

**UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
FINAL PLAN / ENVIRONMENTAL IMPACT STATEMENT FOR PROTECTING AND RESTORING NATIVE  
ECOSYSTEMS BY MANAGING NON-NATIVE UNGULATES**

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

Non-native ungulates were first introduced to the Hawaiian Islands over 1,000 years ago when Polynesians brought domestic pigs to the islands. In the late 18th century, goats, European pigs, sheep, and cattle were introduced as a food source, and eventually some animals became feral (wild). Other non-native ungulates, such as the mouflon sheep that were introduced in the 1950s, were brought as game animals. Axis deer were brought to the Hawaiian Islands from India in late 1867 as a gift to Kamehameha V. Populations of these herbivores flourished because of the mild climate, an abundant food source, and a lack of predators.

Because the ecosystems of the Hawaiian Islands evolved over millions of years in the absence of large mammalian herbivores, they are particularly vulnerable to the effects of non-native ungulates. This is because unlike continental systems that evolved with ungulates, much of the native flora lacks defenses to browsing such as stinging hairs, repellent odors, or thorns. Non-native ungulates cause loss of vegetation, wildlife habitat degradation, and population decline for native Hawaiian species. Non-native ungulates impact native species through browsing, stripping bark, and altering habitat by trampling, soil erosion, digging (pigs), and inhibiting the regeneration of native species. Non-native ungulates increase soil disturbance and encourage the spread of non-native plants. Non-native ungulates detract from the natural conditions that contribute to the wilderness character of the park through the loss of native species and damage to the ecological integrity of the area. Non-native ungulates also have the potential to damage cultural resources, which include archeological sites, cultural landscapes, and ethnographic resources.

The detrimental impacts of non-native ungulates in Hawai'i were recognized before the park's establishment in 1916. In 1903, the Hawai'i Territorial Government Board of Agriculture and Forestry established a forest reserve system to protect remaining watersheds and forests on the islands. In 1910, a Noxious Animal Eradication Program was established, and through 1958 an aggressive campaign to eliminate feral cattle, goats, and pigs was carried out by the Territorial Government that included animal control (1927–1931) within Hawai'i Volcanoes. Park-led efforts began in 1932 and continue to the present.

This *Plan/Environmental Impact Statement for Protecting and Restoring Native Ecosystems by Managing Non-native Ungulates* (plan/EIS) analyzes the no-action alternative and four action alternatives for managing non-native ungulates to protect and restore native ecosystems. Under alternative A (no action), existing management practices would be followed and no new management actions would be implemented beyond those available when the non-native ungulate management planning process started. Methods under this current management would be lethal, and would include the use of fencing, and the use of volunteers in direct reduction with firearms. Under alternative B, all aspects of the current management program would be retained, including the use of fencing and volunteers. However, as with all action alternatives, management would be guided by a comprehensive systematic parkwide management plan, which would include a defined population objective of zero or as low as practicable in managed areas, and a systematic progression of management phases, monitoring, and considerations for the use of management tools. Under alternative C, the park would investigate the expansion and enhancement of existing lethal removal techniques, and qualified volunteers would not be used in any ungulate management actions. All elements under alternative C would be implemented with the goal of providing the most efficient and cost-effective methods of ungulate management. Under alternative D, management would rely primarily on lethal techniques similar to alternative C, but non-lethal techniques such as relocation could also be considered. Qualified volunteers could be used for a variety of management actions, including ground shooting. To provide the full range of alternatives, alternative E would involve the same management techniques as alternative D, and although qualified volunteers would be used, they would not participate in ground shooting.

The National Park Service (NPS) notice of availability for the draft plan/EIS was published in the *Federal Register* on November 23, 2011. The draft plan/EIS was posted online at the NPS Planning, Environment, and Public Comment (PEPC) website at <http://parkplanning.nps.gov/havo> on November 18, 2011. The U.S. Environmental Protection Agency (EPA) notice of availability for the draft plan/EIS was published on November 18, 2011, which opened the public comment period and established the closing date of January 20, 2012, for comments. Responses to public and agency comments received on the draft plan/EIS are included as appendix E and, where needed, as text changes in this final plan/EIS.

The publication of the EPA notice of availability of this final plan/EIS in the *Federal Register* will initiate a 30-day wait period before the Regional Director of the Pacific West Region will sign the Record of Decision, documenting the selection of an alternative to be implemented. After the NPS publishes a notice in the *Federal Register* announcing the availability of the signed Record of Decision, implementation of the alternative selected in the Record of Decision can begin.

For further information, visit <http://parkplanning.nps.gov/havo>, or contact:

Superintendent, Hawai'i Volcanoes National Park

RE: Final Plan / Environmental Impact Statement for Protecting and Restoring Native Ecosystems by Managing Non-native Ungulates

P.O. Box 52

Hawaii National Park, HI 96718-0052



National Park Service  
U.S. Department of the Interior

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



## **HAWAI'I VOLCANOES NATIONAL PARK**

# **FINAL PLAN / ENVIRONMENTAL IMPACT STATEMENT FOR PROTECTING AND RESTORING NATIVE ECOSYSTEMS BY MANAGING NON-NATIVE UNGULATES**

January 2013



# EXECUTIVE SUMMARY

## PURPOSE OF AND NEED FOR ACTION

Non-native ungulates, or mammals with hooves, are an issue of concern in Hawai‘i because of their detrimental effects on native plant and animal diversity and ecosystems. The unique ecosystems of the Hawaiian Islands evolved without large mammalian herbivores and are particularly vulnerable to the impacts of non-native ungulates. Goats, pigs, sheep, mouflon sheep, deer and cattle, all of which are non-native ungulates, destroy habitat, inhibit native forest regeneration and cause local extinctions of vulnerable species. Non-native ungulates detract from the natural conditions that contribute to the wilderness character of the park through the loss of native species and damage to the ecological integrity of the area. Non-native ungulates also have the potential to damage cultural resources at the park, which include archeological sites, cultural landscapes, and ethnographic resources.

The purpose of this *Plan/Environmental Impact Statement for Protecting and Restoring Native Ecosystems by Managing Non-native Ungulates* (plan/EIS) at Hawai‘i Volcanoes National Park (Hawai‘i Volcanoes or the park) is to develop a comprehensive and systematic framework for managing non-native ungulates, including any new introductions, that supports long-term ecosystem protection; supports natural ecosystem recovery and provides desirable conditions for active ecosystem restoration; and supports protection and preservation of cultural resources. A plan/EIS is needed to address the impacts of non-native ungulates, which include loss of native ecosystems, especially native plant and animal communities; loss of sensitive native species, including state- and federally listed species; deterioration of wilderness character; and loss of irreplaceable cultural resources. The park’s most recent plan for non-native ungulate control was written over 30 years ago. The new plan/EIS will provide a parkwide framework to systematically guide non-native ungulate management activities over the next decades that considers the recently acquired Kahuku unit; new invasive species challenges; and current National Park Service (NPS) policy and guidance.

This document has been prepared in accordance with the *National Environmental Policy Act of 1969* (NEPA), as amended, which requires a range of reasonable alternatives be developed and the potential impacts resulting from these alternatives be analyzed. Five alternatives are presented: the no-action alternative (continue existing non-native ungulate management program), and four action alternatives, including the preferred alternative. The document also describes the environment that would be affected by the alternatives and the environmental consequences of implementing any of the alternatives.

## PARK PURPOSE AND SIGNIFICANCE

The purpose and significance of Hawai‘i Volcanoes National Park are based on the park’s management documents, which provide the general direction for each alternative. The purpose and significance are stated below to provide the reader with adequate background when examining the summary of the alternatives and the environmental consequences.

The following park purpose statement was developed for the *Hawai‘i Volcanoes National Park General Management Plan*, which is currently being developed:

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

Park significance statements capture the essence of the park’s importance to the nation’s natural and cultural heritage. Understanding park significance helps managers make decisions that preserve the resources and values necessary to the park’s purpose. The following significance statements were developed for the *Hawai‘i Volcanoes National Park General Management Plan*, which is currently being developed:

- Hawai‘i Volcanoes National Park protects and interprets the largest and most continuously active shield volcanoes in the United States, and provides the best physical evidence of island building processes that continue to form the 2,000-mile-long Hawaiian Archipelago.
- Hawai‘i Volcanoes National Park’s active volcanoes serve as a living laboratory for scientific investigations that began over a century ago and continue to advance global understanding of volcanic processes.
- Hawai‘i Volcanoes National Park protects, restores and studies unique and diverse ecosystems and endemic species that are the result of over 30 million years of evolution on an active volcanic landscape, wide climate variation, and the extreme isolation of the Hawaiian Islands.
- Hawai‘i Volcanoes National Park encompasses the largest and most ecologically diverse wilderness in the Pacific Islands.
- Hawai‘i Volcanoes National Park embraces the Native Hawaiian spiritual significance of this landscape and interprets related cultural traditions.
- Hawai‘i Volcanoes National Park encompasses sites, structures, objects and landscapes that document over 600 years of human life and activities on an active volcanic landscape.
- Hawai‘i Volcanoes National Park provides access to two of the most active volcanoes in the world and an opportunity to understand and appreciate the distinctive geology and natural and cultural adaptations to the land (NPS n.d.a).

## OBJECTIVE IN TAKING ACTION

Objectives are “what must be achieved to a large degree for the action to be considered a success” (Director’s Order 12 Handbook [NPS 2001a]). All alternatives selected for detailed analysis must meet all objectives to a large degree and resolve the purpose of and need for action. Objectives for managing non-native ungulate populations at Hawai‘i Volcanoes must be grounded in the park’s enabling legislation, purpose, significance, and mission goals, and must be compatible with direction and guidance provided by the park’s strategic plan, the 1974 natural resources management plan, the 1975 master plan, the 1986 natural resource management plan, and the 1999 resource management plan (NPS 1974, 1975a, 1986, 1999a), and other management guidance. Any plan the park develops must be consistent with the laws, policies, and regulations that guide the NPS.

The following objectives relate to the management of non-native ungulates at Hawai‘i Volcanoes.

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## MANAGEMENT METHODOLOGY

- Develop or refine informed, scientifically based methods for management of non-native ungulate populations to allow for the protection and recovery of park resources.

## **VEGETATION**

- Protect native plant communities and assist with their natural recovery from impacts of non-native ungulates.
- Provide desirable conditions for active restoration of native plant communities degraded by non-native ungulate activity to a native state.

## **NATIVE WILDLIFE AND WILDLIFE HABITAT**

- Protect native wildlife and wildlife habitat and assist with their natural recovery from impacts of non-native ungulates.

## **RARE, UNIQUE, THREATENED, OR ENDANGERED SPECIES**

- Protect endangered, threatened, and rare plant and animal species and assist with their natural recovery from impacts of non-native ungulates.

## **CULTURAL/HISTORIC RESOURCES**

- Prevent impacts to archeological resources, historic structures, cultural landscapes, and ethnographic resources from non-native ungulate activity.

## **WILDERNESS**

- Using the minimum tools necessary to meet minimum requirements per the *Wilderness Act*, limit the impacts of non-native ungulates, as well as management actions, on wilderness areas located within the park.
- Assist in the recovery of natural conditions that have been impacted, or may be impacted, by non-native ungulates.
- Determine the minimum requirements to restore wilderness character in areas impacted by non-native ungulates.

## **SOILS**

- Minimize the impacts of non-native ungulates on soil erosion and disturbance.

## **VISITOR USE AND EXPERIENCE**

- Provide visitors with the opportunity to experience native ecosystems and cultural landscapes that have not been impacted by non-native ungulate activity.
- Enhance visitor awareness and understanding of non-native ungulate management actions and why they are necessary for the protection of park resources.
- Minimize limitations to visitor access as a result of non-native ungulate management activities.

## **PARK MANAGEMENT AND OPERATIONS**

- Minimize long-term impacts (in terms of reduced staff time and resources) to programs at the park incurred by continued monitoring and management of non-native ungulates.

## COORDINATION AND OUTREACH

- Coordinate with neighboring land managers implementing non-native ungulate management actions beneficial to the protection of park resources.
- Coordinate with other stakeholders regarding non-native ungulate management and the protection of park resources.
- Enhance public awareness and understanding of the impacts of non-native ungulates and the need for management to protect and restore park resources.

## NON-NATIVE UNGULATES AT HAWAI‘I VOLCANOES NATIONAL PARK

At Hawai‘i Volcanoes, non-native ungulate management measures were first implemented in a concentrated manner beginning in 1927, when the Territorial Government conducted goat removal as part of a regional effort to protect Hawai‘i’s watershed. Between 1927 and 1931, these efforts resulted in the removal of 17,389 goats from the park. Efforts by the Territorial Government ceased after 1931. The NPS took over control efforts and relied on private hunters to remove non-native ungulates in the park on a permit basis between 1932 and 1934. These efforts proved to be ineffective in reducing animal numbers and were subsequently discontinued. After 1934, virtually no control of non-native goats or other non-native species occurred at the park until 1938, when the Civilian Conservation Corps used organized drives to remove the animals from the park. These drives were supplemented with boundary and internal fencing. Although successful in removing large numbers of non-native ungulates from the park, Civilian Conservation Corps efforts were suspended in 1941 due to World War II and fences deteriorated (NPS 1972).

Starting in 1944, the NPS hired private companies for goat control. These companies would round up goats from the park and then sell them at a profit. This method continued until 1955, when it was discontinued due to lack of effectiveness. Starting in 1955 and lasting until 1970, the NPS relied exclusively on park staff to eliminate non-native ungulates within the park. During this time, more than 30,000 goats were removed from the park through a variety of techniques such as organized hunts and drives. However, a lack of steady funding and inadequate fencing did not allow for a level of sustained management that would reduce the population. In 1970, the park had over 14,000 goats residing within its boundary (NPS 1972).

Along with feral goat eradication efforts, attempts to control feral pigs were carried out in the park. Approximately 7,000 pigs were eliminated from the older part of the park from 1930 to 1971 (Katahira et al. 1993). These efforts were not successful in eliminating pigs, largely due to the inability of NPS employees to carry out sustained reduction efforts and prevent reentry of pigs into ungulate-control areas.

During this period of feral ungulate control, domestic cattle from the adjoining ranches would wander and graze within the park. The most impacted areas included Mauna Loa and portions of Kīlauea. Although authorized grazing was discontinued in 1948, a small number of stray cattle (both domestic and feral) remained until the early 1970’s (Tunison et al. 1995). A small population of feral sheep was eliminated when the NPS assumed ownership of ‘Āinahou Ranch in the early 1970s (Harry, pers. comm. n.d.).

In the 1970s, the NPS changed management strategies to include a systematic approach of direct reduction and fencing, including the use of volunteers in management efforts. The strategy included the use of boundary and internal fences to isolate populations, removal of individuals at greater rates than they can be replenished by reproduction and ingress, boundary fence inspection and maintenance, and monitoring and removal to prevent population increases (NPS 1974, 1986, 1993, 1997a, 1997b, 1999b,

2001b). Since the approach was adopted, NPS staff have eliminated nearly all goats below 9,000 foot elevation (excluding the Kahuku Unit) and pigs from approximately 40,000 acres of interior fenced units or pig control units. Ingress of feral ungulates (goats, mouflon sheep, pigs and cattle) into managed units has occurred at very low, manageable rates since the 1970s. In Kahuku, large numbers of mouflon sheep are present along with feral pigs and a few feral goats and cattle. Several hundred feral sheep occur in the remote north corner of Kahuku. Between 2004 and 2006, approximately 1,900 mouflon sheep were removed from Kahuku along with construction of fence segments along the park boundary; however, populations remain high in many areas (estimated at  $1,797 \pm 688$  by December 2006) due to an annual population increase estimated between 21.1 and 33.1 percent (Stephens et al. 2008; USGS 2006a).

## ALTERNATIVES CONSIDERED

The alternatives considered include a “no-action” alternative plus four action alternatives—including the preferred alternative—that were developed by an interdisciplinary planning team and through feedback from the public, other agencies, and the scientific community during the planning process. The four action alternatives would meet, to a large degree, the non-native ungulate management objectives for Hawai‘i Volcanoes National Park and the purpose of and need for action.

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*The alternatives considered include a “no-action” alternative plus four action alternatives—including the preferred alternative—that were developed by an interdisciplinary planning team and through feedback from the public, other agencies, and the scientific community during the planning process.*

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Under alternative A (no action), the NPS would continue current non-native ungulate practices, which are informed by the 1974 resources management plan/EIS and subsequent amendments (NPS 1974, 1986, 1999a), and other management decisions. Management techniques would be lethal and would include the use of fencing. Qualified volunteers would continue to be used to assist with certain ground shooting activities, and could be used for certain other non-native ungulate management activities. The population-level objective would be zero (or as low as practicable) in existing management units in the park. However, no population objective and fencing strategy would be defined for future areas in a comprehensive parkwide plan.

Under alternative B, the NPS would implement a comprehensive, systematic management plan that would use lethal techniques and would include the use of fencing. Alternative B would include a systematic progression of management phases, monitoring, and considerations for the use of management tools, with a defined population objective of zero non-native ungulates or as low as practicable in managed areas. Qualified volunteers would be used to assist with ground shooting operations, and could be used for certain other non-native ungulate management activities.

Under alternative C, the NPS would implement a comprehensive, systematic management plan using the most efficient and cost-effective methods of non-native ungulate management. Management techniques would be lethal and would include the use of fencing. Alternative C would include a systematic progression of management phases, monitoring, and considerations for the use of management tools, with a defined population objective of zero non-native ungulates or as low as practicable in managed areas. Volunteers would not be used in any capacity associated with non-native ungulate management.

Under alternative D, the NPS would implement a comprehensive, systematic management plan providing maximum management flexibility. In addition to fencing, management tools would rely primarily on lethal techniques, but non-lethal techniques such as relocation could also be considered. Alternative D would include a systematic progression of management phases, monitoring, and considerations for the use of management tools, with a defined population objective of zero non-native ungulates or as low as

practicable in managed areas. Qualified volunteers would be used to assist with ground shooting operations, and could be used for certain other non-native ungulate management activities.

Under alternative E, the NPS would implement a comprehensive systematic management plan that includes fencing, relies primarily on lethal techniques, but also considers non-lethal techniques such as relocation. Alternative E would include a systematic progression of management phases, monitoring, and considerations for the use of management tools, with a defined population objective of zero non-native ungulates or as low as practicable in managed areas. To provide the full range of alternatives, alternative E would involve the same management techniques as alternative D, and although qualified volunteers would be used, they would not participate in ground shooting.

## **PREFERRED ALTERNATIVE**

The Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1502.14[e]) require that an agency identify its preferred alternative or alternatives in draft and final environmental impact statement (EIS) documents. The preferred alternative is that alternative “which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors” (46 FR 18026, Q4a).

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The NPS has identified alternative D, Comprehensive Management Plan that Maximizes Flexibility by Expanding Lethal and Non-Lethal Removal Techniques, as its preferred alternative. In identifying its preferred alternative, the NPS considered factors such as the extent to which alternatives meet plan objectives, environmental consequences, anticipated effort associated with implementation, degree of management flexibility, and costs.

Among all alternatives evaluated, alternative D provides the greatest flexibility of management techniques, including options for use of non-lethal actions, within the context of a comprehensive, systematic management plan. By incorporating the use of qualified volunteers to assist in management activities, alternative D provides the NPS with opportunities to

- Engage the volunteers in removal of non-native ungulates in support of the park’s resource management program;
- Further the purposes of the Volunteers in Parks Act and NPS Management Policies 2006 related to the use of volunteers by engaging the surrounding community and general public in stewardship of park resources as authorized agents of the NPS; and
- Provide an opportunity to increase awareness of non-native ungulate adverse impacts.

Although alternative D would be expected to involve some increase over other alternatives in time needed to achieve the population-level objective, this would not prevent the NPS from fully meeting its non-native ungulate management objectives. Although alternative D would likely include some additional costs and administrative oversight over other alternatives, these factors would likewise not be expected to prevent the NPS from fully meeting its non-native ungulate management objectives. The NPS would have the discretion to discontinue or expand the volunteer program depending on its effectiveness in helping the park meet its non-native ungulate management objectives.

## **ENVIRONMENTAL CONSEQUENCES**

The summary of environmental consequences considers the actions being proposed and the cumulative impacts from occurrences inside and outside the park. The potential environmental consequences of the actions are addressed for: vegetation; native wildlife and wildlife habitat; rare, unique, threatened, or endangered species; cultural/historic resources (archeological resources, cultural landscapes, ethnographic resources); wilderness; soils; soundscapes; land management adjacent to the park; socioeconomics; visitor use and experience; visitor and employee safety; and park management and operations. The following table is a summary of environmental consequences.



**SUMMARY OF ENVIRONMENTAL CONSEQUENCES**

	<b>Alternative A: No Action (Continue Existing Non-native Ungulate Management Activities)</b>	<b>Alternative B: Comprehensive Management Plan that Uses Lethal Removal Techniques</b>	<b>Alternative C: Comprehensive Management Plan that Maximizes Efficiency by Expanding Lethal Removal Techniques and Discontinuing the Use of Volunteers</b>	<b>Alternative D: Comprehensive Management Plan that Maximizes Flexibility of Management Techniques</b>	<b>Alternative E: Comprehensive Management Plan that Increases Flexibility of Management Techniques While Limiting the Use of Volunteers</b>
Vegetation	<p>Under alternative A, short- and long-term negligible to minor adverse impacts would result from the implementation of ground-based management actions. In areas of the park already considered ungulate free, alternative A would produce negligible adverse impacts because the frequency and duration of management actions in these areas would be minimal; and long-term beneficial impacts on vegetation would result from the continuation of animal exclusion. Long-term beneficial impacts would be unlikely for Kahuku and areas currently unmanaged (e.g., portions of 'Ōla'a), where no established population-level objective or fencing strategy has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on vegetation, would have short- and long-term minor to moderate adverse cumulative impacts on vegetation. Long-term beneficial cumulative impacts would be less certain under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, short- and long-term negligible to minor adverse impacts on vegetation would result from the implementation of ground-based management actions. In areas of the park already managed for ungulates, alternative B would produce negligible adverse impacts because the frequency and duration of management actions in these areas would be minimal. Long-term beneficial impacts to vegetation would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on vegetation, would have short- and long-term minor to moderate adverse and long-term beneficial cumulative impacts.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>
Native Wildlife and Wildlife Habitat	<p>Under alternative A, short-term minor to moderate adverse impacts would result from the implementation of monitoring and management actions. In the older section of the park, long-term beneficial impacts to native wildlife and wildlife habitat would result from the continuation of animal exclusion in managed units. However, long-term beneficial impacts to native wildlife and wildlife habitat would be unlikely for areas currently unmanaged (e.g., portions of Kahuku and 'Ōla'a), for which no established population-level objective and fencing strategy has been identified.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on native wildlife and wildlife habitat, would have short- and long-term minor to moderate adverse cumulative impacts on vegetation. Long-term beneficial cumulative impacts would be less likely under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, short-term minor to moderate adverse impacts would result from the implementation of monitoring and management actions. Long-term beneficial impacts to native wildlife and wildlife habitat would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on wildlife and wildlife habitat, would have short- and long-term minor to moderate adverse and long-term beneficial cumulative impacts.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>

	<b>Alternative A: No Action (Continue Existing Non-native Ungulate Management Activities)</b>	<b>Alternative B: Comprehensive Management Plan that Uses Lethal Removal Techniques</b>	<b>Alternative C: Comprehensive Management Plan that Maximizes Efficiency by Expanding Lethal Removal Techniques and Discontinuing the Use of Volunteers</b>	<b>Alternative D: Comprehensive Management Plan that Maximizes Flexibility of Management Techniques</b>	<b>Alternative E: Comprehensive Management Plan that Increases Flexibility of Management Techniques While Limiting the Use of Volunteers</b>
Rare, Unique, Threatened, or Endangered Species	<p>Under alternative A, short-term minor to moderate, and long-term minor adverse impacts on rare, unique, threatened, or endangered species and their habitat would result from the implementation of non-native ungulate management actions. In the older section of the park, long-term beneficial impacts would result from the continuation of animal exclusion in managed units, with moderate to major beneficial impacts on federally listed species. However, long-term beneficial impacts would be unlikely for Kahuku and areas currently unmanaged (e.g., portions of 'Ōla'a), for which no established population-level objective and fencing strategy has been identified.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on rare, unique, threatened, or endangered species, would have short- and long-term minor to moderate adverse cumulative impacts on vegetation. Long-term beneficial cumulative impacts, including moderate to major beneficial impacts on federally listed species, would be less likely under alternative A, because management would depend largely on the professional judgment, past experience, and scientific knowledge of NPS staff responsible for conducting management activities and implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, short-term minor to moderate, and long-term minor adverse impacts on rare, unique, threatened, or endangered species and their habitat would result from the implementation of monitoring and management actions. Long-term beneficial impacts would be fully realized under this alternative, with moderate to major beneficial impacts on federally listed species because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions, would have short- to long-term minor to moderate adverse and long-term beneficial and cumulative impacts, with moderate to major beneficial cumulative impacts on federally listed species.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>
Cultural/Historic Resources: Archeological Resources	<p>Under alternative A, long-term negligible to minor adverse impacts on archeological sites and associated viewsheds would result from the implementation of management actions. In the older section of the park, long-term minor to moderate beneficial impacts would result from the continuation of animal exclusion in managed units. However, long-term benefits would be unlikely for Kahuku and areas currently unmanaged (e.g., portions of 'Ōla'a), for which no established population-level objective and fencing strategy has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on archeological resources, would have long-term minor to moderate adverse cumulative impacts on archeological resources. Long-term beneficial cumulative impacts would be less likely under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, long-term negligible to minor adverse impacts on archeological sites and associated viewsheds would result from the implementation of management actions. Long-term minor to moderate beneficial impacts to archeological resources would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on archeological resources, would have long-term minor to moderate adverse and long-term moderate beneficial cumulative impacts.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>

	<b>Alternative A: No Action (Continue Existing Non-native Ungulate Management Activities)</b>	<b>Alternative B: Comprehensive Management Plan that Uses Lethal Removal Techniques</b>	<b>Alternative C: Comprehensive Management Plan that Maximizes Efficiency by Expanding Lethal Removal Techniques and Discontinuing the Use of Volunteers</b>	<b>Alternative D: Comprehensive Management Plan that Maximizes Flexibility of Management Techniques</b>	<b>Alternative E: Comprehensive Management Plan that Increases Flexibility of Management Techniques While Limiting the Use of Volunteers</b>
Cultural/Historic Resources: Cultural Landscapes	<p>Under alternative A, long-term minor adverse impacts on cultural landscapes would result from implementation of management actions. Designed landscapes would be less impacted than either historic vernacular landscapes or ethnographic landscapes. In the older section of the park, long-term minor beneficial impacts on cultural landscapes would result from the continuation of animal exclusion in managed units. However, long-term benefits would be unlikely for cultural landscapes still inhabited by non-native ungulates, for which no established population-level objective and fencing strategy has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on cultural landscapes, would have long-term minor adverse cumulative impacts on cultural resources. Long-term beneficial cumulative impacts would be less certain under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, long-term minor adverse impacts to cultural landscapes would result from the implementation of management actions. Designed landscapes would be less impacted than either historic vernacular landscapes or ethnographic landscapes. Long-term minor beneficial impacts to cultural landscapes would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on cultural landscapes, would have long-term minor adverse and long-term minor beneficial cumulative impacts.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>
Cultural/Historic Resources: Ethnographic Resources	<p>Under alternative A, short-term minor adverse impacts on ethnographic resources would result from the implementation of management actions. In the older section of the park, long-term moderate to major beneficial impacts would result from the continuation of animal exclusion in managed units. However, long-term beneficial impacts would be unlikely for Kahuku and areas currently unmanaged (e.g., portions of 'Ōla'a), for which no established population-level objective and fencing strategy has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on ethnographic resources, would have short- and long-term minor adverse cumulative impacts. Long-term beneficial cumulative impacts would be less likely under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, short-term minor adverse impacts on ethnographic resources would result from the implementation of management actions. Long-term moderate to major beneficial impacts would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on ethnographic resources, would have short- and long-term minor adverse and long-term moderate to major beneficial cumulative impacts.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>

	<b>Alternative A: No Action (Continue Existing Non-native Ungulate Management Activities)</b>	<b>Alternative B: Comprehensive Management Plan that Uses Lethal Removal Techniques</b>	<b>Alternative C: Comprehensive Management Plan that Maximizes Efficiency by Expanding Lethal Removal Techniques and Discontinuing the Use of Volunteers</b>	<b>Alternative D: Comprehensive Management Plan that Maximizes Flexibility of Management Techniques</b>	<b>Alternative E: Comprehensive Management Plan that Increases Flexibility of Management Techniques While Limiting the Use of Volunteers</b>
Wilderness	<p>Under alternative A, short- and long-term minor to moderate adverse impacts to wilderness would result from fences, helicopter work and ground activities related to removal efforts and fence construction and maintenance. In the older section of the park, long-term beneficial impacts on wilderness through the recovery of natural conditions would result from the continuation of animal exclusion in managed units. Long-term beneficial impacts would be unlikely for the Kahuku unit and areas currently unmanaged (e.g., portions of 'Ōla'a), where no established population-level objective or fencing strategy has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on wilderness, would have short- and long-term minor to moderate adverse cumulative impacts. Long-term beneficial cumulative impacts would be less likely under alternative A, because non-native ungulate management would depend largely on the professional judgment, past experience, and scientific knowledge of NPS staff responsible for conducting management activities and implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, short- and long-term minor to moderate impacts on wilderness would result from fences, helicopter work and ground activities related to removal efforts and fence construction and maintenance. Long-term beneficial impacts to wilderness would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on wilderness, would have short- and long-term minor to moderate adverse and long-term beneficial cumulative impacts.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>
Soils	<p>Under alternative A, short-term, localized negligible adverse impacts to soils would result from ground-based management actions. In the older section of the park, long-term beneficial impacts on soil would result from the continuation of animal exclusion in current management units. Long-term beneficial impacts would be unlikely for Kahuku and portions of 'Ōla'a, where no established population-level objective or fencing strategy has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on soil, would have short- and long-term minor to moderate adverse cumulative impacts. Long-term beneficial cumulative impacts would be less likely under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, short-term, localized negligible adverse impacts to soils would result from ground-based management actions. Long-term beneficial impacts to soils would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on soil, would have short- and long-term minor to moderate adverse and long-term beneficial cumulative impacts.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>

	<b>Alternative A: No Action (Continue Existing Non-native Ungulate Management Activities)</b>	<b>Alternative B: Comprehensive Management Plan that Uses Lethal Removal Techniques</b>	<b>Alternative C: Comprehensive Management Plan that Maximizes Efficiency by Expanding Lethal Removal Techniques and Discontinuing the Use of Volunteers</b>	<b>Alternative D: Comprehensive Management Plan that Maximizes Flexibility of Management Techniques</b>	<b>Alternative E: Comprehensive Management Plan that Increases Flexibility of Management Techniques While Limiting the Use of Volunteers</b>
Soundscapes	<p>Under alternative A, there would be short-term moderate adverse impacts to soundscapes would result from ground-based and aerial management actions. In the older section of the park, long-term beneficial impacts on soundscapes would result through the continuation of ungulate exclusion in current management units. Long-term beneficial impacts would be unlikely for the Kahuku unit and areas currently unmanaged (e.g., portions of 'Ōla'a), where no established population-level objective or fencing strategy has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable actions on soundscapes, would have short-term moderate adverse cumulative impacts. Long-term beneficial cumulative impacts would be less likely under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, short-term moderate adverse impacts to soundscapes would result from the use of firearms, vehicles, helicopters, and fence maintenance equipment. Long-term beneficial impacts to soundscapes would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable actions on soundscapes, would have short-term moderate adverse and long-term beneficial cumulative impacts.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>
Land Management Adjacent to the Park	<p>Alternative A would result in short- and long-term negligible to moderate adverse and beneficial impacts on land management adjacent to current park management units. Where existing boundary fences occur, impacts of removal efforts on non-native ungulate populations outside the park would be negligible. However, impacts of any future removal efforts would be uncertain in areas currently unmanaged and for which no population objective or fencing strategy has been identified (e.g., portions of 'Ōla'a and Kahuku).</p> <p>The long-term minor to moderate adverse and beneficial impacts of past, present, and reasonably foreseeable future actions on land management adjacent to the park, when combined with the impacts of implementing alternative A, would have long-term minor to moderate adverse and beneficial cumulative impacts on land management adjacent to the park.</p>	<p>Alternative B would result in short- and long-term negligible to minor adverse and beneficial impacts on land management adjacent to the park. Proposed new boundary fences, would minimize impacts of removal efforts conducted inside the park on populations outside the park.</p> <p>The long-term minor to moderate adverse and beneficial impacts of past, present, and reasonably foreseeable future actions on land management adjacent to the park, when combined with the impacts of implementing alternative B, would have long-term, minor to moderate adverse and beneficial cumulative impacts on land management adjacent to the park.</p>	<p>Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.</p>

	<b>Alternative A: No Action (Continue Existing Non-native Ungulate Management Activities)</b>	<b>Alternative B: Comprehensive Management Plan that Uses Lethal Removal Techniques</b>	<b>Alternative C: Comprehensive Management Plan that Maximizes Efficiency by Expanding Lethal Removal Techniques and Discontinuing the Use of Volunteers</b>	<b>Alternative D: Comprehensive Management Plan that Maximizes Flexibility of Management Techniques</b>	<b>Alternative E: Comprehensive Management Plan that Increases Flexibility of Management Techniques While Limiting the Use of Volunteers</b>
Socioeconomics	<p>Under alternative A, non-native ungulate management program would have beneficial impacts on local communities as a result of park payroll and spending on non-native ungulate control, fencing, and related supplies. Impacts to non-market social values would be minor, short-term, and adverse during control activities. There would be no measurable effect on park visitation and recreation spending. Long-term beneficial impacts to non-market social values through the restoration of native species and communities would be less likely for the Kahuku unit and areas currently unmanaged (e.g., portions of 'Ōla'a), where no established population-level objective, or fencing strategy, or management implementation has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with the impacts of past, present, and reasonably foreseeable future actions on socioeconomic resources, would have short- and long-term minor adverse impacts and long-term beneficial impacts on socioeconomic resources. Long-term beneficial cumulative impacts would be less likely under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, non-native ungulate management program would have beneficial impacts on local communities as a result of park payroll and spending on non-native ungulate control, fencing, and related supplies. Impacts to non-market social values would be minor, short-term, and adverse during control activities. There would be no measurable effect on park visitation and recreation spending. Long-term beneficial impacts to non-market social values through the restoration of native species and communities would be fully realized under alternative B because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The impacts of past, present, and reasonably foreseeable future actions on socioeconomic resources, when combined with the impacts of implementing alternative B, would have short- and long- term minor adverse and long-term beneficial cumulative impacts.</p>	<p>Same as alternative B, plus:</p> <p>Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p> <p>Impacts on participants in the volunteer program are expected to be minor, as substitute hunting opportunities are available.</p>	<p>Same as alternative B, except:</p> <p>Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p> <p>Some beneficial impacts to social values would be gained among individuals who prefer non-lethal relocation approaches over lethal methods. Conversely, the additional resources needed to implement non-lethal methods (e.g., relocation of animals) may delay the NPS in reaching desired conditions and result in more reduction efforts, which would contribute to adverse impacts to social values.</p>	<p>Same as alternative D, except:</p> <p>Impacts on participants in the volunteer program are expected to be minor, as substitute hunting opportunities are available.</p>
Visitor Use and Experience	<p>Under alternative A, short- and long-term minor adverse affects on visitor use and experience would result from temporary closures and disruptions caused by ungulate control measures and fence construction and repair, and the long-term presence of fences. In the older section of the park, long-term beneficial impacts to the visitor experience resulting from the recovery of native vegetation and wildlife habitat would continue in managed units. Long-term beneficial impacts would be less likely for the Kahuku unit and areas currently unmanaged (e.g., portions of 'Ōla'a), where no established population-level objective, or fencing strategy, or management implementation has been identified in a comprehensive and systematic plan.</p> <p>The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on visitor use and experience, would have short- and long-term minor adverse cumulative impacts. Long-term beneficial cumulative impacts would be less likely under alternative A, because implementation of management tools could become increasingly inconsistent as staff and institutional knowledge change over time.</p>	<p>Under alternative B, short- and long-term minor adverse affects on visitor use and experience would result from temporary closures and disruptions caused by ungulate control measures and fence construction and repair, and the long-term presence of fences. Long-term beneficial impacts to visitor use and experience would be fully realized under this alternative because the comprehensive, systematic approach described in chapter 2, "Elements Common to All Action Alternatives," would ensure that the NPS would progress through ungulate management phases, monitor, and apply management tools consistently over time.</p> <p>The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on visitor use and experience, would have short- and long-term minor adverse cumulative and long-term beneficial impacts.</p>	<p>Same as alternative B, plus:</p> <p>Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.</p>	<p>Same as alternative B, except:</p> <p>Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.</p>	<p>Same as alternative B, except:</p> <p>Use of relocation could reduce efficiency and delay achieving desired conditions.</p>

	<b>Alternative A: No Action (Continue Existing Non-native Ungulate Management Activities)</b>	<b>Alternative B: Comprehensive Management Plan that Uses Lethal Removal Techniques</b>	<b>Alternative C: Comprehensive Management Plan that Maximizes Efficiency by Expanding Lethal Removal Techniques and Discontinuing the Use of Volunteers</b>	<b>Alternative D: Comprehensive Management Plan that Maximizes Flexibility of Management Techniques</b>	<b>Alternative E: Comprehensive Management Plan that Increases Flexibility of Management Techniques While Limiting the Use of Volunteers</b>
Visitor and Employee Safety	Under alternative A, short- and long-term minor to moderate adverse impacts on visitor and employee safety would result from implementation of management actions. In the older section of the park, long-term beneficial impacts to visitor and employee safety would continue in managed units. Long-term beneficial impacts would be unlikely for the Kahuku unit and areas currently unmanaged (e.g., portions of 'Ōla'a), where no established population-level objective or fencing strategy has been identified in a comprehensive and systematic plan. In these areas, animals could potentially remain on the landscape indefinitely, increasing exposure of employees and visitors to safety risks associated with ungulate management activities. The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on visitor and employee safety, would have short- and long-term minor to moderate adverse cumulative impacts.	Under alternative B, short- and long-term minor to moderate adverse impacts on visitor and employee safety would result from implementation of management actions. Long-term beneficial impacts to visitor and employee safety would be fully realized under this alternative. The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on visitor and employee safety, would have short- and long-term minor to moderate adverse and long-term beneficial cumulative impacts.	Same as alternative B, plus: Potential for reaching desired conditions sooner by relying exclusively on lethal removals conducted by NPS and other professionals.	Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.	Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.
Park Management and Operations	Alternative A would result in long-term moderate adverse impacts on the Natural Resources Division and short- and long-term negligible to minor adverse impacts on other divisions. There could be increased costs associated with alternative A, because management would not have a comprehensive plan to guide implementation. There would be less likelihood that the NPS would progress through management phases, monitor, and apply management tools consistently (and effectively) as staff and institutional knowledge change over time. The greatest uncertainty would be for Kahuku and areas currently unmanaged (e.g., portions of 'Ōla'a), for which no established population-level objective and fencing strategy has been identified. The effects of alternative A, when combined with impacts of past, present, and reasonably foreseeable future actions on park management and operations, would have long-term moderate adverse cumulative impacts.	Alternative B would result in long-term moderate adverse impacts to the Natural Resources Division and short- and long-term negligible to minor adverse impacts to other park divisions. Compared to alternative A, there would be increased cost efficiency associated with alternative B, because ungulate management would be guided by the fencing strategy, population objective, and comprehensive and systematic approach described in chapter 2, "Elements Common to All Action Alternatives." The effects of alternative B, when combined with impacts of past, present, and reasonably foreseeable future actions on park management and operations, would have long-term moderate adverse cumulative impacts.	Same as alternative B, plus: There would be cost efficiency gained through the discontinuation of volunteers in ground shooting efforts.	Same as alternative B, except: Use of volunteers for ground shooting in additional areas and use of relocation could reduce efficiency and delay achieving desired conditions.	Same as alternative B, except: Use of relocation could reduce efficiency and delay achieving desired conditions.



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## Acronyms

ACETA	aerial capture, eradication, and tagging of animals
AGL	Above ground level
ATMP	air tour management plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dba	A-weighted decibel
DLNR	Department of Land and Natural Resources
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FR	Federal Register
GMP	general management plan
GPS	global positioning system
LFO	Level flyover
NEPA	National Environmental Policy Act
NHT	National Historic Trail
NPS	National Park Service
NRCS	Natural Resources Conservation Service
PEPC plan/EIS	Planning, Environment, and Public Comment <i>Plan / Environmental Impact Statement for Protecting and Restoring Native Ecosystems by Managing Non-native Ungulates</i>
SEA	Special Ecological Area
SHPO	State Historic Preservation Office
TMA	Three Mountain Alliance
TNC	The Nature Conservancy
USC	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

