

U.S. Fish & Wildlife Service

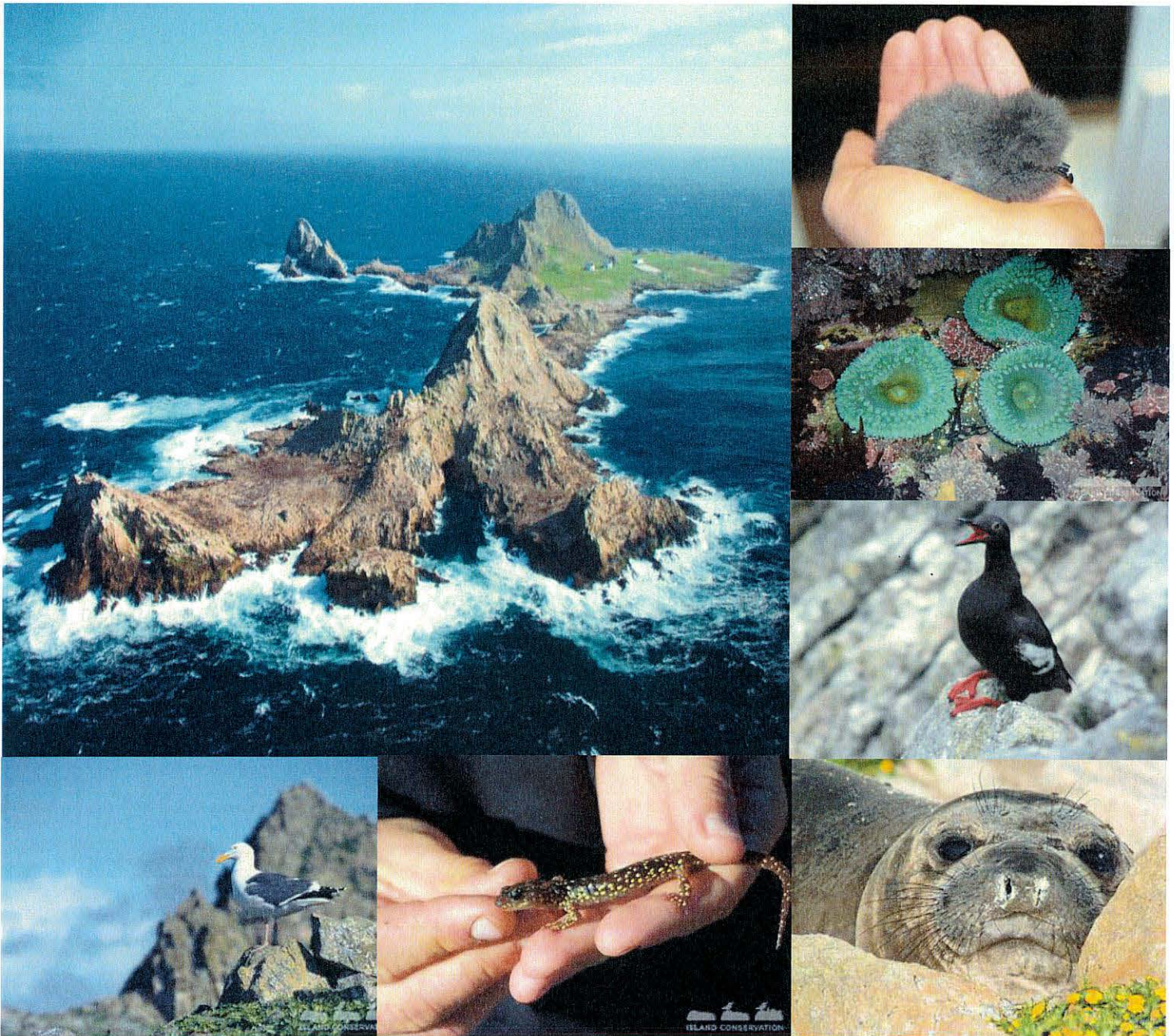
Farallon Islands National Wildlife Refuge

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South Farallon Islands Invasive House Mouse Eradication Project: Final Environmental Impact Statement



Photos Courtesy of Island Conservation

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Final Environmental Impact Statement
South Farallon Islands Invasive House Mouse Eradication Project



U.S. Department of the Interior
Fish and Wildlife Service
Pacific Southwest Region

Prepared by:

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Lead agency:

U.S. Fish and Wildlife Service
San Francisco Bay National Wildlife Refuge Complex

Abstract

The United States Fish and Wildlife Service (Service) proposes to eradicate invasive, introduced house mice (*Mus musculus*) from the South Farallon Islands and eliminate their negative impacts to the ecosystem of the Farallon Islands National Wildlife Refuge. In accordance with the National Environmental Policy Act (NEPA) and its associated regulations, the Service has prepared this Final Environmental Impact Statement (EIS) to determine whether mouse eradication on the South Farallon Islands (or South Farallones) would have significant impacts on the quality of the human environment. The Service has considered three alternatives to address the problem of invasive mice on the South Farallones:

- A. *Alternative A: No Action, which would allow house mice to remain on the South Farallon Islands to continue to negatively impact storm-petrels and other native and endemic species of the islands;*
- B. *Alternative B (preferred alternative): Eradicate invasive house mice from the South Farallon Islands by aerial broadcast of rodent bait containing Brodifacoum-25D Conservation as the primary method of bait delivery; and*
- C. *Alternative C: Eradicate invasive house mice from the South Farallon Islands by aerial broadcast of rodent bait containing Diphacinone-50 Conservation as the primary method of bait delivery.*

The Service has solicited comments from the interested public and prepared a Final EIS based on the responses to comments as well as updates needed between the Revised Draft and Final EIS. The Service expects to release a Record of Decision (ROD) after the 30-day wait period ends following the release of this Final EIS.

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Executive Summary

The U.S. Fish and Wildlife Service (Service) is proposing to eradicate introduced, invasive house mice (*Mus musculus*) from the South Farallon Islands (or, South Farallones) within the Farallon Islands National Wildlife Refuge (Refuge), California. House mice are impacting the native ecosystem of the islands, including several native species and wilderness. Eradicating invasive mice is expected to benefit native seabirds, amphibians, terrestrial invertebrates, and plants and will help restore natural ecosystem processes on the islands. Eradicating house mice would eliminate the last remaining invasive mammal species on the Refuge, enhancing the recovery of this sensitive ecosystem.

Several species are expected to benefit from invasive house mouse eradication. The ashy storm-petrel (*Oceanodroma homochroa*) is a Service Bird Species of Conservation Concern; about half the world population of this species breeds on the South Farallones. The similar Leach's storm-petrel (*O. leucorhoa*), which is more abundant elsewhere, also likely will benefit. Removal of house mice is expected to dramatically reduce predation by burrowing owls (*Athene cunicularia*) on these species, an indirect impact of mice. The fall migrant owls are attracted to stay on the islands through the winter by an abundant mouse supply; after the mouse population crashes, the owls switch to feeding on the storm-petrels. The rare and endemic Farallon arboreal salamander (*Aneides lugubris farallonensis*) and Farallon camel cricket (*Farallonophilus cavernicolus*) are found nowhere else. Mice compete for invertebrate prey with the salamanders and possibly feed on the juveniles or eggs of the salamanders. Mice prey on the camel crickets. The maritime goldfield (*Lasthenia maritima*) is an annual plant endemic to seabird nesting islands along the coasts of California and Oregon; its largest population is on the South Farallones where it forms the basis of a unique plant community. Mice feed heavily on plant seeds and other plant parts, including the goldfields. Mouse predation is likely suppressing native plant populations in favor of more hardy introduced perennial plants.

The benefit of this conservation action is significant from a national perspective because of the importance of the South Farallon Islands for breeding seabirds and for their endemic species. The islands hold the largest seabird breeding colony in the lower 48 United States, including the world's largest colony of ashy storm-petrels. Mouse removal would help satisfy the Service's goal of invasive species control in the United States. Additionally, the eradication of house mice at the South Farallon Islands supports the Service's priority to facilitate ecological adaptation in the face of accelerated global climate change by removing a non-climate change stressor from the Farallones ecosystem. Mouse removal will also benefit wilderness character since mice significantly impact the natural character of the Farallon wilderness.

The South Farallon Islands are about 30 miles west of the Golden Gate Bridge and the City of San Francisco, California. The Farallon Islands National Wildlife Refuge was established in 1909 through Executive Order 1043 "... as a preserve and breeding ground for native birds," and originally included North and Middle Farallon Islands and Noonday Rock. The South Farallon Islands were added to the Refuge in 1969. In 1974, Congress designated all of the emergent land except the island of Southeast Farallon as wilderness under the Wilderness Act of 1964. The Service has cooperative agreements with Point Blue Conservation Science and the U.S. Coast Guard to assist with Refuge stewardship and/or wildlife monitoring. The waters around the

Farallones below the mean high tide line are part of the Greater Farallones National Marine Sanctuary.

The Farallones' isolated nature, varied and extensive habitats, and adjacent productive marine environment makes them an ideal breeding and resting location for wildlife. The Farallon Islands have experienced extensive human impacts beginning in the early 19th century when marine mammals were harvested for fur, oil, and food, while birds were impacted by subsistence hunting and an extensive egg gathering venture in the mid to late 19th century. A military outpost was built and operated during two world wars, and the U.S. Light Service and U.S. Coast Guard operated a manned light station until 1972. The overexploitation of Farallon seabirds and marine mammals in the 19th century resulted in the near to complete extirpation of several species. Offshore, oil pollution, commercial fisheries, and marine ecosystem changes since the early 20th century further impacted the Farallones' seabirds and marine mammals. On the islands, disturbance from long-time resident lightkeepers, U.S. Navy in the early to mid-20th century, combined with the introductions of invasive plants, rabbits and mice, caused dramatic changes to Farallon habitats and ecosystem. Since Service stewardship of the South Farallon Islands began in 1969, some extirpated species have re-colonized the islands and many wildlife populations are recovering. However, other species remain at reduced population levels or are declining on the Refuge, and wildlife remains vulnerable to the impacts of introduced animals and plants, oil spills, other pollution, fisheries interactions, and global climate change. All of these impacts affect the relationship between land and marine resources and compromise the Service's ability to achieve the Refuge goals and objectives to protect and restore populations of native species to the Refuge.

For the Farallon Islands National Wildlife Refuge, the eradication of introduced house mice would aid in achieving the following Refuge goals and objectives, which were set forth in the 2009 *Comprehensive Conservation Plan* for the Refuge:

- Protect, inventory, monitor, and restore the historic levels of breeding populations of 12 seabird species, five marine mammal species, and other native wildlife.
- Reduce or eliminate invasive wildlife species that threaten the viability of seabird and marine mammal species.
- Restore degraded habitat and reduce the prevalence of invasive vegetation in order to re-establish historic abundance and distribution of native plant species by reducing consumption of native species and reducing the spread of invasive plants by house mice.
- Comply with Objective 1.1 of the Refuge's 2009 Comprehensive Conservation Plan (CCP), which established a goal of reducing the impacts of invasive wildlife on the island ecosystem.

The Service published a Notice of Intent to prepare an Environmental Impact Statement (EIS) on April 13, 2011. The action alternatives were developed to focus on the primary issues identified by resource specialists within the Service, national and international experts in island rodent eradication, public comments received after the Notice of Intent to prepare the EIS was released, and government regulatory agencies that have a stake in the decision-making process. To decide

which action alternatives to fully analyze in the EIS, the Service utilized a Structured Decision Making (SDM) approach to assess and compare a total of 49 potential mouse removal methods. In order to be retained for consideration, an alternative had to 1) be consistent with the Service's management guidelines, 2) be feasible to implement, and 3) meet the Service's safety and logistic requirements. Using this information, a Draft EIS (DEIS) was prepared and released to the public for comment on August 16, 2013. A Revised Draft EIS (RDEIS) was released on October 25, 2013 to clarify potential impacts of mice to ashy storm-petrels. In the RDEIS and this Final EIS, the potential impacts of a No Action alternative and two action alternatives were fully analyzed, with no preferred alternative selected. The alternatives include:

- A. Alternative A: No Action, which would allow house mice to remain on the South Farallon Islands;*
- B. Alternative B: Eradicate invasive house mice from the South Farallon Islands by aerial broadcast of the rodent bait Brodifacoum-25D Conservation as the primary method of bait delivery; and*
- C. Alternative C: Eradicate invasive house mice from the South Farallon Islands by aerial broadcast of the rodent bait Diphacinone-50 Conservation as the primary method of bait delivery.*

The Service received more than 550 individual correspondences from the public and interested agencies during the extended Public Comment Period held from August 16 through December 9, 2013. Following the public comment period, comments were collated and responses to substantive comments prepared. Responses to comments resulted in a variety of changes leading to this Final EIS (FEIS), including incorporation of additional literature, additional analyses of action alternatives, descriptions of lessons learned, a study on the potential hazards of anticoagulant rodenticides on salamanders, and revised impacts analyses. After considering this additional information, the Service identified Alternative B has been recommended as the preferred alternative because of its greater potential to successfully eradicate house mice from the South Farallon Islands and lower impact to wilderness.

Alternatives B and C both entail the aerial broadcast of rodent bait containing either the anticoagulant rodenticide brodifacoum or diphacinone from a helicopter using a specialized bait bucket. The bait spreading bucket would broadcast bait at the appropriate rate in a manner that targets all potential mouse territories within a short operational period. Efforts to minimize impacts to island resources include timing of implementation to avoid sensitive breeding periods and times when migratory wildlife are most abundant, a hazing plan to protect gulls and other birds from exposure to potential risks, capture and hold or relocation of predatory birds, and the use of bait stations in certain sensitive areas, as well as the use of specialized equipment and techniques to minimize the risk of bait drift into the marine environment.

Within this document, we provide a quantitative and qualitative assessment of the environmental consequences for each of the alternatives. The potential significance of the environmental consequences (or "impacts") of each action alternative and the No Action alternative are discussed on a case-by-case basis for each environmental issue considered.

The issues analyzed in the document include:

- Impacts to physical resources
 - Impacts to water resources
 - Impacts to geology and soil
 - Impacts to wilderness character
- Impacts to biological resources
 - Impacts to plant and animal species
- Impacts to the social and cultural resources
 - Impacts to personnel from operations
 - Impacts to refuge visitors and recreation
 - Impacts to fisheries resources
 - Impacts to economic and cultural resources
- Unavoidable adverse impacts
- Cumulative impacts
- Irreversible or irretrievable commitments of resources
- Relationship of short-term uses to long-term ecological productivity.

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