

**Updated Descriptions
of Potential Restoration Projects for Birds
and Wetland/Mudflat Habitats
Injured by the *Cape Mohican* Oil Spill**

Prepared on:

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Prepared by:

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Prepared for:

***Cape Mohican* Trustee Council**

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**Bird Restoration and Enhancement Projects:
Restoration of Injured Bird Species Through Native Vegetation Restoration
at Marin Islands National Wildlife Refuge**

Project Location

Marin Islands National Wildlife Refuge and State Ecological Reserve is located approximately one mile north of the Richmond-San Raphael Bridge immediately offshore of the town of San Raphael.

Relationship to Damages Caused by the Spill

Oil from the *Cape Mohican* spill extended as far north as the Richmond-San Raphael Bridge and came within close proximity to this site. A number of colonial nesting species including herons and egrets were affected by the spill.

Project Description

West Marin Island is the largest heron and egret rookery in San Francisco Bay, and also supports up to 40 nesting pairs of western gulls. The purpose of the project is to remove exotic vegetation (scotch broom, eucalyptus) and restore native vegetation on East Marin Island, and to enhance native vegetation on West Marin Island. The goal of this effort is to provide native nesting materials for the West Marin rookery, reduce nesting/roosting sites for avian predators, encourage the expansion of the rookery to East Marin Island, and to supplement nesting sites in the rookery. The effort includes the development of a management plan that will allow for the increased security/protection of the rookery during nesting season through appropriate signing, buoys, and cooperative agreements.

The Refuge will contract with the California Conservation Corps to remove broom and young eucalyptus by hand. Native species including California buckeye, coast live oak, California bay, California sagebrush and other coastal scrub will be replanted in cleared areas. Work would occur within the next non-nesting season (July 30 - February 1) following receipt of funds.

Project Cost

Planning, Environmental Compliance, Project Management (1 GS-9 W/L Bio/Ref.Ops. Spec.for 1 year)	\$47,000
CCC contract (3 weeks @ \$6,000/wk)	\$18,000
Native plants	\$ 3,000
Logistical costs (boat use/gasoline/hand tools)	\$ 2,000
Monitoring (3 years follow-up)	<u>\$ 7,500</u>
Total	\$77,500

**Bird Restoration and Enhancement Projects:
Enhancement of Shorebird Foraging Areas Through Control of Exotic Cordgrass
in San Francisco Bay Wetlands**

Project Location

Intertidal mudflat and saltmarsh areas in the San Francisco Bay Estuary.

Relationship to Damages Caused by the Spill

Mudflats and other wetlands in central San Francisco Bay were damaged by the 1996 *Cape Mohican* oil spill. Intertidal mudflat areas and tidal sloughs function as important foraging areas for 500,000 to 1,000,000 shorebirds which migrate through or winter in the San Francisco Bay area each year. In addition, wintering waterfowl and other waterbirds forage in the shallow intertidal areas. The project described below will restore intertidal habitat similar to that damaged in the spill, which will benefit shorebird, waterfowl, and other waterbird species throughout the Bay.

Project Description

This project involves eradication of the invasive exotic cordgrass (*Spartina alterniflora*) from mudflats and other intertidal areas in the San Francisco Bay Estuary. Project location is in the Central Bay, between the Bay Bridge and the San Mateo Bridge, where 500-600 acres of exotic cordgrass occur (Figure 1). This exotic cordgrass was introduced into San Francisco Bay in the 1970's and has spread through the Bay over the past few decades. This plant species invades mudflats, suppresses marine infauna, competes with native salt marsh plants, excludes native fish, and hinders storm water management. It may also suppress native algae and eel grass.

In order to ensure successful eradication of exotic cordgrass, the control must continue for a minimum of three years. The goal each year will be to spray all existing exotic cordgrass in the project area. Although success of control efforts each year cannot be predicted exactly, it is likely that approximately 50% control will be achieved each year.

Project Cost

Cost for hand spraying of Rodeo herbicide, which is the most effective treatment, is approximately \$1,000/acre. This includes labor, materials, access, and equipment costs. The project can be scaled based on these per acre costs. Three scenarios are presented below:

a) Large Project: Treatment Size = 150 acres

Description	1 st Year	2 nd Year	3 rd Year	Total
Equipment/Labor (\$1,000/acre)	\$150,000.00	\$75,000.00	\$37,500.00	\$262,500.00
Environmental Compliance & Proj Mgmt (GS-11: 2mo. Yr 1, 1 mo.in Yrs. 2 and 3)	\$8,500.00	\$4,250.00	\$4,250.00	\$17,000.00
Monitoring (3 mo.@GS-5/Year)	\$7,500.00	\$7,500.00	\$7,500.00	\$22,500.00
Total	\$166,000.00	\$86,750.00	\$49,250.00	\$302,000.00

b) Medium Project: Treatment Size = 100 acres

Description	1 st Year	2 nd Year	3 rd Year	Total
Equipment/Labor (\$1,000/acre)	\$100,000.00	\$50,000.00	\$25,000.00	\$175,000.00
Environmental Compliance & Proj Mgmt (GS-11: 2mo. Yr 1, 1 mo. in Yrs. 2 and 3)	\$8,500.00	\$4,250.00	\$4,250.00	\$17,000.00
Monitoring (2 mo.@GS-5/Year)	\$5,000.00	\$5,000.00	\$5,000.00	\$15,000.00
Total	\$113,500.00	\$59,250.00	\$34,250.00	\$207,000.00

c) Small Project: Treatment Size = 50 acres

Description	1 st Year	2 nd Year	3 rd Year	Total
Equipment/Labor (\$1,000/acre)	\$50,000.00	\$25,000.00	\$12,500.00	\$87,500.00
Environmental Compliance & Proj Mgmt (GS-11: 2mo. Yr 1, 1 mo. in Yrs. 2 and 3)	\$8,500.00	\$4,250.00	\$4,250.00	\$17,000.00
Monitoring (3 mo.@GS-5/Year)	\$2,500.00	\$2,500.00	\$2,500.00	\$7,500.00
Total	\$61,000.00	\$31,750.00	\$19,250.00	\$112,000.00

**Bird Restoration and Enhancement Projects:
California Least Tern Habitat Enhancement at Alameda Point**

Project Location

Alameda Point, within the proposed boundaries of the Alameda National Wildlife Refuge, Alameda, CA

Relationship to Damages Caused by the Spill

The *Cape Mochican* oil spill caused injuries to terns and gulls. This project would therefore mitigate in-kind for a species group affected by the spill. The spill caused oiling in the Alameda area. Therefore, the project would also compensate for these impacts on-site.

The California least tern colony at Alameda Point is the northernmost breeding colony along the California coast and the only substantial colony in San Francisco Bay. For the past 10 years, the colony has achieved high reproductive success and is growing in numbers of breeding pairs. In several years the colony size is likely to expand beyond the suitable nesting habitat currently available at the site.

Project Description

The project would create additional nesting habitat to accommodate approximately 150 additional pairs of terns, thereby increasing the carrying capacity of this colony site by 60%. Current colony size is approximately 250 pairs. The current colony site of 4 acres would be enlarged to 6-8 acres. Suitable nesting substrate (gravel, oyster shell) would be added along the side of the existing site. The shape of the site would be altered from the current triangle to a rectangle or oval, thereby eliminating confining triangle corners. Drain tile and cinder blocks would be placed in the new site to provide shelter for chicks. The site would be fenced with a 3-4 foot tall electric fence to deter predators. Maintenance of the newly created habitat, consisting of weed-pulling and depositing additional pea gravel, would take place each year prior to tern arrival. This project could begin in year 2001.

Project Cost

Fencing (1,200 feet @ \$10/ft)	\$ 12,000
Shell and pebbles (1,600 cu yds @ \$46/cu yd)	\$ 73,600
Environmental compliance & Project management	\$ 5,500
Monitoring (3 mos/yr for 3 yrs @ GS-5 rate)	\$ 20,000
Maintenance of habitat & fence (\$10,000/yr for 3 yrs)	<u>\$ 30,000</u>
TOTAL	\$141,000

**Bird Restoration and Enhancement Projects:
Caspian Tern Habitat Enhancement at Alameda Point**

Project Location

Alameda Point, within the proposed boundaries of the Alameda National Wildlife Refuge, Alameda, CA

Relationship to Damages Caused by the Spill

The *Cape Mohican* oil spill caused injuries to terns and gulls. This project would therefore mitigate in-kind for a species group affected by the spill. The spill caused oiling in the Alameda area. Therefore, the project would also compensate for these impacts on-site.

A large colony of Caspian terns has nested on Alameda Point. Number of breeding pairs at this colony has been decreasing in recent years, probably due to degrading habitat conditions. The open mudflat/sandy beach habitat that Caspian terns prefer for nesting is being encroached upon by vegetation. The project would recreate this open mudflat habitat, thereby also compensating for a habitat type lost in the spill (99 acres of mudflat/wetland were oiled by the spill).

Project Description

The project would consist of restoring and enhancing the existing Caspian Tern nesting site once the Navy completes hazardous waste clean-up. Cleanup may not take place for another 5 years. A 5-6 acre site would be restored. Restoration would consist of contouring the area, removing invasive vegetation, and depositing suitable substrate to ensure the area is above water level when the site is opened to tidal action. Water control structures and channeling would be done to create a predator barrier.

Project Cost

Materials/Equipment/Labor	\$ 65,000
Environmental compliance and project mgmt (3.5 mos @ GS-9 rate)	\$ 12,000
Monitoring (2.5 mos/yr for 3 yrs. @ GS-5 rate)	<u>\$ 16,500</u>
TOTAL	\$ 93,500

**Bird Restoration and Enhancement Projects:
Seabird Restoration on Southeast Farallon Island**

Project Location

Southeast Farallon Island is located approximately 28 miles west of San Francisco in the Pacific Ocean. The Farallon Islands comprise the largest seabird nesting colony complex on the Pacific coast of North America south of Alaska. Southeast Farallon Island is part of the Farallon National Wildlife Refuge managed by the U.S. Fish and Wildlife Service (FWS). The surrounding waters are part of the Gulf of the Farallons National Marine Sanctuary managed by the National Oceanic and Atmospheric Administration (NOAA), and are also within the Farallon Islands Ecological Reserve managed by the California Department of Fish and Game (CDFG).

Relationship to Damages Caused by the Spill

Oil from the *Cape Mohican* spill swept through ocean waters between the Farallon Islands and the Golden Gate before stranding on beaches. A variety of seabird species that nest on the Farallon Islands were affected by this spill, and researchers from the Point Reyes Bird Observatory observed oiled birds on the Farallons. This project focuses on restoring burrow-nesting seabirds (rhinoceros auklet, Cassin's auklet, and ashy storm-petrel) that have declined in recent years.

Project Description

This project consists of five activities (A-E below) that would be implemented on Southeast Farallon Island to restore burrow-nesting seabirds. These projects would be implemented over a five year period.

A) Exotic Vegetation Control

Exotic species of plants, including New Zealand spinach (*Tetragonia tetragonoides*) and *Malva* spp. have become established on Southeast Farallon Island and are potentially detrimental to nesting seabirds. New Zealand spinach and *Malva* are extremely invasive and out-compete the endemic Farallon weed (*Lasthenia maritima*), which is an important seabird nest-building material. Exotic species also tend to be perennial, covering up nesting crevices and the limited areas of the islands that contain soil deep enough for burrow nesting seabirds, such as auklets and storm-petrels. In contrast, the native Farallon weed dies back during the nesting season, allowing seabirds access to crevice and soil nesting areas.

During the 1990's, the FWS has been able to halt expansion of *Malva*, and the distribution and density of New Zealand spinach has been significantly reduced. Most recently, special funding from the Apex Houston Trustee Council and the FWS Coastal Ecosystem Program enabled the Refuge to successfully battle an outbreak of these exotic plants that resulted from extensive sprouting of seeds during the warm and wet El Nino conditions of the winter of 1998-99. Due to the intensive response to the El Nino outbreak, exotic weed levels are below the levels seen in 1997 prior to the El Nino winter; however, annual spraying of infested areas with Roundup herbicide and hand-pulling of New Zealand spinach and other invasives will be necessary to maintain the quality of areas already treated and to eliminate exotic plants from additional areas. Additionally, a constant vigil must be continued to ensure that new plants are identified and eradicated before they become a problem. For example, monitoring has detected the recent spread of perennial non-native grasses into important burrow and crevice nesting habitat. Funds are needed to find and implement effective methods to control these grasses. Funding of the exotic plant control efforts by the Apex Houston Trustee Council will last only until March 2000.

The budget needed for exotic vegetation control is \$20,000 per year, which includes personnel costs, purchase of herbicide and spraying equipment, and transportation of personnel and equipment to and

from the island. Five years of funding are requested.

B) Marine Terrace Habitat Restoration

In the past, Southeast Farallon Island was used as a base for lighthouse operations and military activities and a number of buildings and dwellings were constructed to support these uses. Obsolete buildings have since been removed, but the concrete foundations, walkways, and pads remain on the marine terrace. These paved areas reduce the amount of deep soil habitat available for burrow-nesting seabirds, such as Cassin's and rhinoceros auklets.

This project involves breaking up concrete in approximately 10 paved areas on the marine terrace. Work will be done with hand tools (jack-hammer, concrete saw) and manual labor. Broken chunks of concrete and stone will be piled into rock walls to create crevice nesting habitat. Habitat would thus be restored/created in two ways: 1) removal of concrete from potential burrow nest sites in areas where soil lies under the concrete, and 2) creation of rock walls containing nesting crevices. In addition, nesting boxes would be constructed and installed to promote colonization, population growth, and monitoring.

This project could be completed for an approximate cost of between \$60,000 and \$120,000. The costs include FWS and/or contract personnel involved in planning, field labor, and/or monitoring, as well as supplies and equipment and transportation. Fewer foundations would be removed at the lower cost.

C) Evaluation of Impact of Gull Predation on Nesting Alcids

The Farallon Islands contain the world's largest colony of western gulls. Previously, western gulls nested only on certain, mostly rocky, portions of Southeast Farallon Island, areas not favored by burrow-nesting auklets and crevice-nesting storm-petrels. Western gulls have gradually expanded their nesting habitat, and now nest all over Southeast Farallon Island, including the scarce areas that provide suitable nesting habitat for auklets and storm-petrels. Although reasons for the western gull expansion are not known with certainty, it is thought that the availability of garbage at mainland landfill dumps has contributed to the increase in the western gull population.

Western gulls prey on smaller seabirds, and the remains of dead Cassin's auklets and ash storm-petrels that have been regurgitated by western gulls are commonly found by researchers along island paths each morning during the breeding season. The gulls apparently prey on the auklets and storm-petrels as they return to incubate eggs and feed chicks at dusk. The numbers of ash storm-petrels and Cassin's auklets breeding on Southeast Farallon Island have declined by approximately 40 and 60 percent, respectively, since the early-1970's. Gull predation is thought to be one of the main causes of the decline of the numbers of auklets and storm-petrels breeding on the island, and the FWS has begun to evaluate methods of reducing this impact.

In 1997, experimental gull exclosures consisting of parallel rows of pole-mounted overhead cables were constructed to discourage gulls from nesting on a portion of the marine terrace. The experiment showed that exclosures may be effective, with a 32 percent reduction in the number of gulls nesting in the area of the larger exclosure in 1998. Biologists continued to experiment with the design of the exclosures in 1999, but have not yet developed a system that completely excludes gulls from auklet and storm-petrel nesting areas. Continued work on the exclosure system, or some alternative method of excluding gulls from seabird nesting areas, is needed. In addition, a study of gull predation is needed to determine whether the predation problems are due to western gulls in general, or just certain problem gulls that have learned to be effective predators on small seabirds. If the latter situation exists, it may be possible to substantially reduce the number of auklets and storm-petrels that are killed by gulls by relocating or eliminating problem gulls.

The budget for this project consists of two parts. The first part, involving continued experimentation with the gull exclosures or alternatives, could be completed over a two year period at a cost of \$10,000 per year. The second part, involving a study of nocturnal and crepuscular gull predation, could be

completed in two years at a cost of \$28,000 per year. Costs for both tasks would include field work, data analysis, and report preparation by FWS and/or contract personnel, supplies and equipment, transportation of personnel and equipment to and from the island, and planning and environmental compliance.

D) Exotic Mouse Control

The house mouse (*Mus musculus*) is not endemic to the Farallon Islands, but has been introduced as a result of human activities. Mice can be an effective predator on eggs and chicks of small seabirds, such as storm-petrels and auklets. Mouse control measures involving poison bait traps or similar methods would be evaluated as a means to control the house mouse population on Southeast Farallon Island. Other non-native mammals (cats, rabbits) have been successfully eradicated from Southeast Farallon Island over the years, indicating that this project has the potential for success. The house mouse is the only non-native mammal remaining on the island.

The project would be completed in three phases. In the first year (Phase I) a pilot study aimed at identifying a feasible means of mouse control, studying the annual cycle of the mouse population on the island to determine timing for control efforts, determining the growth pattern/cycle of important food plants, and understanding other ecological factors that would be important for effective control would be completed. During the pilot year, permit requirements and preliminary scoping to determine the level of public controversy/interest would also be conducted. Phase II would involve preparing a control plan, obtaining the necessary permits, completing environmental documentation and public involvement. Phase III would involve implementing the control plan.

Phase I would cost \$30,000. If warranted based on the pilot study, full-scale mouse control (Phases II and III) would be implemented over a three year period at a cost of \$90,000. Costs include FWS or contract personnel, supplies and equipment, planning and environmental compliance, transportation of personnel and equipment to and from the island, and data analysis and report preparation.

E) Replacement of Mooring Buoy

The Coast Guard installed and maintained two mooring buoys (the North and East Landing Buoys) adjacent to Southeast Farallon Island until the 1990's. These mooring buoys are important to the restoration and monitoring activities conducted on the island by FWS and NOAA, because they make it possible for support vessels to safely transfer personnel and supplies every two weeks. The buoys are also available for recreational and commercial vessels to use in emergencies, thus enhancing public safety and reducing the risk of boat wrecks or oil spills, while at the same time keeping such vessels far enough offshore that they do not create undue disturbance of nesting seabirds and other wildlife.

The Coast Guard has transferred the ownership and management responsibility for the buoys to the FWS and NOAA. These agencies have struggled to maintain the buoys due to funding and personnel limitations. Neither agency has money in their operational budgets for maintenance of the buoys, so maintenance is often postponed. In 1997, the North Landing buoy broke free from its anchor and was lost. Funding for a replacement was not found until 1999, and only then because personnel vacancies provided an unexpected end of the fiscal year surplus. A regular source of funding is needed to insure that periodic inspections of the mooring chain are performed, worn chain segments are replaced, and the buoys and their mooring chains are replaced on a regular schedule.

The project would cost \$10,000 per year for five years, which would cover purchase of replacement parts from marine suppliers, contracting with marine contractors for buoy inspections and replacement, and oversight and planning by FWS Refuge staff. The actual work consists of bi-annual inspections of the buoy and its mooring, as well as replacement of each buoy and its mooring in alternate years according to the following schedule:

- year 1: Re-set North Landing Buoy
- year 2: Inspect North and East Landing Buoys and repair worn chain segments
- year 3: Replace East Landing Buoy
- year 4: Inspect North and East Landing Buoys and repair worn chain segments
- year 5: Replace North Landing Buoy

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Project Cost

Table 1. Budget Summary for Southeast Farallon Island Restoration Projects

Task	Duration	Annual Budget	Total Cost
A) Exotic Plant Control	5 years	\$20,000	\$100,000
B) Marine Terrace Habitat Restoration	2 years	\$60,000	\$120,000
C) Gull Control - Exclosures	2 years	\$10,000	\$20,000
C) Gull Control - Predation Study	2 years	\$28,000	\$56,000
D) Mouse Control - Pilot Study	1 year	\$30,000	\$30,000
D) Mouse Control - Implementation	3 years	\$30,000	\$90,000
E) Mooring Buoy Replacement	5 years	\$10,000	\$50,000
TOTAL	5 years		\$466,000

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Priority: Normal

Subject: Updated Restoration Projects for Cape Mohican

Cape Mohican Trustees,

Attached for your review are updated versions of the bird and wetland/mudflat restoration projects that FWS had the lead in developing.

The project descriptions and budgets were updated as requested on the 1/13 conference call. We look forward to discussing these projects, and the projects that are being updated by other agencies, with the Cape Mohican Trustee Council in Cordelia on 2/9.

The significant changes between these versions and the versions contained in the April 1999 Public Scoping Document are:

1. Marin Islands

The budget for the Marin Islands project has been increased by about \$9,000 to account for the fact that the project would be overseen by a GS-9 rather than a GS-7.

2. Alameda Terns

This project has been split into two projects: one for least terns and one for Caspian terns.

3. Exotic Spartina Control

The duration of the proposed project has been increased from a one year project to a three year project. Three years of treatment would be the minimum needed to eradicate exotic Spartina from the project area, so the duration was increased to ensure that a feasible project could be implemented.

4. Farallon Island Seabirds

This project was not included in the Public Scoping Document. It was developed in response to public comments received during the comment period on the Public Scoping Document.

5. Entry Triangle Marsh

This project has been withdrawn by the FWS because other sources of funding were found. Therefore, this version of the FWS project descriptions does

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not include this project.

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