

National Park Service  
U.S. Department of the Interior



Haleakalā National Park, Makawao, Hawai'i

# Haleakalā National Park

Environmental Assessment:  
Management and Removal of Feral Animals in Upper Elevations of Nu'u, Maui



June 2016

***Public Comment: Environmental Assessment Management and Removal of Feral Animals in Upper Elevations of Nu‘u, Maui***

This Environmental Assessment will be available for public review for 30 days. A copy is available online at the park's website [www.nps.gov/hale](http://www.nps.gov/hale). More information can be found online at the NPS Planning, Environmental, and Public Comment website: <https://parkplanning.nps.gov/projectHome.cfm?projectId=55701>.

Comments may be submitted in several ways.

Online at NPS Planning, Environmental, and Public Comment website: <https://parkplanning.nps.gov/projectHome.cfm?projectId=55701>

Email to: [HALE\\_Superintendent@nps.gov](mailto:HALE_Superintendent@nps.gov) with the subject line “Nu‘u EA”

Regular mail:

Attention: Nu‘u EA Public Comment  
Haleakalā National Park  
P.O. Box 369  
Makawao, HI 96768

Comments must be postmarked, transmitted, or logged online no later than the end of the day on July 13, 2016, 30 days from notice of the public review period.

Contact Information: Cathleen Bailey ([cathleen\\_bailey@nps.gov](mailto:cathleen_bailey@nps.gov))

Comments will not be accepted by fax or in any manner other than the methods specified. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted. Before including a personal address, phone number, email address, or other personal identifying information in written comments, anyone providing written comment should be aware their entire comment - including their personal identifying information - may be made publicly available at any time. While anyone wishing to comment may ask the National Park Service in their comment to withhold their personal identifying information from public review, the National Park Service cannot guarantee it will be able to do so.

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## Acronyms

ACETA	Aerial Capture, Eradication and Tagging of Animals
DLNR	Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife
DOI	United States Department of the Interior
EA	Environmental Assessment
HNP	Haleakalā National Park
IARII	International Archaeological Research Institute, Inc.
LHWRP	Leeward Haleakalā Watershed Restoration Partnership
LZ	Landing Zone
NEPA	National Environmental Policy Act
NPS	National Park Service
RAWS	Remote Automated Weather Station
SHPD	State Historic Preservation Division
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

# 1 INTRODUCTION

This Environmental Assessment (EA) was prepared to analyze the effects of implementing management and removal of feral animals in the Nu‘u parcel of Haleakalā National Park (HNP). According to the National Park Service’s *Management Policies 2006*, “All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species interferes with natural processes and the perpetuation of natural features, native species, or natural habitats...or damages cultural resources...” (US DOI NPS 2006). Management and removal of feral animals to protect and restore habitat has been successful in other areas of HNP, at Hawaii Volcanoes National Park, and other areas statewide.

This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations, 40 CFR § 1500-1508; the National Park Service (NPS) Director’s Order #12 and associated *2015 NPS NEPA Handbook*; Section 106 of the National Historic Preservation Act of 1966 as amended, and implementing regulations, 36 CFR § 800. The NPS prepared this EA for the Proposed Action to evaluate potential issues and impacts to Park resources and values, and identify mitigation measures to lessen the degree or extent of these impacts. This EA does not represent a comprehensive management plan for the HNP Nu‘u parcel. Management actions in this EA are specific to the purpose and need of the Proposed Action (Section 2.3). Any future management plan for the HNP Nu‘u parcel would require a separate environmental compliance process.

## 1.1 Project Context

The NPS, in cooperation with the State of Hawai‘i and with funds provided by National Fish and Wildlife Foundation and the NPS, is working to protect and restore habitat for native species in the Nu‘u area, including additional habitat for the endangered ‘ua‘u (Hawaiian petrel, *Pterodroma sandwichensis*). The ‘ua‘u, which is endemic to Hawai‘i, was once abundant and widely distributed throughout the archipelago. Today, the largest known breeding colony is found at Haleakalā Crater on Maui, with other known colonies on Mauna Loa and Mauna Kea, Hawai‘i Island; on Kaua‘i; and on the summit of Lāna‘i. Current threats to ‘ua‘u include habitat loss, predation, groundings, and collision with man-made objects. The Nu‘u area of the leeward slope of Haleakalā, including the HNP Nu‘u parcel, contains habitat suitable for breeding and nesting of endangered ‘ua‘u.

Habitat restoration is being accomplished through conservation activities, including construction of ungulate control fencing and removal of non-native species. The ungulate control fence (under construction) on the HNP Nu‘u parcel runs between approximately 1,250 ft. and 7,650 ft. elevation and encloses 2,115 acres, 1,885 acres within the HNP Nu‘u parcel and 230 acres within the State Kahikinui Forest Reserve.<sup>1</sup>

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<sup>1</sup> The erection of the ungulate control fence and associated infrastructure work did not require an EA be completed as that activity was granted a categorical exclusion under NPS Director’s Order #12, Section 3.4, C.18, as stated, “construction of fencing enclosures or boundary fencing posing no effect on wildlife migrations.” NPS Planning, Environment and Public Comment Project ID 61189.

This EA addresses reducing and removing non-native, feral animals within the 2,115 acre HNP Nu‘u enclosure using a combination of non-lethal and lethal methods. Adverse impacts from feral ungulates on native plant and wildlife species, as well as habitat in general, is well documented in Hawai‘i and has resulted in extensive biodiversity loss (HCA 2005). Grazing and digging for roots by feral animals result in damage to ground cover and consumption of native plants. Soil disturbance from these activities results in erosion and sediment run-off. Disturbed earth is vulnerable to colonization by non-native plant species. Native wildlife species have evolved in the absence of large predators and are especially vulnerable to predation and loss of habitat caused by their presence. These impacts are listed as significant threats in several US Fish and Wildlife Service (USFWS) Conservation and Recovery Plans, including the recovery plan for the ‘ua‘u (USFWS 1983, 1997, 2005a, 2005b).

Over 15,000 acres of habitat at HNP have already been protected using feral animal control and exclusion methods (e.g. ungulate exclosures) resulting in a significant increase in the ‘ua‘u population. In the 1960s, the population was estimated at 300 – 400 breeding pairs at HNP. The current population is estimated at 3,000 – 4,000 breeding pairs (HNP unpubl. data 2014b). One area that supported 136 burrows prior to lethal control of feral goats, showed recruitment of 8% over the first three years after feral goat removal, and averaged nearly 2% recruitment over the next 17 years (HNP unpubl. data 2014b). Based on surveys (including ground, radar, and visual flyway surveys, and anecdotal audio surveys) and Geographic Information System modeling, HNP staff conservatively estimates that the upper elevations in the HNP Nu‘u parcel currently contain 50 to 100 existing burrows. Previous success with feral animal control within exclosures at HNP supports the assumption that implementing the Proposed Action is likely to provide for more suitable habitat in Nu‘u, which should support an increase in breeding and nesting ‘ua‘u.

## **1.2 Purpose and Need for Federal Action**

The purpose of the Proposed Action (Section 2.3) is to support ecosystem recovery and long-term resource protection in a portion of the degraded lands in Nu‘u, particularly for threatened and endangered species. Within Nu‘u, land degradation and loss of habitat caused by the presence of feral goats (*Capra hircus*), feral pigs (*Sus scrofa*), and axis deer (*Axis axis*) are primary concerns. Ungulates trample landscapes and consume vegetation. Additionally, feral dogs (*Canis lupis familiaris*), which may be attracted to feral ungulates as prey, are also known to be present in the area. Feral dogs prey on ‘ua‘u adults and nests, and are a safety hazard for people entering the area. Without management and removal of feral animals within the HNP Nu‘u enclosure, other conservation activities are unlikely to succeed.

Management and removal of feral animals will provide protected habitat for endangered ‘ua‘u, and potentially other federally listed or candidate species. HNP biologists postulate that ‘ua‘u from the protected areas of Haleakalā are currently attempting to nest in Nu‘u. The area will be managed for "zero tolerance" of feral animals in perpetuity. Intensive control efforts to removal animals to "near zero" population is expected to occur for the first year.

The Proposed Action supports federal, state, and other conservation efforts to protect and enhance endangered species and their habitat in the leeward Haleakalā area.

## 1.3 Management Context

### 1.3.1 Haleakalā National Park

Established in 1916, HNP manages over 33,000 acres of federal lands on the island of Maui (figure 1). Within the Park, approximately 24,000 acres are designated as a Wilderness Area. The Nu‘u parcel is not a designated Wilderness Area. There are two districts in the Park, the Summit District (Summit) and the Kīpahulu District. The Summit includes a 10.6 mile portion of Haleakalā Highway, Haleakalā Crater, Kaupō Gap and Nu‘u. The Summit also includes service roads, public and service trails, buildings, and parking lots. The Kīpahulu District includes State Highway 360, ‘Ohe‘o, Kīpahulu Valley, the upper Hana Rainforest, Manawainui, and Ka‘āpahu. Public use trails, roads, and buildings occur at ‘Ohe‘o. The remaining areas include trails, unimproved roads, and buildings for service use only. Buildings and facilities are located in both districts. These include Park Headquarters, two base yards, visitor centers, public campgrounds, and three visitor cabins located at the Summit.

#### *Park Purpose and Significance of Nu‘u*

HNP was formed to preserve a nationally significant portion of Haleakalā Volcano and its unique native Hawaiian ecosystems, and to provide opportunities for the public to access many of its geologic, scientific, and historic features. The Park’s purpose is stated in the Park’s Foundation Document (US DOI NPS 2015): “For the inspiration of current and future generations, Haleakalā National Park protects a wild volcanic landscape with a wide array of fragile and diverse native ecosystems, including plant and animal species found nowhere else on Earth. Our stewardship perpetuates the unique and continuing connections between Hawaiian culture and this sacred and evolving land.”

In 2008 the NPS acquired the Nu‘u parcel, one of Maui’s largest undeveloped tracts of land, to ensure that critical cultural and natural resources would be preserved and protected for future generations. The Nu‘u area, including the NPS Nu‘u parcel, is significant because it:

- Contains rare, threatened and endangered plant and animal species.
  - Habitat protection offers refugia for these species, especially the ‘ua‘u.
- Once contained tropical dryland forest, which are among the most diverse yet threatened ecosystems in the world.
  - These forests supported an abundance of native Hawaiian flora and fauna, some of which is found nowhere else in the world.
- Is a near-ideal candidate for restoration of tropical dryland forest.
  - Although this once forested area has been transformed by burning, grazing, and the invasion of non-native plant species, due to the absence of shade-adapted forest weeds as well as the characteristics of the dominant native tree species, restoration efforts in this area are proving successful.
- Includes many significant Hawaiian cultural sites.
  - Protecting the Nu‘u area preserves culture significance, places, resources, stories, and intangible elements of sacred importance to Native Hawaiians.

### 1.3.2 Haleakalā National Park Resource Management Activities

The management of natural and cultural resources in the Park is the responsibility of HNP’s Division of Resource Management. The primary purpose of the Division is to uphold the federal mandate as defined in the NPS Organic Act (16 USC § 1) to preserve and protect natural and

cultural resources. The Resource Management Division employs scientists, technical experts, technicians, and laborers.

## **1.4 Laws and Other Plans Related to the Proposed Action**

The potential impacts of the Proposed Action must be evaluated in the context of Park purpose, which is based on the Park's enabling legislation, and other federal laws that affect management of the Park. The *NPS Management Policies 2006* (US DOI NPS 2006) provides guidance for implementing these laws.

### **1.4.1 Pertinent Laws, Regulations, and Policies**

- National Environmental Policy Act of 1969, As Amended (42 USC § 4321 et seq.)
- Endangered Species Act of 1973, As Amended (16 USC § 1531 et seq.)
- National Historic Preservation Act of 1966, As Amended (16 USC § 470; 36 CFR § 800)
- Migratory Bird Treaty Act of 1918, As Amended (16 USC § 703-712)
- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (2001)
- Lacey Act of 1900, As Amended (18 USC § 42-43; 16 USC § 3371–3378)
- Act to Establish A National Park Service (Organic Act) of 1916 (16 USC § 1 et seq.)
- National Park Service NEPA Handbook (2015)
- National Parks Omnibus Management Act of 1998 (P.L. 105-391)
- Title 36, Code of Federal Regulations, Chapter 1
- Executive Order 13112, Invasive Species (1999)
- National Park Service Management Policies 2006
- National Park Service Director's Order #12 (2011)

### **1.4.2 Relationship to Haleakalā National Park Planning Documents**

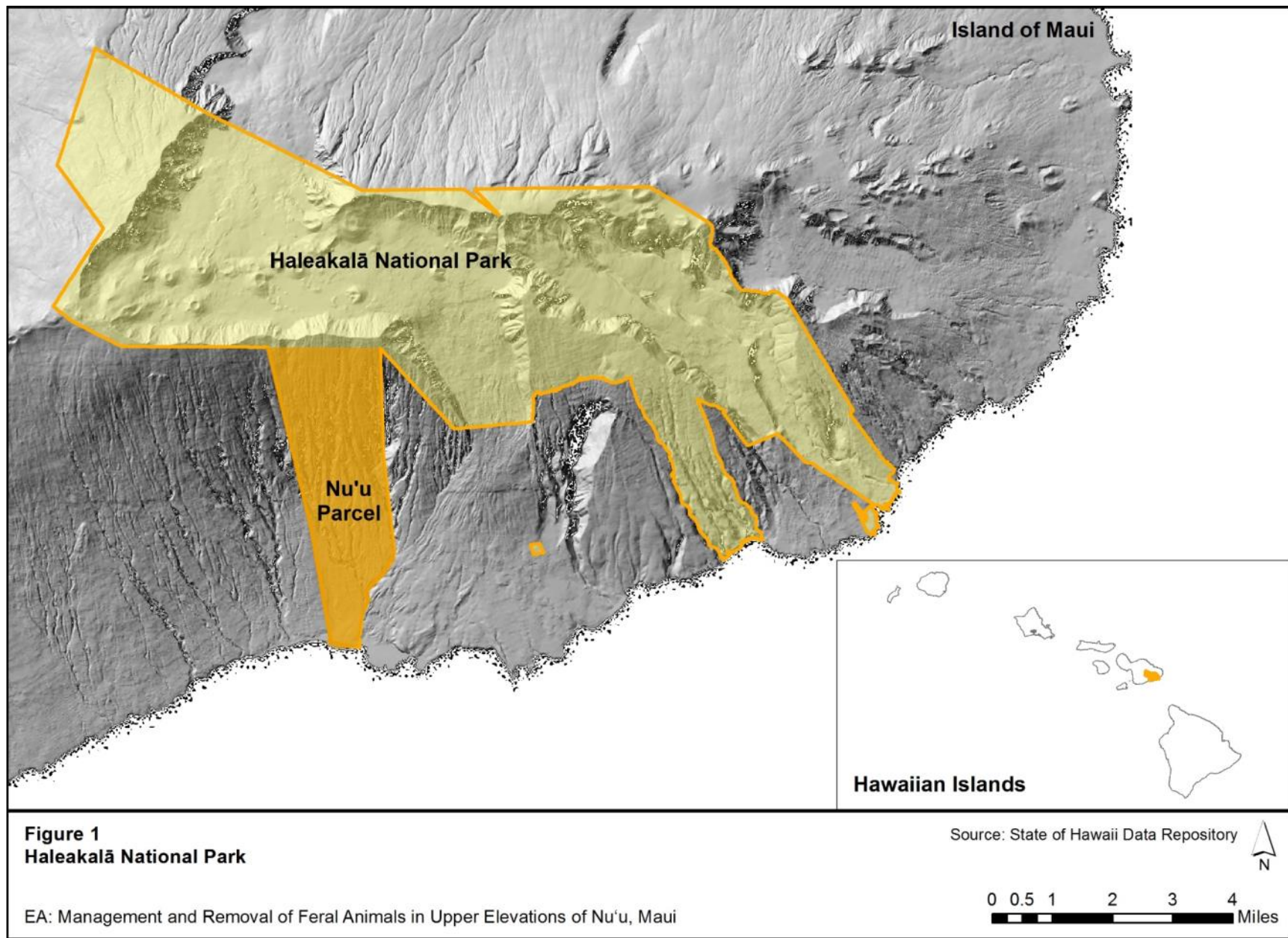
#### ***General Management Plan / Environmental Impact Statement Haleakalā National Park***

The General Management Plan / Environmental Impact Statement for Haleakalā National Park presents a framework to guide management, development, and use of HNP (US DOI 1995). It contains the following broad management objectives: protection of unique geologic, biotic, and cultural resources of HNP; improvement in the quality of the visitor's experience; and helping sustain the traditional Hawaiian lifestyle in East Maui. The plan discusses how introduced feral goats and pigs have had a devastating impact on HNP habitat and that removal and exclusion of feral ungulates has resulted in habitat recovery.

#### ***Foundation Document, Haleakalā National Park***

Foundation Documents provide a basic understanding of a park's resources, values, and history to support planning and management. Core components include a brief description of the park, the park's purpose, significance, fundamental resources and values, and interpretative theme. The HNP Foundation Document presents eight 'significance statements' including "providing a home for diverse threatened and endangered species, including some that exist nowhere else in the world" (HNP 2015).





### ***Biological Opinion and Informal Consultation for the Operation and Management of the Haleakalā National Park***

A Biological Opinion was issued to address all operation and maintenance activities at HNP over a 20 year period and to facilitate Section 7 review in compliance with the Endangered Species Act (USFWS 2012a). Activities included in the Biological Opinion are: general park operations, rare species propagation and conservation; backcountry helicopter operations in support of HNP conservation actions; fencing; and effective removal and management of feral animals. The Biological Opinion addresses all 65 listed or proposed species found within HNP as well as designated or proposed critical habitat.

#### **1.4.3 Relationship to Regional Planning Documents**

##### ***US Fish and Wildlife Service, Regional Seabird Conservation Plan, Pacific Region***

The plan identifies priorities for regional seabird management, monitoring, research, outreach, planning, and coordination (USFWS 2005a). This plan includes: a review of seabird resources and habitats, a description of issues and threats, and a summary of current management, monitoring and outreach efforts. The section covering ‘ua‘u lists distribution, population status, and trends; contains a discussion on ecology; outlines conservation concerns and activities; and provides recommended actions. One of the five recommended actions is for USFWS to work with the NPS, the State of Hawai‘i, and other land managers to control introduced predators and ungulates in the area of important colonies.

#### **1.5 Scoping and Consultations**

Scoping was conducted both internally and externally.

##### **1.5.1 Internal Scoping**

Park personnel met several times to discuss the most effective methods for restoring habitat for ‘ua‘u in the HNP Nu‘u parcel. Topics covered included: successful restoration of habitat in other areas of HNP using feral animal control; the rugged terrain of the Nu‘u parcel and associated safety issues; and the zero-tolerance policy for feral ungulates in other portions of HNP.

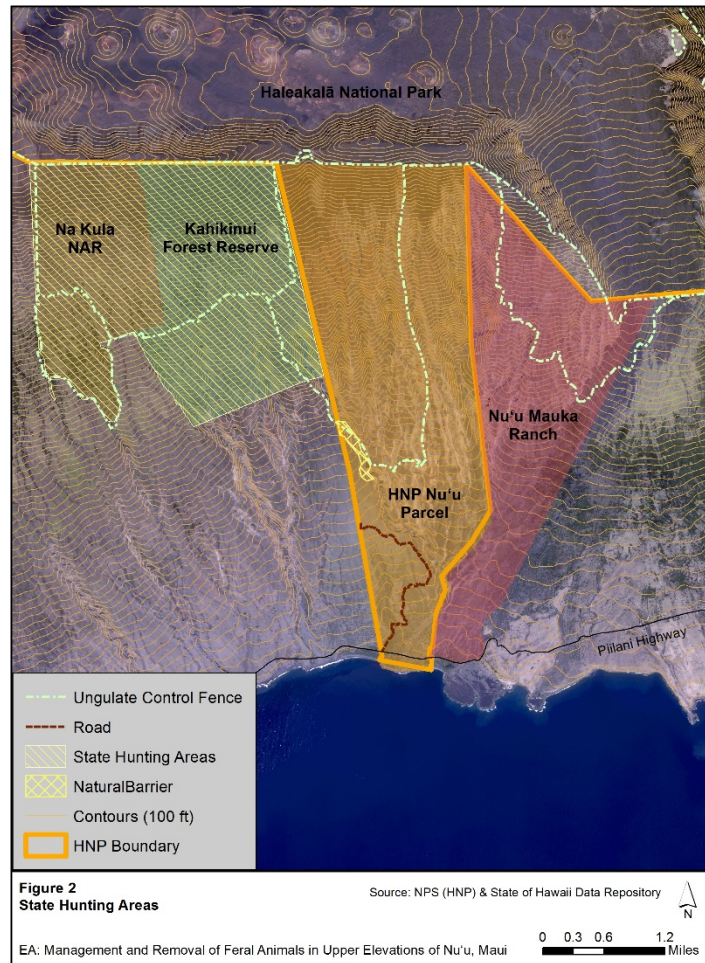
##### **1.5.2 External Scoping**

An external scoping period was held from April 17 to May 17, 2015. External scoping was conducted to engage interested parties on matters related to conservation efforts, including feral animal control, fence work and related infrastructure improvement, and habitat restoration and potential alternatives. The NPS solicited feedback from the public, as well as governmental and non-governmental organizations that have an interest in conservation issues in Hawai‘i and specifically on Maui (Appendix A). The NPS distributed information on the Proposed Action and other planned conservation activities via a press release, a newsletter, agency/organizational letters, and the NPS Planning, Environment, and Public Comment and HNP websites. Two public meetings were held (May 13, 2015 in Kula and May 14, 2015 in Hana) to inform, answer questions, and collect comments.

Nine (9) comments were received during the scoping period, and covered the following topics:

- recreational/public access and use;
- hunting access;
- feral ungulate control;
- using fencing in conservation efforts;
- concern about development;
- use of volunteer resources;
- support for restoration efforts;
- coordination with other federal and state agencies and private entities; and
- project implementation logistics.

Five (5) of the comments expressed support for the NPS implementing conservation actions in Nu‘u. Two (2) other comments expressed concern over management and change in the Nu‘u area in general. One of these concerns was the loss of a potential hunting area (figure 2) due to the inclusion of the 230 acres of the Kahikinui Forest Reserve. The same comment proposed restricting the exclosure fence within HNP borders. The second comment was a general concern about any increase in use or development in the Nu‘u area. Details of the public scoping, including a copy of all comments, are presented in a Public Scoping Report that was made available on the NPS Planning, Environmental and Public Comment website in July 2015.<sup>2</sup> All comments were taken into consideration during the development of this EA.



### 1.5.3 Consultations

#### *US Fish and Wildlife Service*

Section 7 of the Endangered Species Act requires federal agencies to consult with the USFWS or the National Marine Fisheries Service when taking an action that may affect federally listed threatened or endangered species or designated critical habitat.

A Biological Assessment for the Proposed Action was submitted to USFWS for review on May 12, 2015. On June 9, 2015 USFWS informed the NPS that the existing Biological Opinion

<sup>2</sup> <https://parkplanning.nps.gov/projectHome.cfm?projectId=55701>

(USFWS 2012a), and the avoidance and minimization measures specified within, apply to the Proposed Action. Therefore, additional Section 7 consultation with USFWS is not required.

### ***Hawai'i State Historic Preservation Division***

Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of their undertakings on historic properties and to provide state historic preservation officers, tribal historic preservation officers, and, as necessary, the Advisory Council on Historic Preservation a reasonable opportunity to review and comment on the effects of agency actions.

The NPS provided information to the Hawai'i State Historic Preservation Division (SHPD) on April 17, 2015 with a letter detailing all of the planned conservation activities including the Proposed Action and a request for any early input or concerns. On August 13, 2015, the NPS received confirmation of initiation of formal Section 106 consultation from the SHPD. In September 2015, NPS conducted formal Section 106 consultation with the SHPD as well as six Native Hawaiian Organizations and partner organizations regarding fence and infrastructure work for the proposed habitat conservation activities at Nu'u. The six organizations included the Office of Hawaiian Affairs, 'Aha Moku o Kaupō, Friends of Haleakalā National Park, Historic Hawaii Foundation, Kīpahulu 'Ohana, and the Royal Order of Kamehameha Heiau 'O Kahekili IV. NPS requested concurrence with the finding of no adverse effect on the cultural and historic properties within the Area of Potential Effect at Nu'u. No responses were received during the 30-day comment period. The Office of Hawaiian Affairs and 'Aha Moku o Kaupō both responded favorably and voiced support for conservation work at Nu'u in the form of a letter and a voicemail, respectively. HNP is currently completing Section 106 consultation for the Proposed Action.

### ***Hawai'i State Department of Land and Natural Resources***

Hawai'i State Department of Land and Natural Resources (DLNR) manages the State-owned land in the Nu'u area including the Kahikinui Forest Reserve to the west of the HNP Nu'u parcel. The DLNR Division of Forestry and Wildlife (DOFAW) manages parcels within the Forest Reserve system, protecting, managing, restoring, and monitoring natural resources to provide recreational and hunting opportunities; aesthetic benefits; watershed restoration; native, threatened and endangered species habitat protection and management; cultural resources; and fire protection. DLNR-DOFAW supports and has a history of using ungulate control fences and conducting feral animal control efforts along with habitat restoration. Although DLNR would not be assisting with the Proposed Action, DLNR-DOFAW is a partner and supporter of the planned conservation efforts in the Nu'u area of leeward Haleakalā, particularly in the small portion of the State Kahikinui Forest Reserve where the current exclusion fence crosses.

## **1.6 Impact Topics**

### **1.6.1 Impact Topics Selected for Detailed Analysis**

The level of impact to the following topics requires detailed analysis due to potential environmental impacts resulting from implementing the Proposed Action. These topics have been identified based on federal laws, regulations, and orders; the NPS *Management Policies 2006* (US DOI NPS 2006); the NPS knowledge of resources; input from natural resource managers; and public input.



- Soils and Geologic Resources
- Water Resources
- Air Quality
- Natural Soundscape
- Wildland Fire
- Vegetation
- Wildlife
- Special Status Species
- Habitat
- Cultural and Historic Resources
- Recreational Resources
- Safety
- Park Operations

### **1.6.2 Impact Topics Considered but Dismissed**

The following topics were considered but dismissed from detailed analysis in the EA because:

- the topics do not exist in the analysis area, or would not be affected by the Proposed Action or alternatives; or
- the likely impacts are not reasonably expected; or
- through the application of mitigation measures, there would be minor or less effects from the Proposed Action or alternatives.

#### ***Topography***

The Proposed Action does not involve altering the topography in the project area. This issue was considered and eliminated from further analysis in this EA.

#### ***Floodplains***

Executive Order 11988 Floodplain Management requires all federal agencies to take action to reduce the risk of flood loss, to restore and preserve the natural beneficial values served by floodplains, and to minimize the impact of floods on human safety, health, and welfare. The project area and NPS Nu‘u lands do not contain any floodplains, therefore this issue was considered and eliminated from further analysis in this EA.

#### ***Wild and Scenic Rivers***

There are no surface water features or rivers in the project area designated under the Wild and Scenic Rivers Act of 1968, as amended (16 USC § 1271-1287). This issue was considered and eliminated from further analysis in this EA.

#### ***Wilderness***

The Proposed Action does not occur within the Park’s designated Wilderness. Audio and visual impacts of helicopters and firearms cannot from be detected from Wilderness areas because the activities are below the ridgeline, on the opposite side of the mountain. Therefore, this issue was considered and eliminated from further analysis in this EA.

#### ***Climate Change***

Emissions would be generated from helicopter use and vehicles travelling to and from the site. The Proposed Action would produce a small amount of emissions only over a short-term period. Many potential impacts on climate change are unknown because of lack of information. Within the expected duration of the project, no foreseeable changes in weather will occur that could alter any conditions favoring survival of the non-native species or affect efficacy of the planned control efforts. The effect on climate change would be negligible; therefore this issue was considered and eliminated from further analysis in this EA.

### ***Night Sky or Lightscares***

All activities will occur only during daylight hours. The Proposed Action does not include the addition of any permanent lights in the area. This issue was considered and eliminated from further analysis in this EA.

### ***Socioeconomics***

No long-term impact on the local economy would occur as a result of the Proposed Action. This issue was considered and eliminated from further analysis in this EA.

### ***Environmental Justice***

The nature and location of the Proposed Action does not have the potential to have disproportionate health or environmental effects on minorities or low-income populations or communities as defined the Council on Environmental Quality (1997) environmental justice guidance. Therefore, this issue was considered and eliminated from further analysis in this EA.

### ***Indian Trust Resources***

There are no Indian trust resources at Haleakalā National Park; therefore, this topic has been dismissed from further analysis.

## **2 ALTERNATIVES**

This section outlines two alternatives for feral animal control in Nu‘u. The No Action Alternative describes continuing present management activities. It is the basis for comparison for the Proposed Action and its environmental consequences and is required under NEPA. The Description of Alternatives includes potential actions, results, related mitigation, and a summary of the environmental consequences (Section 3.7). Alternatives considered but dismissed from detailed analysis are also discussed, as well as the reasons for dismissing them from consideration.

### **2.1 Alternatives Considered and Dismissed**

Three alternative means of reducing population of feral animals were considered and dismissed: recreational hunting, relocation of animals and fertility control.

Recreational hunting is only allowed in areas where “specifically mandated by Federal Law (36 CFR 2.2)”. The Secretary of the Interior may authorize hunting to “any person if such person is employed by, or is an authorized agent of or is operating under a license or permit of, any State or the United States to administer or protect or aid in the administration or protection of land, water, wildlife, livestock, domesticated animals, human life, or crops, and each such person so operating under a license or permit shall report to the applicable issuing authority each calendar quarter the number and type of animals so taken” (16 USC § 742j – 1). The project area is not mandated for recreational hunting.

The non-lethal methods of relocating animals to an alternate site and fertility control would require capture, sedation, and transportation. Because of the large number of feral ungulates and the rugged terrain of the project area, capture, relocation, and transportation of each individual would be infeasible. This would require transport of not only staff, but also large number of live animals via helicopter. This requires extensive planning to ensure the safety of

staff, pilots and animals. Even with extensive planning, safety concerns for staff and pilots are still high because of the inherent risks of conducting such action.

None of the alternatives would accomplish the purpose of the Proposed Action, which is to support ecosystem recovery and long-term resource protection in Nu‘u, particularly for threatened and endangered species. These alternatives were thus dismissed from consideration.

## **2.2 Alternative 1: No Action**

The No Action alternative includes minimal management activities in the area including sporadic and opportunistic lethal control of feral animals to suppress population increase, especially for the smaller populations of deer and feral dogs, and building of a feral animal control fence and associated infrastructure improvements<sup>3</sup>. These would continue as needed under the No Action alternative. The No Action alternative provides a basis for comparison with the Proposed Action and the respective environmental consequences. Should the No Action alternative be selected, the NPS would respond to future needs and conditions without major actions or changes in the present course.

## **2.3 Alternative 2: Proposed Action**

The Proposed Action consists of reducing the population of feral goats, pigs, and dogs, as well as axis deer, using non-lethal and lethal methods, from approximately 2,115 acres (1,885 acres within the HNP Nu‘u parcel and 230 acres within the State Kahikinui Forest Reserve) of fenced habitat including breeding and nesting habitat for the endangered ‘ua‘u (figure 3).

The Proposed Action takes into consideration the NPS statutory mission and responsibilities; environmental and economic factors; and input from NPS personnel, technical experts, and the public. The Proposed Action also increases the amount of area within the Leeward Haleakalā Watershed Restoration Partnership (LHWRP) where feral animal populations are being controlled on adjacent partnership lands, and supports partnership efforts by providing for habitat restoration over a larger part of the leeward Haleakalā area. The Park will use adaptive management<sup>4</sup> to implement the Proposed Action. HNP Feral Animal Removal and Management program personnel will conduct intensive control of the number of large animals within the HNP Nu‘u enclosure for approximately one year, with control and management for ‘zero tolerance’ occurring in perpetuity. Control will consist of a combination of non-lethal and lethal techniques.

Personnel will plan for each control effort, focusing on priority areas, staff safety, and avoiding likelihood of interference with other activities in the area or critical periods for sensitive species. Lethal control using firearms will be done in compliance with the American Veterinary Medical Association guidelines for field euthanasia and in accordance with the Department of Interior (DOI) ACETA (Aerial Capture, Eradication and Tagging of Animals) Handbook (AVMA 2013, US DOI 1997).

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<sup>3</sup> Sporadic removal of animals conducted under the approved Resources Management Plan (US DOI NPS 1999). As noted on page 1, fence and infrastructure work were granted a categorical exclusion.

<sup>4</sup> Adaptive Management is a systematic approach for improving resource management by learning from management outcomes.

The majority of the project area is remote and consists of rough terrain including steep cliffs and deep gulches. Four-wheel drive vehicles can access the lower part of the project area using the existing road, but accessing other areas requires the use of a helicopter.

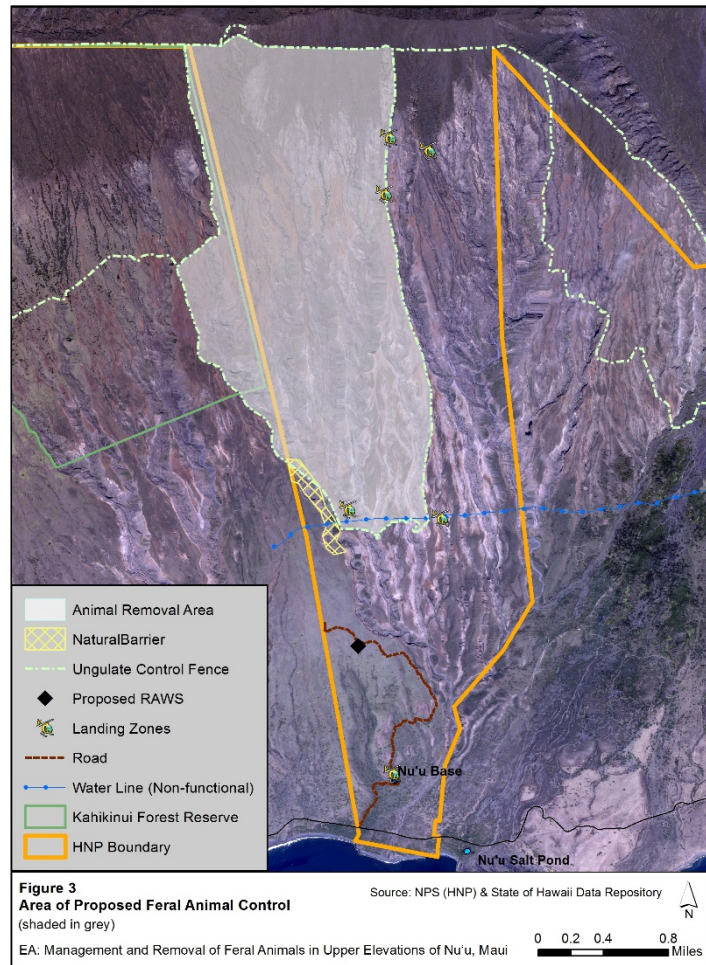
Control effort will be conducted in phases. The initial intensive effort will occur during the first year. Numbers of animals to be controlled through both non-lethal and lethal methods is difficult to determine. Population estimates have not been conducted. Animal population numbers are constantly in flux because of control efforts on adjacent lands that cause animals to move and numbers to decrease, and from animal movement based on food availability. The majority of the animals are expected to be excluded outside the fence during construction. Feral animals currently in the area are

unaccustomed to human presence. The sight of humans causes animals to flee. Staff will use audio (voice) and visual (human presence) scare tactics to drive animals out of the area prior to completion of the fence.

Initial intensive control efforts for animals remaining in the enclosed area will continue using both ground and aerial methods. Small herds of less than 20 animals per herd are expected to remain within enclosed area. Ground-based control efforts involve traversing the terrain on foot and on all-terrain vehicles (driven only on an existing dirt road), and controlling animals using firearms. During aerial efforts, qualified staff will fly in helicopters to locate and then dispatch animals using firearms while hovering. Attention to humane methods of lethal control (dispatch an animal in one shot) is of high concern and priority at HALE, and is balanced with staff safety. Therefore, only highly trained, competent individuals will conduct animal control.

Low altitude helicopter work would be minimized in occupied wildlife habitat during breeding and nesting periods of endangered animal species. During the first year of removal efforts, flights would occur twice a week, two times a day, and last approximately two hours.

Animals occur in treacherous terrain. To ensure the safety of Park staff and helicopter pilots, carcasses will not be retrieved and will be left on-site to decompose. Lethal control of feral animals will be distributed over space and time and a large proportion of the animals are





expected to flee out of the area during fence construction. Control efforts disperse herds, leaving small numbers as targets for control. Therefore, high concentrations of decomposing carcasses will not be present in any one area. Following initial efforts, Park staff will monitor the fenced area and implement additional lethal animal control as needed.

Qualified volunteers may be used for ground-based control efforts, including herding and logistical support, only in areas accessible by foot and all-terrain vehicles. Volunteers will only be able to participate in activities that do not require the use of firearms. Volunteers will be allowed in vehicles as passengers, only. All volunteers would be required to go through an application process, which include background checks, specific NPS safety qualification and training, and must be accompanied by NPS staff. Qualification and safety protocols will be made available to interested volunteers. Volunteer service could be discontinued or expanded at any time at the sole discretion of the park.

After initial intensive efforts, management for 'zero tolerance' of feral animals will continue in perpetuity. These efforts include methods commonly used throughout the conservation community in Hawai'i, which may include use of aerial and ground methods described earlier, and use of 'Judas Goats' (a goat collared with a tracking unit that is released to reunite with a remnant herd). In rare instances, trapping or snaring may be used in remote areas where a handful of individual animals remain and are difficult to capture using other methods. In this instance, traps or snares will be set, then rested for two weeks to allow human scent to dissipate. After the rest period, traps or snare will be checked at least once a month, and more often if staff members can get to these remote locations safely.

## 2.4 Mitigation Measures

Table 1 summarizes measures that will be taken to avoid, minimize, or mitigate any adverse impacts under the Proposed Action. Detailed information is provided in Section 3.

**Table 1 Mitigation Measures of the Proposed Action**

Resource	Mitigation
Water Resources	Lethal control of feral animals will be conducted in elevations above 1,500 ft. and distributed over space and time to limit the number of carcasses present in any one area to minimize effects of decomposing carcasses on water resources, including Nu'u Salt Pond. <sup>5</sup> Additionally, scavenging by other animals will aid in reducing carcass litter.
Wildland Fire	Due to the dry environment and the type of vegetation present, personnel will take all precautions to avoid igniting wildland fires. Vehicles will not idle, especially in tall grass. LZs will be maintained to avoid possible ignition by helicopters. Open campfires will not occur.
	HNP staff regularly conducts on-site measurements of temperature, humidity, and wind to determine fire risk. If level is moderate-high, fire crews warn staff and restrict activity in high-fire risk areas. Water tanks would be maintained and could provide a water source for suppression if needed.
	The local fire department, in coordination with NPS, would respond to and extinguish any fires ignited by project activities as soon as possible.

<sup>5</sup> Nu'u Salt Pond is a small wetland near the shoreline, outside of the Park boundary, approximately 1,000 feet east.

Resource	Mitigation
Vegetation	Disturbance and adverse impacts to native vegetation will be avoided. Transport of weeds by equipment, including helicopters, will be mitigated by strictly following Park protocols for weed sanitation.
Wildlife	HNP staff will observe native wildlife while conducting feral animal control activities. If noise-producing activities appear to be adversely affecting native wildlife, the HNP wildlife biologist would be consulted as to what, if any, restrictions should be implemented. Restrictions could include delaying or modifying flight times and patterns and using firearm noise-suppressing devices.
Special Status Species	HNP personnel working in the area will be required to demonstrate the ability to identify special status plants and trained on how to avoid adverse impacts.
	Any person working on the project will be trained regarding special status wildlife species and ways to minimize impacts to listed species. This information will include maps showing locations of any known nesting or roosting sites, including 'ua'u burrows. Shooting of feral animals will not occur around active 'ua'u burrows, or when nēnē are present in the area. Staff will avoid walking on or around 'ua'u burrows.
Habitat	Personnel tasked with working in or traversing across designated critical habitat will be trained and tested in plant identification. Disturbance to special status species will be avoided. Avoidance measures may include restricting project activities for a certain period of time or in a certain area. If deemed necessary by the HNP wildlife biologist, noise-producing activities may be prohibited near breeding or nesting endangered wildlife.
	All vehicles, equipment, clothes, and footwear will be regularly inspected and cleaned to avoid transport and establishment of introduced species. All project personnel will be provided with maps showing the locations of critical habitat areas and trained on how to avoid unnecessary adverse impacts within critical habitat including disturbance to native and special status plant species and activities that could accelerate erosion.
Cultural and Historic Resources	Archaeological features will be avoided during any animal removal activities.
	Staff will be provided with maps depicting the locations of cultural and historic resources and buffer zones and trained in best practices for avoiding adverse impacts.

### 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section details the affected environment and describes the potential environmental impacts of implementing each alternative on natural and cultural resources, recreational resources, and park operations.

#### 3.1 Methodology

The impact analysis and conclusions contained in this EA were based on existing literature; previous and ongoing HNP research and findings; information provided by experts within the NPS, other agencies, and professionals; NPS professional opinion; and public input. Impacts to resources as a result of each alternative were evaluated to determine whether the impacts were considered beneficial or adverse; if impacts had direct, indirect or cumulative effects; and measures to mitigate impacts. The following terms are used in the discussion describing the environmental consequences of implementing the No Action Alternative or the Proposed Action.

An impact is considered *beneficial* if actions improve the resource or the quality or quantity of the resource. An *adverse* impact is one that harms or depletes the resource or the quality or quantity of the resource.

*Direct impacts* are impacts “which are caused by the action and occur at the same time and place” (40 CFR 1508.8(a)). For example, if there is a proposal to construct a new transit center in a park unit in order to encourage more visitors to use a shuttle system, construction activities might directly affect wildlife due to noise and ground disturbance, and air quality through equipment-related exhaust emissions and production of fugitive dust.

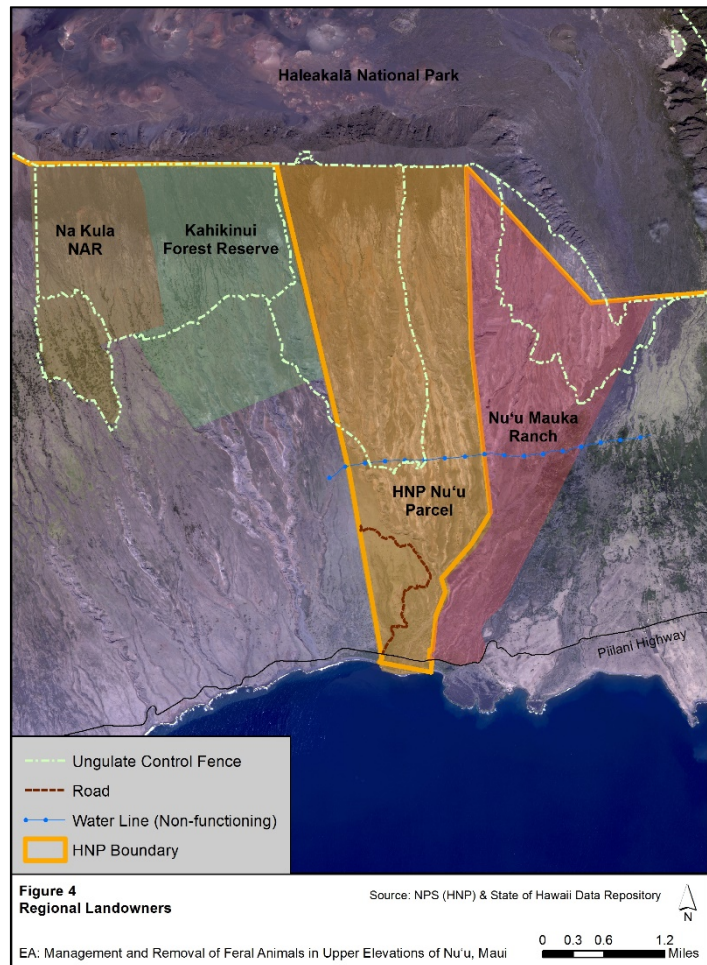
*Indirect impacts* are impacts “which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable” (40 CFR 1508.8(b)). For example, consider the transit center proposal discussed above. A reasonably foreseeable consequence of taking the action might be a reduction of private vehicles on park roads and a corresponding decrease in related vehicle exhaust emissions. The resulting impact on air quality (in this instance, a beneficial one) would represent an indirect impact. It would occur later in time and at a greater distance than the action of building the transit center, but would nonetheless be a consequence of the proposal.

A *cumulative impact* is an “impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). A cumulative impact analysis must consider the overall effects of the direct and indirect impacts of the proposed action, when added to the impacts of past, present, and reasonably foreseeable actions on a given resource.

## 3.2 Project Location

### 3.2.1 Nu‘u Area

The Nu‘u area of the leeward slope of Haleakalā consists of parcels of land owned by the NPS, the State of Hawai‘i, and Nu‘u Mauka Ranch, LLC (figure 4). Land use in the area includes livestock grazing below 4,000 ft. (with the exception of the NPS parcel) and conservation in the upper elevations. The area has very little development and is sparsely populated resulting in minimal light, air and noise pollution.



The area is currently closed to the public, pending development of a comprehensive management plan.

The property directly to the west of the HNP Nu‘u parcel is owned by the State of Hawai‘i. The lower elevation area is leased for cattle grazing and is separated from the HNP Nu‘u parcel by a cattle fence. The upper elevation area is part of the Kahikinui Forest Reserve and is managed for conservation purposes. The northwest portion of the Kahikinui Forest Reserve contains the Nakula Natural Area Reserve that abuts the Park property on the northern boundary. Above 5,000 ft., the Forest Reserve, including the Natural Area Reserve, is enclosed within an ungulate control fence. This fence connects directly with another HNP ungulate control fence on the northern boundary of the State property. Large mammal control efforts (goats, pigs, axis deer, and feral dogs) have been occurring since the fence was completed in summer 2014 (DeSilva pers. comm. 2015). Additional animal control efforts are planned including monthly to bimonthly monitoring and maintenance.

The majority of the property directly to the east of the Nu‘u parcel is owned and managed by Nu‘u Mauka Ranch, LLC. The lower elevations of the property are used for cattle grazing. The upper elevations (above approximately 5,000 ft.) contain an ungulate control enclosure fence. Currently feral ungulate control and habitat restoration efforts are occurring within the enclosure. Continuing habitat restoration efforts are planned both independently and in cooperation with the LHWRP. This property contains the Nu‘u Salt Pond. The Hawaiian Islands Land Trust provides for the protection of cultural sites and conducts habitat restoration activities on this parcel.

### **3.2.2 Project Area**

The proposed project area is located in the Nu‘u area of the leeward slope of Haleakalā. The project area includes the entire area inside the 2,115 acre HNP Nu‘u enclosure; 89% is within the HNP Nu‘u parcel and 11% is within the State-owned land to the west. The HNP Nu‘u enclosure fence runs from 1,250 ft. at the lowest elevation up to 7,650 ft., where it connects to another Park ungulate control fence. All feral animal control will occur within this enclosure.

## **3.3 Physical Environment**

### **3.3.1 Soils and Geologic Resources**

#### ***Affected Environment***

The Nu‘u area consists of rough, steep terrain, is largely inaccessible by vehicle, and in some places difficult to access on foot. The landscape in Nu‘u is dissected by gulches containing numerous intermittent drainage channels. The gulches are well formed and deeply incised.

Very stony land and rock outcrops cover approximately two thirds of the project area and the more well-developed soils are confined to the lower to middle elevations. Lower elevations are predominantly Waiakoa extremely stony silty clay loam mixed with patches of stony alluvial land and rock land. Middle elevations are mixed Puu Pa very stony silt loam with very stony land and rock outcrops. The upper elevations consist of very stony land and rock outcrops.<sup>6</sup>

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<sup>6</sup> Soils data from USDA Web Soil Survey 2013 and USDA Soil Conservation Service 1972.

### ***Environmental Consequences of Alternative 1: No Action***

The No Action alternative would not result in any new adverse direct or indirect effects on soils or geologic resources. Under this alternative, existing adverse effects would continue. These include damage to soils and geologic resources due to trampling and accelerated erosion from removal of plants through browsing, rooting, and movement of feral animals.

### ***Environmental Consequences of Alternative 2: Proposed Action***

Adverse impacts to soils due to disturbance would be confined to specific locations within the project area and be short-term as they would mainly occur within the first year of feral animal removal efforts. Ground-based control efforts involving traversing the terrain on foot and on 4WD vehicles may also directly adversely affect soils and geologic resources due to trampling and disturbance. HNP personnel will ensure that only the minimal amount of ground disturbance necessary occurs. The majority of ground disturbance will decrease substantially after the initial one year period of intensive animal removal is over and long-term adverse effects above current levels are not expected. Long-term, beneficial effects are anticipated throughout the entire enclosure as soils recover and erosion decreases due to the reduction of feral animals.

***Cumulative Impacts:*** Previous cattle grazing in Nu‘u, along with the presence of feral animals, has adversely impacted soils and geologic resources. Implementing the Proposed Action may initially allow for perpetuation of currently deteriorated levels but would not increase them. Removal of feral ungulates and planned restoration activities within the project area will reduce erosion and ongoing adverse effects to soils and geologic resources and thus contribute negligibly to cumulative adverse impacts.

## **3.3.2 Water Resources**

### ***Affected Environment***

The project area is on the leeward side of the Haleakalā Volcanic edifice. As a result rainfall is sparse across most of the area, with annual rainfall averaging 20 inches per year near the coast to 60 inches per year in the middle to upper elevations. Most rainfall is deposited by northeasterly trade winds and tends to be seasonal, occurring mainly November through March. In general, rainfall increases with elevation up to the level of the trade wind inversion. Although the inversion height fluctuates between approximately 3,900 and 7,850 ft., it is generally around 5,000 ft. The upper most elevations are above the trade wind inversion and remain dry except for cyclonic events. The streams and gulches draining the area are all ephemeral. Water flows down stream beds in gulches during heavy rain events and for extended periods during the rainy season they may contain pockets of water.

Although the project area and NPS Nu‘u lands do not contain any wetlands, a portion of the upper slopes of Nu‘u drain into a wetland near the coast just above Nu‘u Bay on land managed by the Hawaiian Islands Land Trust. The six acre wetland, referred to as Nu‘u Salt Pond, is located just outside (approximately 1,000 ft.) the Park boundary at an elevation of 26 ft.

### ***Environmental Consequences of Alternative 1: No Action***

The No Action alternative would not result in any new adverse direct or indirect effects on water quality or water resources. Under this alternative, degradation of water quality and water resources due to accelerated erosion and the higher fecal loads from the presence of feral

animals would continue. Nu‘u Salt Pond would continue to be subjected to intermittent events of increased sediment and nutrient input during periods of heavy rain, as would Nu‘u Bay.

#### ***Environmental Consequences of Alternative 2: Proposed Action***

Erosion can cause soil to wash into streams during rain events and increase sedimentation. Erosion occurs throughout the project area due to impacts from feral animals. Implementation of the Proposed Action will not increase erosion and sedimentation of ephemeral streams above current levels. Most animals are expected to be either naturally moving or herded out of the fence enclosure. Only small herds of less than 20 animals per herd are expected to remain. Control efforts disperse herds, leaving small numbers as targets for control. Therefore, large numbers of carcasses will not be spatially concentrated, thus avoiding increased nutrient levels in water resources, including Nu‘u Salt Pond. To ensure the safety of Park staff and helicopter pilots, carcasses will not be retrieved and will be left on-site to decompose. Due to the dry climate, lack of perennial streams, and distance from permanent waterbodies, implementation of Proposed Action is unlikely to directly or indirectly adversely affect water resources.

Under the Proposed Action, control of feral animals and an increase of plant cover within the enclosure will reduce erosion, and thereby sedimentation, and result in long-term benefits to water resources, including Nu‘u Salt Pond and coastal waters, specifically Nu‘u Bay.

***Cumulative Impacts:*** The management activities under the Proposed Action would not result in any adverse effects to water resources and thus will not contribute to any cumulative adverse effects related to past, current, or future projects in the area. The Proposed Action in combination with past, current, and planned feral animal removal and restoration efforts throughout the area should provide cumulative beneficial effects to water resources through reduced erosion provided by increased plant cover and lower fecal loads.

### **3.3.3 Air Quality**

#### ***Affected Environment***

Air quality in the area is generally good due to lack of pollution from cars or human inhabitants. Volcanic smog, known as vog, originating from the erupting volcanoes on the Island of Hawai‘i, will occasionally be carried to Maui by winds blowing from the south (Kona winds).

#### ***Environmental Consequences of Alternative 1: No Action***

The No Action alternative would not result in any new adverse direct or indirect effects on air quality. Emissions and dust would remain at present levels.

#### ***Environmental Consequences of Alternative 2: Proposed Action***

During implementation of the Proposed Action, emissions and dust generated from the use of helicopters and vehicles could cause localized, temporary changes in air quality. Burning fossil fuels generates emissions that pollute the air. Activities such as driving vehicles off paved surfaces, and take-off and landings of helicopters can generate dust. Changes to air quality would primarily occur during the first year during the two days a week when control operations occur. Changes would be temporary and localized, and would not substantially adversely affect air quality.

***Cumulative Impacts:*** The management activities under the Proposed Action would contribute negligibly to cumulative adverse impacts as any air pollution or dust would dissipate within a short period.

### **3.3.4 Natural Soundscape**

#### ***Affected Environment***

The leeward Haleakalā area is bleak with many wide open spaces. The “natural” soundscape is filled with noises from native and non-native wildlife species as well as the wind. Tour helicopter flights over Nu‘u are part of the soundscape on a regular intermittent basis.

#### ***Environmental Consequences of Alternative 1: No Action***

The No Action alternative would not result in any changes to the natural soundscape. Noise levels within the area would remain at present levels.

#### ***Environmental Consequences of Alternative 2: Proposed Action***

Noise generated by implementation of the Proposed Action would include helicopters and gunfire. Increased noise would occur approximately two days a week for one year. Increased noise levels from helicopters and gunfire would be intermittent and temporary occurring approximately twice a day for two hours, and would not be heard in Park areas open to visitors or homes of the neighboring community. Impacts from increased noise due to implementation of the Proposed Action would be negligible because of duration of helicopter use in the area would be approximately 30 minutes each time.

***Cumulative Impacts:*** The management activities under the Proposed Action would contribute negligibly to cumulative adverse impacts as any noise would be temporary.

### **3.3.5 Wildland Fire**

#### ***Affected Environment***

Hawaiian plants did not evolve with frequent fires and typically do not survive well after a fire. Wildland fire is a threat to the areas where native dryland forests have been impacted by the spread of highly flammable, invasive non-native grasses, and shrubs. In Nu‘u, a majority of the native dryland vegetation has been replaced by non-native grasses and shrubs as a result of grazing, browsing, and rooting by feral and non-native ungulates and domestic cattle. Lightning strikes in the Nu‘u area are very rare and most fires are caused by humans.

#### ***Environmental Consequences of Alternative 1: No Action***

Wildland fires in the Nu‘u region are unlikely to occur due to natural causes. If, however, a wildland fire were to occur, spread would be inhibited due to sparse vegetation as a result of trampling and grazing by ungulates. The No Action alternative neither increases nor decreases the risk of wildland fire or the adverse impacts that could occur as a result of one.

#### ***Environmental Consequences of Alternative 2: Proposed Action***

Due to the dry environment, the potential for igniting a human-caused wildland fire must be considered when undertaking management activities in Nu‘u. Additionally, under the Proposed Action, the risk of wildland fire could increase as vegetation recovers, providing fuel for fire during dry months. Wildland fire could result in habitat changes that may be beneficial, adverse, or both depending on its location, intensity, and duration. Wildland fire can kill both native and

non-native vegetation. It can clear areas and allow for the regeneration of native and non-native plant species. Vegetation loss can lead to increased erosion.

HNP personnel will take precautions to avoid igniting wildland fires. HNP staff regularly conducts on-site measurements of temperature, humidity, and wind to determine fire risk. If the risk level is moderate to high, fire crews warn staff and restrict activity in high-fire risk areas such as Nu'u. Additionally, water tanks would be maintained and could provide a water source for suppression. The local fire department, in coordination with NPS, would respond to and extinguish any fires that occur as a result of project activities.

Due to mitigation measures, wildland fire is not expected to occur as a result of implementation of the Proposed Action. If a fire were to occur, adverse impacts would likely be short-term due to suppression and the capacity of HNP to provide for restoration efforts if necessary.

**Cumulative Impacts:** The management activities under the Proposed Action in combination with planned restoration activities in the HNP Nu'u enclosure and previous and ongoing restoration activities across the Nu'u region, will result in increased plant cover and may increase potential for wildfire to spread more widely, if one were to occur. However, wildland fires are rare in Nu'u. The Proposed Action will likely contribute negligibly to cumulative adverse impacts related to fire.

### 3.4 Biological Resources

#### 3.4.1 Vegetation

##### ***Affected Environment***

Vegetation in Nu'u consists of both native and non-native plants, with non-natives dominating all but the highest elevations. In general Nu'u is dominated by non-native grasslands and contains just over 60% grassland cover, around 25% bare land, 10% scrub/scrub cover and from 1 to 3% other (e.g., trees, water, development (i.e. roads)) (US Geological Survey 2011, DLNR 2008). In the lower elevations of Nu'u non-native grasslands are interspersed with small areas of non-native shrubland including patches of kiawe (*Prosopis pallida*) forest and shrubland. There are also small unvegetated patches of open space with volcanic substrates and/or sparse vegetation.

In the middle elevations small patches of native shrubland and non-native shrubland are scattered among the more dominant cover of non-native grasslands and unvegetated patches of open space with volcanic substrates. The amount of native shrubland increases with elevation although non-native grasslands continue to be the dominant cover until the highest elevations of Nu'u. The dominant cover in the highest elevation areas is native shrubland with non-native grasslands interspersed in small patches. The amount of unvegetated patches of open space decreases with elevation. A small number of native trees are present throughout the area. In the lower elevations a few wiliwili trees (*Erythrina sandwicensis*) are found. On the higher part of the middle elevations, koa (*Acacia koa*) and 'ōhi'a (*Metrosideros polymorpha*) are present. Pili grass (*Heteropogon contortus*) is found in small patches at all elevations of Nu'u. The two primary threats to or causes of mortality for native plants at HNP are feral ungulates and competition with non-native plants (HNP 2012).



### ***Environmental Consequences of Alternative 1: No Action***

Under the No Action alternative existing adverse impacts to native vegetation would continue. The presence of feral ungulates in Nu‘u promotes non-native plant species through habitat alteration and seed dispersal and subjects native plants to browsing and trampling. Large numbers of non-native plant species have an adverse impact on native plant communities through increased competition for resources and habitat alteration.

### ***Environmental Consequences of Alternative 2: Proposed Action***

Native plant populations will benefit over the long-term as removal of feral ungulates will reduce or eliminate browsing and trampling allowing for natural recruitment. Native plant populations will also benefit from improved soil conditions and planned mitigation measures (Section 3.2.1).

***Cumulative Impacts:*** While native plant species will benefit from removal of feral animals, non-native plant species may also benefit, especially in lower elevations. Implementation of the Proposed Action will involve very little disturbance to or elimination of native plants, and thus will contribute negligibly to any cumulative adverse effects in conjunction with past, current, or future projects in the area.

## **3.4.2 Wildlife**

### ***Affected Environment***

Animals that occur at Nu‘u include native and non-native species. With the exception of ‘ōpe‘ape‘a (Hawaiian hoary bat, *Lasiurus cinereus semotus*), the only native terrestrial land mammal found in the Hawaiian Islands, all other mammals are non-native species, with populations and distributions that have increased dramatically since their introduction due to a lack of natural predators and competition for resources. Numerous non-native birds have been documented utilizing the south slope of Haleakalā and may be present within the project area (HNP unpubl. data 2014a, Natividad Bailey 2007). Native birds known to occur include both forest birds and seabirds.

Several native and non- native wildlife species have been confirmed as present in the HNP Nu‘u parcel (table 2). Since a formal inventory in this area has not occurred, this species list should not be considered comprehensive, but representative of the Nu‘u area. Assessments indicate that occupation of the Nu‘u parcel by native wildlife species is currently very low.

### ***Environmental Consequences of Alternative 1: No Action***

Under the No Action alternative existing adverse impacts to native wildlife species would continue throughout the project area due to competition for resources, degradation of suitable habitat, and predation.

### ***Environmental Consequences of Alternative 2: Proposed Action***

Implementing the Proposed Action has the potential to cause intermittent, temporary disturbance to native wildlife, which may result in a change in behavior. Disturbance to native wildlife would most likely occur due to noise created by use of helicopters and gunfire. However, since noise will be intermittent, disturbance will be minimal. Disturbance to native wildlife would likely be restricted to the project area and would be minimal once the initial one year intensive control efforts are completed. Control of feral animals within the project area

would result in long-term, regional benefits for native wildlife due to improved habitat conditions and reduction of predators, providing for range and population expansion.

**Cumulative Impacts:** Given the low population of native animals and the mitigation measures to be followed during implementation of the Proposed Action, there will be little to no disturbance of native wildlife and if so, it would be temporary. Thus the Proposed Action will not contribute to any cumulative adverse effects related to past, current, or future projects in the area.

**Table 2. Wildlife Confirmed Present in Nu‘u Parcel**

Family	Species	Common Name / Hawaiian Name	Origin	Status
<b>Mammals</b>				
Bovidae	<i>Capra hircus</i>	Goat	Non-Native	Common
Canidae	<i>Canis lupis familiaris</i>	Dog	Non-Native	Common
Cervidae	<i>Axis axis</i>	Axis deer	Non-Native	Common
Felidae	<i>Felis catus</i>	Cat	Non-Native	Common
Herpestidae	<i>Herpestes auropunctatus</i>	Mongoose	Non-Native	Common
Muridae	<i>Mus musculus</i>	House mouse	Non-Native	Common
Muridae	<i>Rattus spp.</i>	Rat	Non-Native	Common
Suidae	<i>Sus scrofa</i>	Pig	Non-Native	Common
Vespertilionidae	<i>Lasiurus cinereus semotus</i>	Hawaiian hoary bat/ ‘ōpe‘ape‘a	Native	Endangered
<b>Birds</b>				
Alaudidae	<i>Alauda arvensis</i>	Eurasian skylark	Non-Native	Common
Anatidae	<i>Branta sandvicensis</i>	Hawaiian goose/ nēnē	Native	Endangered
Ardeidae	<i>Bubulcus ibis</i>	Cattle egret	Non-Native	Common
Cardinalidae	<i>Cardinalis cardinalis</i>	Northern cardinal	Non-Native	Common
Columbidae	<i>Geopelia striata</i>	Zebra dove	Non-Native	Common
Estrildidae	<i>Lonchura cantans</i>	African/Warbling silverbill	Non-Native	Common
Fregatidae	<i>Fregata minor</i>	Great frigatebird/ ‘iwa	Native	Common
Fringillidae	<i>Carpodacus mexicanus</i>	House finch	Non-Native	Common
Fringillidae	<i>Hemignathus virens wilsoni</i>	‘amakihi	Native	Common
Fringillidae	<i>Himatione sanguinea sanguinea</i>	‘apapane	Native	Common
Fringillidae	<i>Vestiaria coccinea</i>	‘i‘iwi	Native	Common
Hydrobatidae	<i>Oceanodroma castro</i>	Band-rumped storm petrel/ ‘akē‘akē	Native	Candidate Species
Mimidae	<i>Mimus polyglottus</i>	Northern mockingbird	Non-Native	Common
Passeridae	<i>Passer domesticus</i>	House sparrow	Non-Native	Common
Phaethontiformes	<i>Phaethon lepturus dorotheae</i>	White-tailed tropicbird/ koa’e kea	Native	Common
Phaethontiformes	<i>Phaethon rubricauda melanorhynchos</i>	Red-tailed tropicbird/ koa’e ‘ula	Native	Common
Phasianidae	<i>Alectoris chukar</i>	Chukar	Non-Native	Common
Phasianidae	<i>Francolinus francolinus</i>	Black francolin	Non-Native	Common
Phasianidae	<i>Francolinus pondicerianus</i>	Grey francolin	Non-Native	Common
Phasianidae	<i>Pavo cristatus</i>	Peafowl	Non-Native	Common

Family	Species	Common Name / Hawaiian Name	Origin	Status
Phasianidae	<i>Phasianus colchicus torquatus</i>	Pheasant	Non-Native	Common
Procellariiformes	<i>Pterodroma sandwichensis</i>	Hawaiian petrel/ 'ua'u	Native	Endangered
Sturnidae	<i>Acridotheres tristis</i>	Common myna	Non-Native	Common
Sylviidae	<i>Leiothrix lutea</i>	Red-billed leiothrix	Non-Native	Common
Thraupidae	<i>Paroaria coronata</i>	Brazilian/Red-crested cardinal	Non-Native	Common
Zosteropidae	<i>Zosterops japonicus</i>	Japanese white-eye	Non-Native	Common

### 3.4.3 Special Status Species

#### *Affected Environment*

#### **Birds, Mammals, and Insects**

Endangered nēnē (Hawaiian goose, *Branta sandvicensis*), 'ua'u, and 'ōpe'ape'a as well as the candidate species 'akē'akē (Band-rumped storm petrel, *Oceanodroma castro*) have been documented within Nu'u and may occur in the project area. The endangered Blackburn's sphinx moth (*Manduca blackburni*) potentially occurs but has not been documented in Nu'u in recent years (table 3).

**Table 3. Special Status Bird, Mammal, and Insect Species in Nu'u**

Scientific Name	Common Name	Hawaiian Name	Federal Status	Presence
<b>Birds</b>				
<i>Branta sandvicensis</i>	Hawaiian goose	nēnē	Endangered	Present
<i>Oceanodroma castro</i>	Band-rumped storm petrel	'akē'akē	Candidate	Present
<i>Pterodroma sandwichensis</i>	Hawaiian petrel	'ua'u	Endangered	Present
<b>Mammals</b>				
<i>Lasiurus cinereus semotus</i>	Hawaiian hoary bat	'ōpe'ape'a	Endangered	Present
<b>Insects</b>				
<i>Manduca blackburni</i>	Blackburn's sphinx moth	--	Endangered	Potentially present

Nēnē are medium-sized geese in the family Anatidae and genus *Branta* that are endemic to Hawai'i and historically occurred on all or most of the main Hawaiian Islands and likely were widespread (USFWS 2012b). Although the population was near extinction in the late 1940s and early 1950s, captive breeding programs have resulted in over 2,700 captive bred nēnē being released into the wild on both private and public lands. On Maui, nēnē fly throughout the island, but currently reside in and around the outer slopes of Haleakalā Crater, in West Maui at Hana'ula, and in some lowland areas throughout Maui. Reintroduction of nēnē in HNP began in 1962 and the population in and around the Park is estimated at 200-250 individuals.

'Akē'akē are a medium-sized, pelagic seabird from the family Hydrobatidae (DLNR 2005a). 'Akē'akē have a widespread distribution with breeding sites on islands in the Pacific and Atlantic Oceans. When they are not breeding, 'akē'akē generally stay at sea, but may remain near

breeding areas. The population size is not known but was estimated at 25,000 pairs worldwide in 2005 (DLNR 2005a). The present breeding population in Hawai‘i is suspected to be very small based on confirmed sightings of birds and nests. Confirmed nesting sites in the Hawaiian Islands have been located at high elevations. Conservation actions geared towards recovery of endangered seabirds in Hawai‘i (e.g., Newell’s Shearwater and ‘ua‘u) also benefit ‘akē‘akē. ‘Akē‘akē have been recorded on song-meters in the HNP Nu‘u parcel in 2014 (HNP unpubl. data 2014b), and may utilize the area for nesting.

‘Ua‘u are medium-sized seabirds in the family Procellariidae that are endemic to Hawai‘i and were once abundant and widely distributed throughout the archipelago. Today, the largest known breeding colony is found at Haleakalā Crater on Maui, with other colonies in high elevations on Mauna Loa and Mauna Kea, Hawai‘i Island, Kaua‘i and on the summit of Lāna‘i. ‘Ua‘u nest in burrows located mostly on steep slopes (HNP 2008). Pairs first breed around five or six years of age, mate for life, and may return to the same burrow year after year (Natureserve 2014a, HNP 2008, Simons and Natividad Hodges 1998). During the nesting season they search for food over pelagic waters of the ocean during the day, sometimes for several days, and return to their colony at night. The population size at Haleakalā is estimated at 8,000 – 10,000 individuals (HNP unpubl. data 2014b) and is estimated at 20,000 statewide in 2005 (DLNR 2005b). ‘Ua‘u are known to utilize the upper elevations of Nu‘u for breeding and nesting and may be nesting in the project area. One probable nest was found in Nu‘u in 2014 (HNP unpubl. data 2014b). Current threats to ‘ua‘u include habitat loss, trampling of nests by feral ungulates, predation, groundings, and collision with man-made objects/structures.

‘Ōpe‘ape‘a, from the family Vespertilionidae, are one of the largest bats in the Americas and are endemic to Hawai‘i. ‘Ōpe‘ape‘a are a nocturnal species that roosts solitarily during the day (except mothers and pups) in trees (both native and non-native) or sometimes in rock crevices (USFWS 2012c, Bonaccorso 2010). ‘Ōpe‘ape‘a forage in a variety of habitats including native and non-native forest and shrublands, open areas near forest edges, along roads, over agriculture fields and over areas of fresh/brackish water and open saltwater (Natureserve 2014b, Fraser et al. 2007, Tomich 1986). These bats are insectivorous and use echolocation to locate night flying insects which are captured in flight (Pacific Rim Conservation 2013). ‘Ōpe‘ape‘a eat both native and non-native insects including moths, beetles, crickets, mosquitoes and termites. Relatively little is known about the distribution and population status of ‘ōpe‘ape‘a, but these bats have been documented as occurring from sea level to the highest volcanic peaks (USFWS 2012c, VanderWerf 2012). ‘Ōpe‘ape‘a have been documented in Nu‘u and potentially occur on lands within the project area.

Blackburn’s sphinx moth, one of Hawai‘i’s largest native insects, is from the family Sphingidae and is endemic to Hawai‘i (USFWS 2012d). The species was believed to be extinct until 1984 when a small population was rediscovered in the lowland dry forests on the south coast of east Maui (DLNR 2005c, USFWS 2005b). Currently the Blackburn’s sphinx moth is known to occur in a few small isolated populations on Maui, Kaho‘olawe, and in North Kona on the island of Hawai‘i. Previously this species was found on the five largest main Hawaiian Islands from Kauai to Hawai‘i Island and occurred in coastal, lowland and dryland forests in areas that receive less than 50 inches of rainfall (USDA Natural Resources Conservation Service 2005). Although the Blackburn’s sphinx moth has not been documented within the HNP Nu‘u parcel, based on its

known occurrence in other areas of the leeward Haleakalā slope, there is the potential for this species to occur within the project area. The leeward slope of Haleakalā contains designated critical habitat for the Blackburn's sphinx moth.

### **Plants**

Because the HNP Nu'u parcel is a relatively new acquisition of the NPS, and consists of mostly steep and rough terrain, in-depth vegetation surveys and reconnaissance for special status plants species have not yet occurred over a large portion of the parcel. Based on known individuals or populations in areas adjacent to the Nu'u parcel within both HNP and the Kahikinui Forest Reserve, it is likely that some special status plants are located within the project area. Project area surveys by NPS personnel determined that there are no special status plants located within the vicinity of the existing road, Nu'u base, the proposed location of the RAWs, or the helicopter LZs.

### **Critical Habitat**

Nu'u contains designated critical habitat for three federally listed plant species, māhoe (*Alectryon macrococcus*), the Haleakalā subspecies of 'āhinahina (Haleakalā silversword, *Argyroxiphium sandwicense* ssp. *macrocephalum*), and ko'oko'olau ssp. *kalealaha* (Kalealaha beggartick, *Bidens micrantha* ssp. *kalealaha*, Table 4). Both māhoe and the Haleakalā subspecies of 'āhinahina are present in Nu'u although neither of these species are presently known to occur within the project area. Ko'oko'olau ssp. *kalealaha* is not known to occur within Nu'u (figure 5).

The newly published, Final Rule for Designation of Critical Habitat for Endangered and Threatened Wildlife and Plants was available on March 30, 2016 (81 FR 17790) and is effective as of April 29, 2016. This rule revised critical habitat for the plant species in this EA and added critical habitat for 30-40 species within four ecosystems; Lowland Dry 01, Montane Dry 01, Montane Mesic 01 and Subalpine 01. Most of these species do not occur within the Nu'u parcel, but USFWS believes Nu'u will be suitable habitat for introductions once feral animals are removed and the soil is stabilized. Since this Rule was published late into the development of this document and species do not currently occur in the area, the revised critical habitat for the 30-40 species are not analyzed in this draft.

**Table 4. Plants with Designated Critical Habitat in Nu'u**

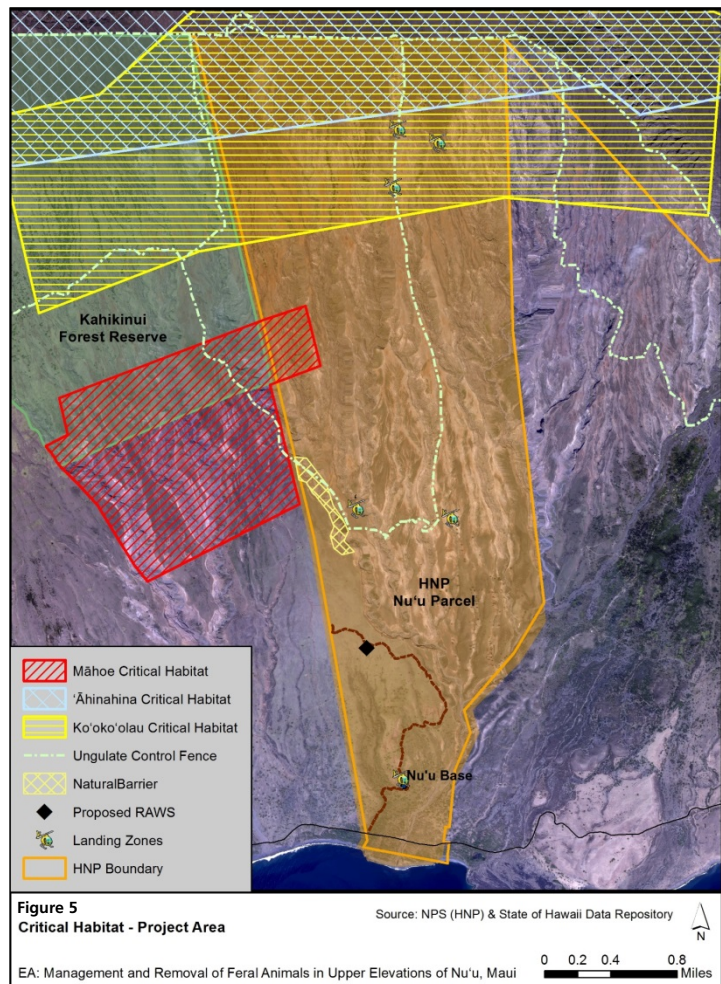
Scientific Name	Common Name	Hawaiian Name	Federal Status
<i>Alectryon macrococcus</i>	Hawai'i plum	māhoe, 'ala'alahua	Endangered
<i>Argyroxiphium sandwicense</i> ssp. <i>macrocephalum</i>	Haleakalā silversword	'āhinahina	Threatened
<i>Bidens micrantha</i> ssp. <i>kalealaha</i>	Kalealaha beggarticks	ko'oko'olau	Endangered

Māhoe is a slow growing but long-lived tree in the soapberry family that is endemic to Hawai'i. The variety that occurs on the leeward slopes on Haleakalā is *Alectryon macrococcus* var. *auwahiensis*. Although this species has never been known to occur within the Park, the variety *auwahiensis* is found within the Kahikinui Forest Reserve, specifically on the ridge east of Pahihi Gulch (HNP 2012, USFWS 2011). In 1992, there were only 22 individuals of variety *auwahiensis*

known to occur in two populations (the other being to the east of the HNP Nu‘u parcel in the Auwahi district). This number of known individuals has not been updated recently.

The Haleakalā subspecies of ‘āhinahina is a slow growing plant from the family Asteraceae that is endemic to Maui where it occurs in the subalpine and alpine deserts of Haleakalā (Bruegmann and Caraway 2003, USFWS 1997). The Haleakalā subspecies of ‘āhinahina, considered the Park’s hallmark plant species, was near extinction in the 1920s due to browsing and trampling by feral ungulates and cattle and vandalism by visitors. The population has increased considerably with intensive ecosystem management including the installation of ungulate control fencing. Individuals of the Haleakalā subspecies of ‘āhinahina occur just north of the HNP Nu‘u parcel within the fenced Haleakalā crater as well as in the upper elevations of the Kahikinui Forest Reserve to the west of the HNP Nu‘u parcel, where plants are also protected by an ungulate control fence.

Ko‘oko‘olau ssp. *kalealaha* is an erect perennial herb in the family Asteraceae that is endemic to Hawai‘i. This species historically occurred in a diversity of habitats from open-canopy koa forests to montane shrublands to cliffs and sides of gulches (USFWS 1997). In East Maui ko‘oko‘olau ssp. *kalealaha* occurs from 5,200 to 7,700 ft. elevation, primarily on drainage headwalls (USFWS 2011). The species persists in places that are inaccessible to feral ungulates. The 1997 Recovery Plan contends that this subspecies “was probably once widespread on East Maui and Lanai, but has been drastically depleted by feral goats and has survived only on precipitous cliff faces inaccessible to goats” (USFWS 1997). Individuals of ko‘oko‘olau ssp. *kalealaha* occur just north of the HNP Nu‘u parcel within the fenced Haleakalā crater.



### ***Environmental Consequences of Alternative 1: No Action***

The No Action alternative would result in continued regional, adverse impacts on special status species within the project area as well as within the Nu‘u region and HNP. Under this alternative, habitat that may be suitable for special status species will continue to be degraded by feral animals. Additionally, certain special status species would continue to be subject to predation by dogs. Any special status species that exist within the project area could face further population decline and the potential for population expansion is limited.

## ***Environmental Consequences of Alternative 2: Proposed Action***

### **Birds, Mammals, and Insects**

Adverse effects to special status wildlife species due to implementation of the Proposed Action would be most likely to occur during the two days a week when control efforts are occurring within the first year of the project. ‘Ua‘u, ‘akē‘akē, nēnē and occur in the area. ‘Ua‘u and ‘akē‘akē are nocturnal and make nests in deep burrows. Helicoptering and shooting of feral animal occur during the day and are not expected to affect these birds. Nēnē are occasional visitors and are not known to nest in the area. Shooting of feral animals will not occur when nēnē are in the area. Ground-based control efforts at high elevations could adversely affect ‘ua‘u and ‘akē‘akē if burrows are trampled or surrounding soil is destabilized.

Under the Proposed Action all Park staff working in Nu‘u will be given information regarding special status wildlife species and ways to minimize impacts to listed species. This information will include maps showing locations of any known nesting or roosting sites, including ‘ua‘u and ‘akē‘akē burrows.

Any adverse effects to special status wildlife related to implementation of the Proposed Action will be short-term, confined to the project area, and are expected to be negligible. The Proposed Action will result in long-term, regional benefits for special status wildlife species due to improved habitat conditions and reduced predation by feral dogs providing opportunity for population recruitment and range expansion.

***Cumulative Impacts:*** Given the low population of special status wildlife species and the mitigation measures to be followed during implementation of the Proposed Action, there will be little to no disturbance of special status wildlife. Thus the Proposed Action will not contribute to any cumulative adverse effects related to past, current, or future projects in the area. The Proposed Action in conjunction with other feral animal control efforts in Nu‘u will likely result in cumulative beneficial effects that support an increase of populations of special status wildlife species across Nu‘u.

### **Plants**

Adverse effects to special status plants due to trampling and disturbance from erosion caused by ground-based activities will be minimal in comparison to effects of feral animals. Based on known occurrences nearby, special status plants may be present within some portion of the project area, however populations are likely to be low. In the event that any threatened or endangered plants are encountered, measures will be taken to avoid disturbance. HNP personnel working in the area will be required to demonstrate the ability to identify special status plants and given instruction on how to avoid adverse impacts. Under the Proposed Action adverse impacts to special status plants is expected to be negligible.

The decrease in feral animals will decrease browsing, trampling, and rooting, which would benefit any existing or future populations of special status plants within the project area. Planned control of non-native plant species will decrease competition with native plant species. The Proposed Action would provide direct, long-term, regional beneficial effects for special status plants due to the potential for population expansion through natural dispersal, re-growth, and out-planting.

**Cumulative Impacts:** Given the presumably low population of special status plants and the mitigation measures to be followed during implementation of the Proposed Action, there will be little to no disturbance of special status plants. Thus the Proposed Action will not contribute to any cumulative adverse effects related to past, current, or future projects in the area. The Proposed Action, in conjunction with other feral animal control efforts and restoration projects in Nu‘u, will result in cumulative beneficial effects that support an increase in populations of special status plants across Nu‘u, in part due to less habitat fragmentation.

### **Critical Habitat**

The HNP Nu‘u enclosure contains a portion of the designated critical habitat for māhoe, the Haleakalā subspecies of ‘āhinahina, and ko‘oko‘olau ssp. *kalealaha* (Figures 5 and 6). Implementing the Proposed Action has the potential to adversely affect 3% of the designated critical habitat in east Maui for māhoe, 2% of the designated critical habitat in east Maui for the Haleakalā subspecies of ‘āhinahina, and 10% of the designated critical habitat in east Maui for ko‘oko‘olau ssp. *kalealaha*. Adverse impacts to critical habitat would be minimal. Indirect adverse effects would be negligible. Implementation of the Proposed Action would result in long-term, beneficial effects to critical habitat as a result of exclusion of feral animals and the expected habitat recovery and could potentially result in population increases of these federally listed plant species.

**Cumulative Impacts:** Implementing the Proposed Action will contribute negligibly to cumulative adverse impacts related to critical habitat. Any critical habitat disturbance will be minimal and not above current levels. Implementing the Proposed Action will result in a cumulative beneficial effect for critical habitat for plant species, including the Haleakalā subspecies of ‘āhinahina and ko‘oko‘olau ssp. *kalealaha* as the amount of designated critical habitat protected from feral animals would increase across the region. The portion of critical habitat for these species directly adjacent to the HNP Nu‘u enclosure in the Kahikinui Forest Reserve has also been fenced and feral ungulates removed. Additionally, Nu‘u Mauka Ranch is also undertaking feral animal control measures in the portion of critical habitat for these species on their property.

### **3.4.4 Habitat Condition**

#### ***Affected Environment***

Prior to the introduction of grazing, the leeward area of Haleakalā supported diverse and robust hardwood forests and native shrublands. Known as dryland forests, this type of habitat is now listed as one of the most critically endangered habitats in the world (Allen 2000, Cabin 2000). During the early 1980s Medeiros, Loope, and Holt conducted an assessment of the south slope of Haleakalā in an attempt to provide a basis for conservation measures for the remaining leeward native vegetation of East Maui (Medeiros et al. 1986). Their assessment documented how, in 1913, Joseph Rock described the south slope of Haleakalā as one of the most important botanical sites in the islands even though it had already been seriously degraded when he first saw it in 1910. It also concluded that “It has long been known that the so-called leeward dryland forest of Maui is one of the richest areas in native tree species in the state of Hawai‘i” (Medeiros et al. 1986).



The habitat changes that have occurred on the leeward slope of Haleakalā are significant. Only about 5% of the previously existing forest remains; the understory of native shrubs, ferns and mosses are all but gone; and it is estimated that up to 5-8 ft. of top soil, leaf litter and forest duff have been lost (Medeiros et al. 1986). Decline of habitat condition is mainly due to: grazing by domestic cattle; browsing and grazing by feral goats and axis deer; feeding and digging by feral pigs; and displacement of native plant species by non-native plant species.

The cattle grazing that occurred in Nu‘u since the early 1900s contributed to the decline of native plant populations as well as inhibited any natural regeneration of native species. Intensive grazing converted large tracts of native shrublands into areas dominated by non-native grasses and herbs. Early ranchers may have removed native trees to facilitate expansion of grassy grazing areas.

Beginning in the early 1800s feral goats ranged freely through the leeward Haleakalā area at all elevations and degraded native shrubland and forests through browsing and trampling. Feral goats also accelerated the rate of erosion by loosening soil with their hooves and removing vegetation. As Medeiros et al. (1986) described, “The middle and upper slopes of Nu‘u appear to present as spectacular an example of accelerated erosion due to goat browsing as exists anywhere.”

Feral pigs prefer areas above 3,000 ft. (Medeiros et al. 1986), but are now seen throughout Nu‘u. Pigs upturn the soil rooting for invertebrates and vegetation material, destroying existing plant cover and accelerating the rate of erosion by loosening soil and removing vegetation.

Five to seven axis deer were introduced to the Pu‘u O Kali area of Maui in 1959 (Anderson 2003). This species is now widespread on the island with the highest number of deer occurring along the southern flank of Haleakalā, including Nu‘u. Axis deer are widely distributed on Maui and are utilizing a large portion of the leeward slope of Haleakalā, including areas with remnant patches of native plants. HNP staff report regular sightings of deer interspersed with goat herds in Nu‘u. Over 30 axis deer were removed from the dry, sub-alpine forests of HNP (around 7,000 ft. elevation) and adjacent areas from 1989 to 2001 (HNP unpubl. data 2005). Deer degrade habitat through browsing, girdling of trees, and contributing to erosion.

Feral animals browse on both native and non-native plants, trample or uproot seedling and plant roots, cause erosion, and promote the invasion of non-native plants. LHWRP describes the Nu‘u district as lacking original shrub and understory, which has been replaced largely by non-native grasses and highly eroded barren hardpan (LHWRP 2006). Current habitat conditions can be described as severely degraded and favorable to the existence and expansion of non-native plant species.

For over ten years organizations and agencies have been working to improve habitat conditions in the leeward Haleakalā area. On the leeward slope of Haleakalā area in general, feral animal control efforts have been occurring and will continue as planned by DLNR in the Kahikinui Forest Reserve and at Nu‘u Mauka Ranch with assistance from LHWRP.

### ***Environmental Consequences of Alternative 1: No Action***

Under the No Action alternative, regional, adverse impacts would continue due to habitat degradation throughout the project area and continued adverse consequences for habitat

restoration goals for the larger Nu‘u area. Native plant species would continue to be adversely impacted through browsing and trampling by ungulates, and increased competition with non-native species. Non-native plants species would continue to dominate the landscape and would have the potential to increase by seed dispersal through animal waste and continued soil disturbance. Native wildlife species would continue to be adversely impacted due to continued loss of habitat, predation by non-native predators, and competition for resources. Soils would continue to be prone to erosion and compaction.

## ***Environmental Consequences of Alternative 2: Proposed Action***

### **Alteration of Habitat**

Implementation of the Proposed Action would protect and restore habitat through the control of feral animals. Implementation of the Proposed Action is likely to result in permanent changes to habitat making it more conducive to breeding and nesting of ‘ua‘u and other native species including special status species. Indirect adverse effects due to reduced browsing pressure on non-native species may increase non-native species cover and may result in intensive invasive species control. The Proposed Action will result in long-term, beneficial effects to habitat within the entire project area as soils and vegetation are no longer subjected to trampling and browsing.

***Cumulative Impacts:*** Implementing the Proposed Action will contribute negligibly to cumulative adverse impacts related to habitat condition. Any habitat disturbance will be minimal and not above current levels in a region where most land has already been degraded, although some sections are recovering due to conservation actions including exclusion and control of feral ungulates. Implementing the Proposed Action adds to cumulative beneficial effects to habitat condition. The Proposed Action would reduce the land area on the leeward Haleakalā slope impacted by feral animals in an area where feral animal control activities have already been occurring on adjacent properties to the east, west, and north. Habitat within the project area would recover naturally over time due to less pressure from trampling, grazing, and rooting. The amount of protected breeding and nesting habitat for ‘ua‘u and other special status bird species in Nu‘u would expand.

### **Introduction of New Non-Native Species**

Adverse impacts to habitat can occur during feral animal control efforts due to introduction of non-native species such as insects or plant propagules (e.g., seeds) from being naturally dispersed or inadvertently transported to and from the project area by hitchhiking on equipment, personnel, and supplies. The Park will maintain a system of inspecting and cleaning vehicles, equipment, clothes and footwear. Because a majority of the project area is currently dominated by non-native plant species, adverse impacts to habitat related to the introduction of new non-native plants will likely be negligible.

***Cumulative Impacts:*** Management activities under the Proposed Action, as well as current and future actions in Nu‘u, have the potential to introduce and disperse new non-native species, mainly through movement of equipment. Implementation of the Proposed Action would only contribute to cumulative adverse effects if a new introduction is not contained and eliminated. Mitigation measures will greatly reduce the chance of this happening, and thus implementation of the Proposed Action will likely contribute negligibly to cumulative adverse impacts.

### 3.5 Cultural and Historical Resources

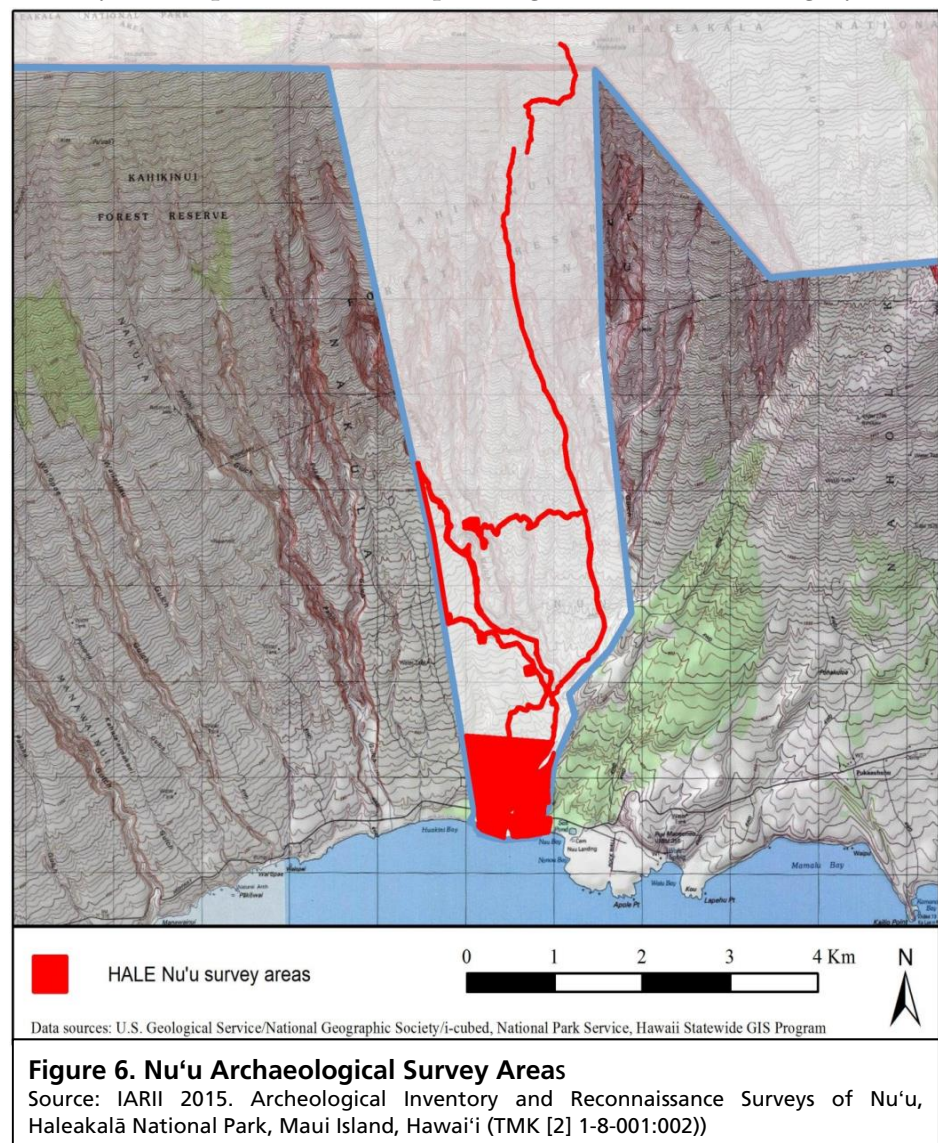
#### ***Affected Environment***

Reconnaissance and inventory surveys in the project area were conducted by the International Archaeological Research Institute, Inc. (IARII) specifically to identify cultural and historic features. IARII conducted surveys within the NPS Nu‘u parcel along four potential fence alignments from approximately 500 ft. to 7,000 ft., around the Nu‘u Base, along the existing road corridor, and in a one acre plot around the proposed RAWs site. A final version of the survey document was submitted to the NPS in September 2015 (IARII 2015).

IARII completed an inventory-level survey of 116.1 acres and a reconnaissance-level survey of 142.1 acres of land at Nu‘u (figure 6). The Phase 1 fieldwork took place from June to August 2012, with Phase 2 carried out from April to May 2014. Data recovery methods included pedestrian survey and, where warranted, subsurface excavations in the form of 34 shovel test pits. Cultural features were carefully documented employing a range of traditional descriptions (e.g., written), along with newly developed field techniques (e.g., Global Positioning Systems and aerial kite photography).

The inventory survey was conducted by two surveyors walking approximately 33 ft. (10 m) abreast. Initial identification, including flagging and detailed recording of cultural features, was conducted concurrently. At the conclusion of the survey, temporary flagging and other markers were removed from the area. No permanent markers were installed.

The survey document includes detailed maps of site locations. The highest concentrations of



cultural and historic resources are found in the lower elevations from sea level up to approximately 300 ft. elevation. Although there were some archaeological features found on the steep upper slopes, the number of cultural and historic features decreases with an increase in elevation. A total of 1,613 cultural features were documented by IARII; 1,103 features were recorded in the parcels subject to inventory-level survey, and the Phase 2 fence line surveys. The other 510 cultural features were recorded during reconnaissance surveys in the *makai* (coastal) area of Nu‘u and will not be impacted by the Proposed Action.

Some examples of cultural and historic features found in the area include: a variety of habitation enclosures, modified outcrops, rock shelters, lithic scatters, push piles, and petroglyphs. Analysis indicated most cultural features date to pre-European Contact and in many cases had been in continuous use in post-Contact times. Ten radiometric dates were obtained from organic materials recovered during fieldwork and indicate the initial use of this area may have occurred as early as the 15<sup>th</sup> century.

Cultural and historic features present indicate that the primary pre-Contact practices in this area included: off- and near-shore fishing; aquaculture (inland fishpond); gathering marine resources such as shellfish, seaweeds and salt; dryland farming of sweet potatoes and dryland *kalo* (taro); the production of stone tools (adze quarries); and habitation in coastal fishing villages and upland farming communities. The area also contains several *heiau* (temples) that have ties to agriculture and marine resource exploitation. The site of the 19<sup>th</sup> century Nu‘u village is not located within the project area.

#### ***Environmental Consequences of Alternative 1: No Action***

Under the No Action alternative feral animals would continue to be present within the project area and continue to inflict adverse effects on cultural and historic features through trampling, rooting, and destabilizing soil.

#### ***Environmental Consequences of Alternative 2: Proposed Action***

Adverse impacts to cultural and historic resources due to implementation of the Proposed Action will be negligible. Under implementation of the Proposed Action, any impacts to cultural and historic resources will be avoided. The information provided by archaeological surveys will facilitate avoiding adverse impacts to cultural and historic resources while conducting feral animal control. The Park will follow the avoidance measures laid out in the September 21, 2015 letter to the Hawai‘i SHPD. The IARII survey findings will be used to create maps and determine buffer zones. Staff will be provided maps depicting the locations of cultural and historic resources and buffer zones and trained in best practices for avoiding adverse impacts. All activities related to the Proposed Action will be done outside of the buffer zones.

Control and exclusion of feral animals will result in direct, long-term, beneficial effects to cultural and historic features within the HNP Nu‘u enclosure by preventing them from being trampled on or uprooted, and by preventing destabilization of the surrounding soil.

***Cumulative Impacts:*** Management activities in the project area as well as in other areas throughout the region can result in damage to cultural and historic features if care is not taken to locate and avoid them. Cultural and historic resources are non-renewable and damage or loss diminishes the types and numbers of resources available for traditional uses, study, or visitor enjoyment within the region as a whole. Measures to protect cultural and historic features

should be sufficient to avoid management activities from the Proposed Action from contributing to cumulative adverse effects to these resources.

### **3.6 Socio-Economic Environment**

The eastern and southern portions of east Maui are rugged and desolate and consist of a sparse population scattered among a few very small towns. Ranching and farming are the main forms of income. Kaupō, the closest town to Nu‘u, has very few residences, one small store, no school, and is approximately five miles away. Larger towns in the area include Kula to the west and Hana to the east. The entire 96713 zip code, which includes the town of Hana, Kaupō, and Nu‘u, had a population of 1,990 during the 2010 census. The small town of Hana contains a school, a few small businesses and a fire station. Kula had a population of 6,452 during the 2010 census. Larger than Kaupō and Hana, Kula is still relatively small, but contains businesses, schools, a hospital, a fire station, and a community center. In 2010 Hawai‘i had a population of 1,360,301 and Maui County had a population of 154,834.

#### **3.6.1 Recreational Resources**

##### ***Affected Environment***

The Nu‘u parcel of HNP is closed to all visitor use, including hunting, which is prohibited on NPS lands. Recreational resources in the adjacent Kahikinui Forest Reserve include hunting and hiking, although these activities are limited due to the steep, rough terrain and difficult access. The general Nu‘u area is not regularly used by visitors for recreation, although thousands pass through Nu‘u every year on the Pi‘ilani Highway to access the Kīpahulu District of HNP as well as the small town of Hana.

##### ***Environmental Consequences of Alternative 1: No Action***

The No Action alternative would not have either adverse or beneficial effects on recreational resources.

##### ***Environmental Consequences of Alternative 2: Proposed Action***

Under the Proposed Action there would be no new adverse, direct or indirect effects on recreational resources as the Nu‘u parcel is closed to visitor use and hunting is prohibited on NPS lands. The portion of State land where feral ungulates will be removed is very inaccessible so hunting rarely occurs there. A long-term, beneficial effect of implementing the Proposed Action would be that a less barren landscape and the return of native plant species would be visually pleasing to recreationists on neighboring lands or for those that access the portion of the State land within the HNP Nu‘u enclosure via the step over gates.

***Cumulative Impacts:*** Some members of the public have commented that past, present, and future management actions aimed at controlling feral animals in the Nu‘u region has decreased the amount of land available for recreation. The management activities under the Proposed Action do not contribute to cumulative adverse impacts to recreational resources because the HNP Nu‘u parcel is closed to recreational use and the small (230 acre) portion of State land, though rarely used by hunters, remains open to hunting.

### 3.6.2 Safety

#### ***Affected Environment***

The safety of workers is a concern due to the rough terrain, and working with firearms and helicopters. Health and safety protocols and best management practices will be followed. The safety of HNP visitors will not be an issue as this portion of the Park is not open to visitors. The Proposed Action will not have any impacts of public health or safety.

#### ***Environmental Consequences of Alternative 1: No Action***

Under the No Action alternative adverse impacts on safety in the HNP Nu‘u parcel would be negligible. Although the management and protection of natural and cultural resources is more difficult, expensive, and labor intensive due to the presence of feral animals, due to the minimal amount of management activities occurring in this area currently, there would be little to no change to the safety of park staff.

#### ***Environmental Consequences of Alternative 2: Proposed Action***

Safety would be minimally affected by implementation of the Proposed Action because of the inherent hazards of terrain, firearms and helicopter use. The safety of park staff and pilots is first and foremost. The inherent hazards of terrain, firearms, and helicopter use will be mitigated and minimized by having only highly trained and safety-conscious staff conduct operations, and by strict adherence to DOI and NPS standards for firearms (USDOI NPS 1991) and helicopter use (National Wildfire Coordinating Group 2013, USDOI 1997, USDOI 2012, USDOI NPS 2012). These involve attention to policies and guidelines that ensure the safety of workers implementing the Proposed Action.

***Cumulative Impacts:*** Safety is paramount to all park operations and measures taken under the proposed action enhance the safety culture of the National Park Service. Cumulative impacts on safety from past, present, or future activities are beneficial.

### 3.6.3 Park Operations

#### ***Affected Environment***

Park operations include: maintenance of facilities (e.g., roads, buildings, trails); management of natural and cultural resources; visitor and resource protection; interpretive services for visitors; and park administration (HNP 2012). Park operations applicable to Nu‘u are minimal, with the main focus being management and protection of natural and cultural resources. Park operations include control of feral animals.

#### ***Environmental Consequences of Alternative 1: No Action***

Under the No Action alternative adverse impacts on park operations in the HNP Nu‘u parcel would be negligible. Although the management and protection of natural and cultural resources is more difficult, expensive, and labor intensive due to the presence of feral animals, due to the minimal amount of management activities occurring in this area currently, there would be little to no change to the cost of park operations.

#### ***Environmental Consequences of Alternative 2: Proposed Action***

The park operations that would be affected by implementation of the Proposed Action include the management and protection of natural and cultural resources.

Under the Proposed Action, resource management operations (i.e. feral animal control) in Nu‘u will increase from the current levels. Implementation of the Proposed Action will have short and long-term, adverse effects on overall resource management operations due to the increase in required labor for implementation as well as the high cost of helicopter operations. Most adverse effects are expected to be short-term as intensive feral animal control efforts will occur during the first year and after that only minimal effort is expected to be necessary. In addition, some non-NPS funding has been provided for the initial activities. Following the removal of feral animals, invasive species control will need to be initiated in order to control the increase in non-native species cover. Long-term adverse effects are expected to be minimal as this type of work is part of on-going HNP resource management operations.

Under the Proposed Action, feral animal control and management will occur within the entire HNP Nu‘u enclosure. The feral animals within the enclosure will represent a “closed population” with little to no ingress from the outside. Adverse impacts to park operations would occur mainly during the initial one year period when efforts will be intensive and work deferred from other areas of the park. After the initial, intensive, focused animal control effort is complete, a long-term goal of zero-tolerance for ungulates and dogs within the HNP Nu‘u enclosure will require ongoing monitoring and removal of any animals that have breached the fence. The long-term, direct, adverse effects associated with the labor and costs related to on-going feral animal control should be negligible as, based on previous experience within other HNP fenced parcels, the effort is unlikely to represent a dramatic increase above current park-wide levels.

***Cumulative Impacts:*** Park operations are independent to most management actions implemented outside of HNP and thus an analysis of cumulative impacts on park operations from past, present or future management activities is not relevant.

### 3.7 Summary of Environmental Consequences

This section summarizes the potential effects of each alternative on impact topic is presented for comparison purposes (Table 5).

**Table 5. Environmental Impact Summary by Alternative**

Impact Topic	Alternative 1: No Action	Alternative 2: Proposed Action
Soils and Geologic Resources	Existing adverse effects to soils and geologic resources would continue. These include damage due to trampling and accelerated erosion due to removal of plants through browsing, rooting, and movement of feral animals.	Long-term, beneficial effects are anticipated throughout the project area as soils recover and erosion decreases. Cumulative adverse impacts would be negligible.
Water Resources	Adverse impacts to water quality and water resources (including Nu'u Salt Pond) due to accelerated erosion and the higher fecal loads from the presence of feral animals would continue.	<b>Erosion:</b> Negligible impacts as this alternative is unlikely to increase erosion and sedimentation of ephemeral streams above current levels. Long-term, beneficial effects expected due to control of feral animals and increase of plant cover, which will reduce erosion and sedimentation. Cumulative adverse impacts would be negligible. <b>Nu'u Salt Pond:</b> Negligible impacts from feral animal control are expected due to mitigation measures and the distance between the pond and the project area. Cumulative adverse impacts would be negligible.
Air Quality	No new adverse, direct or indirect effects.	Changes to air quality due to emissions and dust generated from the use of helicopters and vehicles would be temporary, localized, and negligible. Cumulative adverse impacts would be negligible.
Natural Soundscape	No new adverse, direct or indirect effects.	Noise generated by helicopters and gunfire would be localized, temporary, intermittent, and minor. Noise would not be heard in Park areas open to visitors. Cumulative adverse impacts would be negligible.
Wildland Fire	Wildland fires in the Nu'u region are unlikely to occur due to natural causes. In the case of a wildland fire, spread would be inhibited due to sparse vegetation as a result of trampling and grazing by ungulates.	A wildland fire is unlikely to occur due to planned precautionary measures (mitigation measures). Long term, risk of wildland fire could increase as vegetation recovers, providing fuel for fire during dry months. Although a wildland fire is not expected to occur, if one did, adverse impacts would likely be short-term due to suppression. Cumulative adverse impacts are likely to be negligible.



Impact Topic	Alternative 1: No Action	Alternative 2: Proposed Action
Vegetation	Existing adverse impacts to native vegetation would continue due to the presence feral ungulates browsing and trampling native plants and promoting the persistence of non-native plants. Non-native plant species would continue to adversely impact native plant communities through increased competition for resources and habitat alteration.	Long-term, regional benefits would occur due to control of feral ungulates promoting an increase in native plant cover. Cumulative adverse impacts would include an increase in non-native plant species. The Park will be working on a plan to control these non-native plant species. Cumulative adverse impacts would be negligible.
Wildlife	Existing adverse impacts to native wildlife species would continue including competition for resources, degradation of suitable habitat, and predation.	Short term adverse impacts to native wildlife species due to noise created by use of helicopters and gunfire during animal eradication efforts will be intermittent and temporary. Long-term, regional benefits would occur due to improved habitat conditions and control of feral animals. Cumulative adverse impacts would be negligible.
Special Status Species	Long-term, adverse impacts to special status species and habitat would continue due to habitat degradation and in some cases, predation. Any special status species that exist within the project area could face further population decline. The potential for population expansion would be limited.	<p><b>Birds, Mammals, and Insects:</b> Adverse impacts would be intermittent and most likely to occur only during the first year of effort. Adverse effects on special status wildlife species are expected to be negligible due to low populations within the project area and planned mitigation measures. Long-term, beneficial effects for special status wildlife species due to improved habitat conditions and reduced habitat destruction would promote an increase in special status wildlife species occupation. Cumulative adverse impacts would be negligible. Cumulative beneficial effects will support an increase in populations of special status wildlife.</p> <p><b>Plants:</b> Direct adverse impacts would likely only occur within the first year of effort as feral animal populations remain high. They are expected to decrease and be negligible due to low populations and mitigation measures. Plants will experience direct, long-term, regional benefits due to control of feral animals, and potential population growth through natural expansion. Cumulative adverse impacts would be negligible. Cumulative beneficial effects will support an increase in populations of special status plants.</p> <p><b>Critical Habitat:</b> Adverse impacts related to disturbance would be temporary, negligible, and contained within the project area. Long-term, a beneficial effect to critical habitat would be habitat recovery that would occur as a result of control of feral animals. Habitat recovery could support colonization by the three federally listed plant species. Cumulative adverse impacts would be negligible.</p>

Impact Topic	Alternative 1: No Action	Alternative 2: Proposed Action
Habitat	Long-term, regional, adverse impacts to habitat and designated critical habitat would continue due to degradation from feral animals, non-native plant species, and adverse impacts to soil and water.	<b><i>Alteration of Habitat:</i></b> Adverse impacts related to disturbance caused by Park staff traversing the area during removal efforts would be negligible. The long-term, regional benefit would be habitat recovery due to the removal of feral animals. Cumulative adverse impacts would be negligible. Cumulative beneficial effects to habitat condition would occur as the land area on the leeward Haleakalā slope impacted by feral animals would be reduced in an area where feral animal control activities have already been occurring on adjacent properties to the east, west, and north.  <b><i>Introduction of Non-Native Species:</i></b> Negligible effect due to planned mitigation measures and large presence of non-native species in the area. Cumulative adverse impacts likely to be negligible.
Cultural and Historic Resources	Short and long-term adverse impacts to cultural and historic resources due to feral animals through trampling, rooting, and destabilizing soil.	Adverse effects would be negligible due to planned mitigation measures. Direct, long-term, beneficial effects to cultural and historic resources within the project area would occur due to the protection afforded by the control of feral animals. Cumulative adverse impacts would be negligible.
Recreational Resources	No new direct or indirect adverse effects.	No new direct or indirect adverse effects. A long-term benefit would be a less barren landscape. In addition, the return of native plant species would be visually pleasing to recreationists on neighboring lands. Cumulative adverse impacts would be negligible.
Safety	Adverse impacts on safety are expected to be negligible due to the minimal amount of management activities currently occurring in the area.	Safety would be minimally affected due to planned implementation by only highly trained and safety-conscious staff and by strict adherence to DOI and NPS standards for firearms and helicopter use. Cumulative impacts on safety from past, present, or future activities are beneficial.
Park Operations	Adverse impacts on park operations are expected to be negligible due to the minimal amount of management activities currently occurring in the area.	Short and long-term adverse effects would occur due to an increase in labor required and the high cost of helicopter operations. Adverse impacts will be mainly short-term.

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## **Appendix A. Agencies and Persons Consulted**

The following agencies and persons were contacted by telephone, email, or in-person during the preparation of this document. Copies of official correspondence are on file and available from HNP.

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‘Aha Moku o Kaupō

Friends of Haleakalā National Park

Historic Hawaii Foundation

Kīpahulu ‘Ohana

Royal Order of Kamehameha Heiau ‘O Kahekili IV

## **Appendix B. Recipients of the EA: Persons, Organizations, and Agencies**

The NPS has prepared this EA to assess the environmental impacts of Haleakalā National Park's proposed action, habitat conservation work in Nu'u. The following is a list of agencies and organizations that will receive a notice of availability or a copy of the environmental assessment. In addition, 19 individuals and organizations will have received a notice of availability. A complete list of names on the NPS mailing list for this project is in the project file and is available from the issuing office.

The full document is being made available on the NPS Planning, Environmental and Public Comment website (<https://parkplanning.nps.gov/projectHome.cfm?projectId=55701>) or by request.

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