

NON-NATIVE DEER MANAGEMENT PLAN
DRAFT ENVIRONMENTAL IMPACT STATEMENT



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**United States Department of the Interior
National Park Service**

**Non-Native Deer Management Plan
Draft Environmental Impact Statement
Point Reyes National Seashore**

This *Non-Native Deer Management Plan Draft Environmental Impact Statement* (Plan) analyzes a preferred alternative, no action, and four additional alternatives for future management of Axis deer (*Axis axis*) and Fallow deer (*Dama dama*) in Point Reyes National Seashore (PRNS) and Golden Gate National Recreation Area lands administered by PRNS. As lead agency for the plan, the National Park Service (NPS) developed the alternatives to address problems and management concerns relating to non-native deer in the Seashore. The management plan will assist NPS in the restoration of native ecosystems within the park, will prevent spread of non-native deer into surrounding private and public lands, and will address adverse impacts to agricultural permittees within the Seashore.

The alternatives differ primarily in their approach to deer population control and in desired future numbers of deer. Alternative A, the No Action alternative, calls for no change in existing management of non-native deer, and results in increased range and numbers of both species. Alternatives B and C call for controlling numbers of both species at a pre-determined level (i.e. 350 axis and 350 fallow deer) using lethal removal alone or a combination of lethal removal and long-acting contraceptives. Alternative D calls for eradication of both species by 2020 using lethal removal alone. Alternative E is the preferred alternative and would eradicate both species of non-native deer from the Seashore by 2020 using a combination of lethal removal and long-acting contraceptives. Issues raised during public scoping were incorporated in the analysis and are discussed in the document. A number of alternatives calling for relocation, fencing, hunting, and contraception alone are discussed as Alternatives Considered but Rejected.

Environmental consequences of the five alternatives are divided into impact topics, which include natural resources (wildlife, vegetation, special status species, soils and water), visitor experience, health and human safety, local economy and park operations. Impacts to areas outside the park are discussed as they might be affected by dispersing or expanding non-native deer populations.

The public review period for the draft Environmental Impact Statement begins when the notice of its availability is published in the Federal Register and lasts for 60 days from that date. Please check the Parks website at www.nps.gov/PORE for additional information about the comment deadline, or call the number below.

Please send comments during this period to:

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SUMMARY

This Non-Native Deer Management Plan Draft Environmental Impact Statement analyzes options for the management of non-native axis and fallow deer at Point Reyes National Seashore (PRNS) and the PRNS-administered lands of Golden Gate National Recreation Area (GGNRA). The preferred alternative is the removal of all individuals of these exotic species through a combination of shooting and contraception.

Need for Action

The impacts of non-native deer on the native ecosystem in the park and regulatory policies indicate the reduction or elimination of these species is needed. The alternatives analyzed in this draft EIS investigate the degree of removal required and the means to do so.

In its 2001 Management Policies, the National Park Service instructs parks such as Point Reyes National Seashore to “re-establish natural functions and processes in human-disturbed components of natural systems (sec 4.1.5).” This same section includes non-native (also called “exotic” or “alien”) species as an example of a human-caused disturbance that can have severe impacts on natural biota and ecosystems.

Parks are specifically mandated to control exotic species “up to and including eradication” of a population if that species does not meet an identified park purpose and if such control is “prudent and feasible.” Only through the removal of exotics and other changes resulting from human disturbance can the NPS return its park units to the most natural condition possible and meet its mandate to preserve them in this condition for future generations.

The presence of non-native axis and fallow deer is both the result of human activities and disruptive to many elements of the natural ecosystem at PRNS. Some of the more serious effects these non-native deer have at the Seashore include possible competition with and displacement of native tule elk and black-tailed deer (particularly in high deer density or low forage conditions), the potential for transmitting disease to these native ungulates, and heavy use of and resulting impacts to riparian habitat and presumably to the native wildlife dependent on this habitat. Fallow deer are known to cause reduction or local extinctions of small mammals that rely on the same ground-level grasses and forbs (Putman et al. 1989). Both axis and fallow deer browse shrubs when grasses are not available, and alter riparian cover and vegetation through browsing and creating trails. Loss of riparian habitat can affect a number of species at PRNS, including several special status species, such as California red-legged frog, Coho salmon and steelhead trout. Fallow and axis deer also affect Seashore ranchers by damaging fences, and through depredation of livestock pastures and supplemental livestock feed.

Populations of both species of deer have increased in recent years and the range of fallow deer appears to be expanding eastward, towards and beyond Seashore boundaries. This population and range expansion, if allowed to continue, could mean these same types of impacts would occur on private and public lands outside PRNS. Currently, the population of axis deer and fallow deer are about 250 and 860, respectively.

Purpose and Objectives

The purpose of this management plan is to define management prescriptions for non-native deer management. Both the park's General Management Plan (GMP) and Resource Management Plan (RMP), identify goals for management of these exotic species. The park RMP (NPS 1999) indicates that: "Regardless of potential competition and disease issues, the presence of these non-native deer compromises the ecological integrity of the Seashore and the attempts to reestablish the native cervid fauna comprising tule elk and black-tailed deer" and notes that three scientific panels comprised of federal, state, and university researchers and managers recommended the removal of non-native deer to promote native deer and elk.

The objectives of the plan are:

- To correct past and ongoing disturbances to Seashore ecosystems from introduced non-native ungulates and thereby to contribute substantially to the restoration of naturally functioning native ecosystems.
- To minimize long-term impacts, in terms of reduced staff time and resources, to resource protection programs at the Seashore, incurred by continued monitoring and management of non-native ungulates.
- To prevent spread of populations of both species of non-native deer beyond Seashore and GGNRA boundaries.
- To reduce impacts of non-native ungulates to agricultural permittees within pastoral areas through direct consumption of forage, transmission of disease to livestock and damage to fencing.

Alternatives

The following five alternatives, including the preferred alternative (Alternative E), were created by reviewing public comments, consulting with NPS personnel, and by reviewing relevant literature. Public input consisted of verbal comments made during a public meeting in Point Reyes Station on May 4, 2002, and letters and emails from the public, sent to the superintendent during the scoping period of May 4 to July 5, 2002. An Exotic Deer Interdisciplinary Team, made up of PRNS staff from several divisions, reviewed letters and pertinent literature, compiled all relevant laws, policies and NPS mandates and formulated the alternatives.

Alternative A: No Action

No non-native deer control actions would be undertaken. Monitoring activities would continue for the life of the Plan.

Alternative B: Control of Non-Native Deer at Pre-Determined Levels by Agency Removal

Non-native deer populations would be controlled initially to a level of 350 for each species (700 total axis and fallow deer). Control of each non-native deer species to 350 animals would be accomplished with lethal removal by NPS staff specifically trained in wildlife sharpshooting. Efforts would be made to reach target levels in 15 years, to ensure continued presence of both species in the Seashore, and to reduce risks of range expansion beyond Seashore boundaries.

This would entail removing between 150 and 250 deer per year for the first ten years with harvest numbers decreasing to 100-150 deer per year from 2016 on. The total number of deer that would require removal is unknown. Where axis and fallow deer carcasses could be moved, they would be donated to charitable organizations as food for the needy. In cases where carcasses could not be accessed, they would be left in place to recycle nutrients into the ecosystem. Monitoring activities would continue for the life of the Plan.

Alternative C: Control of Non-Native Deer at Pre-Determined Levels by Agency Removal and Fertility Control

Non-native deer populations would be controlled initially to a level of 350 for each species (700 total axis and fallow deer) using both lethal removal and fertility control. Efforts would be made to reach target levels in 15 years.

The contraceptive program would incorporate the latest contraceptive technologies to safely prevent reproduction, for as long as possible, and with minimal treatments per animal. Because no long-acting “sterilant” has been approved for use in wildlife by the Food and Drug Administration, studies on safe and efficacious use of a candidate drug would have to be conducted at PRNS before it could be used for management and population control.

Population modeling for fallow deer at PRNS suggests that, in this alternative, total numbers of non-native deer removed by 2050 would be at least 3,000 (2,200 axis and 800 fallow deer). Fallow deer would likely be treated with a known long-acting contraceptive, but no known long-acting contraceptive is available for axis deer. Total numbers of fallow does treated by 2050 with a lifetime contraceptive, should one exist, would vary depending on overall sex ratios and density dependent factors but could range from 200 to 300. Because the effectiveness of long-term contraceptives on axis deer is unknown, similar models have not been developed for this species. Should such contraceptive technology become available, its practicality and effectiveness in controlling PRNS axis deer populations at 350 animals would be evaluated.

Because the goal of this alternative would be to control axis and fallow deer at a specified level and not to eradicate them from PRNS, annual culling and fertility control would continue indefinitely and total numbers of deer removed and treated with contraceptives is unknown. Monitoring activities would continue for the life of the Plan.

Alternative D: Removal of All Non-Native Deer by Agency Personnel

In Alternative D, all axis and fallow deer inhabiting the Seashore and the GGNRA lands administered by the Seashore would be eradicated by 2020 through lethal removal by NPS staff specifically trained in wildlife sharpshooting. This would entail culling approximately 250 non-native deer per year. Total numbers of non-native deer removed could range from 1,400 to 2,200 depending on starting population size and structure, composition and type of deer removed early in the program, and herd growth rates. Where deer carcasses could be moved, they would be donated to charitable organizations as food for the needy. In cases where carcasses could not be accessed, they would be left in place to recycle nutrients into the ecosystem. Monitoring activities would continue until all non-native deer were eradicated, by 2020.

Alternative E (Preferred Alternative): Removal of All Non-Native Deer by a Combination of Agency Removal and Fertility Control

In Alternative E, all axis and fallow deer inhabiting the Seashore and the GGNRA lands administered by the Seashore would be eradicated by 2020 through lethal removal and fertility control. Culling would be conducted by NPS staff specifically trained in wildlife sharpshooting.

As in Alternative C, a percentage of fallow deer would be treated with an existing long-acting contraceptive, and both axis and fallow deer would be removed via shooting. If a long-acting contraceptive for axis deer were found, its practicality and effectiveness in eradicating axis deer would be evaluated.

Population modeling for fallow deer at PRNS suggests that, in this alternative, total numbers of both species of non-native deer removed by 2020 are projected to be at least 1,350 (800 axis and 550 fallow deer) while total numbers of fallow does treated by 2020 with a lifetime contraceptive, should one exist, could range from 100 to 150.

Where deer carcasses could be moved, they would be donated to charitable organizations as food for the needy. In cases where carcasses could not be accessed, they would be left in place to recycle nutrients into the ecosystem. Monitoring activities would continue until all non-native deer are eradicated, by 2020.

A number of issues, raised by the public during scoping, are beyond the scope and direction of this document. Some are discussed as they relate specifically to non-native deer (i.e., impacts to native deer or livestock of the various alternatives), while other topics are addressed in other NPS planning documents.

Several alternatives were considered by the NPS or proposed by the public but rejected because they are beyond the document's scope, are technically or economically infeasible, are outside laws, regulations and policies that govern the park or are unable to meet park objectives. These include:

- Managing native deer at PRNS
- Managing non-native deer outside of NPS boundaries
- Managing livestock at PRNS
- Public hunting on non-native deer
- Yearly contraception
- Use of long-acting contraceptives (“sterilants”) alone
- Surgical sterilization
- Relocation
- Restricting deer to a fenced area
- Trapping and euthanasia by lethal injection

Alternatives D and E were identified as environmentally preferable and Alternative E is the park's preferred alternative at this time.

Impacts

Water Quality and Water Resources

Fallow and axis deer can adversely affect water quality by removing streamside vegetation, increasing erosion and turbidity and through increased nutrient input. Current impacts to water quality and resources from non-native deer in the park are minor, but continued growth and expansion of the population will result in impact intensity increasing inside the park to moderate in the long term. As the range of each species expands, the potential for moderate to major impacts outside the park becomes greater. Alternatives B and C would slightly reduce impacts inside the park, but would provide possible substantial benefits to water resources in the region by reducing the risk of the expansion of non-native deer outside the Seashore. Alternatives D and E would increase benefits in the park so that they would range from minor to moderate, and would eliminate the risk of the expansion of the population and water quality impacts to the region. No impairment to park water resources would occur from implementing any alternative.

Soil

Soils could be affected by non-native deer in several ways; through direct mechanical compaction, through erosion related to the loss of overlying vegetation, through the addition of nutrients in waste products, and by more subtle changes in soil characteristics related to physiological responses of vegetation to grazing.

Although impacts to soils from non-native deer inside the park would likely remain no more than localized and minor if existing conditions continue (e.g., if the No Action Alternative is adopted), expansion of the populations outside the park could result in major adverse impacts to soils through compaction and loss. If Alternative B or C was selected, a negligible to minor short-term improvement to soils in some localized areas currently used by deer could occur in the first few years, although the continued presence of large herds of axis and fallow deer would result in impacts similar to those in Alternative A, e.g., long-term minor, adverse impacts. Substantial benefits relative to Alternative A, from lower risk of non-native deer expanding outside the park and affecting soils regionally, are likely.

Beneficial minor impacts to soils would result from adopting Alternative D or E from elimination of compaction, erosion, and the changes to soils from nutrient input and grazing.

No impairment of park soils would occur under any alternative.

Vegetation

Deer, and other ungulates, can cause a variety of impacts on vegetation. Obviously, they consume vegetation, which can result in changes to physical structure, structural diversity, species composition and productivity in plant communities, as well as weed and nutrient dispersal. They can also trample vegetation, particularly when they congregate in large groups, as they do during the rutting season or other times of the year in the Seashore. Deer can alter patterns of nutrient cycling both within plant communities and by transferring nutrients from one community to another, and can change the distribution of nutrients between plant shoot and root structures.

Depending on the soil fertility, intensity of grazing, and the vegetation being grazed, deer and other ungulates can stimulate or suppress vegetative productivity across a landscape.

Damage to riparian and understory vegetation within the Seashore is currently considered minor in intensity. However, this is expected to increase over time under the No Action Alternative (e.g., continuing existing management) to a moderate level because of increasing deer densities and increasing geographical scope. Impacts outside the park could be major in intensity.

Under Alternatives B and C, the impact intensity is expected to decrease slightly initially, but remain at a minor level because of localized high deer densities over the long term. Eliminating non-native deer in Alternatives D and E would increase these benefits, but because they are localized they would still be considered minor. Substantial benefits from any action alternative (B, C, D, or E) are likely relative to Alternative A from lowering the risk of non-native deer expansion outside the park and reducing impacts to vegetation regionally.

No impairment to park vegetation would occur under any alternative.

Wildlife

Non-native deer can affect native wildlife by displacing them, changing habitat features and by eating the same food. Action alternatives would also affect non-native deer by increasing mortality or eliminating them, and by disturbing them or changing reproduction and recruitment through contraception.

Given the projections of growth for both axis and fallow deer, these types of impacts would spread over a wider area of the park as well as outside the park in Alternative A. Pockets of extremely high non-native deer density, such as those currently seen in Olema Valley, are likely to be found increasingly throughout Marin County. Native species richness and diversity would likely decrease in those high-density areas. Overall, the magnitude of impacts to native wildlife within NPS boundaries are considered moderate in intensity, adverse and long-term, and those outside the boundary have the potential to become major in intensity.

In Alternatives B and C, fallow deer numbers would be reduced, but axis deer would grow to 350. Axis deer range is expected to increase in pastoral and natural areas of the Seashore. Although this expansion may benefit a few native species, it would have minor to moderate adverse impacts overall to native wildlife inside and outside the park relative to current conditions. Compared to an even larger axis deer range expansion expected under the No Action Alternative, Alternatives B or C would result in relative benefits for native wildlife. Native species richness and diversity would likely decrease over a smaller area than in Alternative A.

Alternatives D and E will result in a marked decrease in total non-native deer numbers and range over current levels. The impacts are expected to be beneficial, within NPS boundaries, to a large number of native species and adverse to a much smaller number of native species. Overall and in the long-term, the magnitude of impacts to native wildlife within and outside of NPS boundaries is considered moderate in intensity and beneficial.

No impairment to native park wildlife would occur under any alternative.

Species of Special Concern

The federally listed species that are likely to be affected by non-native deer include northern spotted owls (*Strix occidentalis caurina*), western snowy plover (*Charadrius alexandrinus nivosus*), California red-legged frog (*Rana aurora draytonii*), Coho salmon (*Oncorhynchus kisutch*), steelhead trout (*Oncorhynchus mykiss*), California freshwater shrimp (*Syncaris pacifica*), and Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*). No impairment to these species or other non-listed, but protected, species (see bird species of concern, below) would occur under any alternative.

Northern spotted owl- Threatened

The northern spotted owl preys almost exclusively on small mammals, particularly dusky-footed wood rats in the Seashore (Chow and Allen, unpublished data). Woodrats, in turn, are dependent on roots, stems, leaves, seeds, and mast (Linsdale and Tevis 1951, Willy 1992). Fallow deer have been recorded in areas where spotted owls nest and roost. To date, no direct effects have been noted on the productivity or survival of owls. However, deer compete with the prey species of owls, and therefore, likely have an indirect negative impact on food resources. Alternatives B and C would likely continue this impact, with continued minor, long-term effects. Because of the likely beneficial impact on rodent prey base due to reduced competition for food and cover, Alternatives D and E would have a minor, long-term beneficial impact on northern spotted owls.

Western snowy plover- Threatened

Western snowy plovers nest along the sandy beaches of the Seashore that may also be used sporadically by axis deer. A large herd of 60 axis deer has been seen on South Beach within the last five years, and where the herd occurred, the ground was heavily impacted (S. Allen, NPS, personal communication). Plovers are known to be disturbed by cattle that once roamed on Seashore beaches, and would presumably be similarly disturbed or perhaps disrupted from nesting by the presence of non-native deer. Because this likely only occurs occasionally, the overall impact of Alternative A to plovers in the Seashore is likely minor. Because Alternatives B and C result in higher populations of axis deer within the Seashore, such impacts may increase slightly in frequency, but would remain minor in intensity. With the elimination of axis and fallow deer under Alternatives D and E, plovers would likely experience a minor, long-term benefit.

California Red-legged frog- Threatened

Fallow deer regularly frequent riparian areas where California red-legged frog live and/or breed. They can destroy vegetation by trampling or eating plants, and by thrashing their antlers during the rut. Overall, the adverse impacts of Alternative A to frogs in the Seashore and in Marin County would be minor and long-term. Impacts would remain minor and long term if either Alternative B or C were implemented. A relatively minor, long-term benefit from eliminating axis and fallow deer would accrue if Alternative D or E were adopted.

Coho salmon and steelhead trout- Threatened

Coho and steelhead occur in many of the streams of the Seashore, particularly in Olema Creek and Lagunitas Creek. Fencing has been installed to restrict cattle from riparian areas, in part to protect coho salmon, steelhead trout and other sensitive and protected wildlife. These fences,

however, do not impede the movement of fallow deer. The destruction of riparian vegetation reduces cover, increases water temperature and contributes to earlier drying of streams exposed to sunlight. Overall, the adverse impacts of Alternative A to anadromous fish in the Seashore and in Marin County would be minor and long-term. This would not change if Alternative B or C were selected, but would be eliminated with relatively minor, long-term benefits under either Alternative D or E.

California Freshwater Shrimp- Endangered

The California freshwater shrimp inhabits lower Lagunitas Creek and lower Olema Creek, within the current fallow deer range at PRNS. Shrimp are highly dependent on overhanging riparian vegetation, under which they live year-round. Fallow deer have not been observed within known shrimp habitat. However, in other areas of both Lagunitas and Olema Creeks, high densities of fallow deer have been observed to browse and trample riparian vegetation (Brannon Ketcham, NPS, personal communication). An increase in fallow deer range, resulting from Alternative A would likely cause loss of shrimp habitat thus adversely impacting shrimp survival at all stages of the life cycle. The relative decrease in range under Alternatives B or C, or in density under Alternatives D or E, would not be likely to result in measurable changes to impacts.

Myrtle's silverspot butterfly- Endangered

Two populations of Myrtle's silverspot butterfly occur within the Seashore. The PRNS coastal dune system and coastal prairie provide critical habitat for this species. To date, it is not known whether non-native deer browse on the preferred nectar or larval host plants of the butterfly. However, research elsewhere indicates they may graze on species similar to the one plant that serves as a larval host for Myrtle's silverspot butterfly at PRNS. Overall, the adverse impacts of Alternative A to Myrtle's silverspot butterfly in the Seashore and in Marin County would be moderate to major and long-term. Because the potential for increasing range would decrease with Alternatives B and C, impacts may be reduced to moderate and long-term. With elimination of grazing by non-native deer, a moderate to major relative benefit, compared to No Action, would occur.

Bird species of concern (not federally listed)

Numerous restoration projects and fire management actions have strived to improve nesting success in land birds, particularly in riparian areas. In addition, the park is an active member of the Partner-in-Flight program, collaborating with other agencies and organizations to protect and restore populations of Neotropical migratory songbirds. Destruction of riparian habitat and grazing of vegetation from ground level to a height of 2 meters can adversely affect habitat and remove food and nesting resources used by bird species. These include not only ground or low-nesting species, but also those that nest in the forest understory. The potential impacts on reproductive success and survival are unknown. Overall, the adverse impacts of Alternative A to understory nesting songbirds of concern in the Seashore and in Marin County would be moderate to major and long-term. With fewer non-native deer, the chances of habitat destruction may be lower, and adverse impacts of Alternative B or C would likely be minor to moderate and long-term. Eliminating the impact of non-native deer to understory nesting songbirds of concern in the Seashore and in Marin County by adopting Alternative D or E is likely to be beneficial, moderate to major and long-term.

Plant Species of Special Concern

Non-native deer can impact rare plant species directly by consuming and trampling them. Fallow deer herds have been observed often in grassland, evergreen scrub, and Douglas fir/redwood plant communities (NPS 2001b), all of which can provide habitat for rare plant species. Adverse impacts to rare plants in the Seashore are currently considered to be minor and short-term. Alternative A would result in increased ranges and densities for both species and would likely lead to adverse impacts which were moderate and long-term. Alternatives B and C would result in slightly reduced deer densities and would likely lead to adverse impacts, which were minor and long-term. Alternative D or E would result in beneficial impacts to rare plants, which are minor and long-term.

Human Health and Safety

Impacts to human health or safety would result from deer-vehicle collisions, the use of firearms and the use of aircraft. The risk of a deer-vehicle collision would be highest under Alternative A because the total number of non-native deer is highest. Minor relative benefits in Alternatives B and C from reductions in numbers, and minor to moderate benefits in Alternatives D and E would result from elimination. The risk to staff from firearms used to control deer would be a minor adverse impact associated with all action alternatives. The duration of this impact would be shorter in Alternatives D and E than in Alternative B or C, as culling would occur indefinitely for these latter alternatives. Additional risks to staff safety from herding animals into capture facilities and from applying contraceptive treatment are also possible in Alternatives C and E.

Visitor Experience

The impacts to visitor experience would primarily involve opportunities for viewing native or non-native deer, although actions in the alternatives could also affect visitor soundscape, access and visual quality. Alternative A would provide the opportunity to view both native and non-native deer, more non-native deer than action alternatives, and fewer native deer. Impacts would vary depending on the social value of the visitor, but would be negligible or minor. In addition, implementation of alternative A would likely increase adverse impacts to viewshed enjoyment over time as vegetation is removed. Alternatives B and C would permanently decrease the fallow deer herd, and allow axis deer to increase. Negligible to minor, long-term benefits to visitors with naturalistic or ecologicistic social values related to wildlife viewing of native ungulates, and this same level of adverse impacts to visitors with moralistic or humanistic social values would occur. These may both increase to moderate if Alternatives D or E were selected. Minor impacts on the visitor experience from noise and deer management activities would occur under Alternatives B and C. These may increase to moderate, short-term impacts if Alternative D or E were selected.

Park Operations

Park operations would continue to be affected indefinitely under Alternatives A, B or C, as monitoring would be required under all, and perpetual management needed under B or C. Costs associated with monitoring, including purchase and operation of equipment is about 2.9% of the annual park budget. As the herd size increases and occupies land outside the park, monitoring and mitigation efforts would increase, as would the potential for litigation. This could increase costs to the park of this alternative to from 5 to 15% of the total PRNS budget over the long term, a moderate impact. Although reductions and management in Alternatives B and C would initially

cost more, in the long term, avoidance of litigation, or extensive monitoring and mitigation outside the park would likely result in a total reduction in costs compared to the No Action Alternative. Costs would be about 3-6% of the park budget, a moderate decrease over current conditions, but a beneficial impact compared to Alternative A. These costs would continue in perpetuity. Alternative C would require additional funds to capture and treat deer with contraceptives. Because boosters and continued contraception would be required, costs would be about 3-12% of the park budget in perpetuity. Again, because deer would be much more likely to remain in the park under this alternative, costs related to monitoring, mitigation and litigation would be less than under the No Action alternative, with comparatively negligible to minor benefits to park operations. Alternative D would be the lowest cost alternative, as deer would be eradicated by shooting within 15 years, and no continued monitoring or management beyond that time would be required. Alternative D would require a 4.6% increase in the park budget for 15 years. Alternative E would be more expensive than Alternative D, and would require a 5-9% increase for 15 years. Because they are finite costs, both Alternative D and E offer moderate benefits to park operations compared to Alternative A.

Regional Economy

Alternative A would continue existing minor adverse impacts to the regional economy indefinitely as non-native deer interfere with park ranching and grazing operations. Impacts to agricultural concerns could increase over time to a moderate, adverse level as the density of deer and the damage they cause increases. Negligible to minor, adverse socioeconomic impacts are also possible to low-income/minority farm workers should the viability of agricultural operations be threatened under this alternative. As the population of non-native deer expands outside the park, impacts to agricultural operations would become more widespread and could become major in intensity. Alternatives B and C would reduce the risk of the herd leaving the Seashore and affecting agricultural production, a minor long-term benefit. Alternatives D and E would eliminate any risk of the spread of these deer, a greater benefit than in Alternatives B or C, but still minor in intensity.