nāpau Crater

and Campground. Mauna Ulu also provides the best views of Pu‘u ‘Ō‘ō, which is part of the current eruption.

KEALAKOMO

Kealakomo will continue to be maintained as a day-use picnic area and viewing platform.

Further makai in the Kealakomo ahupua‘a, or closer to the ocean along Chain of Craters Road, the park will continue to improve interpretation and preservation of Kealacomowaena and its resources by implementing recommendations from the *Archeological Preservation Plan for Kealakomo Ahupua‘a* (Tomonari-Tuggle 2011).² A phased approach will be used and will include primary messages and themes for interpretive trails and signage, sites to be interpreted, site preparation required to mitigate impacts to sensitive resources, and guidance for managing natural and cultural resources in the area.

The park will also explore the establishment of an educational pavilion at Kealacomowaena. Other site improvements needed include expanding parking at the turnout along Chain of Craters Road, creating an area for school bus parking, and installing vault toilets near the pavilion. The park will interpret and protect archeological sites along the loop trail at Kealacomowaena.

END OF CHAIN OF CRATERS ROAD

The end of Chain of Craters Road is defined as the place where vehicles currently turn around before parking. The actual end of the pavement is approximately 0.5 miles past the visitor contact station and provides pedestrian access to where the lava flows crossed the road.

The park will strive to replace some of the functions provided by the Waha‘ula Visitor Center and administration area that was destroyed by lava in 1989. The functions being replaced include visitor contact information, exhibit space, interpretation and outdoor education, emergency operations, restrooms, and an alternative visitor center when the summit is closed. To achieve

this goal, the park will continue to work with partners to provide a sustainable and movable visitor contact station at the current end of Chain of Craters Road for interpretation and safety on a trial basis. If the pilot project is successful, the park will retain the structure as a contact station to provide visitor services and emergency operations over the long term.

If the pilot project is unsuccessful, the park will develop a long-term replacement visitor contact station in the form of an open air pavilion or similar structure at the end of Chain of Craters Road. The structure will not be mobile, but interior elements could be made to be quickly removable in the event of an active lava flow that threatens the structure, and the framing could be salvaged.

Under either scenario, the existing temporary mobile infrastructure will be removed once a long-term contact station is finalized and any additional site requirements such as improved vehicle turnaround and parking facilities will be evaluated.

A 5.5-mile segment of the Chain of Craters Road that ran through the park towards Kalapana was buried by lava flows generated by Pu‘u ‘Ō‘ō. Due to a change in the direction of the lava flow in 2014, the Federal Emergency Management Agency funded the construction of an unpaved emergency access route following the historic road alignment. This route is for emergency access only, and the park is now responsible for protecting and maintaining the road as an emergency access route. When this route is not needed as an emergency access route, it could be used as a trail (similar in character and functionality to the Escape Road from the summit to Mauna Ulu) to provide a quality nonmotorized visitor use opportunity while ensuring the route is protected and maintained for its original intent. These uses would ensure that natural values are not compromised without adding the management complexity of managing a coastal entrance for public vehicles to enter the park.

The park will continue to consult with the Kalapana community about issues in the Kalapana Extension related to the community.

² Tomonari-Tuggle, M. J. 2011. *Archeological Preservation Plan for Kealacomowaena Ahupua‘a*. Prepared for Hawai‘i Volcanoes National Park. 114 pages. Honolulu, HI.

Hilina Pali Road

The Hilina Pali Road is a historic 8.5-mile paved, one-lane narrow spur road dating from the early 1930s. It extends southwest from the Chain of Craters Road to a view of the Pacific Ocean and Ka'ū Desert wilderness unit. The Hilina Pali Road is significant for its association with NPS road design and construction principles as well as for its NPS Rustic architectural style. The park will maintain the existing road width and historic alignment indicative of the architecture style. The park will also continue to maintain the Hilina Pali Overlook, a historic Civilian Conservation Corps (CCC) shelter, and adjacent trails.

The park will continue to maintain the Kulanaokuaiki Campground as it currently exists.

The park will also consider expanding interpretive opportunities, such as waysides and turnouts for interpreting wilderness values. Interpretive signs could be placed at trailheads leading into wilderness, at short trails along the road corridor, and at the end of Hilina Pali Road near the CCC shelter and outside of wilderness boundaries. An outdoor covered education pavilion could also be developed in the vicinity of Kulanaokuaiki Campground in an area that avoids sensitive wildlife, and the park could expand on the interpretive themes in this area.

The park will improve trailhead management at the end of the road by removing nonnative plants and restoring native species.

As a way to encourage hiking and biking, the park will consider management strategies to provide safer access. The park will consider identifying days or parts of days when Hilina Pali Road could be closed to day-use vehicles and become hike/bike only. Overnight campers staying at Kulanaokuaiki and backpackers with permits would still have vehicular access on the road during these times. The park will also consider developing a bicycle loop access to connect Escape Road with Hilina Pali Road outside designated wilderness and sensitive wildlife habitat.

Should Hilina Pali Road be impassible due to volcanic or seismic activity, the NPS will consider the following three options:

- 1) Maintaining and restoring road access to the historic features such as the Hilina Pali Overlook
- 2) Converting the former road into a trail for pedestrians and/or bicycles
- 3) Evaluating the areas for potential wilderness designation

‘Āinahou Ranch House and Gardens

The 6,324-acre ‘Āinahou Ranch was acquired under the authority of the Endangered Species Conservation Act of 1969 (Public Law 91-135) for the purpose of protecting, restoring, and propagating endangered bird species. Since then, the general area has served an important role in the conservation and reestablishment of endangered nēnē on the island. In 1995, the Ranch House was listed in the National Register of Historic Places, and in 2004, the cultural landscape inventory amended the National Register nomination to include the 13-acre garden with concurrence from the State Historic Preservation Officer.

‘Āinahou Ranch will continue to provide a core management area for nēnē recovery. Park staff will continue to maintain the house and cultural landscape in good condition. The water system will be maintained for fire protection, and the access road to ‘Āinahou will be maintained as an unpaved road.

The NPS will focus on restoration for nēnē. Additional measures to provide opportunities for public stewardship of the ranch house and gardens and habitat restoration may be allowed through the use of trained volunteers and small service groups under the direction of NPS staff in the field. Such opportunities will be consistent with NPS *Management Policies* (2006) and with appropriate consultation with USFWS so as to avoid impacts to nēnē and other endangered species in the area.

Within the formal gardens, the park will work with cultural resource staff to replace invasive nonnatives with native species, minimize any new plantings or cultivation, and prevent any inadvertent introduction of nonnatives. In the

areas surrounding the formal gardens and where invasive faya tree (*Morella faya*) and European olive (*Olea europaea*) have taken over, habitat restoration to remove these invasives and re-establish native plant communities will occur, improving forage for native forest birds (e.g., amakihi, apapane, ‘i‘iwi).

Interpretation of ‘Āinahou Ranch and its significance as a cultural resource and important site for nēnē will occur offsite for the general public.

Mauna Loa Road

Mauna Loa Road extends just over 11 miles, from Highway 11 to an elevation of 6,662 feet. A two-lane road constitutes the lower 1.5 miles, then the upper section of road is a narrow two lane road for 2.1 miles at which point it narrows further to one lane (approximately 10 feet wide) for the next 7.7 miles. The road ends at the Mauna Loa Observatory, a historic CCC lookout shelter.

The park will maintain the existing road width and historic alignment. To address safety issues along the one-lane section, the park will improve signage and employ other techniques, such as adding more turnouts to allow for safer passing.

Because of the current low visitation levels along the Mauna Loa Road and the unique resources in this area of the park, the focus at Mauna Loa will be on increasing the unique interpretive and birdwatching opportunities with minimal additional infrastructure or impacts. The park will consider a turnout at a designated area for birdwatching at about 6,000 feet of elevation. Forest restoration could also be an important interpretive theme for this location, with parallels between Mauna Loa and Kahuku.

The park will also consider adding interpretive waysides and one or two loop trails along the road for hiking and watching native birds (such as elepaio and ‘i‘iwi), which will also provide opportunities for visitors to experience a wide range of mesic and dry montane habitats not found in the rest of the park. Possible trail linkages could include trails to Kīpuka Kī and the mosaic of native koa forest, shrublands, and grasslands above the Powerline Road; a trail linking the lookout to Kīpukapuau; and trails linking the Ka‘ū Desert and Mauna Loa wilderness units.

For outdoor education use, the park will provide two covered educational pavilions along Mauna Loa Road at different elevations to represent different types of habitat.



Bicycling Mauna Loa Road. NPS photo by Jay Robinson.

Similar to Hilina Pali Road, the park could consider identifying days or parts of days when Mauna Loa Road is closed to private day-use vehicles and will become hike/bike only. Backpackers will not be restricted from using the road for trailhead access during these times.

Should Mauna Loa Road be impassible due to volcanic or seismic activity, the NPS will consider the following three options:

- 1) Maintaining and restoring road access to the historic features such as the Mauna Loa Observatory
- 2) Converting the former road into a trail for pedestrians and/or bicycles
- 3) Evaluating the area for potential wilderness designation

NĀMAKANIPAIO CAMPGROUND

Nāmakaniāpio Campground, a property eligible for inclusion in the National Register, will continue to function as the primary campground for visitors on the summit and be managed as part of the park's concession contract for commercial services. In order to expand capacity and address demand for amenities, concession operations could expand at Nāmakaniāpio to include the construction and operation of an indoor lodging opportunity such as a dormitory style or hostel-like facility, cabins, or similar. The construction and operation of such a facility could be included in the park's concession contract covering operations at Nāmakaniāpio. The concession operation will incur the construction costs for such a facility.

A pedestrian and possibly a bicycle trail could be created to link the Nāmakaniāpio Campground with Kīpukapuāulu on Mauna Loa Road and key sites on Crater Rim Drive. The park will take particular caution in siting the trail due to the high concentration of sensitive resources in the area.

Ka'ū Footprints Area and Ka'ū Desert

The park will continue to rehabilitate and interpret the historic CCC shelter and footprints in the Ka'ū Desert area.

A site plan will be developed to address issues and needs for interpretation of the Ka'ū Footprints and the Ka'ū Desert area. Planning for the Ka'ū Desert area will focus on concentrating use in existing development areas and improving amenities for visitor use, while ensuring the protection and preservation of cultural and natural resources. Planning will also address: (1) expanding and promoting access, including accessible access, to the area, (2) providing trail connections and interpretive opportunities, and (3) determining other visitor support facilities needed such as signs, toilets, and parking. Within the existing development areas, the park could consider slightly expanding the development footprint to accommodate the goals of the site plan.

‘Ōla‘a

‘Ōla‘a is composed of two tracts of land totaling 9,679 (9,684.5) acres that are noncontiguous to the park boundary. Donated to the NPS in 1952 via Hawai'i Territorial Executive Order 1540, this area, though not officially within the boundary of Hawai'i Volcanoes National Park, is managed by the park. The park will seek legislation to include ‘Ōla‘a within the legislated park boundary.

The park will construct a boundary fence for unfenced portions of the ‘Ōla‘a rainforest, consistent with the park's plan for protecting and restoring native ecosystems by managing nonnative ungulates.

‘ŌLA‘A SMALL TRACT

The small tract of ‘Ōla‘a is 356.13 (355.9) acres in size and is not designated wilderness (as opposed to the "large tract"). Currently, visitors accessing the small tract informally park along Wright Road in Volcano Village. The park will collaborate with the county to formalize a turnout for parking on Wright Road for two to three vehicles (current capacity).

In addition, to ensure resource protection and minimize impacts, the park will develop a boardwalk-style or weed-mat trail to provide visitors with onsite interpretation of the rainforest. Before implementation, the park will determine a route to avoid sensitive resources, develop and implement a monitoring and treatment plan

to address the spread of nonnative plants, and determine a group size limit for the trail. Once completed, the trail will be available for general self-guided public access.

To increase offsite interpretation opportunities and educational group use of the ‘Ōla‘a rainforest, the park will explore partnership opportunities to create joint interpretive media with adjacent land managers such as the Pu‘u Maka‘ala Natural Area Reserve managed by the Department of Land and Natural Resources (DLNR) and a co-member with the park in the Three Mountain Alliance Watershed Partnership.

‘ŌLA‘A LARGE TRACT

The large tract of ‘Ōla‘a is 9,298.54 (9,329.5) acres of designated wilderness. The park will maintain custodial responsibility for the large tract of ‘Ōla‘a and will continue to manage it for its wilderness values without developing trails for day use. No improvements will be made to facilitate public access and no overnight camping will be allowed. Interpretation will occur offsite only for the wilderness portion of ‘Ōla‘a.

In the long term, if trails and access provided in the small tract are successful in terms of providing visitor access with minimal resource damage, the park will consider additional public access in the large tract consistent with wilderness values and character. Any additional public access will be determined through minimum requirements analysis as directed by the Wilderness Act (1964).

Kahuku Unit

In 2003, Hawai‘i Volcanoes National Park acquired 115,788 (150,867) acres of land that straddles the Southwest Rift Zone of Mauna Loa and extends across lava fields, pastures, forests, shrubland and mesic, subalpine, alpine, and desert environments in the Ka‘ū District of Hawai‘i County (see *Figure 3: Existing Conditions, Kahuku Unit*). Referred to as the Kahuku Unit, this acquisition increased the size of the park by 50 percent and expanded opportunities for visitor use and resource protection. While the lower portion of Kahuku is a pastoral landscape resulting from years of cattle ranching, much of Kahuku is noted for its biological diversity, ecological integrity, and wild

character. Existing park management activities in Kahuku concentrate on protecting and recovering native species, including special status species, and ecosystems, controlling invasive nonnative plants and animals, developing interpretive programs, and conducting surveys and inventories of cultural and natural resources. Restoration activities will continue to include construction of boundary and internal fences to exclude nonnative ungulates, consistent with the park’s *Final Plan/EIS for Protecting and Restoring Native Ecosystems by Managing Nonnative Ungulates* (2013).³

The Kahuku Unit is currently managed under an interim operating plan with limited day-use visitation on weekends and for special events. Over time and with adequate funding for staff and infrastructure, the park will strive to open Kahuku for visitors beyond the weekends, and will ultimately have operational capacity seven days a week. Recreational infrastructure, such as trails, small-scale campgrounds, and interpretive and educational programs and activities will be developed to optimize visitor access and provide a range of opportunities to experience Kahuku’s unique natural and cultural resources and participate in the recovery of species and sites. The focus will be on recreational activities such as hiking, camping, and nature-viewing, with some biking and scenic driving opportunities, and the experience will be designed to fully immerse visitors and engage local communities in the restoration process and story throughout Kahuku. The park will offer opportunities for the community, visitors, and school groups to volunteer on restoration projects in Kahuku and participate in hands-on resources management activities.

KAHUKU ENTRANCE

The existing entrance to Kahuku is 43 miles to the southwest of the main park entrance on Highway 11 and poses safety concerns due to its location on a curve with limited line-of-sight. The park will maintain the existing entrance at Kahuku but address safety issues by clearing vegetation, improving signage, and possibly lowering existing

³ Hawai‘i Volcanoes National Park. 2013. *Plan and Final EIS for Protecting and Restoring Native Ecosystems by Managing Nonnative Ungulates*. National Park Service, Hawai‘i Volcanoes National Park.

berms to improve the line of sight for drivers. The park will also seek to collaborate with the state to evaluate and add turn lanes on Highway 11 and will work with the state and other partners to expand interpretive and scenic opportunities along Highway 11.

The park will also explore working with the state to develop a parking area for a few cars off the Old Mamalahoa Highway as a trailhead to the 1868 lava flow and rare native dryland forest, as well as a potential trail following the historic Kahuku-‘Ainapō Trail alignment to connect other trails in lower Kahuku.

LOWER KAHUKU

For the purposes of this GMP, lower Kahuku is defined as the acreage below a line that is 100 meters above the uppermost road in the paddock system. Lower Kahuku extends down the Southwest Rift Zone of Mauna Loa from this line to Highway 11.

The park will develop a site plan for the lower Kahuku area to create a design that provides visitors with a sense of arrival in Kahuku as well as general orientation and information. The site plan will provide detailed guidance on how best to implement the recommendations of the general management plan, including adaptively reusing existing buildings for specific uses, and will determine the numbers and locations of campgrounds, picnic areas, and trails.

DEVELOPED AREA AND USE OF EXISTING BUILDINGS

In lower Kahuku, some limited use of existing ranch buildings will continue. In addition, the park will adaptively reuse the existing ranch buildings and surrounding site for a mixture of visitor services and park operations, including administrative offices and maintenance space.

The park will develop an orientation/interpretive strategy to site various media to interpret Mauna Loa geologic and natural history, native species and forest conservation, history of cattle ranching, Native Hawaiian presence in this area, and military history.

The park will rely primarily on self-guided infrastructure to convey a sense of arrival and tell interpretive stories of Kahuku. In order to welcome visitors to Kahuku, the park will maintain a visitor contact station past the current entrance gate in the existing visitor contact area. This visitor contact station can be self-guided or staffed. The park will also maintain a small amphitheater in proximity to the visitor contact station that could be used for outdoor programs and organized activities.

In an effort to improve visitor circulation near the entrance, the park will explore opportunities to use existing interior roads in the developed area.

In addition, the park will provide a location in lower Kahuku to accommodate camping and staging for groups such as volunteers, researchers, students, and educational and service groups.

RECREATION ACTIVITIES AND VISITOR OPPORTUNITIES

The park will encourage a rustic visitor experience in Kahuku. The focus will be on recreational activities such as hiking, camping, and nature-viewing, with some biking and scenic driving opportunities. A minimum amount of pavement and road infrastructure will be reconstructed and/or maintained to accommodate recreation and visitor circulation while preserving the natural surroundings.

An educational covered pavilion will be provided near the 1916 flows to support a range of visitor programs and volunteer groups.

The park will manage the amount of commercially guided recreation in lower Kahuku primarily through vehicle size limits and commercial use authorizations (CUAs). The road will be evaluated to determine final vehicle size limits; however, based on current knowledge it is likely that commercial services will be limited to vehicles no greater than 22 feet in length or 15,000 pounds maximum GVWR in lower Kahuku. The park will encourage commercial service groups to provide environmental or conservation-focused messages while sightseeing and/or recreating in lower Kahuku.

Road Access

No new roads will be developed in lower Kahuku, and access and circulation will focus on use of the existing road network. Large commercial vehicles will be restricted to the developed area around the existing visitor contact area due to the constraints of existing road infrastructure.

The park will upgrade and maintain the main road from the existing developed area to Upper Glover for two-wheel-drive access. This road will primarily be one-lane with turnouts, and the surface will be either gravel or paved surface, similar in character to the Hilina Pali or Mauna Loa Roads. The main road, from Upper Glover east to a designated location near the 1916 lava flows (approximately 3 miles), will be maintained for four-wheel-drive access. There will be no public vehicular access west from Upper Glover.

Any remaining roads not used for administrative purposes (including administrative or emergency vehicular access or use as a fuel break) or trail access will be restored to natural conditions and/or native communities. Prior to making a determination on converting roads to trails or restoring roads to natural conditions, the park will evaluate routes for any historic significance. Historic use of routes in Kahuku will help guide management decisions about future use of these roads and routes. The park could consider allowing smaller capacity shuttles in response to increased demand (e.g., 15–20 passengers) as a transportation strategy in Kahuku.

Trails and Trailheads

The park will emphasize the use of trails and trailheads for nonmotorized access through Lower Kahuku as opposed to formalizing any additional road access.

As part of the site plan, the park will develop a trail network in lower Kahuku that will accommodate different visitor abilities across a series of loop trails and trail connections in an effort to promote hiking, bicycling, and a pilot program for equestrian use. In designing the trail network, the park will take existing and historic trails and routes into consideration for long-term use and preservation and will prioritize re-establishing these traditional and historic travel routes before

any new trail construction. However, new trails could also be constructed in order to create trail connections, such as connecting Kahuku to the Mauna Loa summit, or to the historic Kahuku-‘Ainapō Trail, or creating linkages between historic trails across lava flows. Trail alignments and uses will also be analyzed for identifying appropriate locations of picnic tables and trail signs. Trail management in the Kahuku Unit will also be evaluated and assessed as part of the trail management plan for the entire park.

Campgrounds

Overnight camping in Kahuku will be allowed and supporting infrastructure will be developed. Development to support overnight camping in Kahuku will be focused on multiple small-scale designated campgrounds with a low level of infrastructure and minimal services, such as water and compost or vault toilets. Sites will be developed for both drive-in and walk-in campers, with some accessible campsites provided. Camping opportunities will be located close to trailheads and features of interest.

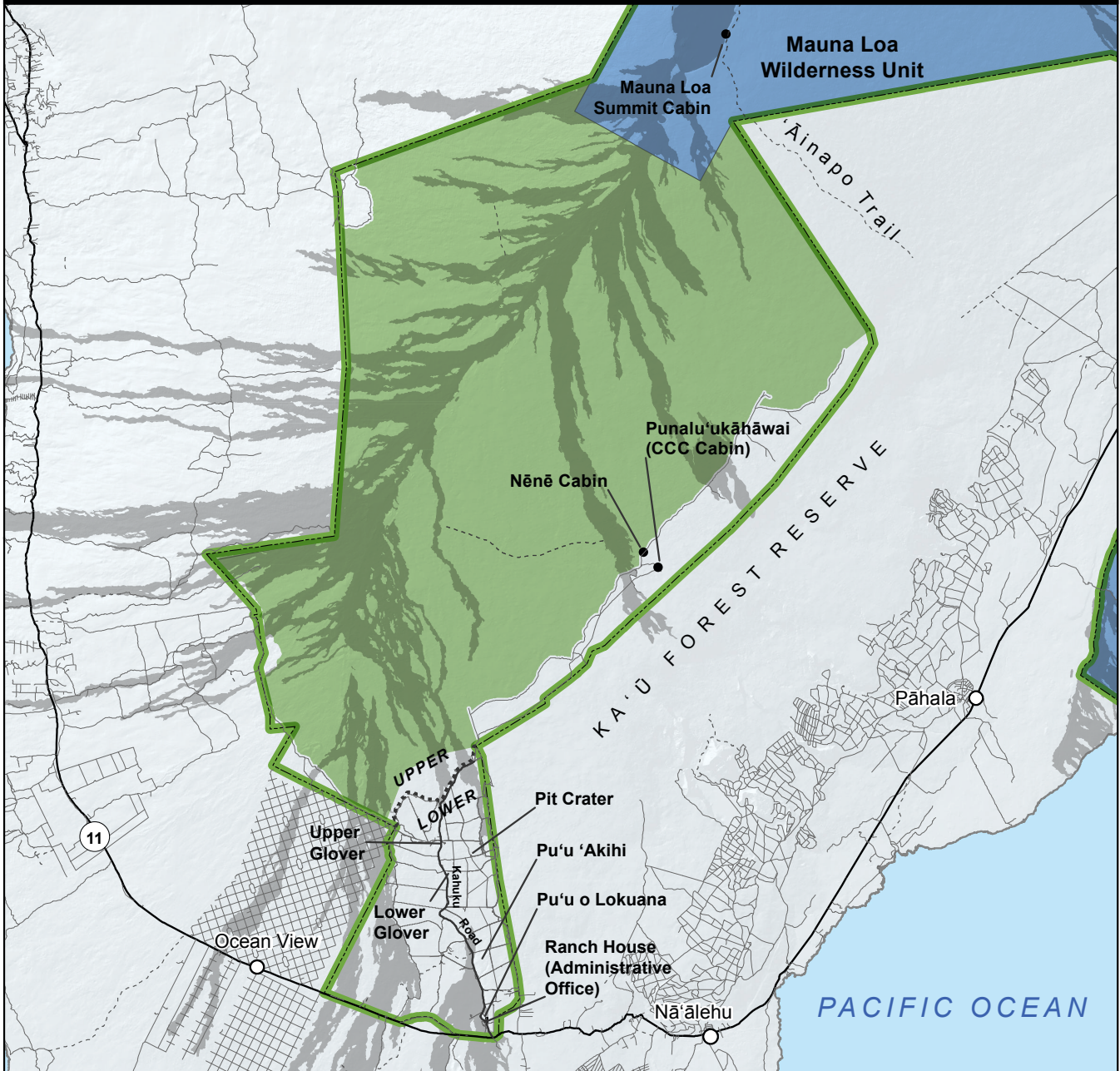
The park will also accommodate extended family or group camping by providing multiple tent sites in close proximity to one another in different locations. The park will ensure a separate group camping location for larger educational groups, such as school groups and volunteer groups, with a covered area for staging or programs. Some temporary and movable field camps could be established at designated sites for environmental study areas for staff, volunteers, or other science, research, and educational groups, but no permanent infrastructure will be associated with these sites.

Bicycling

Bicycling will be allowed on designated routes. Primary pasture roads will be assessed for their ability to serve as bicycle routes or trails. Some pasture roads could be maintained as multipurpose trails if they are wide enough and some of which could also be maintained for administrative vehicular road access. Unless new connector trails are necessary to manage the flow of bike traffic on these trails, no new bike trails will be developed on undisturbed ground.

Figure 6: Eligible Wilderness, Kahuku

Hawai'i Volcanoes National Park GMP/WS/EIS



Legend

- NPS Boundary
- Designated Wilderness
- Eligible Wilderness
- Cabins
- Roads
- Trails
- Recent Lava Flows

Kilometers
0 10

Miles
0 5

Produced by: PWR - Seattle Planning Office
 Date Created: July 2016
 Data Sources: USGS - Lava Flows, Roads, Coastline
 NPS - Park Boundary, Trails, Wilderness
 Fig. 4.2 KahukuEligibleWild_060914.mxd

Equestrian Use

The park will implement a small pilot program for equestrian use in lower Kahuku pastures. The goal of the pilot program is to explore allowing equestrian use in Kahuku while managing for resource concerns such as the spread of invasive nonnative species. Under the pilot program, vegetation monitoring will be required and limited equestrian use will be allowed by special permit and potentially through a commercial use authorization (CUA) for guided trips. Best management practices, such as weed-free protocols, will be implemented for resource protection, and use will be authorized only on designated trails or in designated sites. The number of equestrian-accessible trails will also be limited as a way to manage use and monitor impacts. Separating equestrian and bicycle trails will be considered in the site plan.

Implementation of this pilot program will require park staff to research, monitor, and mitigate potential impacts of concern, such as the spread of invasive plants. A baseline vegetation assessment and monitoring plan will be needed in advance of the pilot program. If impacts to resources are found to be acceptable and manageable, limited equestrian use could be allowed in lower Kahuku pastures in the long-term under similar conditions of the pilot program. Any future increases in equestrian use will need to be slowly phased in to monitor and mitigate impacts. The extent of future equestrian use will depend on the success of the pilot program.

UPPER KAHUKU

For the purposes of this GMP, upper Kahuku is defined as the acreage above a line that is 100 meters above the uppermost road in the paddock system. Upper Kahuku extends up the Southwest Rift Zone of Mauna Loa.

The park will manage upper Kahuku for its wilderness characteristics based on its determination of eligibility for inclusion in the national wilderness preservation system (see *Figure 6: Eligible Wilderness, Kahuku*). Management of upper Kahuku will emphasize restoring native ecosystems and recovering biological diversity of native species based on best available science. Recreational access in upper

Kahuku will be permitted and visitor opportunities such as hiking and camping will be managed consistent with a wilderness experience.

NPS vehicular access for administrative use and emergencies will be allowed on existing roads outside of eligible wilderness. These roads will be maintained to the minimum standard required to support administrative and emergency use.

RECREATIONAL ACTIVITIES AND VISITOR OPPORTUNITIES

Recreation in upper Kahuku will consist of all recreational activities associated with foot travel such as hiking, birdwatching, and overnight backcountry travel. No public vehicular, biking, or equestrian use will be permitted beyond the 1916 lava flows. The park will consider NPS-guided vehicular and/or biking cost-recovery interpretive and recreational experiences above the 1916 lava flows if practical and feasible.

The park will implement a permit system for public hiking and backcountry use for access beyond the 1916 lava flows. Facilities, such as a trailhead and primitive campground in the vicinity of the 1916 flows, will be developed, and water tanks and catchments will be provided, as appropriate.

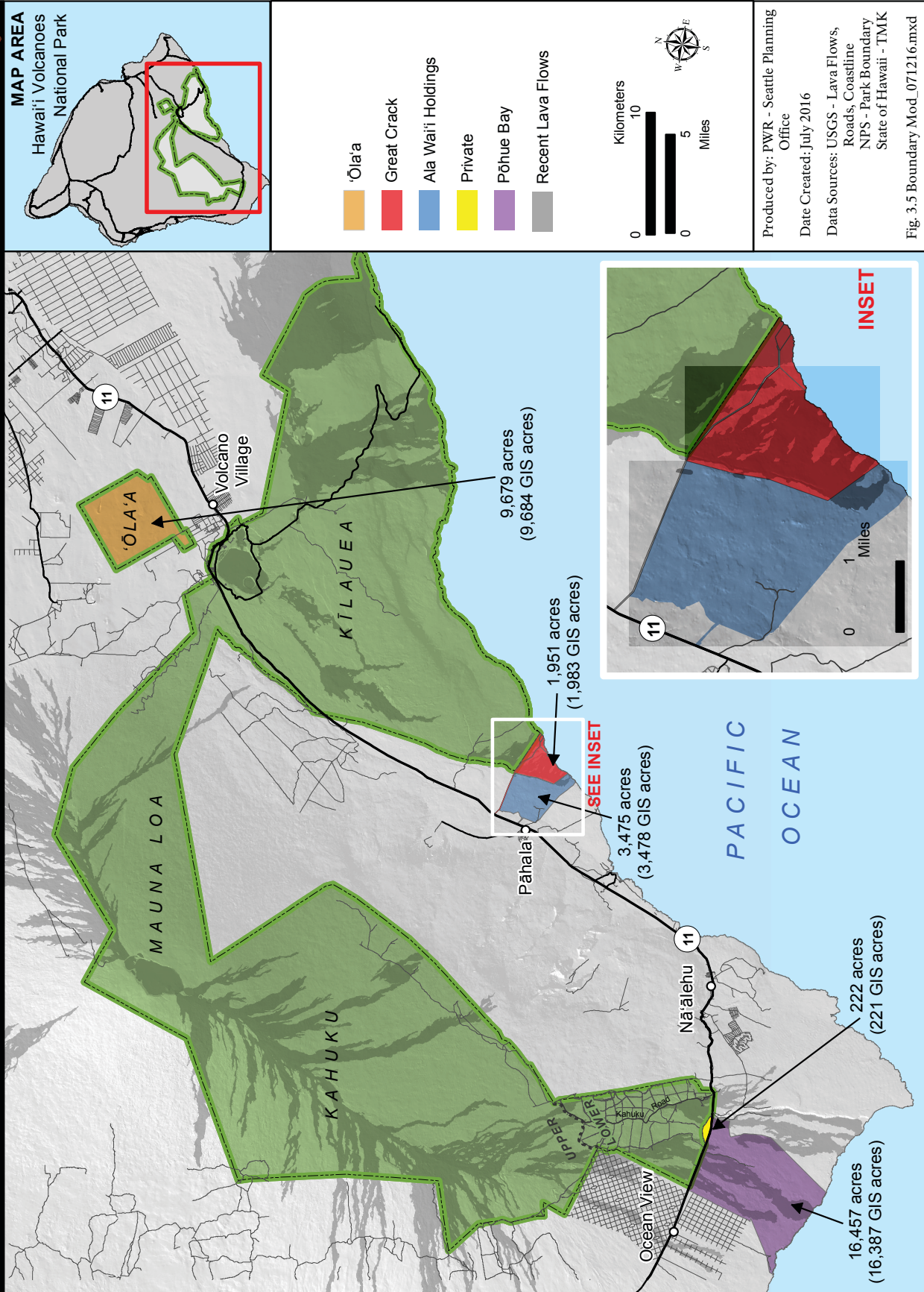
No commercial services or commercially guided recreation will be permitted in upper Kahuku.

NPS administrative vehicular access, such as use associated with protection of special status species, restoration, wildland fire suppression, and search and rescue will be allowed in upper Kahuku; however, the park will implement best management practices to minimize the spread of invasives, such as sanitizing procedures for NPS vehicles and sanitation protocols for boots and gear.

Trails and Trailheads

Trails in upper Kahuku will provide the primary recreational experience for visitors. Trail design will be consistent with the undeveloped character of the area, emphasizing minimal development, and could be as simple as routes designated by

Figure 7: Boundary Modifications
 Hawai'i Volcanoes National Park GMP/WS/EIS



cairns. The trail network, including any new routes, will emphasize connecting historic trails across lava flows.

Campgrounds

Dispersed backcountry camping will also be permitted, consistent with wilderness recreation. Backcountry camping will not necessarily require camping in designated sites but will require a backcountry use permit.

The park will consider developing a system of shelters with water catchments for backcountry and wilderness camping. These shelters could simply be a covered water tank for rain catchment, with the cover providing enough shelter as a windbreak for a tent. Any development in eligible or designated wilderness in upper Kahuku will need to be analyzed through the minimum requirements analysis as required by the Wilderness Act (1964) and NPS *Management Policies* (2006).

The park will also consider developing a small campground in the proximity of the existing cabins and out of nēnē habitat in nonwilderness for walk-in users. This campsite could also serve as a launching point for backcountry users. Rainwater catchment/shelter could also be provided.

BOUNDARY MODIFICATIONS

NPS policies require park managers to evaluate the adequacy of boundaries for protecting resources and providing visitor opportunities in general management plans. Appendix E of the draft GMP/WS/EIS includes an *Analysis of Boundary Modification and Land Protection* that reviews the criteria for boundary adjustments as applied to Hawai'i Volcanoes National Park. In accordance with this analysis, the GMP proposes several parcels for inclusion within the boundary of Hawai'i Volcanoes National Park, all of which meet the boundary adjustment criteria (see *Figure 7: Boundary Modifications*).

Hawai'i Volcanoes National Park will seek legislation to include 'Ōla'a within the official park boundary. 'Ōla'a is composed of two tracts of land totaling 9,654.67 (9,684.5) acres. Donated

to the NPS in 1952 via the Hawai'i Territorial Governor's Executive Order 1540, 'Ōla'a is geographically separated from the rest of the park by Volcano Village. Because language in the 1938 legislation for the park stated that Hawai'i Volcanoes National Park could acquire lands only if "adjacent and contiguous" to park boundaries, 'Ōla'a has never been formally designated as part of Hawai'i Volcanoes National Park, even though the unit is managed by park administrators for its valuable rainforest habitat and presence of endemic and/or rare and endangered species. This proposed legislation will adjust the boundary of Hawai'i Volcanoes National Park to include 'Ōla'a's two noncontiguous parcels (Parcels 319001006 and 319001007).

The GMP also recommends that the following parcels are added to the park boundary.

- The park will seek to acquire the Great Crack parcels (1,951 acres) and the Ala Wai'i parcel (3,478 acres), which is located west of the Great Crack. Both properties are in private ownership and contain excellent geology and important archeological sites. Acquisition of the Great Crack parcels was proposed in the park's 1975 *Master Plan*.
- The park will pursue acquisition of a parcel at Pōhue Bay that has been proposed to the county as a development called Kahuku Village. This privately owned parcel is 16,457 acres and extends from lower Kahuku on Highway 11 down to the coast. The local community, nonprofit organizations, elected officials, and the developers have approached the park to acquire it. The site is used by the endangered hawksbill turtle for nesting. The threatened green turtle and the endangered Hawaiian monk seal are both known to bask on the beaches during the day. The area also contains other endemic and endangered invertebrate, plant, and animal species. In addition, there are important archeological sites and coastal resources that are still used traditionally. Acquisition of this parcel will extend the park's portion of Kahuku from mauka to makai and give the park a wider range of options for recreation improvements in lower Kahuku.

No legislation will be needed for acquisition of these parcels contiguous to the boundary; however, acquisition by the NPS will be restricted to a willing seller purchase only. This means that the seller must be willing to sell and adequate funds must be available to support the purchase.

In addition, subsequent to the completion of the environmental impact statement for this GMP, the Nature Conservancy acquired a private parcel (222 acres) located along the southern edge of Kahuku (west of present entrance off Highway 11), which essentially connects the entire Kahuku parcel with Highway 11. This property was identified for acquisition in the draft and final environmental impact statement as it protects lower Kahuku from incompatible development.

Rather than proposing boundary adjustments to enhance protection of coastal and marine resources, the park will engage partners, such as the Department of Land and Natural Resources (DLNR) and the National Oceanic Atmospheric Administration (NOAA), to enhance protection of these resources. Park jurisdiction at the coast currently ends at the high water mark, so resources or activities that fall below that mark are outside of park jurisdiction and make protection of marine resources difficult. Increased emphasis on partnerships for coastal and marine resources could improve protection by engaging agencies with different authorities to work together in pursuit of common preservation goals. A number of tools and techniques will be available, including pursuing designation of the coastal area as a marine managed area or national marine sanctuary. Designation will ensure additional protection of these waters.

PROGRAM-SPECIFIC MANAGEMENT GUIDANCE

The following section presents an overview of the management strategies for program areas at Hawai'i Volcanoes National Park.

Although this plan separates resource protection into discrete categories of natural and cultural resources, park management recognizes that these resources are inextricably integrated, particularly within Native Hawaiian understanding. In Hawaiian culture, the land or 'āina is sacred. The

natural and cultural worlds are intricately bound together, and the spiritual world is not separate from the secular at Hawai'i Volcanoes National Park. For example, volcanic activity is a part of geological processes and history, but Kīlauea Volcano is also home to Pelehonuamea or Pele, the deity of the volcano, and her family. The literal meaning of Pelehonuamea is lava earth matter; hence, lava is a manifestation of the deity. Observed in the lava flows and other natural phenomena associated with volcanic activity, Pele and her family continue to be a presence in Native Hawaiians' lives both physically and spiritually. Management of Hawai'i Volcanoes National Park will continue to recognize and embrace the interconnectedness of natural and cultural resources into the future.

Natural Resources

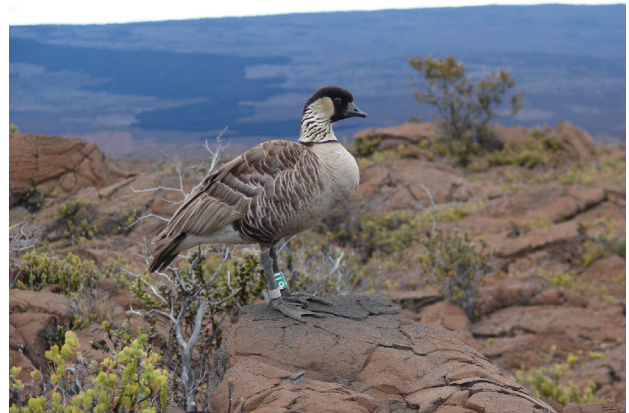
The park will continue to protect and provide access to the iconic places, volcanic processes, and experiences that the park is known for—volcanic features and active eruption sites, endemic species, evolutionary and ecological processes, traditional Hawaiian culture, and historic properties. Native species, communities, and ecological processes will be perpetuated and restored in as natural a condition as possible. The NPS will continue to rely on the best available science to guide management actions so as to minimize impacts to park resources and visitor experience and as required by policy and law.

Restoration activities will emphasize restoring native ecosystems, and the recovery of rare species (including endangered and threatened species) and biological diversity of native species. Specific activities include fencing and nonnative ungulate removal; control of other invasive nonnative plant and animal species; reintroducing, augmenting, and otherwise bolstering native species; and monitoring to assess both short- and long-term management impacts. Restoration activities will continue to be implemented consistent with the park's *Final Plan/ EIS for Protecting and Restoring Native Ecosystems by Managing Nonnative Ungulates* (2013). The park will also consider additional techniques for establishing native species and plant communities, such as mechanized tools or prescribed fire to stimulate native species recovery and remove invasive species in severely degraded areas, such

as those provided in the *Fire Management Plan* (2007)⁴ and the *Plan and Environmental Assessment for Facilitating Forest Recovery in Former Cattle Pastures, Kahuku Unit* (currently in progress).⁵ The park will continue to provide opportunities for communities, visitors, and school groups to volunteer on restoration projects in the park, notably at Kahuku. The park will also continue to coordinate activities with members of Three Mountain Alliance and other partners on research and restoration measures, including reintroduction activities.

In addition, the park will strive to increase current staffing levels to improve monitoring and control of nonnative plants and animals; reintroduction of historical species, protection and recovery of locally rare, threatened, and endangered species, fire restoration, fuels reduction; and supporting research that informs natural resources management activities (e.g., climate change studies, fire ecology, vegetation mapping, wildlife monitoring, etc.). The natural resources program will emphasize and expand research to identify new methods and optimize existing methods for habitat conservation, watershed protection, and restoration of native species, habitats, ecosystems, and habitat linkages, such as those provided in the *Fire Management Plan* (2007) and such as those being developed for the *Plan and Environmental Assessment for Facilitating Forest Recovery in Former Cattle Pastures, Kahuku Unit* (currently in progress).

Concepts of traditional Native Hawaiian land management, such as ahupua‘a management that recognizes the interconnectedness between mauka and makai ecosystems and the natural and cultural environments, will be integrated into natural resource management activities. The park will also seek to enhance restoration techniques and practices with Native Hawaiian traditional ecological knowledge.



[Top to bottom] **1.** Nēnē with Southwest Rift of Mauna Loa in background. Photo courtesy of USGS. **2.** Earth fissure during 2011 Kamoamoao eruption. Photo by Kelly Wooten, courtesy of USGS. **3.** Monitoring endangered plants with park partners and volunteers. NPS photo.

⁴ Hawai‘i Volcanoes National Park. 2007. *Fire Management Plan*. National Park Service, Hawai‘i Volcanoes National Park.

⁵ Hawai‘i Volcanoes National Park. [In progress]. *Plan and Environmental Assessment for Facilitating Forest Recovery in Former Cattle Pastures, Kahuku Unit*. National Park Service, Hawai‘i Volcanoes National Park.

The natural resources program will also seek to engage the visitor in the protection and restoration of native species and ecosystems by expanding opportunities to participate in restoration activities. Additional NPS-led volunteer stewardship and service-learning opportunities (defined as a strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen community ties to the park) will be offered to the public to foster long-lasting connections to the park and enhance resource protection and educational opportunities. Also, citizen science opportunities (defined as participation in a science-based approach to understanding the environment, such as collecting data) will be expanded for park visitors in focal areas.

The park will also work with interpretive and educational programs to showcase specific areas (such as special ecological areas) as living laboratories for experimental restoration and research. For example, programs might focus on the experimental restoration in the enclosures in the former cattle pastures at Kahuku and the enclosures on Mauna Loa, and strategically engage educational groups and service groups in restoration activities at Kahuku. Students and the general public will be provided opportunities to study and participate in restoration efforts in these areas as part of expanding service-learning and stewardship programs. Use of personal lighting (flashlights) will be limited when required for safe movement and work and/or modified (such as using red or blue light bulbs as opposed to white) to protect wildlife.

The park will continue to participate in existing partnerships for landscape-level restoration and conservation. Partnering opportunities include coordinating activities with members of the Three Mountain Alliance and other partners on research and restoration measures including reintroduction activities, such as for the Hawaiian crow ('alalā). The park will continue to engage partners such as DLNR and NOAA for coastal and marine resource protection along the park boundary. The park will seek additional collaborations with appropriate agencies and surrounding communities to enhance protection of coastal and marine resources in

addition to land resources. Shoreline resources that the park manages above the high water mark will be perpetuated and restored in as natural a condition as possible, while acknowledging that some ethnographic use of nonsensitive shoreline resources may be allowed.

Cultural Resources

The park will continue to provide cultural resource protection for cultural landscapes, historic buildings and structures, archeological and ethnographic resources, and museum collections for park-related projects as required by law. Documentation, research, and stewardship of cultural resources, including natural and cultural history collections, will be strengthened. The park will strive to expand towards a full complement of preservation specialists on staff. The park will seek to enhance cultural resource preservation techniques and practices with Native Hawaiian traditional ecological knowledge. The park will also strive to expand understanding of cultural resources within the context of the Native Hawaiian world view. Concepts of traditional Native Hawaiian land management, such as ahupua'a management, will be integrated into cultural resource management activities and emphasize the interconnectedness of the cultural and natural environments. Traditional cultural practices will be facilitated as allowed by NPS policy and regulations. Park management actions will continue to recognize the sacredness of the park to Native Hawaiians, notably Kilauea and Mauna Loa volcanoes, important to the Native Hawaiian sense of identity, unity, and continuance.

The cultural resource program will seek to strengthen the archeology program in the park by building and expanding the permanent staff of archeologists, which will allow the park to better meet the needs of all the park's compliance projects. The larger staff will seek to expand the ongoing documentation and inventory of park resources and will seek formal determinations of eligibility and National Register nominations. Staff specialists will be hired to facilitate compliance with the National Historic Preservation Act and the NPS guidelines for the park's cultural resource management program.

A suite of preservation plans that will provide guidelines for interpreting and preserving cultural landscapes and historic structures will be developed and implemented. Natural and cultural museum collections will be researched and exhibited at a greater number of available and appropriate opportunities. The park will work toward permanent facilities to house and showcase locally and nationally significant collections as staff expand the preservation of park history through the care of objects and archives, and provide researchers access to those materials.

The park will seek to stabilize and maintain some significant ranching and World War II-era landscapes and their contributing elements, and work in a collaborative manner with the natural resources division to carry out the vision of an integrated restoration plan for Kahuku that will provide for protection of Kahuku's rich and diverse histories. The park will also continue to inventory Kahuku's resources and complete the National Register of Historic Places

Determination of Eligibility, when appropriate. Some historically significant landscapes or contributing elements of landscapes in Kahuku will be identified and maintained for interpretation and education, highlighting different periods of occupation, such as early Hawaiian use, World War II, and ranching (if historic research shows ranching to be a significant theme).

Research

The park will continue park research efforts and collaboration with partners and will continue to support independent research under the NPS permitting system, consistent with NPS *Management Policies* (2006). Particular emphasis will be placed on research related to volcanology and geologic processes, ecology and evolutionary processes, biology of rare plant and animal species, invasive species and their impacts, weather and climate change, air quality, archeology, history, and traditional cultural properties.



Keiki o Halau o Kekuhi, hula performance. Photo by Jay Robinson.



[Top to bottom] 1. Learning about kapa bark cloth. 2. Halapē Iki. 3. Sail image at Pu'uloa Petroglyphs. All NPS photos.

The park will also strengthen the emphasis on disseminating research related to ecology, endemics, climate change, archeology, history, and traditional cultural properties to park visitors in a lay-person format.

Wilderness

Hawai'i Volcanoes National Park will continue to manage designated wilderness consistent with NPS *Management Policies* (2006) and the Wilderness Act and will develop a wilderness stewardship plan to guide wilderness use in the park after completion of this GMP. Wilderness stewardship will emphasize preserving the qualities of wilderness character including undeveloped, untrammeled, natural, solitude, and primitive and unconfined recreation. Activities and uses that will continue to occur in wilderness under minimum requirements analysis based on previous environmental compliance include: (1) fences to protect native ecosystems from nonnative ungulates, (2) research instrumentation and telecommunication essential to continued volcanic and seismic studies and warnings, (3) the use of helicopters as a minimum tool in servicing research instrumentation and in the protecting and restoring of natural and cultural resources, and (4) water catchment shelters in remote waterless backcountry.

The Hawai'i Volcanoes National Park Wilderness Study recommends wilderness designation for 121,015 acres (GIS) of the Kahuku Unit that met eligibility criteria and requirements necessary to qualify for the National Wilderness Preservation System (see *Figure 6: Eligible Wilderness, Kahuku*). Consistent with NPS policy, the park will continue to manage these proposed eligible lands for their wilderness qualities prior to formal designation.

Approximately 13,795 acres (GIS) in upper Kahuku are not recommended for wilderness designation at this time, due to incompatible uses in the area, particularly the presence of four-wheel-drive roads and the needed access along these roads for NPS management efforts to protect and restore natural conditions including the native plant and animal communities, ecological processes, and threatened and endangered species. If and when recovery and

restoration are completed and successful in upper Kahuku, the NPS will consider conducting another eligibility and suitability study for these remaining 13,795 acres (GIS) in the upper Kahuku area.

The remaining 16,055 acres (GIS) in Kahuku (located in the lower pastures) are not eligible for wilderness designation due to the changes wrought by past cattle ranching activities and the presence of past developments including extensive cattle paddocks of exotic grasses, roads, corrals, water pipelines, a small runway, two water reservoirs, and a series of small ranch buildings. In addition, visitor services for Kahuku will be developed in this area, including campgrounds, picnic areas, interpretive exhibits, and a visitor contact station.

Soundscapes and the Acoustic Environment

The NPS will continue to use a variety of methods to reduce human-caused noise and improve natural sounds.

Aircraft use will continue to be allowed for administrative purposes throughout the park, and minimum requirements analysis will be used when appropriate, as outlined in the *Mission Critical Administrative Aviation Plan/ Environmental Assessment* (2015).⁶ The Federal Aviation Administration (FAA), NPS, and the Volpe National Transportation Systems Center will work together to develop the *Hawai'i Volcanoes National Park Air Tour Management Plan/ Environmental Impact Statement* (ATMP/EIS),⁷ whose objective, as outlined under the National Parks Air Tour Management Act of 2000, “shall be to develop acceptable and effective measures to mitigate or prevent the significant adverse impacts, if any, of commercial air tour operations upon the natural and cultural resources, visitor experiences, and tribal lands.” The NPS, as a

cooperator with the FAA, will complete an ATMP/EIS that will develop measures to limit or prevent any significant impacts that may be caused by commercial air tour operations upon the natural and cultural resources or visitor experiences at the park. This plan will be consistent with the guiding principle of reducing noise/human sound in sensitive areas.

To improve soundscapes and the acoustic environment, the park will expand active management practices to include: (1) implementing best management practices to limit the duration of artificial noise, (2) maximize human-caused noise free periods, (3) create more opportunities for visitors to experience natural soundscapes, and (4) implement partial closures of air space in sensitive areas. In addition, park operations and projects will be implemented using best management practices to minimize noise impacts.

The park will strive to improve soundscapes and the acoustic environment by reducing artificial noise within wilderness; in and near critical habitat for threatened and endangered species; in traditional cultural areas such as volcano summits, active lava, or active volcanic features; and in high visitor use areas. The park will also provide commercial air tour operators with information and training on wilderness boundaries and the location of these sensitive areas and provide guidance on best management practices to improve understanding of the importance of these resources and encourage greater protection.

The GMP also recommends the implementation of a soundscape monitoring program and will consider developing a soundscape management plan, if additional guidance is needed.

Visitor Experience

Visitors will continue to experience the park's world treasures, iconic landscapes, and other significant highlights. The park will strive to provide high-quality visitor experiences, and visitors will continue to be offered a menu of options depending on length of stay, interests, and capabilities. Existing recreation opportunities such as camping, picnicking, hiking, biking,

⁶ Hawai'i Volcanoes National Park. 2015. *Mission Critical Administrative Aviation Plan and Environmental Assessment*. National Park Service, Hawai'i Volcanoes National Park.

⁷ Hawai'i Volcanoes National Park. [In progress]. *Air Tour Management Plan and Environmental Impact Statement*. Federal Aviation Administration and National Park Service.



Halema'uma'u from Jaggar Museum Overlook on a foggy evening. NPS photo by Mark Wasser.

equestrian use, and viewing lava, scenery, and wildlife will continue, as well as a variety of interpretive and educational programs, events, and guest speakers to engage park visitors and diverse audiences.

Hawai'i Volcanoes National Park will continue to provide visitors with safe access to volcanic features, active lava, cultural resources, and ecosystems from mauka to makai. The park will offer unique opportunities that provide visitors with an appreciation for the ways in which kama'āina (local people of the land) view, understand, and connect with park landscapes and resources today.

The park will deliberately manage different geographic areas of the park for different types of visitor experiences and levels of visitor services. The summit of Kīlauea will continue to be managed for the greatest concentration of park visitors and offer the most readily accessible services and amenities, such as visitor centers, restrooms, interpretive programming, etc. Along Chain of Craters Road and Mauna Loa Road, the park will maintain the driving and sightseeing

experience by preserving the character of these park roads. The park will also strive to provide visitors with improved opportunities along these road corridors to experience and connect with park resources and values, including new opportunities at places like the 1974 flows.

The park will continue to maintain the existing park entrance off Highway 11 for both public and administrative use. A second entrance off Highway 11 near the intersection of Mauna Loa Road will continue to be used for administrative use and to address safety and emergency concerns.

The end of Chain of Craters Road will continue to be a destination for park visitors, offering a coastal experience and opportunities to experience recent lava flows. As the primary location to see the ocean in the park, this area will continue to be more congested than other locations along the road, however, replacement visitor contact facilities will improve the overall experience.

Infrastructure and development in Kahuku will be minimal, will be gradually phased in over time, and remain rustic in design to allow for a primitive

visitor experience. Visitor access and recreation opportunities will be expanded from what is currently offered.

New visitor opportunities at ‘Ōla‘a will expand rainforest experiences in the park. ‘Āinahou Ranch will be managed primarily as a core nēnē recovery area; however, guided access will be allowed for groups participating in habitat restoration or historic preservation and maintenance activities.

The park will also set the expectation for visitors that eruptive events will likely be linked with congested areas in the park. Experience and research at Hawai‘i Volcanoes National Park has shown that the public has tolerance for greater levels of congestion during these events.

The park will also develop an accessibility plan to identify and evaluate opportunities throughout the park to improve accessibility, including improvements to park facilities, such as campgrounds, trails, and overlooks, as feasible.

RANGE OF RECREATIONAL ACTIVITIES

The park will continue to allow for a range of recreational activities such as viewing lava and evidence of volcanic activity, camping, hiking, backpacking, biking, equestrian use, birding and wildlife viewing, picnicking, general sightseeing, and stargazing. Additional opportunities for existing activities could be provided in different geographic areas of the park. The park will focus on ranger-guided tours for access to new and particularly sensitive areas in the park. Expanded recreational activities will be authorized in Kahuku beyond current use.

TRAILS: HIKING, BIKING, AND EQUESTRIAN

A trail management plan will be created to comprehensively assess trail conditions and needs and to identify specific trail alignments and uses, such as hiking, biking, and equestrian use. Development of any new trail alignments will be primarily along historic alignments and traditional routes, or on existing roads, such as at Kahuku. The park will strive to provide access to a variety of locations for different audiences and types of recreationists. The park will also strive to create loop trail experiences through new links between existing trails.

Rather than construct extensive new trails, the park will evaluate ways to use the existing road network for improved nonvehicular recreation opportunities. For example, in some areas of the park, such as Hilina Pali or Mauna Loa, roads could be closed to private day-use vehicles during certain times of day or days of the week to provide a more enjoyable and less congested experience for recreationists such as hikers, backpackers, bikers, and equestrian users.

Establishment of the Ala Kahakai National Historic Trail in November 2000 included approximately 27 miles of trail segments along the coast in Hawai‘i Volcanoes National Park. The park will continue to work with Ala Kahakai National Historic Trail staff to sign and interpret those trail segments through the park.

FRONTCOUNTRY CAMPING

Nāmakanipaio Campground and Kulanaokuaiki Campground will continue to serve as formal frontcountry campgrounds in the park with drive-in camping opportunities. Nāmakanipaio Campground will continue to be run as a concession operation. The expansion of Nāmakanipaio campground to include additional indoor lodging facilities may be considered.

Kulanaokuaiki Campground was constructed in 1999 to replace the Kīpuka Nēnē Campground, which had to be closed due to conflicts with the endangered nēnē. Kulanaokuaiki Campground will remain a frontcountry campground with fewer than 10 sites and a vault toilet, i.e., no water.

Any additional camping considered in the future will be more primitive and dispersed than current facilities and will most likely be in Kahuku due to the lack of current facilities in this unit. Any future frontcountry camp development will also be considered in relationship to outdoor education pavilions that have been sited based on ecological themes and will be targeted to educational groups, but could also expand capacity for general public camping.

BACKCOUNTRY CAMPING

The park will maintain existing backcountry camping and will explore, with additional planning, formally designating backcountry

campsites, primarily along the coast outside the tsunami evacuation zone and at Mauna Loa, but potentially in a range of environments. Additional backcountry camping opportunities will also be available in Kahuku. Any new campsites will require further planning.

Some backcountry sites could contain water catchments/shelters, and any decisions about designating campsites in wilderness will be consistent with the minimum requirements analysis.

INTERPRETATION AND EDUCATION

The park will continue to promote environmental education, ranger-led programs and tours, and a variety of curriculum-based activities.

The park will develop a long-range interpretive plan. This plan will be parkwide, with an interpretive media plan and long-term direction for the park's front-line interpretive programs and the park's education program. Some of the park themes that require additional, updated guidance in this plan include Kahuku; the park's special ecological areas as places to experience the park's most intact native ecosystems, learning about the special plants and animals, and efforts to protect and restore them in these areas; and impacts from climate change to park resources.

PROGRAMS

The park will continue to provide the current range of interpretive programs, media, and techniques and will develop a long-range interpretive plan that will expand interpretive opportunities to introduce visitors to all of the park's interpretive themes through the use of interpretive standards and methods. Kahuku will also be integrated into the park's long-range interpretive plan, and key stories such as the Southwest Rift of Mauna Loa and the five recent eruptions, the story of refugia and restoration, ranching and the paniolo lifestyle, Pu'u Akihi—a Special Ecological Area, how land affects people and people affect the land, Kahuku in the context of climate change, and the ahupua'a management (Native Hawaiian land management) system will be featured in this unit.

Interpretation methods, while diverse in nature, will focus on ranger-led experiences and live programs to immerse visitors in the volcanic, biologic, and cultural resources at Hawai'i Volcanoes National Park. These live programs will also provide additional opportunities to learn from Native Hawaiians and/or other cultural practitioners. Self-guided interpretation opportunities such as waysides and interpretive trails will also be provided, particularly in lower Kahuku.

New, additional interpretive programs will also focus on providing hands-on educational experiences for school, volunteer, and other organized groups in the frontcountry. Stewardship and hands-on activities will be a key element in these programs engaging visitors in research, learning, science, restoration, and educational programs and facilities. In addition, park staff will engage visitors in research and citizen science.

Interpretive programming will also utilize new media and tools to provide inquiry-based learning through frontcountry self-guided interpretive and educational opportunities in order to meet the diverse needs of an increasingly international audience.

INTERPRETATION AND EDUCATIONAL FACILITIES

The park will expand the uses of Jaggar Museum and Kilauea Visitor Center as dramatic opportunities to introduce visitors to the volcanic, biologic, and cultural resources at Hawai'i Volcanoes National Park. Kahuku will also serve as an important location for visitor orientation.

The park will emphasize minimal development of new facilities. When needed, structures will be small, low-impact, potentially designed to be consistent with traditional Hawaiian design (such as thatched hale), and will provide flexibility during periods of eruptive activity.

The park will provide opportunities for outdoor education and inquiry-based learning that stretches from mauka to makai with a series of small, covered pavilions at key locations.

The park will also seek to engage visitors in resource management activities through developing combined interpretive and resource management features such as a mala (native and canoe plant garden), rare plant orchards, or a greenhouse, which will serve to interpret indigenous plants, provide plant material for stewardship restoration activities, and demonstrate the park's role in protecting endemic plant species.

Commercial Services

A commercial services strategy was produced as part of the draft GMP and includes criteria for evaluating new commercial services, consistent with existing concession law and polices (including PL 105-391; see Appendix F of the draft GMP/WS/EIS). This strategy provides broad guidance for future decisions involving commercial services but does not apply retroactively to previously made decisions. The commercial services strategy does not affect the terms of ongoing contracts or authorizations previously signed or issued prior to the completion of the GMP.

The park will continue to allow the range of commercial services that presently exist at Hawai'i Volcanoes National Park. Commercial services will continue to operate in the existing developed area around Crater Rim Drive and will extend to the end of Chain of Craters Road when necessary, such as to provide access to eruptive events in that area. Commercial use will continue at current levels along Hilina Pali and Mauna Loa Roads. Commercial services will also be allowed in lower Kahuku, similar to access granted to the general public, but will be restricted from upper Kahuku, including all areas eligible for wilderness designation. Any proposed significant increases in use due to eruptive events, or even due to increased ecotourism or other types of tours not related to an eruptive event, will need to be evaluated due to safety concerns, natural and cultural resource concerns, and limited infrastructure in these areas. Any necessary environmental and/or cultural compliance will also be completed.

In managing commercial services, the park will continue to balance access to resources for commercial service providers and clients with access granted to the general public, ensuring that the public is not displaced from high use areas in the park. The park will also engage commercial service providers in managing visitor use and providing valuable information to the public, including general park visitor information, safety updates, and interpretation of the park's fundamental resources and values. Management strategies could include: infrastructure changes to accommodate commercial uses (such as additional parking, staging areas, and limiting tour buses to one-way traffic on Crater Rim Drive when fully opened), limits on numbers or size/capacity or times/dates of commercial activities, interpretive training for all commercial service employees, and ongoing communication with commercial service providers about changes in park conditions, etc.

Administrative Facilities and Infrastructure

The park will continue to maintain and upgrade, when necessary, administrative infrastructure in the park such as offices, storage, and utilities and will improve provisions for accessibility. Administrative functions may be relocated from Kīlauea Visitor Center to other buildings within the park so that interpretive and visitor use functions could be consolidated at the visitor center.

At Kahuku, the park will continue to maintain and upgrade when necessary, existing infrastructure in lower Kahuku and continue to use existing buildings for office space and storage. The park will also adaptively reuse the existing developed area in lower Kahuku for a mix of visitor services and administrative and operational use as needed. Any new development in Kahuku will primarily occur in the existing developed footprint.

Transportation and Access

All park roads are eligible for inclusion in the National Register and will be maintained to provide for a safe driving experience, consistent with the park setting to ensure a park-like and scenic driving experience. Historic road

alignments and built features that define the period of significance of the roads will be maintained to the extent possible. A range of roads and road standards will continue, and the park will continue to work cooperatively with the state and other partners, particularly on Highway 11, in order to provide for visitor safety, signage, and information.

No construction of new roads and no major new parking areas will be anticipated, though the park will continue to maintain parking areas and turnouts with upgrades as needed. Existing parking areas could be expanded or new smaller parking areas could be developed to facilitate visitor access in keeping with the existing road history and character-defining features. Some parking areas could also be reduced or removed out of concern for park resources.

The park will strive to maintain and improve visitor access for both vehicles and bicycles. This improved access could involve exploring the use of utility corridors or other existing unpaved areas in the park, especially for bicycles.

The first focus for managing congestion and reducing private vehicle use will be guided by information management, such as educating visitors about when to visit locations that may be crowded, and park policies to control cars and congestion. Intelligent transportation systems (ITS) will be another tool or element of this strategy. New restrictions or management of vehicles on some roads will be implemented, such as implementing size limits (no vehicles greater than 98 inches in width or over 38 feet in length) and testing one-way traffic for large commercial buses within a pilot program on part of Crater Rim Drive if it reopens.

Some road connections previously lost to lava could be restored and the park will strive to reopen roads impacted by lava, seismic activity, eruptive events, or other acts of nature when feasible.

Continuation of a shuttle (nonmandatory) will be evaluated after completion of the pilot project.

Partnerships

The park will continue to maintain existing partnerships with agencies and organizations that are key to the park's mission and other entities that provide visitor services and support park operations.

The park will also foster and expand partnerships with local and regional communities, organizations, nonprofits, and businesses; Native Hawaiian communities (including families and Native Hawaiian organizations); adjacent landowners; local, state, and federal agencies; and other interested groups or organizations in efforts to support the purpose and significance of Hawai'i Volcanoes National Park.

The park will continue to collaborate with and engage partners in monitoring and protecting terrestrial, coastal and marine resources, as well as maintain formal and informal partnerships in support of broader landscape protection.

As a way to involve local participation, the park will promote community and school involvement in traditional practices and environmental service projects.

Climate Change and Sustainability

As a leader in how parks and land managers are responding to threats from climate change, the park will continue to implement the climate action plan for Hawai'i Volcanoes National Park and participate in the Climate Friendly Parks program. The park will strive for increased energy efficiency, conservation, and sustainability in development of facilities and will give priority to green facility design for any new construction, retrofitting, and upgrading of facilities to the greatest extent possible. Increased reliance will be placed by the park on temporary and movable facilities to improve flexibility for both visitors and operations during periods of eruptive activity.

Contractors and concessioners will be encouraged to reduce their own greenhouse gas emissions, particularly during their operations in the park, by using sustainable practices, purchasing local products, and using vehicles with alternative fuels.

The park will also promote activities to get visitors out of cars, such as hiking, biking, and equestrian use, and employees will be encouraged to bicycle to decrease the park's carbon footprint.

The park will serve as a model for climate change adaptation by supporting climate change-related research, adapting management activities based on climate projections, and building resilience among populations of rare native species, communities, and ecosystems. Examples include long-term weather monitoring of park ecosystems, establishing wildlife corridors through restoration of forest fragments, and expanding populations of rare species throughout their former range.

Operations

ESTIMATED COSTS

Cost estimates are identified in *Table 2: Summary of Costs*. Costs shown are not intended for budgeting purposes; instead they are used to show a general estimation of costs. Implementation of the approved plan will depend on future funding, and approval of a general management plan does not guarantee that the funding and staffing needed to implement the plan will be forthcoming. Full implementation of the plan may take many years. The NPS will also evaluate proposed facility investments prior to project approvals using the best scientific information available related to climate change and other possible scenarios to ensure the long-term sustainability of these investments. Due to potential vulnerabilities of some of the park's facilities, it is feasible that the NPS may conclude that such financial investments for facilities will be unwise and that other options will be considered, or potentially the project will not be pursued or implemented.

These costs are in 2012 dollars and are based upon general "Class C" estimates for site development and construction and are referred to as conceptual estimates by the design and construction industry. They are general in nature and representative of a broad-based vision rather than focused on specific details. Prior to submitting funding requests for the design and construction phases, "Class B" estimates are required, based upon

detailed site and facility designs. "Class A" estimates will be prepared from completed construction documents.

ONE-TIME COSTS

One-time costs emphasize the rehabilitation of facilities and infrastructure and address critical resource management concerns. Almost half the one-time costs involve projects in the Kahuku Unit, which is the newest addition to the park. At Kahuku, the majority of costs will be to rehabilitate the main road from the entrance to Upper Glover for two-wheel-drive access and to invest in the construction and maintenance of ungulate-proof fences that help control invasives and assist the natural recovery of native species. Additional new construction costs at Kahuku include campsites and associated infrastructure, an educational pavilion, wayside exhibits, and a small amphitheater associated with the visitor contact station.

Overall, a large portion of the costs in the main part of the park will be to renovate the 'Ōhi'a Wing, a historic structure, as a cultural museum/administrative offices. Additional facility rehabilitation costs include those necessary to accommodate the steady stream of visitors at the park's main visitor facilities, such as Kīlauea Visitor Center, Jaggar Museum, and the 'Ōhi'a Wing.

Resource management costs will be primarily for fencing for nonnative animal control. Invasive species are the overriding threat to natural resources in the park, degrading and simplifying native ecosystems and eroding biological diversity. The park's main strategy to control invasives and monitor the natural recovery of native species is through constructing and maintaining ungulate-proof fences. In addition to Kahuku, the park will invest in fencing to exclude ungulates from the wilderness area at 'Ōla'a.

Costs for new construction focus on installation of educational pavilions, waysides, and new trail segments or linkages in the main portion of the park. Transportation costs focus on continuing and expanding the shuttle system around the rim and evaluating the feasibility of a shuttle system at Kahuku.

Projects are identified as either Priority 1 or Priority 2. Priority 1 projects include projects that emphasize resource protection, threats, and visitor safety. Priority 2 projects, which are less urgent, include all other projects important to the full implementation of the GMP, including those that address visitor opportunities and experiences such as enhanced facilities, as funding allows and could be sustained. For the Priority 1 projects, the renovation of the 'Ōhi'a Wing is expected to take many years, so it may be completed after implementation of other Priority 1 projects. At Kahuku, the most pressing Priority 1 projects will be construction and rehabilitation of fencing for animal control. Though still a Priority 1 project, the rehabilitation of the main road at Kahuku from the entrance to Upper Glover for two-wheel-drive access may be phased after fencing projects are completed. The least important Priority 2 project will be the evaluation of the development of a shuttle system for visitor access at Kahuku.

Deferred maintenance, also presented in *Table 2: Summary of Costs*, is maintenance and repair activities that were not performed when they should have been or were scheduled to be and which, therefore, were put off or delayed for a future period. Maintenance and repairs are activities directed toward keeping fixed assets in an acceptable condition. Many of the proposals in the GMP address deferred maintenance issues; therefore, deferred maintenance costs will "offset" the total one-time costs. A fully staffed maintenance division will also assist the park in addressing the amount of deferred maintenance.

STAFFING

Implementation of the GMP will require additional staffing for increased natural resources protection and restoration efforts, additional cultural resources program needs, new interpretive and educational programs, and additional maintenance, law enforcement, and administrative needs.

Proposed staffing requires 47 new FTE employees (one "FTE," or full-time equivalent employee, is one person working 40 hours per week for one year, or the equivalent): 11.5 FTE for additional natural and cultural resources management and restoration activities, eight positions for

interpretation and education to address additional and new interpretation throughout the park, 12 positions for facilities and maintenance, five additional positions for visitor protection, nine positions for Kahuku operations seven days a week, and 1.5 new administrative and management positions (see *Table 3: Staffing*).

The staffing table does not include seasonal staffing, which will vary depending on specific projects needs and funding allocations.

ANNUAL OPERATING COSTS

Annual operating costs are the total costs per year for maintenance and operations, including utilities, supplies, staff salaries and benefits, leasing, and other materials. Costs and staffing estimates assume that the GMP is fully implemented as described in the narrative. The park's annual operating budget for fiscal year 2014 was \$7,281,000. Full implementation of this plan includes filling vacant positions and filling an additional 47 FTE (\$3,079,000). Additional operations and maintenance costs related to capital investments will be \$379,000. Total operating costs will be \$10,739,000. FTE salaries and benefits are included in the annual operating costs.

TABLE 2: SUMMARY OF COSTS

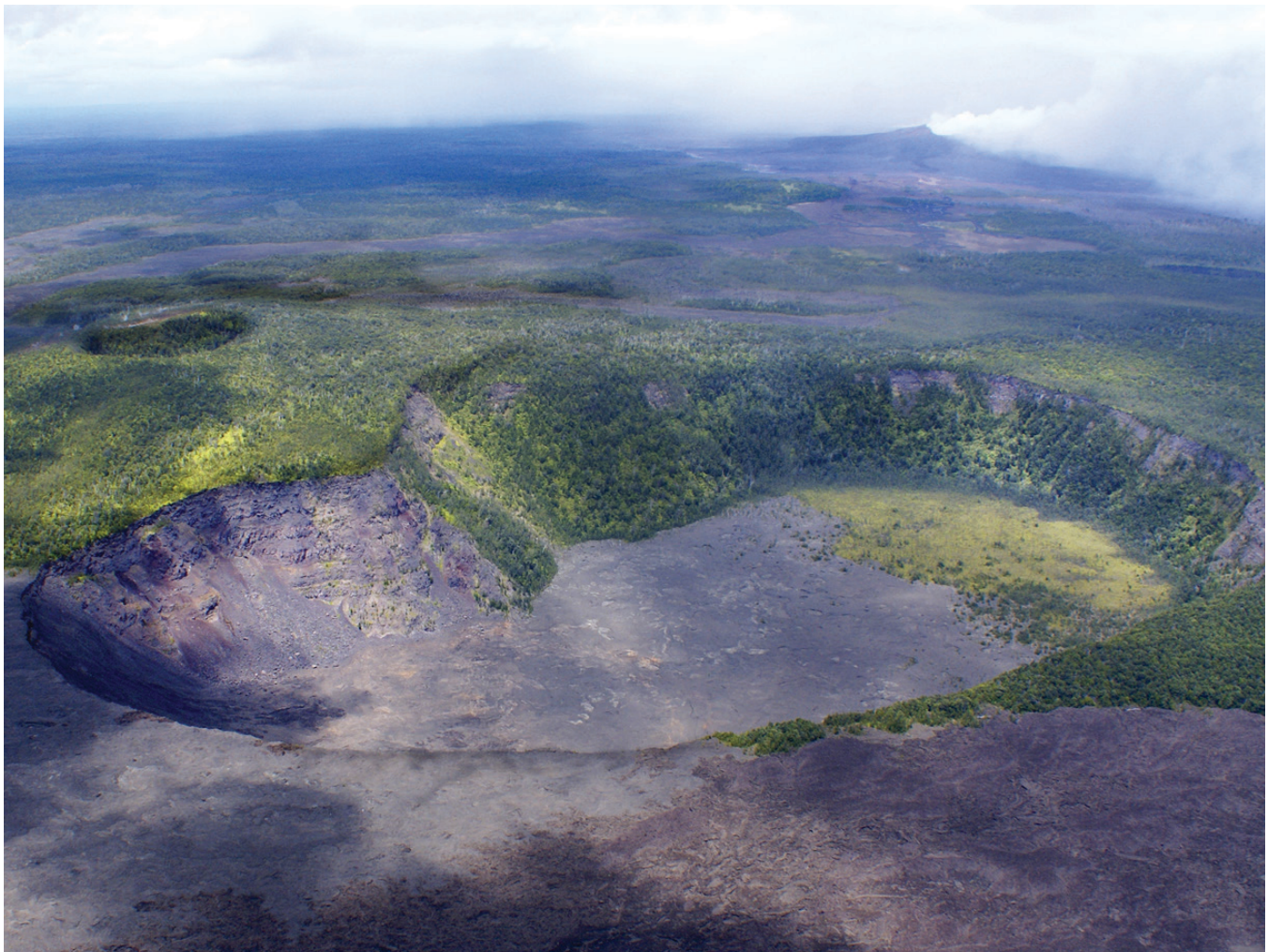
| Description of Costs | Estimated Summary of Costs |
|--|---|
| ANNUAL OPERATIONAL COSTS | |
| Existing Annual Operational Costs | \$7,281,000 |
| Additional Staffing Costs (+47 FTE)* | \$3,079,000 |
| Additional Operations & Maintenance Costs Related to Capital Investments | \$379,000 |
| Total Annual Operational Costs | \$10,739,000 |
| ONE-TIME CAPITAL COSTS | |
| Program Support | |
| Priority 1 Projects** | \$1,158,000 |
| Priority 2 Projects | \$0 |
| Facility Rehabilitation | |
| Priority 1 Projects | \$13,281,000 |
| Priority 2 Projects | \$1,312,000 |
| Natural Resource Management | |
| Priority 1 Projects | \$6,763,000 |
| Priority 2 Projects | \$0 |
| Cultural Resource Management | |
| Priority 1 Projects | \$10,494,000 |
| Priority 2 Projects | \$70,000 |
| New Construction | |
| Priority 1 Projects | \$1,006,000 |
| Priority 2 Projects | \$3,684,000 |
| Transportation | |
| Priority 1 Projects | \$150,000 |
| Priority 2 Projects | \$150,000 |
| Total Priority 1 Projects | \$32,852,000 (Kahuku costs are \$14,029,000 of this total) |
| Total Priority 2 Projects | \$5,216,000 (Kahuku costs are \$2,452,000 of this total) |
| Total One-time Costs | \$38,068,000 (Kahuku costs are \$16,481,000 of this total) |
| Deferred Maintenance Offset | \$22,841,000 |

* The current staffing level is below the authorized level of 143 FTE; the additional staffing level would add 47 FTE to the authorized level of 143. The new staffing level would be 190 FTE.

** Priority 1 projects include projects that emphasize resource protection, threats, and visitor safety. Priority 2 projects include all other projects important to the full implementation of the alternative, including those that address visitor opportunities and experiences such as enhanced facilities as funding allows and could be sustained. Costs are in 2012 dollars.

TABLE 3: STAFFING

| Park Management Division | Full-Time Equivalent (FTE) |
|---|-----------------------------------|
| Administrative and Management (includes Kahuku staff) | 27 + 10.5 new |
| Natural and Cultural Resources Management | 29 + 11.5 new |
| Interpretation and Education | 12 + 8 new |
| Facilities and Maintenance | 28 + 12 new |
| Visitor Protection/Fire | 26 + 5 new |
| Vacant Positions | 21 |
| Total New Positions | 47 |
| Total Positions | 190 FTE |
| Total Staffing Costs | \$10,739,000 |



Makaopuhi Crater and Kane Nui o Hamo in foreground with Pu'u 'Ō'ō in the background. USGS photo by Jim Kauahikaua

USER CAPACITY

Overview of Visitor Use Management and Visitor Capacity

General management plans for national park system units, including Hawai'i Volcanoes National Park, must address visitor use management and visitor capacity. Managing visitor use in national park units is inherently complex and depends not only on the number of visitors, but also on where the visitors go, what they do, and the "footprints" they leave behind. The NPS defines visitor use management as the proactive and adaptive process of planning for and managing characteristics of visitor use and the physical, social, and managerial setting through a variety of strategies and tools to sustain desired resource conditions and visitor experiences. Visitor use characteristics may include amount, type, timing, and distribution of visitor use, including activities and behaviors. In short, visitor use management strives to maximize the benefits of visitor use while meeting resource and experiential protection goals. This planning and management process provides the framework within which visitor capacity can be addressed. As part of the visitor use management process, visitor capacity is the maximum amount and type of visitor use that an area can accommodate while sustaining desired resource conditions and visitor experiences consistent with the values for which the area was established. In managing for visitor use, Hawai'i Volcanoes National Park staff and partners rely on a variety of management tools and strategies rather than relying solely on regulating the number of people in the park. In addition, the ever-changing nature of visitor use requires a deliberate and adaptive approach to visitor use management.

The foundations for making visitor use management decisions in this general management plan are the purpose, significance, special mandates, and management zones associated with the park. The purpose, significance, and special mandates define why the park was established and identify the most important resources, values, and visitor opportunities that will be protected and provided. The management zones describe the desired resource conditions and visitor experiences, including appropriate types

of activities and general use levels, for different locations throughout the park. The zones, as applied within this plan, are consistent with and help the NPS achieve its specific purpose, significance, and special mandates. As part of the NPS commitment to implement visitor use management, the park staff will abide by these directives for guiding the types and levels of visitor use that will be accommodated while sustaining the quality of park resources and visitor experiences consistent with the purposes of Hawai'i Volcanoes National Park.

In addition to these important directives, this GMP includes indicators and standards for Hawai'i Volcanoes National Park. Indicators are measurable variables that will be monitored to track changes in resource conditions and visitor experiences. Standards represent the minimum acceptable conditions for those indicator variables. The indicators and standards are important feedback mechanisms that help the NPS make decisions about managing all aspects of visitor use to ensure that desired conditions are being attained and that the park's legislative and policy mandates are being fulfilled. The general management plan also identifies the types of management actions that will be taken to achieve desired conditions and related legislative and policy mandates.

Appendix B: User Capacity Indicators and Standards includes the indicators, standards, and potential future management and monitoring strategies, allocated by management zones, which will be implemented as a result of this planning effort. The planning team considered many potential issues and related indicators that identify impacts of concern, but those described below were considered the most significant, given the importance and vulnerability of the resource or visitor experience affected by visitor use. The planning team also reviewed the experiences of other parks with similar issues to help identify meaningful indicators. Standards that represent the minimum acceptable condition for each indicator were then assigned, taking into consideration the qualitative descriptions of the desired conditions, data on existing conditions, relevant research studies, staff management experience, and scoping on public preferences.

Some of the indicators and standards are more directly tied to helping NPS address visitor capacity. These indicators include crowding, parking issues, and traffic congestion. These indicators and standards directly inform management of the kinds and amounts of use that can be accommodated in different areas of the park while maintaining desired conditions. Further guidance for addressing visitor capacity will be found in subsequent implementation-level plans that have a significant visitor use management component. These types of plans may be informed by the proposed/planned traffic study, which would provide baseline data for acceptable levels of traffic flow, and potentially would provide additional management strategies that could be implemented to achieve acceptable levels. Visitor use management is a form of adaptive management in that it is an iterative process in which management decisions are continuously informed and improved. Indicators are monitored, and adjustments are made as appropriate. As monitoring of conditions continues, managers may decide to modify or add indicators if better ways are found to measure important changes in resource and social conditions. Monitoring indicators helps the NPS determine the most effective way to manage kinds and amounts of visitor use in order to attain desired visitor experience and resource conditions. Frequency of monitoring may vary depending on the availability of funds. Information on NPS monitoring efforts, related visitor use management actions, and any changes to the indicators and standards will be available to the public through the most appropriate and effective outreach method chosen by the park. It should be noted that revisions to indicators and standards will potentially be subject to compliance with NEPA, NHPA, and other laws, regulations, and policies.

Indicators and Standards

The priority indicators for Hawai'i Volcanoes National Park are associated with the following issues:

- Informal trails
- Invasive plant and animal species
- Incidences of human-wildlife interactions (threatened or endangered species)

- Damage or theft of threatened or endangered plant and animal species
- Damage or loss of geologic resources
- Campsite conditions
- Fire risk
- Artificial light
- Damage to archeological sites
- Lack of understanding of Native Hawaiian culture
- Visitors impacting access for cultural practitioners
- Soundscapes
- Crowding
- Trail-based user conflicts
- Parking and traffic congestion

A table detailing the specific indicators, standards, management strategies, and monitoring strategies appears in *Appendix B: User Capacity Indicators and Standards*.

MITIGATION MEASURES

Mitigation measures are the practicable and appropriate methods that will be used under any alternative to avoid and/or minimize harm to natural and cultural resources, wilderness, visitors and the visitor experience, and socioeconomic resources when no other management alternative exists (such as avoidance). These mitigation measures have been developed using existing laws and regulations, best management practices, conservation measures, and other known techniques from past and present work in and around Hawai'i Volcanoes National Park.

This general management plan provides a management framework for Hawai'i Volcanoes National Park. Within this broad context, the following measures may be used to minimize potential impacts from the implementation of the plan. These measures will be applied to all implementation activities, subject to funding and staffing levels. Additional mitigation will be identified as part of implementation planning and for individual projects to further minimize resource impacts.

Cultural Resources

GENERAL

- Avoid adverse impacts on historic properties listed in, determined eligible for listing in, or not yet assessed for eligibility to the National Register of Historic Places, if possible. If adverse impacts could not be avoided, develop an assessment of effect and a treatment plan, if necessary, through a consultation process with all interested parties. In accordance with NPS *Management Policies* (2006), assess proposed adverse effects to determine whether the proposed actions constitute impairment of significant fundamental cultural resources.
- Continue to develop inventories for and oversee research about archeological, historic, and ethnographic resources to better understand and manage the resources, including historic cultural and ethnographic landscapes.
- Conduct any needed archeological or other resource-specific surveys, National Register evaluations, and identify recommended treatments.
- Incorporate the results of these efforts into site-specific planning and compliance documents.
- Continue to manage cultural resources and collections following federal regulations and NPS guidelines.
- Inventory the park's collection and keep in a manner that will meet NPS curatorial standards.
- Protect and maintain cultural resources in wilderness according to the pertinent laws and policies governing cultural resources, using management methods that are consistent with the preservation of wilderness character and values such as the Organic Act, the National Historic Preservation Act, the Archeological Resources Protection Act, the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, and Executive Order 13007 that addresses government-to-government consultation.

ARCHEOLOGICAL RESOURCES

- Complete archeological surveys prior to ground disturbance for new construction or removal of eligible historic properties. Avoid known archeological resources to the greatest extent possible. If National Register listed, eligible, or unassessed archeological resources could not be avoided, develop an appropriate treatment plan in consultation with the Hawai'i State Historic Preservation Officer, National Advisory Council, and associated Native Hawaiian groups.
- Conduct archeological site monitoring and routine protection.
- Conduct data recovery excavations at archeological sites threatened with destruction, where protection or site avoidance during design and construction is infeasible.
- If previously unknown archeological resources are discovered during project work, immediately inform NPS cultural resources staff, halt all work in the immediate vicinity of the discovery, and secure the location until the resources are identified, evaluated, and documented and an appropriate treatment plan is developed, if necessary, in consultation with the Hawai'i State Historic Preservation Officer and associated Native Hawaiian groups.
- Encourage visitors through the park's interpretive programs to respect and leave undisturbed any inadvertently encountered archeological resources and respect and leave undisturbed any offerings placed by Native Hawaiians.

HISTORIC BUILDINGS AND STRUCTURES

- Conduct all project work relating to historic structures/buildings in accordance with Director's Order 28 and the guidelines and recommendations of the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*.

- Rehabilitate and adaptively reuse structures wherever feasible.
- Design any new development to be compatible with surrounding historic properties.
- Screen new development from surrounding historic resources to minimize impacts on viewsheds, cultural landscapes, and ethnographic resources.
- Maintain and stabilize historic structures until appropriate preservation maintenance can be undertaken. Benign neglect will not be considered an appropriate management strategy.
- Do not remove or allow a National Register listed or eligible structure to decay naturally without prior review by park and region cultural resource specialists, including approval by the NPS regional director and consultation with the Hawai'i State Historic Preservation Officer. Before a National Register listed or eligible structure is removed, prepare appropriate documentation recording the structure in accordance with Section 110(b) of the National Historic Preservation Act, and submit the documentation to the Historic American Buildings Survey (HABS), Historic American Engineering Record (HAER), or Historic American Landscapes Survey (HALS) program, if deemed appropriate.
- Protect and maintain historic structures that are within designated wilderness areas according to the pertinent laws and policies governing cultural resources using management methods that are consistent with the preservation of wilderness character and values. Laws pertaining to historic preservation remain applicable within wilderness but must generally be administered to preserve the area's wilderness character. Consultation of treatment will include appropriate consideration of the application of the provisions of the Wilderness Act in analyses and decision-making concerning cultural resources.

CULTURAL LANDSCAPES

- Conduct all project work relating to cultural landscapes in accordance with Director's Order 28 and the guidelines and recommendations of the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.
- Design new development to be compatible with surrounding historic properties.
- Screen new development from surrounding cultural landscapes to minimize impacts on those landscapes and viewsheds.

ETHNOGRAPHIC RESOURCES

- Continue to consult with Native Hawaiian groups to identify ethnographic resources and develop appropriate strategies to mitigate impacts on these resources.
- Continue to provide access to traditional use or spiritual areas.
- Screen new development from traditional use areas to minimize impacts on ethnographic resources.
- Consult with Native Hawaiians linked by ties of kinship, culture, or history to park lands to address any inadvertent discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony.
- Follow all provisions outlined in the Native American Graves Protection and Repatriation Act of 1990.

MUSEUM COLLECTIONS

- Conserve all collections through proper storage, handling, and exhibit of objects as specified in the NPS *Museum Handbook* and NPS Director's Order 24, "NPS Museum Collections Management." This will include artifacts used in exhibits in the visitor centers.

Natural Resources

AIR QUALITY

- Implement a dust abatement program including the following potential actions: water or otherwise stabilize soils, cover haul trucks, employ speed limits on unpaved roads, minimize vegetation clearing, and revegetate with native species.
- Minimize NPS vehicle emissions by using the best available technology whenever possible.
- Encourage the public and commercial tour companies to employ methods that reduce emissions.
- Employ sustainable designs that reduce energy demands, thus reducing pollutant production.

SOUNDSCAPES AND THE ACOUSTIC ENVIRONMENT

- Implement standard noise abatement measures during NPS operations, including: scheduling to minimize impacts in noise-sensitive areas, using the best available noise control techniques wherever feasible, using hand tools or hydraulically or electrically powered impact tools when feasible, and locating stationary noise sources as far from sensitive areas as possible.
- Site and design facilities to minimize objectionable noise.
- Minimize idling of motors when power tools, equipment, and vehicles are not in use.
- Muffle above ambient noise whenever possible to reduce noise impacts.

LIGHTSCAPES AND NIGHT SKIES

- Light only where and when it is needed.
- Shield lights, direct them downward, and use lamping that is ≥ 560 nm wavelength.
- Use minimum amount of light necessary.

- Consider alternatives to the use of artificial lighting, such as reflective surface walkways, reflective signage, or guidance to use hand-held lighting devices.
- Replace existing outdoor lighting with fixtures that do not contribute to nighttime light pollution.
- Install energy-efficient lights equipped with timers and/or motion detectors so that light will only be provided when it is needed to move safely between locations.
- Use low-impact lighting, such as diffused light bulbs, and techniques such as downlighting in outdoor fixtures, to prevent light spill and preserve the natural lightscape and avoid light pollution. Select lamps with warmer colors (≥ 560 nm wavelength).
- Limit use of personal lighting (flashlights) when required for safe movement and work and/or modify (such as using red or blue lightbulbs as opposed to white) to protect wildlife.

SOILS

- Build new facilities on soils suitable for development. Minimize soil erosion by limiting the time that soil is left exposed and by applying erosion control measures, such as erosion matting, silt fencing, and sedimentation basins in construction areas to reduce erosion, surface scouring, and discharge to water bodies. Once work is completed, revegetate construction areas with native plants in a timely period.
- Place construction equipment in previously disturbed areas.
- Locate trails on soils with low erosion hazards and small changes in slope and develop proper signs to minimize social trails to the extent possible.
- Ensure proper drainage of parking areas.

WATER RESOURCES

- To prevent water pollution during construction, use erosion control measures, minimize discharge to water bodies and washes, and regularly inspect construction equipment for leaks of petroleum and other chemicals.
- Build a runoff containment filtration system to minimize water pollution from larger parking areas.
- Include ways to minimize damage from runoff in parking area designs. Parking areas could include detention basins, runoff filtration, and/or could be sited away from drainage.

VEGETATION

- Monitor areas used by visitors (e.g., trails and campsites) for signs of native vegetation disturbance. Use public education, revegetation of disturbed areas with native plants, erosion control measures, and barriers to control potential impacts on plants from erosion or social trails.
- Avoid impacts by relocating project sites when possible.
- Develop revegetation plans for disturbed areas and require the use of genetically appropriate native species. Revegetation plans should specify species to be used, seed/plant source, seed/plant mixes, site-specific restoration conditions, soil preparation, erosion control, and ongoing maintenance and monitoring requirements, etc. Salvaged vegetation should be used to the extent possible.
- Survey for rare plants prior to any ground-disturbing activities; disturbance to rare or unique vegetation will be avoided to the greatest extent possible. Consult with the USFWS for projects where listed species and their habitats occur.
- Implement an invasive, nonnative plant management program. Standard measures could include the following elements: use only weed-free materials for road and trail construction, repair, and maintenance; ensure equipment arrives onsite free of mud

or seed-bearing material; certify all seeds and straw material as weed-free; identify areas of invasive plants pre-project; monitor and treat invasive plants or invasive plant topsoil before construction (e.g., topsoil segregation, storage, herbicide treatment); when depositing ditch spoils along the roads, limit the movement of material to as close as possible to the excavation site; scrupulously and regularly monitor and clean areas that serve as introduction points for invasive plants (campgrounds, staging areas, maintenance areas, and corrals); revegetate with genetically appropriate native species; inspect rock and gravel sources to ensure these areas are free of invasive plant species; and monitor locations of ground-disturbing operations followed by appropriate invasive plant control actions for at least three years following the completion of projects.

WILDLIFE

- Employ techniques to reduce or avoid impacts to fish and wildlife, including visitor education programs, restrictions on visitor and NPS activities, and law enforcement patrols.
- Implement a wildlife protection program. Standard measures will include project scheduling (season and/or time of day), project monitoring, biological monitoring, erosion and sediment control, fencing or other means to protect sensitive resources adjacent to project areas, disposing of all food-related items or rubbish, salvaging topsoil, and revegetating. This could include specific construction monitoring by resource specialists as well as treatment and reporting procedures. Consider relocation of facilities to avoid impacts, temporary closures, and group size limits to mitigate impacts. Also include management of artificial light and sound to avoid adverse impacts to wildlife.

SPECIAL STATUS SPECIES

- Mitigative actions will occur during normal park operations as well as before, during, and after construction to minimize immediate and long-term impacts on rare, threatened, and endangered species and their habitat. These actions will vary by specific project and area

of the national park affected, and additional mitigations will be added depending on the specific action and location.

- Conduct surveys for rare, threatened, and endangered species as warranted.
- Locate and design facilities/actions to avoid adverse effects on rare, threatened, and endangered species and their habitat. If avoidance is infeasible, minimize and compensate for adverse effects on rare, threatened, and endangered species as appropriate and in consultation with the appropriate resource agencies. Conduct work outside of critical periods for the specific species.
- Develop and implement restoration and/or monitoring plans as warranted. Plans should include methods for implementation, performance standards, monitoring criteria, and adaptive management techniques.
- Implement measures to reduce adverse effects of nonnative plants and wildlife on rare, threatened, and endangered species and their habitat.
- Carry out surveys and monitoring for special status species.
- Protect and preserve critical habitat features, such as nest trees and key host plants, whenever possible.

Management and Protection of Wilderness Values

- Develop specific desired conditions in the park's future wilderness stewardship plan for wilderness resources, visitor experiences, and management protocols.
- Develop standards and guidelines establishing acceptable limits of change and mitigation measures for wilderness within a future wilderness stewardship plan.

- Conduct monitoring to ensure that conditions are meeting established standards and to determine if mitigation measures have been successful.
- Apply the minimum requirement process to all proposed management actions that might affect wilderness and potential wilderness in order to develop, evaluate, and select the actions that will be the least intrusive on wilderness character and values, while allowing necessary administration of the wilderness.

Scenic Resources

- Where appropriate, use facilities such as boardwalks and fences to route people away from sensitive natural and cultural resources while still permitting access to important viewpoints.
- Design, site, and construct facilities to minimize adverse effects on natural and cultural resources and visual intrusion.
- Provide vegetative screening, where appropriate.
- Implement vegetation management which could include selective clearing to manage or improve important viewpoints and viewsheds while minimizing impacts to native vegetation and wildlife habitat.

Socioeconomic Environment

- During future planning and implementation of the general management plan, the NPS will pursue partnerships with Native Hawaiian organizations, local communities, and county governments to further identify potential impacts and mitigating measures that will best serve the interests and concerns of both the NPS and the local communities.

Sustainable Design and Aesthetics

- Use sustainable practices in the selection of building materials and sources and building location and siting. Sustainable practices and resources will be used whenever practicable by recycling and reusing materials, by minimizing materials, by minimizing energy consumption

during the project, and by minimizing energy consumption throughout the lifespan of the project.

- Develop design standards specific to the park in all repair, rehabilitation, and construction projects.

Visitor Safety and Experiences

- Consider accessibility in each project to understand barriers to programs and facilities. Provide the maximum level of accessibility.
- Implement adaptive visitor use management, as outlined in the user capacity section of this plan, when resource and visitor experience conditions are trending towards or violating a user capacity standard. Management strategies may include visitor education, site management, visitor use regulations, rationing or reallocation of visitor use, and enforcement.
- Consider visitor safety in all planning and projects.
- Consider using the principles of Operational Leadership in planning safe visitor access to park features.

Hazardous Materials

- Implement a spill prevention and pollution control program for hazardous materials. Standard measures could include hazardous materials storage and handling procedures; spill containment, cleanup, and reporting procedures; and limitation of refueling and other hazardous activities to upland/non-sensitive sites.

IMPLEMENTATION OF THE GENERAL MANAGEMENT PLAN

This document is the new management plan for Hawai'i Volcanoes National Park and will be implemented in phases over the next 15–20 years. The general management plan establishes a vision to guide future management of Hawai'i Volcanoes National Park. The park's strategic plan,

business plan, and annual work plans will help develop priorities that will determine how best to implement this general management plan.

Implementation of the actions and developments proposed within the management plan is dependent upon funding available at the time of need. The approval of this general management plan does not guarantee that the funding and staffing needed to implement the plan will be forthcoming.

In addition to funding, implementation of the GMP also could be affected by other factors. More detailed planning and environmental documentation may be completed, as appropriate, before some of the actions will be carried out. The GMP was developed based on the assumption that mitigation measures will be incorporated into the proposed actions to reduce the degree of adverse impacts.

Implementation Plans, Studies, and Design Work

The following list includes some of the plans, studies, and design work needed to implement the selected alternative.

PLANS AND DESIGNS

- Kilauea Summit site plan, including visitor center improvements, planning for improvements from Kilauea Iki to Devastation, and trail design for Kilauea Visitor Center to Jaggar Museum
- Lower Kahuku site plan, including site improvements for entrance
- Jaggar Museum site plan for outdoor seating area
- Mauna Loa Road and surrounding area site plan
- Site plan for Lua Manu Crater area
- Kealakomowaena site plan for improvements for groups

- ‘Ōla‘a (small tract) interpretive site design for boardwalk
 - Site plan for Ka‘ū Footprints / Ka‘ū Desert area
 - Adaptive reuse plan for ‘Ōhi‘a Wing
 - Wilderness stewardship plan (parkwide)
 - Trail management plan (parkwide)
 - Accessibility plan (parkwide)
 - Long-range interpretive plan (parkwide)
 - Air tour management plan
 - Commercial services plan
 - Soundscape management plan (if additional guidance is needed)
 - Emergency operations plan (update to address changes to park as a result of implementing the general management plan)
 - Pilot program for equestrian use at the lower Kahuku pastures
 - National Register of Historic Places determination of eligibility for Kahuku
 - Pilot program for testing one-way traffic for large commercial buses on Crater Rim Drive
 - Monitoring and treatment plan to address the spread of nonnative plants in the ‘Ōla‘a rainforest
 - Environmental education curriculum and waysides updates in the Devastation Trail area
 - Soundscape monitoring program (parkwide)
 - Site-specific assessment of rare and listed species (all projects)
- In addition, policy-required baseline studies and updates of existing plans, such as the *Fire Management Plan* (2007) and *Museum Management Plan* (2001), will be completed when needed.

STUDIES AND DATA NEEDS

- Baseline vegetation assessment and monitoring plan for the lower Kahuku pastures



Kilauea Iki hikers. NPS photo by Stephen Geiger.



Entering Thurston Lava Tube (Nāhuku). NPS photo by Michael Szoenyi.

APPENDICES



Halema'uma'u at sunset. NPS photo by Ed Shiinoki.



Keanakāko'i Overlook. NPS photo by Stephen Geiger.

APPENDIX A: RECORD OF DECISION

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US Department of the Interior
National Park Service

RECORD OF DECISION

General Management Plan / Wilderness Study Abbreviated Final Environmental Impact Statement

Hawai'i Volcanoes National Park
Hawai'i County, Hawai'i

SUMMARY

The Department of the Interior, National Park Service (NPS) prepared this Record of Decision for the *Hawai'i Volcanoes National Park General Management Plan / Wilderness Study / Final Environmental Impact Statement (GMP/WS/FEIS)* for Hawai'i Volcanoes National Park. This Record of Decision (ROD) includes a description of the selected action, synopses of other alternatives considered, the basis for the decision, a description of the environmentally preferable alternative, a summary description of measures designed to minimize environmental harm and an overview of public involvement in the decision-making process. Measures to mitigate environmental harm are provided as Appendix A. In addition, the park manager has completed a determination of non-impairment, as required by the 2006 NPS Management Policies.

DECISION (SELECTED ACTION)

The NPS will implement Alternative 2 as described in the Draft GMP/WS/EIS, and as amended by the errata in the GMP/WS/FEIS, which identified this alternative as both the preferred and environmentally preferable alternative.

The new GMP will strengthen and broaden opportunities to connect people with the volcanic world treasure, Hawai'i Volcanoes National Park, and provide a wide range of high quality visitor experiences based on different geographic areas. Kīlauea summit will continue to be the most actively visited area of the park with the greatest concentration of services and amenities for park visitors. Along Chain of Craters Road and Mauna Loa Road, the park will strive to provide visitors with improved opportunities to experience and connect with park resources and values, including new opportunities at places like Mauna Ulu and Kealākomōwāena, while dispersing use to create a less congested and more tranquil experience. At Kahuku, although visitor access and recreation opportunities will be expanded from what is currently offered, infrastructure and development will be minimal, gradually phased in over time, and remain rustic in design to allow for a primitive visitor experience.

Natural and cultural resources will continue to be managed and protected with a high degree of integrity, consistent with direction provided by existing laws and policies. The selected action emphasizes the park's role as a refuge and haven for native biota, people, and cultures in a world constantly adapting to volcanic activity and island building processes. It also honors the Native Hawaiian people and culture by recognizing Native Hawaiian values such as mālama 'āina (nourishing or taking care of the land) and kuleana (responsibility) and perspectives from Native Hawaiian land management such as ahupua'a management (managing land from mauka (mountains) to makai (sea)) as important concepts in park stewardship of resources. Native Hawaiian traditional ecological knowledge will be used to enhance current scientific understanding to protect park resources and provide additional interpretive and educational opportunities for visitors.

The selected action also provides the park with the flexible guidance necessary to respond to the changing natural conditions inherent in operating a park unit situated on two active volcanoes. Rather than provide specific recommendations in the GMP for how the park may respond to a given event, the selected action includes general guidance for managers facing volcanic activity in the future, notably with respect to facilities and infrastructure in the park.

In addition to implementing management zoning (as described on pages 117-121 in the Draft GMP/WS/EIS) and user capacity indicators and standards (as described in Appendix G of the Draft GMP/WS/EIS), the selected action includes the following primary components that will be implemented as staffing and funding allow. Details of all actions associated with the selected action are provided under “Actions Common to All Alternatives” and “Alternative 2” in the Draft GMP/WS/EIS, as amended by the errata in the Abbreviated Final GMP/WS/EIS.

Site-Specific Management Guidance

Kīlauea Visitor Center and Surrounding Area

- The park will produce a site plan and site specific interpretive strategy to integrate visitor experiences among the complex of buildings on the summit of Kīlauea. This integrated campus, or *kauhale*, will include the Kīlauea Visitor Center, ‘Ōhi‘a Wing, Volcano Art Center, *pā hula* (place reserved for hula dancing), and other buildings in the vicinity including those currently utilized by Kīlauea Military Camp and the Hawaiian Volcano Observatory. The priority will be to stay within the existing footprint of development; however modest expansion could be necessary to achieve the overall vision and to accommodate walkways, improve circulation, and reduce conflicts between vehicles and visitors.
- The park will continue to use Kīlauea Visitor Center as one of two primary visitor facilities as well as park headquarters and administrative offices. Additional parking will be provided to address increased visitor use; a 2.5-mile separate shared trail for pedestrian and bicycle use will be constructed from Kīlauea Visitor Center to Jaggar Museum; and through the completion of the development concept plan, the park will consider either expanding the lanai or removing and replacing the current restroom at the visitor center with a facility of similar capacity closer to the 1877 Volcano House in order to increase the interpretation space at the visitor center.
- The park will adaptively reuse the historic ‘Ōhi‘a Wing as a cultural museum and administrative offices to also complement the visitor functions of the Kīlauea Visitor Center and Jaggar Museum.
- The park will continue to provide interpretation at the Jaggar Museum, with improved exhibits, and the US Geological Survey Hawaiian Volcano Observatory will continue to operate adjacent to Jaggar Museum.

Crater Rim Drive

- Assuming eruptive activity ceases or changes in Halema‘ūma‘u Crater and the park determines through active monitoring that air quality and other hazards are at a level that is consistent with general visitor use, the park will reopen the southern section of Crater Rim Drive and keep the road open to the public for two-way traffic, allowing a mix of private vehicles and smaller shuttles (non-mandatory). The historic character and historic alignment of the road will be preserved. To improve safe bicycle access around Crater Rim Drive, the park will also improve signage along the road corridor, provide adjacent bicycle trails when feasible, and consider vehicular traffic closures during specific times of day or days of the week to encourage bicycle use.
- As part of a pilot program, large commercial buses or vehicles over 98 inches in width and/or over 38 feet in length will be limited to one-way traffic between Jaggar Museum and Chain of Craters Road junction along the southern portion of road. Administrative use of the road for two-way vehicle traffic will continue to be allowed.

- Once the Halema'uma'u Overlook is reopened to visitation, the parking lot will be maintained to accommodate the existing capacity but the park could evaluate site modifications to address sensitive cultural issues and values and improve resource protection.
- The park will also continue to evaluate the pilot hydrogen shuttle technology, including the performance of the shuttles that will service proposed stops along Crater Rim Drive.

Thurston Lava Tube and Surrounding Area

- The park will maintain the current mix of parking for private and commercial vehicles at Thurston and use a suite of tools to address congestion and improve the visitor experience. These tools could include improved visitor information and outreach for trip planning (emphasizing less busy times of day to visit), increased ranger presence to direct traffic, the use of intelligent transportation systems (such as electronic message boards giving real-time information), vehicle size limitations for parking, time of day restrictions on certain vehicles, and/or reservations for commercial vehicles only. Additional restriping and reconfiguration of parking at Thurston Lava Tube along the road may also be required. In addition, the park will consider developing a more specific site plan to integrate trails and parking areas from Kīlauea Iki to Devastation.
- Large commercial buses will be able to load and unload at Thurston but these buses may be required to park at nearby underutilized lots such as Devastation Trail and Pu'u Pua'i. Some reconfiguration within the existing developed footprint of these parking lots may be needed to accommodate large buses, and improved signing and accessibility ramping will be needed. The park will continue to evaluate implications of implementing one-way traffic between Jaggar Museum and Chain of Craters Road junction on Crater Rim Drive for large commercial buses and requiring buses to only load and unload at Thurston as conditions change.
- The park will also improve and increase interpretive opportunities and themes at Thurston while still protecting rainforest resources.

Chain of Craters Road

- The park will continue to maintain the character of Chain of Craters Road to NPS standards, ensuring a park-like feel for the driving experience, while providing for visitor safety. The park will identify and clear over-vegetated pullouts to restore views/vistas and to encourage stops along the road.
- The park will also explore the option of locating an educational pavilion, in addition to a mobile visitor contact station, along Chain of Craters Road to orient visitors, communicate visitor safety information, and provide an alternative visitor experience when the summit is closed to disperse visitation. Potential locations include Mauna Ulu or where the 1974 flows first cross Chain of Craters Road.
- The park will continue to work with partners to provide a sustainable and moveable visitor contact station at the current end of Chain of Craters Road for interpretation and safety on a trial basis, replacing some of the functions provided by the Waha'ula Visitor Center and administration area that was destroyed by lava in 1989. If the pilot project is successful, the park will retain the structure as a contact station to provide visitor services and emergency operations over the long term. If the pilot project is unsuccessful, the park will develop a long-term replacement visitor contact station in the form of an open pavilion or similar structure at the end of Chain of Craters Road. The structure will not be mobile, but interior elements could be made to be quickly removable in the event of an active lava flow that threatens the structure, and the framing could be salvaged.
- A 5.5 mile segment of the Chain of Craters Road that ran through the park towards Kalapana was buried by lava flows generated by Pu'u 'Ō'ō. Due to a change in the direction of the lava flow in 2014, the Federal Emergency Management Agency funded the construction of an unpaved emergency access route following the historic road alignment. This route is for emergency access only and the park is now responsible for protecting and maintaining the road as an emergency

access route. When this route is not needed as an emergency access route, it could be used as an equestrian, biking, and hiking trail (similar in character and functionality to the Escape Road from the summit to Mauna Ulu) to provide a quality non-motorized visitor use opportunity while ensuring the route is protected and maintained for its original intended function limited to emergency access. These uses will ensure that natural values are not compromised without adding the management complexity of managing a coastal entrance for public vehicles to enter the park.

‘Āinahou Ranch House and Gardens

- ‘Āinahou Ranch will continue to provide a core management area for nēnē recovery. Park staff will continue to maintain the house and cultural landscape in good condition. The water system will be maintained for fire protection, and the access road to ‘Āinahou will be maintained as an unpaved road.
- The NPS will focus on restoration for nēnē. Additional measures to provide opportunities for public stewardship of the ranch house and gardens and habitat restoration may be allowed through the use of trained volunteers and small service groups under the direction of NPS staff in the field.
- Within the formal gardens, the park will work with cultural resource staff to replace invasive nonnatives with native species, minimize any new plantings or cultivation, and prevent any inadvertent introduction of nonnatives.
- Interpretation of ‘Āinahou Ranch and its significance as a cultural resource and important site for nēnē will occur off-site for the general public.

Kahuku Unit

- Over time and with adequate funding for staff and infrastructure, the park will strive for operational capacity in Kahuku seven days a week. Recreational infrastructure, such as trails, small-scale campgrounds, and interpretive and educational programs and activities will be developed to optimize visitor access and provide a range of opportunities to experience Kahuku’s unique natural and cultural resources and participate in the recovery of species and sites. The focus will be on recreational activities such as hiking, camping, and nature-viewing, with some biking and scenic driving opportunities. The park will offer opportunities for the community, visitors, and school groups to volunteer on restoration projects in Kahuku and participate in hands-on resources management activities.
- The park will maintain the existing entrance at Kahuku but address safety issues by clearing vegetation, improving signage, and possibly cutting back existing berms to improve the line of sight for drivers. The park will also seek to collaborate with the state to evaluate and add turn lanes on Highway 11 and will work with the state and other partners to expand interpretive and scenic opportunities along Highway 11.
- The park will produce a site plan for the lower Kahuku area to provide detailed guidance on adaptive reuse of existing buildings for specific uses, and will determine the numbers and locations of campgrounds, picnic areas, and trails consistent with the overall vision of this alternative.
- The park will upgrade and maintain the main road from the existing developed area to Upper Glover for two-wheel-drive access, primarily as one-lane with pullouts, similar in character to the Hilina Pali or Mauna Loa Roads. The main road from Upper Glover east to a designated location near the 1916 lava flows (approximately three miles) will be maintained for four-wheel-drive access. There will be no public vehicular access west from Upper Glover. No new roads will be developed in lower Kahuku.
- The park will develop a trail network in lower Kahuku that will accommodate different visitor abilities across a series of loop trails and trail connections in an effort to promote hiking, biking, and a pilot program for equestrian use. The park will prioritize re-establishing traditional and historic travel routes before any new trail construction; however, new trails could also be constructed in order to create trail connections.

- Overnight camping in Kahuku will be allowed and multiple small-scale designated campgrounds with a low level of infrastructure and minimal services, such as water and compost or vault toilets, will be developed. Sites will be developed for both drive-in and walk-in campers, with some handicap-accessible campsites provided.
- The park will implement a small pilot program for equestrian use in lower Kahuku pastures to explore allowing equestrian use in Kahuku while managing for resource concerns such as the spread of invasive nonnative species. Under the pilot program, vegetation monitoring will be required and limited equestrian use will be allowed by special permit and potentially through a commercial use authorization (CUA) for guided trips.
- The park will manage upper Kahuku for its wilderness characteristics based on its determination of eligibility for inclusion in the national wilderness preservation system. Recreational access in upper Kahuku will be permitted and visitor opportunities such as hiking and camping will be managed consistent with a wilderness experience.
- Trails will provide the primary recreational experience for visitors in upper Kahuku. The park will also consider developing a small campground in the proximity of the existing cabins, outside nēnē habitat and wilderness, for walk-in users, which could also serve as a launching point for backcountry users. Rainwater catchment/shelter could also be provided.
- No commercial services or commercially guided recreation will be permitted in upper Kahuku.

Boundary Modifications

- Hawai‘i Volcanoes National Park will seek legislation to include ‘Ōla‘a within the official park boundary.
- Hawai‘i Volcanoes National Park will also recommend that the following parcels are added to the park boundary: the Great Crack parcels (1,951 acres) and the Ala Wai‘i parcel (3,478 acres), a private parcel (222 acres) located along the southern edge of Kahuku (west of present entrance off Highway 11), and a parcel at Pōhue Bay (16,457 acres) that extends from lower Kahuku on Highway 11 down to the coast.

Program Specific Guidance

Natural Resources

- The natural resources program will continue efforts to perpetuate and restore native ecosystems and recover populations of rare species (including threatened and endangered) and biological diversity of native species by using scientifically informed methods.
- The park will strive to increase current staffing levels to improve monitoring and control of nonnative plants and animals, reintroduction of historical species, protection and recovery of locally rare, threatened and endangered species, fire restoration, fuels reduction, and supporting research that informs natural resources management activities.
- Concepts of traditional Native Hawaiian land management will be integrated into natural resource management activities. The park will also seek to enhance restoration techniques and practices with Native Hawaiian traditional ecological knowledge.
- The natural resources program will seek to engage the visitor in the protection and restoration of native species and ecosystems by expanding opportunities to participate in restoration activities, particularly at Kahuku. Students and general public will be provided opportunities to study and participate in restoration efforts in these areas as part of expanding service-learning and stewardship programs, and citizen science will be expanded for park visitors in focal areas.
- The park will continue to participate in existing partnerships for landscape-level restoration and conservation. The park will seek additional collaborations with appropriate agencies and surrounding communities to enhance protection of coastal and marine resources in addition to land resources.

Cultural Resources

- The cultural resource program will seek to expand the on-going documentation and inventory of park resources and will seek formal determinations of eligibility and national register nominations. A suite of preservation plans that will provide guidelines for interpreting and preserving cultural landscapes and historic structures will be developed and implemented.
- The park will seek to enhance cultural resource preservation techniques and practices with Native Hawaiian traditional ecological knowledge. Concepts of traditional Native Hawaiian land management will be integrated into cultural resource management activities and emphasize the interconnectedness of the cultural and natural environments.
- The park will work toward permanent facilities to house and showcase locally and nationally significant collections. Natural and cultural museum collections will be researched and exhibited at a greater number of available and appropriate opportunities.
- The park will seek to stabilize and maintain some significant ranching and World War II-era landscapes and their contributing elements, and work in a collaborative manner with the natural resources division to carry out the vision of an integrated restoration plan for Kahuku.
- The park will continue to inventory Kahuku's resources and complete the National Register of Historic Places Determination of Eligibility, when appropriate. Some historically significant landscapes or contributing elements of landscapes in Kahuku will be identified and maintained for interpretation and education, highlighting different periods of occupation.

Research

- The park will continue park research efforts and collaboration with partners and will continue to support independent research under the NPS permitting system consistent with NPS management policies.
- The park will also strengthen the emphasis on disseminating research related to ecology, endemics, climate change, archeology, history, and traditional cultural properties to park visitors in a lay-person format.

Wilderness

- Hawai'i Volcanoes National Park will continue to manage existing designated wilderness (123,100 acres) consistent with National Park Service management policies (including Director's Order #41 Wilderness Stewardship) and the Wilderness Act of 1964, and would develop a wilderness stewardship plan to guide wilderness use in the park after completion of this GMP/WS/EIS.
- Hawai'i Volcanoes National Park Wilderness Study recommends wilderness designation for 121,015 acres (GIS) of the Kahuku Unit that met eligibility criteria and requirements necessary to qualify for the National Wilderness Preservation System. Consistent with NPS policy, the park will continue to manage these proposed eligible lands for their wilderness qualities prior to formal designation.

Soundscapes and the Acoustic Environment

- The National Park Service, as a cooperator with the Federal Aviation Administration, will complete an Air Tour Management Plan/Environmental Impact Statement that will develop measures to limit or prevent any significant impacts that may be caused by commercial air tour operations upon the natural and cultural resources, or visitor experiences at the park. This plan will be consistent with the guiding principle of reducing noise/human sound in sensitive areas.
- The park will strive to improve soundscapes and the acoustic environment by reducing artificial noise within wilderness; in and near critical habitat for threatened and endangered species; in traditional cultural areas such as volcano summits, active lava, or active volcanic features; and in high visitor use areas.

- To improve soundscapes and the acoustic environment, the park will expand active management practices to include: (1) implementing best management practices to limit the duration of artificial noise, (2) maximize human-caused noise free periods, (3) create more opportunities for visitors to experience natural soundscapes, and (4) implement partial closures of air space in sensitive areas. In addition, park operations and projects will be implemented using best management practices to minimize noise impacts.
- The park will provide commercial air tour operators with information and training on wilderness boundaries and the location of these sensitive areas, and provide guidance on best management practices to improve understanding of the importance of these resources and encourage greater protection.
- The park will recommend the implementation of a soundscape monitoring program and will consider developing a soundscape management plan, if additional guidance is needed.

Visitor Experience

- Hawai'i Volcanoes National Park will continue to provide visitors with safe access to volcanic features, active lava, cultural resources, and ecosystems from mauka to makai. The park will offer unique opportunities that provide visitors with an appreciation for the ways in which kama'āina (local people of the land) view, understand, and connect with park landscapes and resources today.
- The park will develop an accessibility plan to identify and evaluate opportunities throughout the park to improve accessibility.

Range of Recreational Activities

- Under the preferred alternative, the park will continue to allow for a range of recreational activities such as viewing lava and evidence of volcanic activity, camping, hiking, backpacking, biking, equestrian use, birding and wildlife viewing, picnicking, general sightseeing, and stargazing. Additional opportunities for existing activities could be provided in different geographic areas of the park. The park will focus on ranger-guided tours for access to new and particularly sensitive areas in the park. Expanded recreational activities will be authorized in Kahuku beyond current use.
- A trail management plan will be created to comprehensively assess trail conditions and needs and to identify specific trail alignments and uses, such as hiking, biking, and equestrian use. Development of any new trail alignments will be primarily along historic alignments and traditional routes, or on existing roads, such as at Kahuku, and the park will evaluate ways to use the existing road network for improved non-vehicular recreation opportunities. For example, in some areas of the park, such as Hilina Pali or Mauna Loa, roads could be closed to private day use vehicles during certain times of day or days of the week to provide a more enjoyable and less congested experience for recreationists such as hikers, backpackers, bikers, and equestrian users. The park will also strive to create loop trail experiences through new links between existing trails.
- Any additional frontcountry camping will be more primitive and dispersed than current facilities and will most likely be in Kahuku due to the lack of current facilities in this unit. Any future frontcountry camp development will also be considered in relationship to outdoor education pavilions that have been sited and will be targeted to educational groups but could also expand capacity for general public camping.
- The park will maintain existing backcountry camping and will explore, with additional planning, formally designating backcountry campsites, primarily along the coast outside the tsunami evacuation zone and at Mauna Loa. Additional backcountry camping opportunities will also be available in Kahuku. Any new campsites will require further planning. Some backcountry sites could contain water catchments/ shelters Any decisions about designating campsites in wilderness will be consistent with the minimum requirements decision guide.

Interpretation and Education

- The park will expand the uses of Jaggar Museum and Kīlauea Visitor Center as dramatic opportunities to introduce visitors to the volcanic, biologic, and cultural resources at Hawai‘i Volcanoes National Park. Kahuku will also serve as an important location for visitor orientation.
- The park will develop a long range interpretive plan that will expand interpretive opportunities to introduce visitors to all of the park’s interpretive themes through the use of interpretive standards and methods.
- Interpretation methods, while diverse in nature, will focus on ranger-led experiences and live programs to immerse visitors in the volcanic, biologic, and cultural resources at Hawai‘i Volcanoes National Park. These live programs will also provide additional opportunities to learn from Native Hawaiians and/or other cultural practitioners. Self-guided interpretation opportunities such as waysides and interpretive trails will also be provided, particularly in lower Kahuku.
- New, additional interpretive programs will focus on providing hands-on educational experiences for school, volunteer, and other organized groups in the frontcountry. Stewardship and hands-on activities will be a key element in these programs engaging visitors in research, learning, science, restoration, and educational programs and facilities. In addition, park staff will engage visitors in research and citizen science.
- Interpretive programming will also utilize new media and tools to provide inquiry-based learning through frontcountry self-guided interpretive and educational opportunities in order to meet the diverse needs of an increasingly international audience.

Commercial Services

- A Commercial Services Strategy has been produced as part of the general management plan that includes criteria for evaluating new commercial services, consistent with existing law and policies (including PL 105-391). This strategy provides broad guidance for future decisions involving commercial services but does not apply retroactively to previously made decisions.
- The park will engage commercial service providers in managing visitor use and providing valuable information to the public, including general park visitor information, safety updates, and interpretation of the park’s fundamental resources and values. Management strategies could include: infrastructure changes to accommodate commercial uses (such as additional parking, staging areas, and limiting tour buses to one-way traffic on Crater Rim Drive when fully opened), limits on numbers or size/capacity or times/dates of commercial activities, interpretive training for all commercial service employees, and ongoing communication with commercial service providers about changes in park conditions, etc.

Administrative Facilities and Infrastructure

- The park will continue to maintain and upgrade, when necessary, administrative infrastructure in the park such as offices, storage, and utilities and will improve provisions for accessibility. Administrative functions may be relocated from Kīlauea Visitor Center to other buildings within the park so that interpretive and visitor use functions could be consolidated at the visitor center.
- At Kahuku, the park will continue to maintain and upgrade when necessary, existing infrastructure in lower Kahuku and continue to use existing buildings for office space and storage. The park will also adaptively reuse the existing developed area in lower Kahuku for a mix of visitor services and administrative and operational use as needed. Any new development in Kahuku will occur in the existing developed footprint.

Transportation and Access

- All park roads will be maintained to provide for a safe driving experience, consistent with the park setting to ensure a park-like and scenic driving experience. Historic road alignments and built features that define the period of significance of the roads will be maintained to the extent possible.

- The park will continue to maintain parking areas and turnouts with upgrades as needed. Existing parking areas could be expanded or new smaller parking areas could be developed to facilitate visitor access in keeping with the existing road history and character defining features. Some parking areas could also be reduced or removed out of concern for park resources.
- The park will strive to maintain and improve visitor access for both vehicles and bicycles. This improved access could involve exploring the use of utility corridors or other existing unpaved areas in the park, especially for bicycles.
- The first focus for managing congestion and reducing private vehicle use will be guided by information management, such as educating visitors about when to visit locations that may be crowded, and park policies to control congestion. Intelligent transportation systems (ITS) will be another tool or element of this strategy. New restrictions or management of vehicles on some roads will be implemented, such as implementing size limits (no vehicles greater than 98 inches in width or over 38 feet in length) and testing one-way traffic for large commercial buses within a pilot program on part of Crater Rim Drive if it re-opens. Continuation of a shuttle (non-mandatory) will be evaluated after completion of the pilot project.
- Some road connections previously lost to lava could be restored and the park will strive to reopen roads impacted by lava, seismic activity, eruptive events, or other acts of nature when feasible.

Partnerships

- The park will continue to maintain existing partnerships with agencies and organizations that are key to the park’s mission.
- The park will foster and expand partnerships with local and regional communities, organizations, nonprofits, and businesses; Native Hawaiian communities; adjacent landowners; local, state, and federal agencies; and other interested groups or organizations in efforts to support the purpose and significance of Hawai‘i Volcanoes National Park.
- As a way to involve local participation, the park will promote community and school involvement in traditional practices and environmental service projects.

Climate Change and Sustainability

- The park will continue to implement the climate action plan for Hawai‘i Volcanoes National Park and participate in the Climate Friendly Parks program. The park will strive for increased energy efficiency, conservation, and sustainability in development of facilities and will give priority to green facility design for any new construction, retrofitting, and upgrading of facilities to the greatest extent possible. Increased reliance will be placed by the park on temporary and movable facilities to improve flexibility for both visitors and operations during periods of eruptive activity.
- Contractors and concessioners will be encouraged to reduce their own greenhouse gas emissions, particularly during their operations in the park, by using sustainable practices, purchasing local products, and using vehicles with alternative fuels.
- The park will serve as a model for climate change adaptation by supporting climate change-related research, adapting management activities based on climate projections, and building resilience among populations of rare native species, communities, and ecosystems. Examples include long-term weather monitoring of park ecosystems, establishing wildlife corridors through restoration of forest fragments, and expanding populations of rare species throughout their former range.

Wilderness Study

The selected action also includes the proposal to designate as wilderness all of the lands found eligible in the Kahuku Unit (121,015 acres (GIS)) as a natural extension of the existing wilderness within the park. This designation of wilderness at Kahuku will further the conservation vision for high-elevation protection of natural and cultural resources and will create connectivity for park wilderness that will span from the summit of Mauna Loa Volcano all the way down its massive Southwest Rift. Consistent with

NPS policy, the park will continue to manage these proposed eligible lands for their wilderness qualities prior to formal designation. Additional information including implications for managing lands proposed for wilderness can be found in Chapter 4 of the Draft GMP/WS/EIS.

OTHER ALTERNATIVES CONSIDERED

The *Hawai'i Volcanoes National Park Abbreviated Final General Management Plan / Wilderness Study / Environmental Impact Statement* and its incorporated language from the Draft GMP/WS/EIS describes a no-action alternative and one other action alternative, each of which are summarized below.

Alternative 1 (no-action) assumes that existing programming, facilities, staffing, and funding would generally continue at current levels to protect the values of Hawai'i Volcanoes National Park. There would be no major changes in current management or visitor use, and implementation of currently approved plans would continue as funding allows.

Alternative 3 emphasizes building new connections with the park, primarily through expanded education and hands-on stewardship opportunities. As in the selected action, this alternative emphasizes the park's role as a refuge and haven for native biota, people, and cultures in a world constantly adapting to volcanic activity and island-building processes and emphasizes Native Hawaiian values such as mālama 'āina (nourishing or taking care of the land) and kuleana (responsibility) as important concepts in park stewardship of resources. Although Alternatives 2 and 3 have similar guidance for managing natural and cultural resources in the park, they differ significantly on proposed developments within the park for managing visitor use and enhancing the visitor experience. For example, Alternative 3 would maintain the closure along Crater Rim Drive and use shuttles as the primary methods for transportation and managing congestion whereas the selected action (Alternative 2) will reopen Crater Rim Drive to two way traffic assuming eruptive activity ceases or changes in Halema'uma'u Crater and the park determines through active monitoring that air quality and other hazards are at a level that is consistent with general visitor use. Recreational opportunities in Kahuku would also be more primitive and limited than in the selected action, and Alternative 3 would prohibit commercial use in Kahuku whereas the selected action allows for this use. Alternative 3 also focuses more on guided-only access in key areas.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

In accordance with NPS Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making, the National Park Service is required to identify the environmentally preferable alternative in environmental documents. Guidance from the Council on Environmental Quality states that the environmentally preferable 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 (46 FR18026 – 46 FR18038)."

The National Park Service has determined that Alternative 2, the selected action is also the environmentally preferable alternative. This alternative best satisfies the national environmental goals by providing the highest level of protection of natural and cultural resources while concurrently providing for a wide range of neutral and beneficial uses of the environment. While both of the action alternatives would provide a high level of protection of natural, cultural, and wilderness resources, the selected action provides a wider range of visitor, educational, and research opportunities than Alternative 3, while at the same time proactively ensuring the protection of natural, cultural, and wilderness resources within the park. Although the park would continue to protect natural and cultural resources under Alternative 1, the NPS would be limited in its ability to address current issues related to resource damage in the park – such

as visitor congestion near Thurston Lava Tube – and would not have proactive tools on hand to ensure the future protection of resources – particularly within Kahuku as the area becomes more accessible to the public.

BASIS FOR DECISION

In reaching its decision to select the preferred alternative for implementation, the NPS considered the purposes for which Hawai‘i Volcanoes National Park was established and other laws and policies that apply to lands in Hawai‘i Volcanoes National Park, including the Organic Act, the Wilderness Act, National Environmental Policy Act and NPS Management Policies (2006). The NPS also carefully considered public comments received during the planning process. This alternative best complies with NPS management policies, and best meets the management objectives to preserve the natural, cultural, and wilderness resources at Hawai‘i Volcanoes National Park while also providing increased opportunities for public use and enjoyment of the park.

The National Park Service has determined that the selected action:

- Continues to provide for the long-term protection and preservation of the park’s natural, cultural, and wilderness resources.
- Enhances the park’s management of visitor use in different areas of the park through the implementation of management zoning.
- Provides strategies for addressing vehicular congestion along Crater Rim Drive, particularly near Thurston Lava Tube.
- Expands educational and recreational opportunities throughout the park by providing new visitor facilities and limited commercial services in key locations, while minimizing impacts on park resources as much as possible.
- Addresses resource concerns within and increases opportunities for the public to access Kahuku, acquired by the park in 2003.
- Provides new opportunities for education and research in the park.
- Provides functional and flexible guidance for providing visitor services within a park that is located on two of the world’s most active shield volcanoes.
- Makes park operations more sustainable.
- Provides guidance on managing commercial services within the park.
- Provides additional opportunities to protect natural and cultural resources on adjacent lands through recommended boundary adjustments.
- Protects wilderness character of the park through proposed wilderness designation.

The following key factors support implementation of the selected action:

- The selected action has a high likelihood of achieving the expressed purpose and goals as articulated in the Draft GMP/WS/EIS.
- The selected action is fully compliant with the mission of the NPS, its policies, and other pertinent laws and regulations.
- The selected action specifies all feasible and prudent measures to minimize environmental harm.
- The selected action was crafted through many years of public involvement and agency coordination.
- The environmental analyses demonstrate that the selected action will have beneficial effects on wilderness character and short- and long-term negligible to moderate beneficial and adverse impacts to natural and cultural resources. This alternative could also have major beneficial effects on visitor use and experience in the park given plans for expanded opportunities at Kahuku.

MEASURES TO MINIMIZE ENVIRONMENTAL HARM

Attachment A summarizes the best management practices, monitoring and mitigation measures that will be used to avoid or minimize environmental harm associated with the management actions that will be implemented under this decision. All practical means to avoid and/or minimize environmental harm from the selected action have been adopted.

PUBLIC ENGAGEMENT AND AGENCY COORDINATION

The NPS provided a number of opportunities for the public to participate in the planning process, including scoping, alternatives scoping, public review on the Draft EIS, and a 30 day no-action period following the release of the Final GMP/WS/EIS.

Public Scoping

A Notice of Intent formally initiating preparation of the environmental impact statement (EIS) and general management plan was published in the *Federal Register* on April 13, 2009 (74 FR 16888-89). The NPS also announced the public scoping period and invited public comment through newsletters, correspondence, press releases, public workshops, informal meetings, the NPS Planning, Environment, and Public Comment (PEPC) website, and a *Federal Register* notice. The public scoping process began in spring of 2009 with distribution of an initial newsletter announcing the start of the planning process and soliciting feedback on issues to be addressed in the plan. A comprehensive scoping outreach effort was planned to elicit early public comment regarding issues and concerns, the nature and extent of potential environmental impacts, and possible alternatives that should be addressed in the preparation of the GMP. NPS staff produced and mailed a newsletter to approximately 710 individuals and entities on the mailing list. Overall, more than 8,500 newsletters were mailed or distributed during initial scoping.

Agencies, organizations, governmental representatives, and Native Hawaiian organizations were sent letters of invitation to attend the public workshops or individual meetings. Press releases were distributed to local and regional news media. The project was launched on the NPS Planning, Environment, and Public Comment (PEPC) website: <http://parkplanning.nps.gov/havo>, providing access to information about the Hawai'i Volcanoes National Park GMP and a method for taking public comments. News articles featuring the public open house meetings were written in the West Hawai'i Today, Hawai'i Tribune Herald, and the Ka'ū Calendar, as well as public service announcements on local radio stations. The public was invited to submit comments by regular mail, online, at open house meetings, and at individual meetings.

The NPS held seven public open house meetings on the islands of Hawai'i, O'ahu and Maui in April and May 2009 to provide the public with an opportunity to learn about the general management planning project and to offer comments. The park also conducted several stakeholder meetings to obtain input from representatives of city, county, and federal agencies, business and community organizations, Native Hawaiian organizations, and research permit holders. Park staff also gave poster presentation at local meetings of the Ka'ū Chamber of Commerce, Volcano Community Association, and Friends of Hawai'i Volcanoes National Park. During the 2009 initial scoping period, the park planning team spoke with approximately 400 people at public and stakeholder meetings and approximately 1,500 people at park and community tabling events.

During the scoping period, the NPS received correspondence from over 130 individuals and organizations that provided a total of over 1,250 specific comments. All comments received were reviewed and considered by the NPS interdisciplinary planning team for the preparation of the GMP/WS/EIS.

A Notice of Intent to Expand Scope of the EIS was published in the *Federal Register* on December 2, 2011 (76 FR 5557-58). The EIS was expanded to include a wilderness study which is an evaluation of foreseeable effects associated with possible designation of wilderness within the park. This Notice of Intent also formally extended the GMP preliminary alternatives comment period to January 2, 2012 in order to gain additional input on wilderness, including the recently evaluated wilderness-eligible lands within the Kahuku Unit.

Alternatives Scoping

The NPS conducted an additional round of public involvement at the draft alternatives phase of the planning process to ensure that the public fully comprehended the range of draft alternatives and was able to comment effectively on these draft alternatives. One of the primary purposes of this planning step was to understand the public's concerns and preferences with regard to the range of draft alternatives and to assist the planning team in refining the draft alternatives and selecting a preferred alternative. The other primary purpose of this step was to provide formal scoping for the wilderness study that was now being included in the EIS. During scoping for the wilderness study the NPS described the wilderness eligibility analysis that had been completed for the Kahuku Unit and provided opportunity for public comments to be considered for the wilderness study.

The official GMP alternatives/wilderness study scoping public process began in August 2011 when the NPS produced and mailed the Draft Alternatives Newsletter to approximately 955 contacts on Hawai'i Volcanoes National Park's mailing list and announced this planning step on the NPS website (www.nps.gov/havo and <http://parkplanning.nps.gov/havo>). The newsletter fully outlined the concepts and actions in the draft alternatives and proposed management zones. The newsletter also included information on the wilderness eligibility that was completed and the wilderness study that would be included in the GMP and analyzed under a single EIS. A planning schedule including dates, times, and locations for the public 'talk story' (open house) meetings and invited public participation and comments on the range of draft alternatives. The newsletter also contained a business reply questionnaire that asked the public to comment on the four draft alternatives. Press releases were prepared and distributed to local media in advance of the public meetings and articles were printed in three local papers: West Hawai'i Today, Hawai'i Tribune Herald, and the Ka'ū Calendar.

The NPS held three public open house meetings in August 2011 at the following locations: in the park, and in the towns of Pāhoā and Na'alehu. The park also held two stakeholder meetings in the park. A total of 66 people participated in the public open house and stakeholder meetings and provided oral comments.

During the public comment period, the NPS received a total of 72 written responses in the form of letters, e-mails, comment forms, and comments submitted on the NPS Planning, Environment, and Public Comment (PEPC) website. A total of 709 individual comments were received on the draft alternatives and covered a broad range of topics, issues, and recommendations for Hawai'i Volcanoes National Park. All comments received were again reviewed and considered by the NPS interdisciplinary planning team for the preparation of the Draft GMP/WS/EIS. A summary of public comments on the preliminary alternatives and wilderness study scoping was created and made available to the public in February 2012 on the park's website, in PEPC, and through a postcard mailed to 830 names on the park's mailing list.

Draft Environmental Impact Statement Public Review

The Environmental Protection Agency (EPA) announced the release of the *Hawai'i Volcanoes National Park Draft General Management Plan / Wilderness Study / Environmental Impact Statement* on May 1, 2015 for a 60 day public review extending through July 30, 2015. The NPS announced the public release of the Draft GMP/WS/EIS and invited public comment through a notice of availability in the *Federal*

Register, (published May 6, 2015), as well as press releases, website postings, mailings, social media, and a public talk story session (public meeting) and formal wilderness hearing.

The press release announcing availability of the DEIS was distributed to local and regional news media on April 30, 2015, and the draft plan and information about how to provide public comments were made available on both the park and the NPS and Planning, Environment, and Public Comment websites (www.nps.gov/havo and <http://parkplanning.nps.gov/havogmp>) on May 1, 2015. The project site on the PEPC website (<http://parkplanning.nps.gov/havogmp>) also included a venue to accept public comments. In late April 2015, the NPS distributed approximately 107 paper and digital copies of the complete Draft GMP/WS/EIS to state congressional offices, Native Hawaiians individuals and organizations, governmental agencies, and other interested organizations and individuals. The NPS also produced and mailed the Draft GMP/WS/EIS Executive Summary Newsletter #4 to over 800 contacts on the park's mailing list. The newsletter fully outlined the three alternatives in the plan and encouraged the public to participate in the planning process.

The NPS also held a talk story session and formal wilderness hearing on June 10, 2015 at the Kīlauea Visitor Center to share information, answer questions, and take public comment. Approximately 20 people participated in these meetings and provided oral comments. This talk story session and wilderness hearing was announced via the newsletter, the project website, social media, and a separate press release that was distributed to media on June 5, 2015.

Throughout the public review period, the public had opportunities to provide comments through attending the talk story session and wilderness hearing, submitting comments on the project website in PEPC, writing a letter or e-mail, or providing comments on the postage paid comment form enclosed in the newsletter. Contact information for the public to either request more planning materials and/or comment on the draft plan was printed in the newsletter and available on the web.

During the public review period, the NPS received approximately 32 responses in the form of letters, comment cards, phone calls, and comments submitted on the NPS Planning, Environment, and Public Comment (PEPC) website. Of the comments received, two were from businesses, two were from non-profit conservation organizations, and two were from other federal agencies. No form letters were submitted.

Final Environmental Impact Statement No-Action Period

Initiated by the EPA's notice of filing, as well as the NPS's notice of availability, both published in the *Federal Register* on March 11, 2016, the *Hawai'i Volcanoes National Park General Management Plan / Wilderness Study / Final Environmental Impact Statement* was made available for public inspection during a minimum 30 day no-action period.

Given that comments received on the Draft GMP/WS/EIS required only minor changes involving only factual corrections or explanations of why comments did not warrant further response, the NPS issued an abbreviated, rather than full, final GMP/WS/EIS which includes a summary of the public review process for the Draft GMP/WS/EIS, the NPS responses to public comments, errata detailing editorial changes to the Draft GMP/WS/EIS, and copies of comment letters from agencies, business, and other organizations. The material included in the Final EIS/GMP/WS, combined with the Draft GMP/WS/EIS, constitutes the complete and final documentation upon which this record of decision is based.

On March 10, 2016, the NPS mailed the Final EIS/ GMP/WS (or a CD-ROM version of the document) to approximately 75 members of the county, state, and federal delegation; 25 Native Hawaiian groups; four state and federal agencies; and 13 public libraries on Hawai'i Island. The NPS also distributed a letter to

approximately 825 members of the public (via mail and e-mail) announcing the availability of the document and providing information about how to access the Draft and Final EIS/GMP/WS. Twenty-two additional copies of the document were mailed to Native Hawaiian individuals and organizations on March 14, 2016 due to a printing error in the initial CD-ROM that delayed this distribution.

During this no-action period, 10 pieces of correspondence were received. No substantive new environmental information was provided in these correspondences.

Consultation and Coordination

U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration

In compliance with Section 7 of the Endangered Species Act, the NPS initiated informal consultation on the GMP/WS/EIS with the United States Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) on May 1, 2015 at which time the NPS sent both agencies a physical and electronic copy of the Draft GMP/WS/EIS and a request for concurrence with the determinations that the GMP “may affect, but not is not likely to adversely affect” federally listed species. The NPS provided clarifying information on October 29, 2015. Given that the GMP/WS/EIS is a programmatic planning document that lacks site-specific management actions, consultation will occur, as needed for individual projects tiered from the selected action as they are implemented in the future. The USFWS concurred with the NPS’ findings in a letter dated November 2, 2015. No response was received from NOAA.

Hawai‘i State Historic Preservation Division and Native Hawaiian Consultation

The park consulted with Native Hawaiians throughout the planning process through a number of meetings and mailings, including the distribution of the Draft GMP/WS/EIS in May 2015 and the Abbreviated Final GMP/WS/EIS in March 2016 to affected/concerned Native Hawaiian organizations, the park’s Kupuna Consultation Group, the Hawai‘i State Historic Preservation Division, and the Advisory Council on Historic Preservation for review and comment related to compliance with Section 106 of the National Historic Preservation Act.

That said, there is not enough information at this time to identify an undertaking-determined area of potential effect or make a determination of effect consistent with Section 106 of the National Historic Preservation Act of 1966 (as amended, 16 U.S.C. 470-470w-6) for the actions related to historic properties. Undertakings that have the potential to effect resources eligible for or listed on the National Register of Historic Places (such as, ground disturbing construction activities for developing visitor facilities at Kahuku, capital improvements at Kilauea Military Camp, or undertakings related to the implementation of the *Archeological Preservation Plan for Kealakomo Ahupua ‘a*) will fulfill all procedural requirements specified in 36 CFR 800 (as amended in August, 2004). As more information is available, NPS staff will continue to consult with the SHPD.

In the interim, no historic properties will be inalterably changed without consultation with the State Historic Preservation Division and the Advisory Council on Historic Preservation, as appropriate. Archeological sites will be protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable, and when disturbance is unavoidable appropriate treatment will follow with consultation as per the National Historic Preservation Act.

CONCLUSION

Among the alternatives considered, the Selected Action best protects the resources and values of Hawai'i Volcanoes National Park while also improving the range of high quality visitor experiences. It fulfills the purpose and need for the GMP, and the statutory and policy requirements for managing Hawai'i Volcanoes National Park, as well as national environmental policy goals.

Approved:

Patricia L. Neubacher

Date:

5/24/16

Patricia L. Neubacher
Acting Regional Director, Pacific West

ATTACHMENT A. MEASURES TO MINIMIZE ENVIRONMENTAL HARM

Mitigation measures are the practicable and appropriate methods that will be used under any alternative to avoid and/or minimize harm to natural and cultural resources, wilderness, visitors and the visitor experience, and socioeconomic resources when no other management alternative exists (such as avoidance). These mitigation measures have been developed using existing laws and regulations, best management practices, conservation measures, and other known techniques from past and present work in and around Hawai'i Volcanoes National Park.

Cultural Resources

General

- Avoid adverse impacts on historic properties listed in, determined eligible for listing in, or not yet assessed for eligibility to the National Register of Historic Places, if possible. If adverse impacts could not be avoided, develop an assessment of effect and a treatment plan, if necessary, through a consultation process with all interested parties. In accordance with *NPS Management Policies 2006*, assess proposed adverse effects to determine whether the proposed actions constitute impairment of significant fundamental cultural resources.
- Continue to develop inventories for and oversee research about archeological, historic, and ethnographic resources to better understand and manage the resources, including historic cultural and ethnographic landscapes.
- Conduct any needed archeological or other resource-specific surveys, national register evaluations, and identify recommended treatments.
- Incorporate the results of these efforts into site-specific planning and compliance documents.
- Continue to manage cultural resources and collections following federal regulations and NPS guidelines.
- Inventory the park's collection and keep in a manner that will meet NPS curatorial standards.
- Protect and maintain cultural resources in wilderness according to the pertinent laws and policies governing cultural resources, using management methods that are consistent with the preservation of wilderness character and values such as the Organic Act, the National Historic Preservation Act, the Archeological Resources Protection Act, the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, and Executive Order 13007 that addresses government-to-government consultation.

Archeological Resources

- Complete archeological surveys prior to ground disturbance for new construction or removal of eligible historic properties. Avoid known archeological resources to the greatest extent possible. If National Register listed, eligible, or unassessed archeological resources could not be avoided, develop an appropriate treatment plan in consultation with the Hawai'i State Historic Preservation Officer, National Advisory Council, and associated Native Hawaiian groups.
- Conduct archeological site monitoring and routine protection.
- Conduct data recovery excavations at archeological sites threatened with destruction, where protection or site avoidance during design and construction is infeasible.
- If previously unknown archeological resources are discovered during project work, immediately inform NPS cultural resources staff, halt all work in the immediate vicinity of the discovery, and

secure the location until the resources are identified, evaluated, and documented and an appropriate treatment plan is developed, if necessary, in consultation with the Hawai‘i State Historic Preservation Officer and associated Native Hawaiian groups.

- Encourage visitors through the park’s interpretive programs to respect and leave undisturbed any inadvertently encountered archeological resources and respect and leave undisturbed any offerings placed by Native Hawaiians.

Historic Buildings and Structures

- Conduct all project work relating to historic structures/buildings in accordance with Director’s Order 28 and the guidelines and recommendations of the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*.
- Rehabilitate and adaptively reuse structures wherever feasible.
- Design any new development to be compatible with surrounding historic properties
- Screen new development from surrounding historic resources to minimize impacts on viewsheds, cultural landscapes, and ethnographic resources.
- Maintain and stabilize historic structures until appropriate preservation maintenance can be undertaken. Benign neglect will not be considered an appropriate management strategy.
- Do not remove or allow a National Register listed or eligible structure to decay naturally without prior review by park and region cultural resource specialists, including approval by the NPS regional director and consultation with the Hawai‘i State Historic Preservation Officer. Before a National Register listed or eligible structure is removed, prepare appropriate documentation recording the structure in accordance with Section 110(b) of the National Historic Preservation Act, and submit the documentation to the Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER) or Historic American Landscape Survey (HALS) program, if deemed appropriate.
- Protect and maintain historic structures that are within designated wilderness areas according to the pertinent laws and policies governing cultural resources using management methods that are consistent with the preservation of wilderness character and values. Laws pertaining to historic preservation remain applicable within wilderness but must generally be administered to preserve the area’s wilderness character. Consultation of treatment will include appropriate consideration of the application of the provisions of the Wilderness Act in analyses and decision-making concerning cultural resources.

Cultural Landscapes

- Conduct all project work relating to cultural landscapes in accordance with Director’s Order 28 and the guidelines and recommendations of the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.
- Design new development to be compatible with surrounding historic properties.
- Screen new development from surrounding cultural landscapes to minimize impacts on those landscapes and viewsheds.

Ethnographic Resources

- Continue to consult with Native Hawaiian groups to identify ethnographic resources and develop appropriate strategies to mitigate impacts on these resources.
- Continue to provide access to traditional use or spiritual areas.

- Screen new development from traditional use areas to minimize impacts on ethnographic resources.
- Consult with Native Hawaiians linked by ties of kinship, culture, or history to park lands to address any inadvertent discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony.
- Follow all provisions outlined in the Native American Graves Protection and Repatriation Act of 1990.

Museum Collections

- Conserve all collections through proper storage, handling, and exhibit of objects as specified in the NPS *Museum Handbook* and NPS Director's Order 24, "NPS Museum Collections Management". This will include artifacts used in exhibits in the visitor centers.

Natural Resources

Air Quality

- Implement a dust abatement program including the following potential actions: water or otherwise stabilize soils, cover haul trucks, employ speed limits on unpaved roads, minimize vegetation clearing, and revegetate with native species.
- Minimize NPS vehicle emissions by using the best available technology whenever possible.
- Encourage the public and commercial tour companies to employ methods that reduce emissions.
- Employ sustainable designs that reduce energy demands, thus reducing pollutant production.

Soundscapes and the Acoustic Environment

- Implement standard noise abatement measures during NPS operations, including: scheduling to minimize impacts in noise-sensitive areas, using the best available noise control techniques wherever feasible, using hand tools or hydraulically or electrically powered impact tools when feasible, and locating stationary noise sources as far from sensitive areas as possible.
- Site and design facilities to minimize objectionable noise.
- Minimize idling of motors when power tools, equipment, and vehicles are not in use.
- Muffle above ambient noise whenever possible to reduce noise impacts.

Lightscaapes and Night Skies

- Light only where and when it is needed.
- Shield lights and direct them downward.
- Use minimum amount of light necessary.
- Consider alternatives to the use of artificial lighting such as reflective surface walkways, reflective signage, or guidance to use hand held lighting devices.
- Replace existing outdoor lighting with fixtures that do not contribute to nighttime light pollution.
- Install energy-efficient lights equipped with timers and/or motion detectors so that light will only be provided when it is needed to move safely between locations.
- Use low-impact lighting, such as diffused light bulbs, and techniques such as downlighting in outdoor fixtures, to prevent light spill and preserve the natural lightscape and avoid light pollution. Select lamps with warmer colors (less blue light).
- Limit use of personal lighting (flashlights) when required for safe movement and work and/or modified (such as using red or blue lightbulbs as opposed to white) to protect wildlife.

Soils

- Build new facilities on soils suitable for development. Minimize soil erosion by limiting the time that soil is left exposed and by applying erosion control measures, such as erosion matting, silt fencing, and sedimentation basins in construction areas to reduce erosion, surface scouring, and discharge to water bodies. Once work was completed, revegetate construction areas with native plants in a timely period.
- Place construction equipment in previously disturbed areas.
- Locate trails on soils with low erosion hazards and small changes in slope and develop proper signs to minimize social trails to the extent possible.
- Ensure proper drainage of parking areas.

Water Resources

- To prevent water pollution during construction, use erosion control measures, minimize discharge to water bodies and washes, and regularly inspect construction equipment for leaks of petroleum and other chemicals.
- Build a runoff containment filtration system to minimize water pollution from larger parking areas.
- Include ways to minimize damage from runoff in parking area designs. Parking areas could include detention basins, runoff filtration, and/or could be sited away from drainage.

Vegetation

- Monitor areas used by visitors (e.g., trails and campsites) for signs of native vegetation disturbance. Use public education, revegetation of disturbed areas with native plants, erosion control measures, and barriers to control potential impacts on plants from erosion or social trails.
- Avoid impacts by relocating project sites when possible.
- Develop revegetation plans for disturbed areas and require the use of genetically appropriate native species. Revegetation plans should specify species to be used, seed/plant source, seed/plant mixes, site-specific restoration conditions, soil preparation, erosion control, and ongoing maintenance and monitoring requirements, etc. Salvaged vegetation should be used to the extent possible.
- Survey for rare plants prior to any ground-disturbing activities; disturbance to rare or unique vegetation will be avoided to the greatest extent possible. Consult with the USFWS for projects where listed species and their habitats occur.
- Implement an invasive, nonnative plant management program. Standard measures could include the following elements: use only weed-free materials for road and trail construction, repair, and maintenance; ensure equipment arrives on-site free of mud or seed-bearing material; certify all seeds and straw material as weed-free; identify areas of invasive plants pre-project; monitor and treat invasive plants or invasive plant topsoil before construction (e.g., topsoil segregation, storage, herbicide treatment); when depositing ditch spoils along the roads, limit the movement of material to as close as possible to the excavation-site; scrupulously and regularly monitor and clean areas that serve as introduction points for invasive plants (campgrounds, staging areas, maintenance areas, and corrals); revegetate with genetically appropriate native species; inspect rock and gravel sources to ensure these areas are free of invasive plant species; and monitor locations of ground-disturbing operations followed by appropriate invasive plant control actions for at least three years following the completion of projects.

Wildlife

- Employ techniques to reduce or avoid impacts to fish and wildlife, including visitor education programs, restrictions on visitor and NPS activities, and law enforcement patrols.
- Implement a wildlife protection program. Standard measures will include project scheduling (season and/or time of day), project monitoring, biological monitoring, erosion and sediment control, fencing or other means to protect sensitive resources adjacent to project areas, disposing of all food-related items or rubbish, salvaging topsoil, and revegetating. This could include specific construction monitoring by resource specialists as well as treatment and reporting procedures. Consider relocation of facilities to avoid impacts, temporary closures, and group size limits to mitigate impacts. Also include management of artificial light and sound to avoid adverse impacts to wildlife.

Special Status Species

- Mitigative actions will occur during normal park operations as well as before, during, and after construction to minimize immediate and long-term impacts on rare, threatened, and endangered species and their habitat. These actions will vary by specific project and area of the national park affected, and additional mitigations will be added depending on the specific action and location.
- Conduct surveys for rare, threatened, and endangered species as warranted.
- Locate and design facilities/actions to avoid adverse effects on rare, threatened, and endangered species and their habitat. If avoidance is infeasible, minimize and compensate for adverse effects on rare, threatened, and endangered species as appropriate and in consultation with the appropriate resource agencies. Conduct work outside of critical periods for the specific species.
- Develop and implement restoration and/or monitoring plans as warranted. Plans should include methods for implementation, performance standards, monitoring criteria, and adaptive management techniques.
- Implement measures to reduce adverse effects of nonnative plants and wildlife on rare, threatened, and endangered species and their habitat.
- Carry out surveys and monitoring for special status species.
- Protect and preserve critical habitat features, such as nest trees and key host plants, whenever possible.

Management and Protection of Wilderness Values

- Develop specific desired conditions in the park's future wilderness stewardship plan for wilderness resources, visitor experiences, and management protocols.
- Develop standards and guidelines establishing acceptable limits of change and mitigation measures for wilderness within a future wilderness stewardship plan.
- Conduct monitoring to ensure that conditions are meeting established standards and to determine if mitigation measures have been successful.
- Apply the minimum requirement process to all proposed management actions that might affect wilderness and potential wilderness in order to develop, evaluate, and select the actions that will be the least intrusive on wilderness character and values, while allowing necessary administration of the wilderness.

Scenic Resources

- Where appropriate, use facilities such as boardwalks and fences to route people away from sensitive natural and cultural resources while still permitting access to important viewpoints.

- Design, site, and construct facilities to minimize adverse effects on natural and cultural resources and visual intrusion.
- Provide vegetative screening, where appropriate.
- Implement vegetation management which could include selective clearing to manage or improve important viewpoints and viewsheds while minimizing impacts to native vegetation and wildlife habitat.

Socioeconomic Environment

- During future planning and implementation of the general management plan, the NPS will pursue partnerships with Native Hawaiian organizations, local communities, and county governments to further identify potential impacts and mitigating measures that will best serve the interests and concerns of both the NPS and the local communities.

Sustainable Design and Aesthetics

- Use sustainable practices in the selection of building materials and sources and building location and siting. Sustainable practices and resources will be used whenever practicable by recycling and reusing materials, by minimizing materials, by minimizing energy consumption during the project, and by minimizing energy consumption throughout the lifespan of the project.
- Develop design standards specific to the park in all repair, rehabilitation, and construction projects.

Visitor Safety and Experiences

- Consider accessibility in each project to understand barriers to programs and facilities. Provide the maximum level of accessibility.
- Implement adaptive visitor use management, as outlined in the user capacity section of this plan, when resource and visitor experience conditions are trending towards or violating a user capacity standard. Management strategies may include visitor education, site management, visitor use regulations, rationing or reallocation of visitor use, and enforcement.
- Consider visitor safety in all planning and projects.
- Consider using the principles of Operational Leadership in planning safe visitor access to park features.

Hazardous Materials

- Implement a spill prevention and pollution control program for hazardous materials. Standard measures could include hazardous materials storage and handling procedures; spill containment, cleanup, and reporting procedures; and limitation of refueling and other hazardous activities to upland/non-sensitive sites.

DETERMINATION OF NON-IMPAIRMENT

General Management Plan

Hawai'i Volcanoes National Park

The Prohibition on Impairment of Park Resources and Values

NPS Management Policies 2006, § 1.4.4 explains the prohibition on impairment of park resources and values: “While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the 1916 Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.”

What is Impairment?

As defined by NPS Management Policies 2006, impairment “is an 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 will be present for the enjoyment of those resources or values” (§1.4.5 and §1.4.6). §1.4.5 of Management Policies 2006 furthermore clarifies that, “An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified as a goal in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact will be less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated.”

Per §1.4.6 of Management Policies 2006, park resources and values that are subject to the non-impairment standard include:

- “the park's scenery, natural and historic objects, and wildlife, and the processes and condition that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structure, and objects; museum collections; and native plants and animals;
- appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;
- the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and

- any additional attributes encompassed by the specific values and purposes for which the park was established.”

Impairment could result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. Impairment could also result from sources or activities outside the park, but this will not be a violation of the 1916 Organic Act unless the NPS was in some way responsible for the action.

How is an Impairment Determination Made?

§ 1.4.7 of NPS Management Policies 2006 states, "In making a determination of whether there will be an impairment, an NPS decision maker must use his or her professional judgment. This means that the decision-maker must consider any environmental assessments or environmental impact statements required by the National Environmental Policy Act of 1969 (NEPA); consultations required under section 106 of the National Historic Preservation Act (NHPA); relevant scientific and scholarly studies; advice or insights offered by subject matter experts and others who have relevant knowledge or experience; and the results of civic engagement and public involvement activities relating to the decision."

Management Policies 2006 further define "professional judgment" as "a decision or opinion that is shaped by study and analysis and full consideration of all the relevant facts, and that takes into account:

- the decision-maker's education, training, and experience;
- advice or insights offered by subject matter experts and others who have relevant knowledge and experience;
- good science and scholarship; and, whenever appropriate,
- the results of civic engagement and public involvement activities relating to the decision” (Glossary).

Impairment Determination for the Selected Action

This determination of non-impairment has been prepared for the selected action as summarized in the Record of Decision and described further in Alternative 2 of Draft GMP/WS/EIS as amended by the errata in the Abbreviated Final GMP/WS/EIS. This determination is provided for the following analyzed impact topics: geologic resources, vegetation, native wildlife and wildlife habitat, special status species, wilderness, soundscapes and the acoustic environment, archeological resources, historic structures and cultural landscapes, and ethnographic resources. No impairment determination is provided for the following impact topics: visitor use and experience, transportation and access, socioeconomics, park operations, and greenhouse gas emissions, climate change, and sustainability as these impact topics are not generally considered to be park resources or values protected by the 1916 Organic Act.

Geologic Resources

The selected action will not result in impairment to geological resources within Hawai'i Volcanoes National Park because although there will be long-term minor to moderate adverse impacts to geologic resources and soils from the development of new facilities and trails in some areas, these impacts will be localized and off-set by restoration activities and improved management of visitor vehicular and foot traffic that will result in long-term minor to moderate beneficial impacts to these resources. Adverse impacts will be further mitigated by implementing best management practices that limit the developed footprint of new facilities, encourage the use of historic routes for new trails, and minimize soil erosion during construction and maintenance.

Vegetation

The selected action will not result in impairment to vegetation resources within Hawai'i Volcanoes National Park because although there will be negligible to moderate adverse impacts to vegetation from the development of new facilities and maintenance-related activities associated with roads, trails, campgrounds, and visitor use, these impacts will be localized and mostly near or in previously disturbed areas. These adverse impacts will be further mitigated by implementing best management practices associated with site-specific developments and ongoing restoration activities within the park.

Native Wildlife and Wildlife Habitat

The selected action will not result in impairment to wildlife and wildlife habitat in Hawai'i Volcanoes National Park because although there will be negligible to moderate adverse impacts to wildlife habitat from some improvements and expansions to facilities within the park, these impacts will be limited in scope and mitigated by appropriate site-specific planning. Furthermore, wildlife populations and habitats within the park will experience long term minor to major benefits from improved management of visitor traffic, ongoing restoration activities, improved soundscape management, and specific actions related to population recovery.

Special Status Species

Although special status species could be impacted by inadvertent, short-term disturbances from activities implemented through the GMP such as trail and facility improvements, the selected action will not result in impairment to rare, threatened, and endangered species in *Hawai'i Volcanoes National Park* due to ongoing monitoring, mitigations, and the implementation of best management practices. In fact, if during future planning, impacts to special status species cannot be avoided, the National Park Service will consult with the US Fish and Wildlife Service to ensure that potential impacts are identified, avoided where feasible, and mitigation measures developed to protect these species. In addition, the 60 federally-listed species in the park will continue to be protected through seasonal closures where appropriate, continued restoration of habitat, management of detrimental nonnative species, and by virtue of the area's protected status as a unit of the National Park Service.

Wilderness

While ongoing management actions such as the removal of invasive plants and animals, restoration of native species, fire suppression, and use of motorized equipment for administrative purposes may result in short-term adverse impacts to wilderness character, the selected action will provide long-term benefits to the wilderness resources at Hawai'i Volcanoes National Park through the restoration actions to maintain or improve important attributes of wilderness character. Furthermore, the recommendation to designate an additional 121,015 acres within the park as wilderness attests to the long-term commitment to manage and protect these lands for their wilderness values. Whereas adverse impacts will be transitory and are ranging from minor to moderate, the selected action will have long-term beneficial effects on wilderness resources.

Soundscapes and the Acoustic Environment

The selected action will not result in impairment to soundscapes and the acoustic environment in Hawai'i Volcanoes National Park as the NPS will expand active management of human-caused sounds within the park and will implement a soundscape monitoring program to monitor and protect these resources. While human-caused sounds may increase, particularly in the frontcountry areas, under the selected action from expanded visitor services, increased visitation levels, and ongoing management actions, the park will actively implement best management practices and educational tools to reduce and mitigate these impacts, resulting in long-term minor to moderate beneficial impacts on the park's soundscapes and acoustic environment. Natural sounds will therefore continue to prevail under the selected action.

Archeological Resources

Although new trails and expanded visitor facilities outlined in the selected action will have negligible to minor adverse impacts on archeological resources, these impacts will be largely mitigated through proper planning, and the selected action will therefore not result in impairment to archeological resources within Hawai'i Volcanoes National Park. Furthermore, there will be long-term moderate beneficial impacts to archeological resources from the enhanced ability to document these resources which will ensure protective actions can be taken when implementing future actions in the park.

Historic Structures/Cultural Landscapes

The selected action will not result in impairment to historic structures and cultural landscapes in Hawai'i Volcanoes National Park because additional site-specific planning will be conducted to ensure any improvements from the selected action do not impact the integrity of the historic roads, trails, and other cultural resources. Mitigations will also be implemented where necessary to protect these resources. While some adverse impacts are anticipated, the selected action will contribute very little to adverse cumulative effects and will instead contribute modestly to the overall beneficial cumulative effects from implementation.

Ethnographic Resources

The selected action will not result in impairment to ethnographic resources in Hawai'i Volcanoes National Park. Although the selected action will likely have negligible to minor long-term adverse impacts on site-specific ethnographic resources in the park due to the development of new trails, impacts to these resources will largely be beneficial as the selected action will enhance knowledge, management, and protection of ethnographic resources, resulting in minor to moderate beneficial long-term impacts to these resources as a whole.

APPENDIX B: USER CAPACITY INDICATORS AND STANDARDS

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|-----------------|---|---|---|--|--|--|--|
| NATURAL | | | | | | | |
| Informal trails | Number of informal trails leaving designated trail (measured every mile). | This indicator measures multiple issues of concern including vegetation trampling, soil compaction, spread of invasives, habitat fragmentation, safety concerns, visitor experience, degradation of cultural resources, wilderness character, and contact with sensitive resources. Also relates to impacts on threatened and endangered (T&E) species habitat. | Wild/ Primitive Zone | No more than one informal trail leaving designated trail per 1-mile measurement. | The standard would be based on sensitivity of resource, amount of use, and tolerance of impact. There would be a range of acceptance depending upon site, area, or zone. | <ul style="list-style-type: none"> Educate visitors regarding sensitive resources and staying on trails. Improve trail identification and signage. Rehabilitate informal trails as soon possible. Evaluate informal trails to determine appropriate management action. Formalize informal trails as designated trails, if appropriate. Use site management/design such as constructing boardwalks, rails, borders, and pavement to improve delineation of designated trails. Restrict off-trail travel in particularly sensitive areas. Potential area closures that may be temporary or longer duration. | The monitoring effort would follow the frequency prescribed for all front and backcountry facilities by the Facility Management Software System (FMSS) for annual condition assessments and five-year comprehensive condition assessments. |
| | Number of informal trails leaving designated trail (measured every 0.5 mile). | This indicator measures multiple issues of concern including vegetation trampling, soil compaction, spread of invasives, habitat fragmentation, safety concerns, visitor experience, degradation of cultural resources, wilderness character, and contact with sensitive resources. Also relates to impacts on T&E species habitat. | Park Support, Transitional and Visitor Services zones | No more than one informal trail leaving designated trail per 0.5-mile measurement. | There is generally a higher tolerance of visitor impact in this zone than in the Wilderness/Primitive Zone but not in specific sensitive sites within these zones. | <ul style="list-style-type: none"> Educate visitors regarding sensitive resources and staying on trails. Improve trail identification and signage. Rehabilitate informal trails as soon possible. Evaluate informal trails to determine appropriate management action. Formalize informal trails as designated trails, if appropriate. Use site management/ design such as constructing boardwalks, rails, borders, and pavement to improve delineation of designated trails. Restrict off-trail travel in particularly sensitive areas. Potential area closures that may be temporary or longer duration. | The monitoring effort would follow the frequency prescribed for all front and backcountry facilities by the Facility Management Software System (FMSS) for annual condition assessments and five-year comprehensive condition assessments. |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|-----------------------------------|---|---|--|--|---|--|--|
| Informal trails—sensitive sites | Number of informal trails leaving designated trail (measured every 0.5 mile). | This indicator measures multiple issues of concern including vegetation trampling, soil compaction, spread of invasives, habitat fragmentation, safety concerns, visitor experience, degradation of cultural resources, wilderness character, and contact with sensitive resources. Also relates to impacts on T&E species habitat. | Sensitive sites regardless of zone (‘Ola’a, Sulfur Banks, Steam Vents, Ka’ū Footprints, Puhimau, upper Kahuku) | No informal trails leaving designated trail per mile measurement. | The standard applies to the park’s most sensitive resources, so there is very low tolerance for impact. | <ul style="list-style-type: none"> Educate visitors regarding sensitive resources and staying on trails. Improve trail identification and signage. Rehabilitate informal trails as soon possible. Evaluate informal trails to determine appropriate management action. Formalize informal trails as designated trails, if appropriate. Use site management/design such as constructing board walks, rails, borders, pavement to improve delineation of designated trails. Restrict off-trail travel in particularly sensitive areas. Potential area closures that may be temporary or longer duration. | The monitoring effort would follow the frequency prescribed for all front and backcountry facilities by the Facility Management Software System (FMSS) for annual condition assessments and five-year comprehensive condition assessments. |
| Invasive plant and animal species | Number of present and abundant invasive species measured at each individual site (e.g., specific species along a segment of road corridor). | This indicator would vary depending upon landscape type, habitat, and transportation mode. This indicator would identify new species being brought into the park. | All zones | Detection of new species occurrences or spread of invasive species would trigger a management response (depends upon species). | Early detection requires early intervention. | <ul style="list-style-type: none"> Increase visitor and staff education and awareness. Implement existing protocols for eradication. Continue monitoring. Use/encourage sanitation protocols, boot cleaning stations, etc. Regulate the type and amount of activities. | Future comprehensive monitoring for invasive plant species would occur every 3–5 years, as park capacity permits. In most cases, park staff does not have the capacity to monitor for invasive invertebrates and reptiles. |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|--|--|---|-----------|--|---|--|--|
| Human-wildlife interactions | The number of incompatible interactions between humans and wildlife: see overview paragraph for species-specific indicators selected for monitoring. | Required by law and the resources are highly sensitive to impact (vulnerable given low numbers). Also related to park purpose and significance. | All zones | Every observation of interaction would trigger a management response. | Need to meet law and policy requirements, and given the sensitivity of these resources, the threshold for impact is very low. | <ul style="list-style-type: none"> Educate visitors. Evaluate each incident. Modify or reduce artificial light sources. Use of signage and/or traffic calming devices Reduce speed limits. Reduce the number or duration of visitors and staff to an area. Temporary or permanent rerouting, relocation, or closure of trails, roads, campsites, and picnic facilities. Appropriate notification and/or consultation with USFWS. | Monitoring would continuously occur via observations, and routine staff monitoring. For most species, population numbers are too low or unknown for routine monitoring to be feasible. Therefore documentation would be opportunistic. Annual monitoring is done for two endangered species throughout their breeding seasons, the nēnē (Hawaiian goose) and honu'ea (Hawksbill turtle). |
| Damage or theft of endangered or threatened plant and animal species | Incidences of damage or theft of T&E plant and animal species tracked through incident reports or staff monitoring. | Required by law and the resources are highly sensitive to impact (vulnerable given low numbers); also related to park purpose and significance. | All zones | Every incident of damage or theft would trigger a management response. | Need to meet law and policy requirements, and given the sensitivity of these resources, the threshold for impact is very low. | <ul style="list-style-type: none"> Educate visitors on the sensitivity of plant and animal species. Increase monitoring. Increase enforcement. Use protective barriers and other site management. Area closures (temporary or permanent). Relocate, if appropriate Appropriate notification and/or consultation with US. Fish and Wildlife Service. | Monitoring would continuously occur via incident reports and staff monitoring. Given the large number of listed species and limited available resources, monitoring is currently done infrequently (occurring sporadically or every few years) for most species with the exception of four flagship species (nēnē, honu'ea, 'ua'u, Ka'ū silversword). |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|--------------------------------------|--|---|-----------|---|--|--|--|
| Damage or loss of geologic resources | Observations and reports of damage or loss of significant geologic features, such as cave features, volcanic features, and products (e.g., sulfur crystals, tree molds, tree casts, etc.). | Nonrenewable (renewable in some instances) resource and related to the park purpose and significance; can be vulnerable to visitor use. | All zones | Standard will vary depending on the rarity and fragility of the features and also on the level of visitation for a given area. Threshold for impact would be low in pristine areas, especially for those features that are particularly rare or fragile, but may be higher in areas already impacted. | Potential for repeated damage once it occurs, so threshold for initial impact is low in a pristine area. Threshold may be higher in previously disturbed areas. | <ul style="list-style-type: none"> • Increase education and outreach. • Initiate monitoring and photo documentation. • Provide barriers, trail and overlook realignment, and other site management. • Area closures (temporary or permanent). | <p>Park staff would continue to track incident reports of damage and would review log quarterly. Written reports of damage from staff would also be reviewed.</p> |
| Campsite conditions | Percent of campsite expansion beyond designed campground size. | This indicator is important for protection of vegetation, soils, invasive species, habitat destruction, and visitor experience. | All zones | No more than 15% expanded footprint beyond designed campground size. | Standard based on desired backcountry campsite size and baseline conditions, but can be replicated in frontcountry campsites. Since some impact is expected given regular use of a site, it was determined that 15% above designed campsite size would allow for an acceptable amount of impact to sites of varying sizes. | <ul style="list-style-type: none"> • Educate visitors. • Better delineate campsite boundaries. • Designate campsites. • Restore disturbed areas. • Regulate use levels. • Close or relocate campsite (temporarily) with presence of T&E species. • Evaluate the ability to add an additional campsite option. | <p>Monitoring on a two-year interval would be ideal, but no less frequently than every five years.</p> |
| Fire risk | Number of human-caused fires reported. | Use data on existing fire occurrences. | All zones | No increase in the five-year average of human-caused fire incidents. | Some accidents will occur, but the goal is that fire is not increasing. | <ul style="list-style-type: none"> • Improve fire prevention with increased information, education, and signage particularly during times of very high or extreme fire danger. • Expand the types of media used to communicate fire risk. • Limit campfires. • Implement area closures. | <p>Continue to monitor weather conditions on a daily basis, fuel conditions on a monthly basis, and catalog fire occurrence with the Wildlife Fire Management Information program. Review human-caused fire trends every five years.</p> |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|-------------------------------|---|--|-----------------------------|--|--|--|---|
| Fire risk | | Fire is a significant concern at Kahuku given the landscape, pastures, and resource and visitor concerns. | Kahuku | Management action would be taken with the first report of human-caused fire. | There is no historic data for Kahuku, and we are about to introduce regular visitation to the area, so there is a need to be highly proactive in minimizing fire risk. | <ul style="list-style-type: none"> • Increase fire prevention. • Consider fire breaks, especially around high-use areas. • Stage a wildland fire engine in Kahuku for quick response. • Ensure that enough staff at Kahuku are red-card-trained to staff an engine. • Increase information, education, and signage, particularly during times of high or extreme fire danger. • Expand the types of media used to communicate fire risk. • Implement area closures. • Prohibit campfires during high-risk times. • Enforce smoking restrictions (in vehicles only). | Continue to monitor weather conditions on a daily basis, fuel conditions on a monthly basis, and catalog fire occurrence with the Wildlife Fire Management Information program. Review human-caused fire trends every five years. |
| Artificial light | Presence of artificial light at night without the appropriate mitigation. | This indicator is important because of the continuation of dark night sky, orientation for species, visitor experience, and wilderness experience. | All zones | No artificial light sources without the appropriate mitigation. | Would be mitigated as needed. | <ul style="list-style-type: none"> • Educate visitors and staff on importance of the night sky. • Mitigation could include use of different wave lengths, shielding, and redirection of artificial light. • Include artificial light guidance in permit conditions for commercial, special use, and back country. • Conduct night sky monitoring. • Give campers red cellophane to cover flashlights. | Park staff would continue to monitor incidentally when in the field. Specific monitoring strategies to be determined. |
| CULTURAL | | | | | | | |
| Damage to archeological sites | Number of incident reports of vandalism or theft per year. | Damage to archeological sites can occur through both intentional and unintentional means. Both can impact the integrity of these resources. | All zones, including Kahuku | No incidents of vandalism or theft. | Archeological sites are nonrenewable and the threshold for acceptable impact is zero tolerance. | <ul style="list-style-type: none"> • Prioritize documentation of resources in high visitor use areas. • Continue monitoring. • Educate visitors on the sensitivity of resources and the need to protect archeological sites, including the use of signage. • Target education to groups that are accessing areas with archeological sites. • Increase ranger presence or patrol. • Increase enforcement and documentation. • Reroute trails. • Create physical barriers. • Area closures. | Continue to record incidences of vandalism or theft. Review incident reports on a yearly basis. |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|-------------------------------|--|---|--|--|--|--|--|
| Damage to archeological sites | Documented changes to archeological site conditions from visitor-caused actions and disturbances, as defined in NPS Archeological Site Management Information System (ASMIS). This system includes a rating system of "good, fair, poor, and destroyed." | Damage to archeological sites can occur through both intentional and unintentional means. Both can impact the integrity of these resources. | All zones, prioritize Visitor Services Zone and Transitional Zone. | Maintain sites in a "good" condition, according to the Archeological Site Management Information System(ASMIS), with the following specific standards: Impacts directly associated with visitor use should not be a significant contributor to changing overall site condition to a lesser condition (i.e., good to fair, fair to poor, etc.) with an emphasis on maintaining sites in good condition. At sites in less than good condition, management actions should seek to improve condition at least one level. | Archeological sites are a nonrenewable resource so there is a zero tolerance for degradation based on human activity. Need to prioritize in areas of high visitor use, along trails, and along coastal areas. | <ul style="list-style-type: none"> Continue condition assessments on an interval basis and increase frequency of condition assessments if necessary. Prioritize documentation of resources in high visitor use areas. Continue monitoring. Educate visitors on the sensitivity of resources and the need to protect archeological sites, including the use of signage. Target education to groups that are accessing areas with archeological sites. Increase ranger presence or patrol. Increase enforcement and documentation. Reroute trails, if appropriate. Create physical barriers. Area closures Formalize access or take a design action to correct the problem. | Continue condition assessments on the predetermined basis designated in ASMIS. |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|---|---|--|--|--|---|---|--|
| Lack of understanding of Native Hawaiian culture | Number of actions observed at active lava flows that interfere with the natural flow of lava or create an unsafe environment (such as: trash in the area, poking sticks in lava, throwing rocks in lava, cooking marshmallows over lava). | These actions observed demonstrate a lack of understanding of Native Hawaiian culture and the significance of lava. | All zones | No more than two observed instances of behavior within an eruption ranger shift. | This is a safety concern as well, so there is a very low tolerance for this indicator. In addition, once these types of behaviors occur, other visitors are more likely to engage in these types of activities, leading to increased impact. | <ul style="list-style-type: none"> • Increase ranger presence and staffing and visitor education. • Use visitor management strategies, such as orientation before traveling to the site. • Educate visitors about expected behaviors. • Increase information on the web about how to visit the park. • Direct Native Hawaiian practitioners to areas where visitors are not present. • Consider guided-only access to some areas (very staff- intensive). • Keep visitors further away from active lava so they can see it but not be too close. | Monitoring would occur during eruption ranger shifts. |
| | Instances of non-traditional offerings that are left on the landscape. | Some offerings are considered litter and incidences of these offerings is upsetting to cultural practitioners. The offerings can also have effects on natural resources, including endangered species (nēnē eating trash, rice, etc.). | All zones, but emphasis on Visitor Services and Transitional zones | Finding no more than 10 pounds of non-traditional offerings per area per patrol over the course of a month. Nontraditional offerings are removed and recorded in terms of total pounds per patrol. | There is some tolerance and expectation for this type of impact, but it becomes more significant from a cultural resource protection and operational basis once it happens on a recurring basis. In addition, once these types of behaviors occur, other visitors are more likely to engage in these types of activities, leading to increased impact. Concerns exist about staff time and hazards associated with cleanup. | <ul style="list-style-type: none"> • Suggest and/or designate sites that are recommended for leaving all offerings; for example consider constructing a tele (altar) for offerings. • Offer traditional or culturally appropriate offerings for people to leave for Pele at the park (e.g., provide packets of salt or awa). • Increase visitor education—publish traditional offerings on the web (which can simply be a voice in prayer and leave no trace) | Monitoring would be conducted weekly according to existing park protocols. |
| Visitors impacting access for cultural practitioners (causing displacement) | Number of reports of practitioners being displaced (in visitor comments, oral reports at Kupuna meetings, third-party reporting). | Significance of the park to Native Hawaiian culture and the perpetuation of the living Hawaiian culture and place-specific cultural practices | All zones, but emphasis on Visitor Services and Transitional zones | No more than one complaint received quarterly in a given location. | Need for immediate action because of the sensitivity of the park relations to the Native Hawaiian community. | <ul style="list-style-type: none"> • Increase visitor education about Native Hawaiian cultural protocols. • Be proactive about asking if people have adequate space for cultural practices. • Offer temporary site closures for periods of time on a regular basis to ensure practices continue. | <p>Park staff are currently tracking visitor complaints.</p> <p>Park staff would continue to track visitor complaints, and would review the complaint log quarterly.</p> |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|--|--|--|---|---|---|---|---|
| Soundscapes and the Acoustic Environment | Complaints related to human-caused noise/sounds affecting a park experience (cultural practice, visitor experience). | Significance of natural sounds to the cultural landscape and Native Hawaiian significance of the land. | Visitor Services and Transitional zones | No more than five complaints received quarterly in a given location. | Complaints don't necessarily come in often so examining quarterly is reasonable. Concern about repeated noise disrupting people in a given location. | <ul style="list-style-type: none"> Strategies may vary depending on source of noise. Increase educational messages and information. Increase enforcement of idling limits. Implement time restrictions for different locations to ensure there are times of day for quiet hours and natural sounds to prevail. | <p>Park staff are currently tracking visitor complaints. Park staff would continue to track visitor complaints, and would review complaint log quarterly.</p> |
| | Complaints related to human-caused noise/sounds affecting a park experience (cultural practice, visitor experience). | Significance of natural sounds to the cultural landscape and Native Hawaiian significance of the land. | Wild/ Primitive Zone | No more than two complaints received quarterly in a given location. | Complaints don't necessarily come in often so examining quarterly is reasonable. Concern about repeated noise disrupting people in a given location. Lower tolerance in the wild zone than other zones but still want more than one to establish a problem. | <ul style="list-style-type: none"> Strategies may vary depending on source of noise. Increase education and outreach about importance of quiet as part of solitude and wilderness character. Increase educational messages and information, especially at trailhead signs. Increase enforcement of idling limits. | <p>Park staff are currently tracking visitor complaints. Park staff would continue to track visitor complaints, and would review complaint log quarterly.</p> |
| VISITOR EXPERIENCE/SOCIAL | | | | | | | |
| Soundscapes and the Acoustic Environment | Decibel level (dBA) of human-caused sounds. | Since this is a Park Support Zone, the indicator is different than other zones. | Park Support Zone | Permanent noise sources should not exceed sleep dBA thresholds (35dBA) at the receptor site at nighttime. | Sounds from park activities and visitors dominate during daytime hours. Natural sounds are more prevalent in the evening. | <ul style="list-style-type: none"> Educate visitors about soundscapes in the park. Limit idling of buses and larger vehicles. Limit size of vehicles. Implement temporary standoffs for aircraft when appropriate. Enforce quiet hours at the campground. Enforce noise ordinances (36 CFR Section 2.12). <p>In addition to impacts from visitor-caused noise, it is important to reduce noise caused by administrative activities.</p> <ul style="list-style-type: none"> Limit administrative use of aircraft. | Acoustic monitoring would occur at specific intervals, to be determined. Park staff would incidentally monitor throughout the year, particularly related to projects or permits issued. |
| | | | | | | <ul style="list-style-type: none"> Enforce noise ordinances (36 CFR Section 2.12). | <ul style="list-style-type: none"> Enforce noise ordinances (36 CFR Section 2.12). |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|--|--|---|-----------------------|---|--|---|---|
| Soundscapes and the Acoustic Environment | dBA levels that cause speech interference. L ₁₀ (the sound level would exceed the specified value for no more than 10% of the time). | Wildlife behavior and the visitor experience are impacted by the duration and intensity of human-caused noise, but it should not negatively impact visitor experience. | Visitor Services Zone | If dBA levels that cause speech interference occur, management strategies will be triggered. L ₁₀ does not exceed 45 dBA. | According to desired conditions set for this zone, this standard was set to ensure that natural sounds are generally audible in this zone. However, sounds from visitors and park activities can be heard and may dominate during daylight hours in certain areas, but levels that cause speech interference rarely occur. | <ul style="list-style-type: none"> Educate visitors about soundscapes in the park. Educate visitors about noise they are making at nighttime near eruptive areas. Implement quiet times during specific times or in specific locations for particular sites. Limit idling of buses and larger vehicles. Limit size of vehicles. Implement temporary standoffs for aircraft. Enforce quiet hours at the campground. Enforce noise ordinances (36 CFR Section 2.12). In addition to impacts from visitor-caused noise, it is important to reduce noise caused by administrative activities. Limit administrative use of aircraft. | Acoustic monitoring would occur at specific intervals, to be determined. Park staff would incidentally monitor throughout the year, particularly related to projects or permits issued. |
| | Difference between existing and natural ambient sound levels – Mean L ₅₀ Impact (dBA). | Wildlife behavior and the visitor experience are impacted by the duration and intensity of human-caused noise. Human-caused noises reduce the opportunities for solitude. | Transitional Zone | Mean difference between natural and ambient dBA (L ₅₀) is not more than 1.5 dBA. | Based on desired conditions, this standard is set to ensure that natural sounds dominate the soundscape. Sounds from visitor and park operations may be heard. However, sounds from visitor and park operations do not mask natural sounds or very seldom mask natural sounds. If human-caused noise is present, it occurs mostly during the daytime and does not cause speech interference. Noise sources would be distant. | <ul style="list-style-type: none"> Educate visitors about soundscapes in the park. Implement quiet times during specific times or locations for particular sites. Limit size of vehicles. Enforce standards on idling. Enforce noise ordinances (36 CFR Section 2.12). Implement temporary standoffs for aircraft. In addition to impacts from visitor caused noise, it is important to reduce noise caused by administrative activities. Limit administrative use of aircraft. | Acoustic monitoring would occur at specific intervals, to be determined. Park staff would incidentally monitor throughout the year, particularly related to projects or permits issued. |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|--|---|---|--|---|---|---|--|
| Soundscapes and the Acoustic Environment | Difference between existing and natural ambient sound levels – Mean L_{50} Impact (dBA). | Wildlife behavior and the visitor experience are impacted by the duration and intensity of human-caused noise. Human-caused noises reduce opportunities for solitude. | Wild/ Primitive Zone | Mean difference between natural and ambient dBA (L_{50}) is not more than 1.0 dBA. | This standard is set to ensure that natural sounds dominate the soundscape. Distant artificial sounds may be heard in some areas of this zone. Human-caused noise should be rare or very infrequent in occurrence and in limited areas of the zone. Pristine soundscapes should occur in some areas of this zone. | <ul style="list-style-type: none"> Educate visitors about soundscapes in the park. Educate visitors about self-noise at nighttime near eruptive areas. Enforce noise ordinances 36 CFR Section 2.12. Implement temporary standoffs for aircraft. In addition to impacts from visitor-caused noise, it is important to reduce noise caused by administrative activities. Limit administrative use of aircraft. | Acoustic monitoring would occur at specific intervals, to be determined. Park staff would incidentally monitor throughout the year, particularly related to projects or permits issued. |
| Crowding | Level of service (m2 / pedestrian) OR (persons / feet ²) For the following: <ul style="list-style-type: none"> Walkways Viewing platforms/ areas Stairs/ steep areas | Crowding may displace visitors or negatively impact visitor experience in high-use areas (including eruptive sites). | The level of service indicator used for monitoring would vary by location and need. (For example, at Jaggar Museum we may only use the level of service indicator for viewing platforms.) | Walkway: not to exceed level of service E. Take immediate action if level of service F is reached. Viewing platforms / areas: Level of service E. View would not be impeded. Visitor conflicts and arguments should not occur as a result of crowding. Stairs / steep areas: Level of service D would be acceptable (when no interpretive signs are there). Flow would not be impeded at any time. See Itami, 2002 for visual examples of level of service indicators. | This standard is set to allow highest access to features of the park while still allowing for flow of visitors through key areas. | <ul style="list-style-type: none"> Inform visitors about crowding issues to create awareness and to adjust expectations. Increase staffing at high-use areas to keep people moving. Talk to commercial service providers and ask them to shorten their length of stay or alter their schedule to avoid known congested periods. Offer interpretive programs in locations at low-use times to offset some of the use that occurs at busy times. Open alternative sites to offer alternative attractions and to disperse use. Disperse visitor use elsewhere by offering other choices (information at the gate, social media, radio, website, electrical signs). Expand trails and areas to allow for more use where appropriate. Regulate number of tour buses in the parking lot or size of tour buses. Regulate shuttle schedule. Expand shuttle service. | <p>Park staff would continue to track number of visitors at specific locations (e.g., Jaggar Museum area) during peak times as part of their daily log, and the logs would be reviewed quarterly.</p> <p>Park staff would continue to track visitor complaints and would review complaint log quarterly.</p> |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|----------------------------|---|--|---------------------------------------|--|--|---|---|
| Crowding | Number of visitor-reported complaints and written staff reports of user conflicts on trails between different types of uses (hikers, bicycles, horses). | Concerns about mixed use on trails and a desire to promote positive trail-based experiences. | Visitor Services and Transition zones | Four similar complaints received in the same area (single location or segment of trail) quarterly. Complaints (visitor-related or staff reports). | Low standard given that the number of reports of conflicts has historically been low, and the park wants to promote a positive visitor experience on trails | <ul style="list-style-type: none"> Implement better signage and education about trail etiquette. Separate trail uses. Change the design of a trail to accommodate multiple user groups. Limit a particular type of use. Managers may also choose to adopt the following 12 principles for minimizing conflicts on multiple use trails: 1) recognize conflict as goal interference, 2) provide adequate trail opportunities, 3) minimize the number of contacts in problem areas, 4) involve users as early as possible, 5) understand user needs, 6) identify the actual source of conflict, 7) work with the affected users, 8) promote trail etiquette, 9) encourage positive interaction among different users, 10) favor light-handed management, 11) plan and act locally, 12) monitor progress (USDOT 2012). For more information on the aforementioned principles, please see the full synthesis of literature and state of practice for addressing user conflicts on multiple-use trails (USDOT 2012). | Number of complaints would be tracked at park office. |
| Trail-based user conflicts | | Concerns about mixed use on trails and a desire to promote positive trail-based experiences. | Wild/ Primitive Zone | Two similar complaints received in the same area (single location or segment of trail) quarterly. | We have a relatively low standard given the historically low number of reports of conflicts, and we want to promote a positive visitor experience on trails. | | Number of complaints would be tracked at park office. |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|--|--|--|--|--|--|--|--|
| Parking and traffic congestion (including bikes) | Number of incidents of illegal parking (when parking lots are full). | This informs management on frequency of full-capacity parking lots, which could also lead to other parking issues. | All zones. Focus efforts in Visitor Services Transition zones. | Standard will be determined once baseline monitoring is completed. | A traffic study has been proposed and will provide baseline data for acceptable parking conditions and potentially will provide additional management strategies that can be implemented to achieve acceptable conditions. | <ul style="list-style-type: none"> Educate visitors about other areas of the park to visit. Use sign boards, AM radio stations, or social media to give transportation updates (direct traffic). Advertise opportunities in a variety of areas to divert use to other areas. Promote the use of underutilized parking areas and either have visitors walk to attractions or be shuttled. Communicate with large tour companies about taking turns (different days or different locations). If visitors choose to ride a provided shuttle, drop them off before reaching the prime locations to offer an additional walking experience and to disperse crowding, when practicable. Have rangers divert traffic at congested areas and direct parking during peak times. Enforce parking stall capacity. Send volunteer or interpreter to help direct traffic. Move bicycle staging areas to other locations. Have bicycles use alternate routes (e.g. from Steam Vents to Jaggar). Have bicycles utilize the Escape Road off of Crater Rim Drive. Increase parking lot capacity. Open access to another area of the park. Limit the number of commercial tour buses that are allowed to park in the area. Restrict private parking access. Enact mandatory shuttle system for high-use attraction sites. | Currently this threshold is exceeded regularly during peak periods. As management strategies are implemented, monitoring will be conducted to determine if additional management strategies are needed to bring this to a level under the threshold. |

TABLE B.1. INDICATORS, STANDARDS, MANAGEMENT STRATEGIES, AND MONITORING STRATEGIES

| Indicator Topic | Indicator | Indicator Rationale | Zone | Standard | Standard Rationale | Management Strategies | Monitoring Strategies and Timeline |
|--|---|---|-----------------------|--|---|-----------------------|--|
| Parking and traffic congestion (including bikes) | Amount of time a traffic lane is blocked. | This informs management of when traffic congestion is occurring. Once congestion occurs, other issues could begin to occur as well. During monitoring, observer would want to capture the source of congestion (bikes, cars, buses, etc.). | Visitor Services Zone | Standard will be determined once baseline monitoring is completed. | A traffic study has been proposed/ planned and will provide baseline data for acceptable levels for traffic flow and potentially will provide additional management strategies that can be implemented to achieve acceptable levels | | Currently this threshold is exceeded regularly during peak periods. As management strategies are implemented, monitoring will be conducted to determine if additional management strategies are needed to bring this to a level under the threshold. |

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ACRONYMS AND ABBREVIATIONS

| | |
|------|---|
| CCC | Civilian Conservation Corps |
| CUA | Commercial Use Authorization |
| DLNR | Department of Land and Natural Resources |
| EIS | Environmental Impact Statement |
| FAA | Federal Aviation Administration |
| FTE | Full-time Equivalent |
| GMP | General Management Plan |
| HVO | Hawaiian Volcano Observatory |
| KMC | Kilauea Military Camp |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NOAA | National Oceanic and Atmospheric Administration |
| NPS | National Park Service |
| TMA | Three Mountain Alliance |
| WS | Wilderness Study |



Steaming bluff. NPS photo by Stephen Geiger.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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Rainbow over Halema'uma'u Vent and Kīlauea Caldera. *Photo by Peter Anderson*

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