MONTROSE SETTLEMENTS RESTORATION PROGRAM

FINAL RESTORATION PLAN

Programmatic Environmental Impact Statement / Environmental Impact Report

October 2005 • Natural Resource Trustees

National Oceanic and Atmospheric Administration

U.S. Fish and Wildlife Service

National Park Service

California Department of Fish and Game

California Department of Parks and Recreation

California State Lands Commission

NOV 8 2005

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

Dear Reviewer:

In accordance with provisions of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), we enclose for your review the Final Restoration Plan and Programmatic Environmental Impact Statement/Environmental Impact Report (FRP/FEIS/EIR) for the Montrose Settlements Restoration Program (MSRP).

From the late 1940's to the early 1970's, millions of pounds of DDTs and PCBs were discharged into the ocean near Los Angeles, California. These hazardous substances remain in the marine environment and continue to harm birds and impair fishing in the Southern California Bight. The federal and state governments held the Montrose Chemical Corporation of California and several other parties responsible, and in 2000, the final settlement was signed ending ten years of litigation. Approximately $38 million is available from these legal settlements to restore injured natural resources.

As a restoration plan, this is the primary decision document that identifies the actions the natural resource trustees for the Montrose case will take to restore injured natural resources and the services they provide. It describes how the trustees sought public input, evaluated alternatives, and selected the preferred set of restoration actions. The preparation of a restoration plan is required under federal natural resource damage assessment regulations (43 CFR Part 11) and the terms of the final consent decree for the Montrose case. As a Programmatic Environmental Impact Statement and Environmental Impact Report, this document fulfills the requirements of NEPA and CEQA through the evaluation of beneficial and adverse effects of the restoration actions on the environment.

Comments or questions on this document submitted during the agency's 30-day review period for the FRP/FEIS/EIR must be received by December 19, 2005. Written comments on the FRP/FEIS/EIR should be submitted by mail to Greg Baker, MSRP Program Manager, 501 West Ocean Blvd., Suite 4470, Long Beach, CA 90802. Comments may also be submitted by e-mail to msrp@noaa.gov, or by fax to (562) 980-4065. A copy of your comments should be submitted to me either by mail to the NOAA Strategic Planning Office (PPI/SP), SSMC3, Room 15603, 1315 East-West Highway, Silver Spring, Maryland 20910; by fax to 301-713-0585; or by e-mail to www.nepa.comments@noaa.gov.

NOAA is not required to respond to comments received as a result of the issuance of the FRP/FEIS/EIR. Comments received will be reviewed and considered for their impact on the issuance of a Record of Decision, and will be made part of our administrative record.

Sincerely,

Susan A. Kennedy
Acting NEPA Coordinator

MONTROSE SETTLEMENTS RESTORATION PROGRAM

FINAL RESTORATION PLAN AND PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT

Natural Resource Trustees:

National Oceanic and Atmospheric Administration (lead Federal agency)
U.S. Fish and Wildlife Service (cooperating agency)
National Park Service (cooperating agency)
California Department of Fish and Game (lead State of California agency)
California Department of Parks and Recreation (cooperating agency)
California State Lands Commission (cooperating agency)

October 2005

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Copies

Copies may be requested from:

Montrose Settlements Restoration Program
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(866) 795-7786

Or by e-mail at: msrp@noaa.gov

Or from the MSRP web site at: www.montroserestoration.gov

Cover:

Photograph of the Southern California coast at White Point on the Palos Verdes Peninsula. Most of the DDTs and PCBs found in the sediments off the coast of Southern California entered the environment through the wastewater outfalls several miles offshore of White Point.

Photo by David Witting.

List of Agencies, Organizations, and Individuals to Whom Copies of the Final Restoration Plan and Programmatic EIS/EIR or Notice of its Availability Have Been Sent

The Natural Resource Trustees for the Montrose case (Trustees) have assembled a contact list of approximately 1,200 agencies, organizations, and individuals for the Montrose Settlements Restoration Program (MSRP). This list includes federal, state, and local agencies; commissions and special districts; elected officials; community-based organizations; environmental, fishing, and other special interest organizations; schools, universities, and research institutions; media outlets; and individuals who have asked to be placed on the contact list. Notice of availability of this document has been distributed via U.S. mail and/or e-mail to the entire MSRP contact list. Notice has also been placed on the MSRP web site, www.montroserestoration.gov. The entire document may be obtained from this web site or may be requested from the MSRP office in Long Beach, California, in hard copy or on a compact disk (CD) readable on a personal computer. A printed summary version of the document has also been prepared and may be obtained from the web site or the MSRP Long Beach office.

Also, copies of this document have been provided to the following agencies and organizations:

Federal Agencies

U.S. Environmental Protection Agency

National Oceanic and Atmospheric Administration

U.S. Fish and Wildlife Service

National Park Service

U.S. Department of the Navy

U.S. Army Corps of Engineers

California State Agencies

Governor's Office of Planning and Research

Department of Fish and Game

Department of Parks and Recreation

State Lands Commission

Department of Boating and Waterways

Coastal Commission

Coastal Conservancy

Office of Historic Preservation

Department of Water Resources

State Water Resources Control Board

Native American Heritage Commission

Other Agencies

Secretary of the Environment and Natural Resources (SEMARNAT), Mexico

Los Angeles County Sanitation Districts

Santa Monica Bay Restoration Commission

Port of Los Angeles

Port of Long Beach

Organizations

Institute for Wildlife Studies

Catalina Island Conservancy

Island Conservation

Heal the Bay

Predatory Bird Research Group

Pacific Seabird Group

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μg/g	micrograms per gram
ACC	Avian Conservation Center
ATTC	American Trader Trustee Council
C	Centigrade
CAA	Clean Air Act
CARB	State of California Air Resources Board
CBO	community-based organization
CDFG	California Department of Fish and Game
CDPR	California Department of Parks and Recreation
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CFR	Code of Federal Regulations
cm	centimetres
CMS	Center for Marine Studies
CO	carbon monoxide
Commission	California Coastal Commission
CONANP	National Commission of National Protected Areas (Mexico)
CSLC	California State Lands Commission
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dBA	decibels
DDD	dichloro-2,2-bis (p-chlorophenyl) ethane
DDE	dichloro-diphenyl-dichloroethylene
DDT	dichloro-diphenyl-trichloroethane
DDTs	total DDT, or the sum of DDT, DDD, and DDE isomers
DO	Dissolved oxygen
DTSC	California Department of Toxic Substances Control
EA	Environmental Assessment
EE/CA	engineering evaluation and cost analysis
EFH	essential fish habitat
EIR	Environmental Impact Report

EIS	Environmental Impact Statement
ENSO	El Niño Southern Oscillation
EO	executive order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FAD	Fish Aggregation Device
FCEC	Fish Contamination Education Collaborative
FDA	Food and Drug Administration
GC	General Counsel
GIS	Geographic Information System
IC	institutional control
INRMP	Integrated Natural Resources Management Plan
IWS	Institute for Wildlife Studies
JWPCP	Joint Water Pollution Control Plant (LACSD)
kg	kilogram
km	kilometre
km^2	square kilometres
LACSD	Los Angeles County Sanitation Districts
LGEEPA	General Law of Ecological Balance and Environmental Protection (Mexico)
LNG	liquefied natural gas
m	meter
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
mi^2	square miles
MLLW	mean lower low water
MLPA	Marine Life Protection Act
MMCC	Marine Mammal Care Center
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
Montrose	Montrose Chemical Corporation
MPA	Marine Protected Area

MRFSS	Marine Recreational Fishing Statistical Survey
MSRP	Montrose Settlements Restoration Program
NAAQS	national ambient air quality standards
NCI	Northern Channel Islands
NEPA	National Environmental Policy Act
NMSA	National Marine Sanctuaries Act
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Marine Fisheries Service
NPS	National Park Service
NRDA	Natural Resource Damage Assessment
O_3	ozone
OEHHA	California Office of Environmental Health Hazard Assessment
PAH	polynuclear aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PISCO	Partnership for Interdisciplinary Study of Coastal Oceans
PM_{10}	particulate matter equal to or less than 10 microns in size
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in size
POLA	Port of Los Angeles
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
PROFEPA	Federal Environmental Protection Agency (Mexico)
PRP	potentially responsible party
PSRPA	Park System Resource Protections Act
PVPLC	Palos Verdes Peninsula Land Conservancy
RecFIN	Pacific Recreational Fisheries Information Network
Record	Administrative Record
ROV	remotely operated vehicle
SCB	Southern California Bight
SCWI	Southern California Watershed Inventory
SEMARNAT	Secretary of the Environment and National Resources (Mexico)

SO_2	sulfur dioxide
SONGS	San Onofre Nuclear Generating Station
Trustees	Natural Resource Trustees for the Montrose case
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRP	Southern California Wetlands Recovery Project

INTRODUCTION

From the late 1940s to the early 1970s, millions of pounds of DDTs and PCBs were discharged from industrial sources through a wastewater outfall into the ocean at White Point, near Los Angeles. These discharges resulted in widespread impacts on the natural and human environment. The contaminants, chemical mixtures banned in the United States today but manufactured in the past for pesticides and industrial purposes, contributed to severe declines in the populations of several species of birds, including the extirpation of bald eagles and peregrine falcons from the Channel Islands. The high levels of DDTs and PCBs in certain species of fish also led the State of California to issue consumption advisories, impose bag limits, and enact a commercial catch ban on certain types of fish. Although the releases were largely brought under control in the 1970s, these chemicals still contaminate the marine environment (sediments, water, and biota) of the Southern California Bight (SCB) (Figure ES-1).

Facts About DDTs and PCBs

DDT (Dichlorodiphenyltrichloroethane)

- DDTs include DDT and breakdown products (such as DDD, DDE, DDMU)
- Used in pesticides (insecticide)
- Manufactured at the Montrose chemical plant, Torrance, CA (1947–1982)
- DDT use banned in the U.S. (1972)

PCB (Polychlorinated biphenyl)

- PCBs are a group of 209 related chemicals
- Used for electrical transformer cooling fluids, hydraulic fluid in the paper industry, antifouling paints, manufacturing processes (electrical, glass)
- Widely used in industry
- Banned from manufacturing (1977)

Sources of DDTs and PCBs to ocean:

- Discharge through Joint Water Pollution Control Plant (JWPCP) ocean outfalls
- Ocean dumping of wastes
- Runoff and storm drain discharge
- Aerial transport

In 1990, the federal government and the State of California initiated legal action against the Montrose Chemical Corporation (Montrose) and the other polluters responsible for the discharges of DDTs and PCBs.[1] In December 2000 the final settlement was signed, ending ten years of litigation. Under the terms of four separate settlement agreements, Montrose and the other defendants agreed to pay $140.2 million plus interest to the federal and state governments. Of this amount, the U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control (DTSC) received $66.25 million, the Natural Resource Trustees for the Montrose case (Trustees)[2] received $63.95 million, and $10 million of "swing money" was earmarked for EPA response actions, though the swing money may instead go to natural resource restoration, depending on the outcome of the EPA's ongoing remedial investigation.

[1] The other defendants were Aventis CropScience USA, Inc. (formerly Rhone-Poulenc, Inc., and corporate successor to Stauffer Chemical Company); Chris-Craft Industries, Inc.; Atkemix Thirty-Seven, Inc.; CBS Corporation (formerly Westinghouse Electric Corp.); Potlach Corporation; Simpson Paper Company; and County Sanitation District No. 2 of Los Angeles County (LACSD) and 150+ local government entities.

[2] The Natural Resource Trustees are charged with protecting, managing, and restoring natural resources that are held in trust for current and future generations. For the Montrose case, the Trustees include the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, the National Park Service, the California Department of Fish and Game, the California Department of Parks and Recreation, and the California State Lands Commission.

Figure ES-1. Geographic extent of the Southern California Bight.

The EPA and DTSC are using the recovery funds to address the contaminated offshore sediments as well as for public outreach, education, monitoring, and enforcement actions aimed at reducing human exposure to contaminated fish. The Trustees have used $35 million to reimburse past damage assessment costs and are using the remainder plus accumulated interest (approximately $38 million to date) for natural resource restoration.

In 2001, the Trustees created the Montrose Settlements Restoration Program (MSRP) as a multi-agency effort to manage the work of restoring the injured resources. Through the MSRP, the Trustees initiated a broad restoration planning effort, which included soliciting and evaluating potential restoration ideas. During the planning period, the Trustees also initiated certain studies in support of resource restoration, including a feasibility study on the reestablishment of bald eagles on the Northern Channel Islands, a comprehensive survey of fish contamination, and a survey of angler fishing practices and preferences.

As required by Superfund law, the Trustees must use the settlement monies to restore the natural resources that were harmed by the chemicals at issue in this case and must prepare a restoration plan subject to public review. The MSRP Restoration Plan and Programmatic Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) is a comprehensive document detailing the characteristics of the affected region, the restoration planning process, and the restoration alternatives, including the Trustees' Preferred Alternative. As an EIS/EIR, the document also addresses National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) requirements for environmental review for certain projects.

RESTORATION GOALS AND OBJECTIVES

The overall goals of the MSRP are to:

- Restore, replace, rehabilitate, or acquire the equivalent of the injured natural resources and the services those resources provide; and
- Compensate for the interim lost services of the injured natural resources while those resources are recovering.

The final consent decree for the Montrose case states: "The Trustees will use the damages for restoration of injured natural resources, including bald eagles, peregrine falcons and other marine birds, fish and the habitats upon which they depend, as well as providing for implementation of restoration projects intended to compensate the public for lost use of natural resources" (page 5, lines 18–22). The restoration objectives for the MSRP (i.e., the specific targets or milestones that help accomplish the overall goals) have been formulated with this consent decree provision in mind and with consideration of the input from the public during restoration planning workshops. The MSRP restoration objectives are to:

- Restore fishing services within the SCB;
- Restore fish and the habitats on which they depend within the SCB;
- Restore bald eagles within the SCB;
- Restore peregrine falcons within the SCB; and
- Restore seabirds within the SCB.

Of the two fish-related objectives, one addresses human use (restoring anglers' ability to catch fish that are low in contamination) and the other aims for ecological results. When the Trustees initially sorted and categorized the many restoration ideas they had compiled, they often found that little practical distinction existed between projects benefiting fish and fish habitat and projects benefiting fishing as a human use. Therefore, for the purpose of evaluating restoration ideas in categories, these two fish-related objectives have been combined into a single broad category labeled "fishing and fish habitat." Thus, the evaluation of restoration actions is organized into four categories (fishing and fish habitat, bald eagles, peregrine falcons, and seabirds) that encompass the five restoration objectives listed above.

RESTORATION IDEAS

The Trustees began collecting and compiling potential restoration ideas even before the legal case was settled in 2000. The early list of ideas was expanded through a public scoping process in 2002 and 2003. This process included further consultation with scientific experts with specialized knowledge about the injured resources as well as a series of public workshops to encourage public participation (see Section 1.4). The initial broad list of potential restoration ideas that the Trustees gathered was then evaluated in a two-step process.

Tier 1 Evaluation

The initial list of project ideas was screened and consolidated in a Tier 1 evaluation, using the following criteria: nexus, feasibility, resource benefits, and ecosystem benefits. A detailed description of the Tier 1 process, including descriptions of the criteria and a list of those restoration ideas that did not receive further consideration after the Tier 1 evaluation, is included in Section 5 of this document.

The Tier 1 evaluation resulted in a list of the 17 most promising potential restoration actions. Some of these actions are fully developed, specific projects for which this EIS/EIR constitutes final environmental impact assessment under NEPA and CEQA. However, other actions are still conceptual approaches that would require further development and environmental review prior to initiation.

In addition to actions that directly and actively restore the specific injured resources and lost services of the Montrose case, the Trustees received several suggestions from the public that some of the restoration funds be used for more general public outreach and education. Other suggestions were received for further research studies to better understand the injuries and potential restoration approaches (data gap studies). The Trustees did not evaluate the outreach and education ideas gathered against specific actions that restore fishing and fish habitat, bald eagles, peregrine falcons, and seabirds. However, certain outreach concepts identified through this process have been incorporated into one of the fish restoration ideas ("provide public information to restore lost fishing services"). As the MSRP outreach program proceeds, other outreach and data gap ideas will receive consideration as planning and decision-making proceed and specific outreach and data needs become apparent.

Tier 2 Evaluation

In the Tier 2 evaluation, the 17 potential restoration actions were analyzed in greater detail. The Trustees expanded on the criteria used in the Tier 1 evaluation by including consideration of environmental acceptability and cost. The Tier 2 evaluation is also summarized in Section 5, and the full evaluations of the actions are presented in their entirety in Appendices A–D. Section 7 includes analyses and discussions to address the requirements of NEPA and CEQA at the action-specific level.

RESTORATION FUNDING ALLOCATION AND PHASING

One important consideration in this Restoration Plan is how available funds should be distributed between the different natural resources and services identified for restoration in the final Montrose consent decree, which did not specify how the restoration funds should be allocated. When the final consent decree for the case was signed in 2000, the settlements provided a principal amount of approximately $30 million for natural resource restoration. As of summer 2004, interest had increased the amounts within these accounts to an estimated $38 million. The ongoing restoration program operating costs are comparable to the interest currently accruing. The final legal settlements also provided the potential that additional settlement funds currently earmarked for EPA response actions (i.e., the swing money, which is $10 million plus interest) may instead go to natural resource restoration, depending on the outcome of the EPA's ongoing remedial investigation.

Taking these factors into consideration, along with the uncertain outcomes of the ongoing data gap studies, the Trustees will commit $25 million during the first 5 years (Phase 1) of restoration implementation under this Restoration Plan. At the 5-year point, several uncertainties should be resolved, including the outcome of the Northern Channel Islands Bald Eagle Feasibility Study and the EPA's site remediation decision. The Trustees will then assess their progress and allocate the remaining restoration funds.

The Trustees propose to allocate the $25 million for Phase 1 among the four restoration categories: fishing and fish habitat, bald eagles, peregrine falcons, and seabirds. Considering the likely costs of the actions and various uncertainties, the Trustees propose to allocate the initial $25 million on an approximately equal basis between fishing/fish habitat restoration and bird restoration as follows:

- $12 million for fishing and fish habitat restoration actions
- $13 million for bald eagle, peregrine falcon, and seabird restoration actions

This overall commitment ($25 million for the first 5 years) and its allocation are built into the restoration alternatives discussed below.

RESTORATION ALTERNATIVES

NEPA, CEQA, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) require consideration of a range of possible restoration alternatives, including a natural recovery alternative with minimal management actions (i.e., a No Action Alternative). The 17 potential actions evaluated in Tier 2 represent a range of individual injury-specific restoration options. In addition to evaluating the actions individually, the Trustees have considered ways that these actions can be combined to build a comprehensive Restoration Plan. The Trustees present three such alternatives below and in Section 6.2 of this plan: Alternative 1 (No Action Alternative), Alternative 2 (Preferred Alternative), and Alternative 3 (see Figure ES-2).

Alternative 1 (No Action)

For the purposes of this plan, this alternative assumes that the Trustees would not intervene to restore injured natural resources or compensate for lost services for any of the affected resources of the Montrose case. Instead, the Trustees would rely on natural processes for the gradual recovery of the injured natural resources and would only take the limited action of monitoring natural recovery.

Although natural recovery may eventually occur for many of the injured resources, it may take a significantly longer time than would recovery under an active restoration scenario; also, the interim losses of natural resource services would not be compensated. Certain events, such as the extirpation of bald eagles and the introduction of exotic species on the Channel Islands, have led to consequences that may not be addressed under a natural recovery alternative. Because feasible restoration actions have been identified that would address the injuries and lost services of the case, the Trustees found that this alternative, as an overall approach across all resource categories, does not fulfill the goals of the MSRP. However, this determination does not preclude selection of natural recovery as an option for specific resources (e.g., peregrine falcons) within the overall framework of a comprehensive restoration alternative.

Alternative 2 (Preferred)

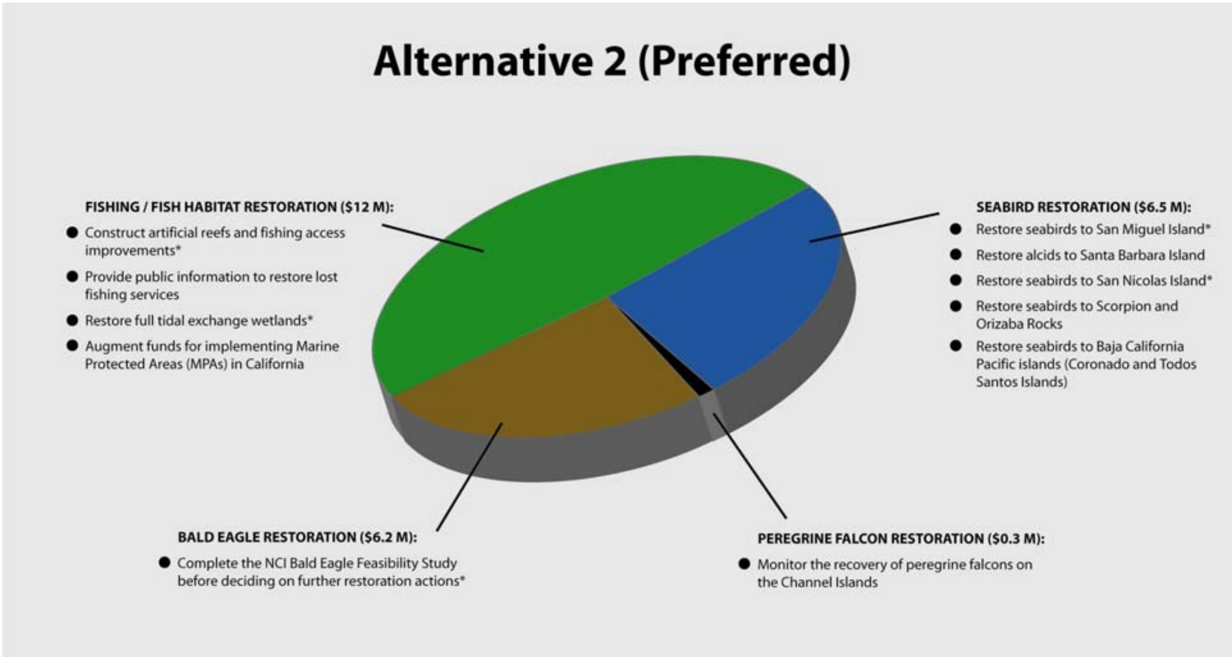
Based on the detailed evaluations performed in Tier 2 (see Appendices A–D), the Trustees have determined that the following subset of actions would most effectively address the continuing injuries and lost services of the Montrose case and compensate for past injuries. These actions, which constitute the Trustees' preferred alternative (Figure ES-2, top panel) include projects to restore fishing and fish habitat, bald eagles, and seabirds in the Southern California Bight, and a project to monitor the recovery of peregrine falcons in the Channel Islands. These actions will address all of the resource categories, their total cost falls within the limits of the funding allocated for Phase 1 of restoration implementation, and the actions encompassed by this alternative are distributed throughout the Southern California Bight (Figure ES-3).

The following sections describe how the restoration actions in Alternative 2 address the restoration objectives.

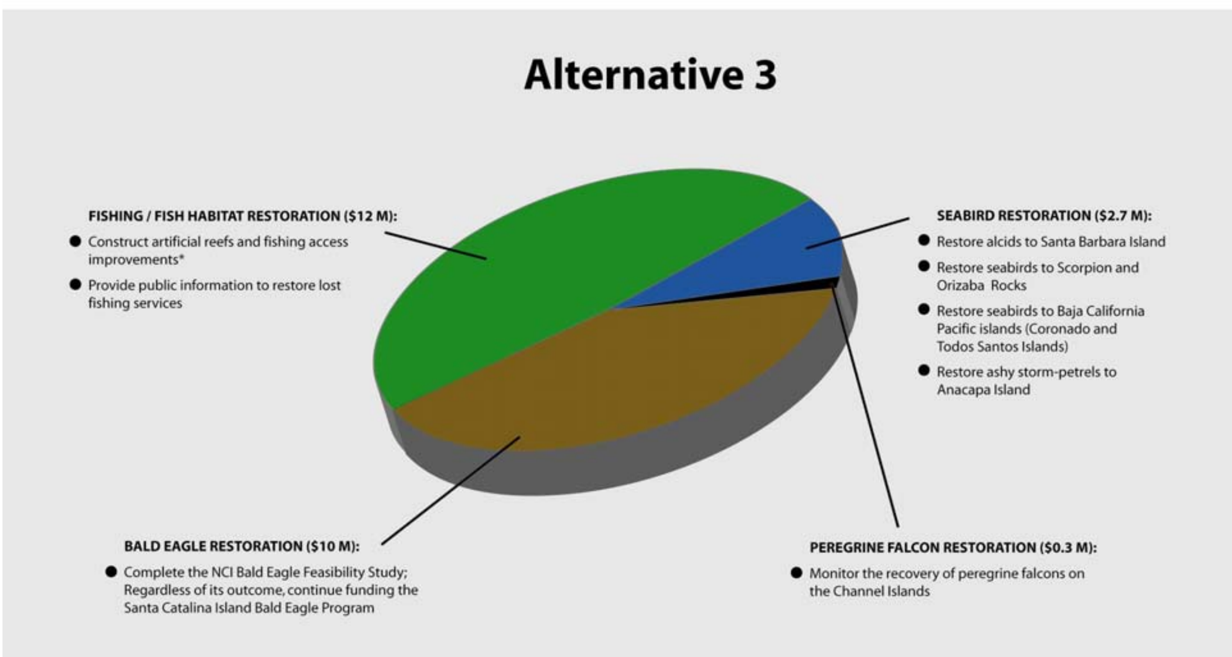
Fishing and Fish Habitat

Alternative 2 provides for a diverse set of actions that address both the restoration of human uses (fishing services) and the restoration of fish and the habitats on which they depend. The fishing and fish habitat actions for this alternative include:

Construct artificial reefs and fishing access improvements. This action funds the construction of reefs to displace the more highly contaminated fish that occupy existing soft-bottom habitats by recruiting and/or producing reef- and water-column-feeding fish that are lower in DDTs and PCBs. This action also provides facility improvements to promote the use of the enhanced fishing sites, to heighten awareness of how habitat affects the concentration of contaminants in different species of fish, and to provide compensatory restoration for past losses in fishing opportunities due to the limitations imposed by fish consumption advisories. This action would effectively address both fishing and fish habitat restoration close to the areas affected by the contaminants of the case.



* These actions require further detailed development and subsequent NEPA and/or CEQA analysis prior to implementation.



* These actions require further detailed development and subsequent NEPA and/or CEQA analysis prior to implementation.

Figure ES-2. Actions and fund allocations in Alternative 2 (Preferred) and Alternative 3.

Figure ES-2 BACK

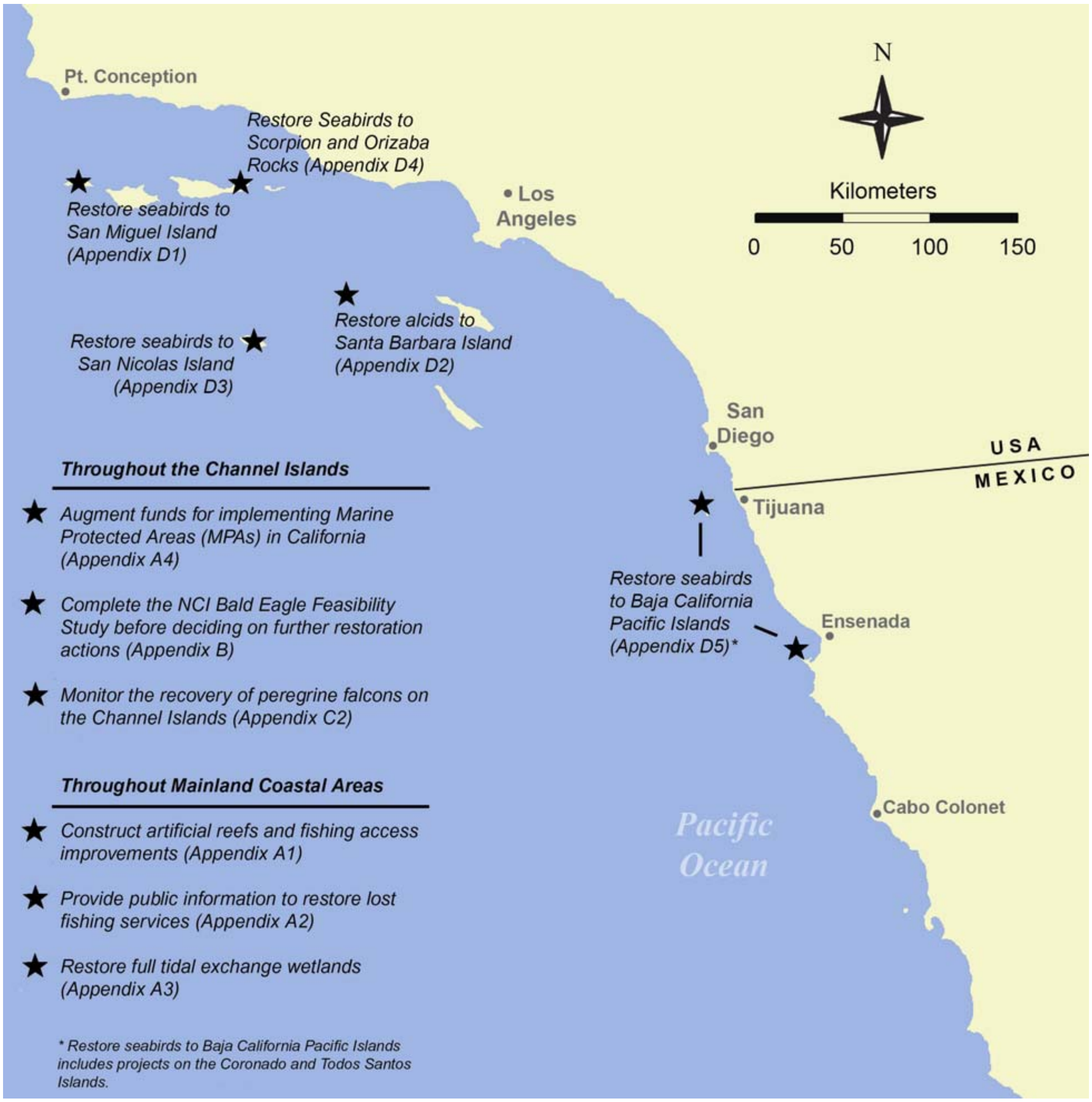


Figure ES-3. Geographic locations of actions included in Alternative 2 (preferred).

- **Provide public information to restore lost fishing services.** This action builds on the public outreach and education work initiated by the EPA through the establishment of the Fish Contamination and Education Collaborative (FCEC). FCEC is a federal, state, and local partnership project that addresses public exposure to contaminated fish in the Southern California coastal area. The FCEC focuses on educating the public about the human health hazards associated with DDT and PCB contamination in fish. In particular, the FCEC program provides information to help people reduce their exposures to DDTs and PCBs from the fish they eat.

  The Trustees will expand this ongoing effort will be to increase fishing services by providing information to anglers that allows them to make sound decisions about where and for which species to fish. The Trustees will also provide outreach materials that establish the link between the ecology and life history of a particular species, and its tendency to bioaccumulate contaminants. This information will enable people to make knowledgeable choices about where, when, and for which species to fish and in doing so will minimize anglers' exposure to contaminants, regardless of where they fish.

- **Restore full tidal exchange wetlands.** This action seeks out opportunities to contribute funding toward ongoing or planned larger-scale wetland restoration efforts in the Southern California Bight. In particular, restoration projects that involve coastal wetland/estuarine habitats that have direct tidal links to the ocean and serve as nursery habitats for fish, especially species that are targeted by ocean anglers (e.g., California halibut) will be given highest priority.

- **Augment funds for implementing Marine Protected Areas in California.** This action supplements existing management and monitoring activities within the recently created Channel Islands Marine Protected Areas (MPAs).This action provides specific benefits to fish habitats adjacent to the Northern Channel Islands, but this action will also provide longer-term benefits for fishing and fish habitats throughout California by helping to generate sound empirical underpinnings for the siting and design of future networks of MPAs.

Bald Eagles

Efforts to reintroduce bald eagles to Santa Catalina Island, one of the Southern Channel Islands, began in the 1980s; however, even today bald eagles on Santa Catalina Island have high concentrations of DDTs from their diet, produce abnormal eggs, and require continued human intervention (manipulation of eggs and fostering of chicks into their nests) to sustain their presence on the island. Assessments indicate that this situation is likely to persist on Santa Catalina Island for the foreseeable future. The Northern Channel Islands (NCI) Feasibility Study currently under way seeks to determine whether the bald eagles reintroduced onto the Northern Channel Islands (and therefore further from the Montrose contamination source) can be self-sustaining (i.e., reproduce without human intervention). Alternative 2 thus provides for the following:

- **Complete the NCI Bald Eagle Feasibility Study Before Deciding on Further Restoration Actions.** The Trustees will defer making longer-term decisions on bald eagle restoration until the results of the NCI Bald Eagle Feasibility Study are known (in or around 2008). In light of the continuing high levels of contamination in bald eagles on Santa Catalina Island, continued funding of the Santa Catalina Island Bald Eagle Program over the near term is unlikely to achieve the goal of long-term restoration of bald eagles to the Channel Islands. Thus, during the interim period until the NCI Bald Eagle Feasibility Study is completed, the Trustees have chosen to focus restoration efforts on the Northern Channel Islands, which continue to hold the potential for long-term restoration, and discontinue funding of the Santa Catalina Island Bald Eagle Program. Even without continued Trustee funding for the current Santa Catalina Island Bald Eagle Program, it is highly likely that bald eagles will remain on Santa Catalina Island for several years despite their inability to hatch offspring naturally. When the results of the NCI Bald Eagle Feasibility Study become available, the Trustees will re-evaluate all potential options for bald eagle restoration, including measures that may be taken even if bald eagles are not able to reproduce on their own anywhere in the Channel Islands. The Trustees will then release a subsequent NEPA/CEQA document for public review and input once the results of the NCI Bald Eagle Feasibility Study are known. The remaining bald eagle restoration funds could then be used on any of the Channel Islands. This action conserves limited restoration funds until sufficient information is known on the ability of the environments on the different Channel Islands to support bald eagles.

Peregrine Falcons

Given that previous peregrine falcon recovery efforts have been successful and that the number of breeding pairs is increasing on the Channel Islands, Alternative 2 provides for the following:

- **Monitor the recovery of peregrine falcons on the Channel Islands.** This action monitors recovering peregrine falcon populations on the Channel Islands through periodic surveys and contaminant analysis.

The Trustees also recognize that peregrine falcons will benefit from seabird restoration actions, as an increase in the numbers of seabirds increases the availability of the preferred prey of peregrine falcons.

Seabirds

Alternative 2 incorporates a diverse set of actions that provide for significant benefits to several species of seabirds. Evidence indicates that the seabird species benefiting from these actions are known to have been injured by DDTs or had elevated levels of DDTs in their eggs. The Trustees have selected those seabird restoration actions that they consider to provide the greatest restoration benefits within the limits of funding. The seabird actions for Alternative 2 include:

- **Restore seabirds to San Miguel Island.** This action enhances seabird nesting habitat on San Miguel Island in the Channel Islands National Park by eradicating the introduced black rat over a period of approximately 5 years.
- **Restore alcids to Santa Barbara Island.** This action re-establishes a once-active Cassin's auklet breeding population and augments Xantus's murrelets on Santa Barbara Island in the Channel Islands National Park through social attraction and habitat enhancement.
- **Restore seabirds to San Nicolas Island.** This action restores the western gull and Brandt's cormorant colonies on the U.S. Navy–owned San Nicolas Island by eradicating feral cats on the island.
- **Restore seabirds to Scorpion and Orizaba Rocks.** This action restores seabird habitat off of Santa Cruz Island, within the Channel Islands National Park, through the removal of non-

native vegetation, the installation of artificial nesting boxes, and reduction in human disturbance.

- **Restore seabirds to Baja California Pacific Islands (Coronado and Todos Santos Islands).** This action restores seabird populations using social attraction, habitat enhancement, and human disturbance reduction**.**

Having considered the restoration goals and objectives, the current state of recovery of resources, and the continuing presence of contamination, the Trustees believe that Alternative 2 represents an optimal distribution of funding for natural resource restoration across the demonstrated injury types for the purposes of both primary and compensatory restoration.

Alternative 3

The Trustees developed Alternative 3 through a reconsideration of some of the restoration priorities of the program (Figure ES-2, bottom panel). In this alternative, a greater level of effort is devoted to restoration of continuing injuries and lost services (primary restoration), and consequently the set of actions proposed is less diverse than in Alternative 2 (the Preferred Alternative). Alternative 3 provides for the maintenance of breeding bald eagles in the Channel Islands regardless of the outcome of the NCI Bald Eagle Feasibility Study. Thus, Alternative 3 reserves a greater level of funding for bald eagle restoration to sustain the Santa Catalina Island birds until, and potentially long after, the conclusion of the NCI Bald Eagle Feasibility Study. The funds available for seabird restoration are commensurately reduced.

Alternative 3 also recognizes the continuing human use impacts of fish contamination and state consumption advisories for several commonly caught species of fish and gives restoration of lost fishing services greater emphasis. Actions that benefit fish habitat but do not have as clear and measurable a benefit to anglers are not included.

SUMMARY

Table ES-1 lists the 17 potential restoration actions that received detailed evaluation and indicates how they are assembled into the two comprehensive alternatives and the no action alternative for this Restoration Plan and programmatic EIS/EIR. Both Alternative 2 and Alternative 3 allocate $25 million in restoration funding to cover data gap studies and the initial 5 years of restoration implementation. Alternative 2 distributes funding across a wide range of actions that are both primary and compensatory in nature. Alternative 3 focuses greater effort on primary restoration by (1) targeting the human use (fishing) benefits of fish restoration and (2) reserving greater funding for long-term intervention to maintain bald eagles on the Channel Islands despite continuing reproductive injuries. By reserving greater funding for bald eagles, Alternative 3 reduces the funds available for seabird actions. The Trustees' preferred alternative is Alternative 2.

Table ES-1
Comparison of Restoration Alternatives

Potential Restoration Actions	Alternative 1 (No Action)	Alternative 2 (Preferred)*	Alternative 3*
Fishing and Fish Habitat Restoration		$12 million	$12 million
Construct artificial reefs and fishing access improvements		•	•
Provide public information to restore lost fishing services		•	•
Restore full tidal exchange wetlands		•	
Augment funds for implementing Marine Protected Areas in California		•	
Bald Eagle Restoration		$6.2 million	$10 million
Complete the NCI Bald Eagle Feasibility Study before deciding on further restoration actions.		•	
Complete the NCI Bald Eagle Feasibility Study; Regardless of its outcome, continue funding Santa Catalina Island Bald Eagle Program			•
Peregrine Falcon Restoration		$0.3 million	$0.3 million
Restore peregrine falcons to the Channel Islands			
Monitor the recovery of peregrine falcons on the Channel Islands		•	•
Restore peregrine falcons to the Baja California Pacific Islands			
Seabird Restoration		$6.5 million	$2.7 million
Restore seabirds to San Miguel Island		•	
Restore alcids to Santa Barbara Island		•	•
Restore seabirds to San Nicolas Island		•	
Restore seabirds to Scorpion and Orizaba Rocks		•	•
Restore seabirds to Baja California Pacific Islands • *Coronado and Todos Santos Islands* • *Guadalupe Island* • *San Jeronimo and San Martin Islands* • *San Benitos Islands* • *Asuncion and San Roque Islands* • *Natividad Island*		• *(Coronado and Todos Santos Islands)*	• *(Coronado and Todos Santos Islands)*
Create/enhance/protect California brown pelican roost habitat			
Implement entanglement reduction and outreach program to protect seabird populations			
Restore ashy storm-petrels to Anacapa Island			

*The budgets shown in this table reflect the total amount of funding allocated for each resource category, including the funds already expended for fish contamination and angler surveys, bald eagle work on Santa Catalina Island and the Northern Channel Islands, and a peregrine falcon survey, as described in more detail in Section 4.2.1 and Appendices A, B, and C.

ENVIRONMENTAL CONSEQUENCES

The NEPA and CEQA analyses of the environmental consequences of the Montrose Settlements Restoration Program and the restoration alternatives are presented in Section 7. Expanded discussions of the individual actions are provided in Appendices A–D. The environmental effects of the MSRP will be largely beneficial given its fundamental purpose; however, final analysis of all issues cannot be completed, given that certain actions, such as the construction of artificial reefs, are only developed to a conceptual level at this stage. The Trustees have identified seven of the 17 actions evaluated in Tier 2 that will need further development and subsequent NEPA and/or CEQA analyses prior to implementation. These actions are:

- Construct artificial reefs and fishing access improvements
- Restore full tidal exchange wetlands
- Complete the NCI Bald Eagle Feasibility Study Before Deciding on Further Restoration Actions
- Restore peregrine falcons to the Channel Islands
- Restore seabirds to San Miguel Island
- Restore seabirds to San Nicolas Island
- Create/enhance/protect California brown pelican roost habitat

PUBLIC INVOLVEMENT

The NEPA, CEQA, and CERCLA requirements that guide the restoration planning process require significant public involvement to support and direct the planning process. Public involvement for the MSRP Restoration Plan and Programmatic EIS/EIR was initiated through a scoping document released on August 24, 2001, which included notices of public meetings to discuss restoration planning. The document was disseminated to approximately 500 recipients, including individuals, organizations, and government agencies, and was posted to the program Web site. The Trustees also advertised the upcoming public meetings in local and area newspapers. The scoping document was followed by the publication of a Federal Register notice on October 9, 2001. The official public scoping period extended from October 9, 2001, to November 24, 2001.

In addition to the notice published in the Federal Register, the Trustees published a Notice of Preparation in the California State Clearinghouse on March 15, 2002. This established a second 30-day comment period, which extended from March 15, 2002, to April 15, 2002.

Since the close of the official scoping period, the Trustees have maintained open channels of communication with the public, other organizations, and government agencies. As planning progressed, the Trustees initiated a second round of technical and public workshops to encourage roundtable review of the draft restoration program goals and objectives as well as the screening criteria and to solicit restoration project ideas. These workshops were followed by a March 17, 2003, public announcement further soliciting restoration ideas that was disseminated to the mailing list.

The Trustees then released the draft MSRP Restoration Plan and programmatic EIS/EIR for a 45-day comment period from April 8, 2005, to May 23, 2005. During this time, a series of public meetings were held in affected locations to accept comments on the draft document. The Trustees received many comments spanning all aspects of the draft Restoration Plan. These comments served to enhance the final version. A full copy of the written comments as well as transcripts from the public meetings and transcripts from telephone comments has been included in the MSRP Administrative Record and is available online at www.montroserestoration.gov. The Trustees' responses to comments are included in Section 9 of this plan.

The public is encouraged to follow the MSRP planning and implementation process by accessing the program web site at **www.montroserestoration.gov** or by contacting program staff at:

Montrose Settlements Restoration Program
501 W. Ocean Blvd, Suite 4470
Long Beach, CA 90802
(562) 980-3236
msrp@noaa.gov

1.1 PROPOSED ACTION: IMPLEMENT PROJECTS THAT RESTORE NATURAL RESOURCES INJURED AND SERVICES LOST DUE TO DDTS AND PCBS DISCHARGED TO COASTAL WATERS OF SOUTHERN CALIFORNIA

For more than five decades, DDTs and PCBs have contaminated the Southern California marine environment. Although the major point source discharges of these chemicals were curtailed in the 1970s, large amounts of DDTs and PCBs persist in ocean water and sediments, and certain fish, birds, and other wildlife continue to accumulate DDTs and PCBs in harmful amounts. The state and federal governments investigated these problems and in 1990 filed an action in U.S. District Court against several of the parties responsible for the discharges of DDTs and PCBs.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or "Superfund," Title 42 United States Code [U.S.C.] Section 9601 et seq.) provides a mechanism for addressing the nation's hazardous waste sites: states and the federal government may sue polluters for the cleanup and restoration of sites. CERCLA provides for the designation of "natural resource trustees," who are federal, state, or tribal authorities who represent the public interest in natural resources. These trustees may seek monetary damages from polluters for injury, destruction, or loss of natural resources resulting from releases of hazardous substances. These damages, which are distinct from cleanup costs, must be used by the natural resource trustees to "restore, replace, rehabilitate, or acquire the equivalent of" the natural resources that have been injured.

At the end of October 2000, after ten years of litigation, the federal and state governments and the remaining defendants signed the last of a series of settlements. The court approved the final settlement in March 2001. Under the terms of the four separate settlement agreements, Montrose Chemical Corporation and the other defendants[1] agreed to pay $140.2 million plus interest to the federal and state governments. Of this amount, the U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control (DTSC) received a total of $66.25 million; the Natural Resource Trustees for the Montrose case (Trustees)[2] received $63.95 million; and $10 million was set aside in a special account (swing money).[3] The EPA and DTSC are using their recovery funds to address the contaminated sediments offshore and for institutional controls. The Trustees have used $35 million to reimburse past damage assessment costs and are using the remainder plus the accumulated interest to plan and implement the actions necessary to restore the natural resources and their services[4] that were injured by the DDTs and PCBs. Further discussion regarding the current balances and the proposed allocation of restoration funds can be found in Section 6.3.2.

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[1] The other defendants were Aventis CropScience USA, Inc. (formerly Rhone-Poulenc, Inc., and corporate successor to Stauffer Chemical Company); Chris-Craft Industries, Inc.; Atkemix Thirty-Seven, Inc.; CBS Corporation (formerly Westinghouse Electric Corp.); Potlatch Corporation; Simpson Paper Company; and County Sanitation District No. 2 of Los Angeles County, and 150+ local governmental entities.

[2] The Trustees for the Montrose case are the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, the National Park Service, the California Department of Fish and Game, the California Department of Parks and Recreation, and the California State Lands Commission.

[3] The swing money goes to the Natural Resource Trustees in the event that EPA makes a decision not to select any in situ response or remedial action for the Palos Verdes Shelf.

[4] The "services" that a natural resource provides are the functions performed by a natural resource for the benefit of another natural resource and/or the public.

Once the case was settled, the Trustees established the Montrose Settlements Restoration Program (MSRP) to plan and conduct the natural resource restoration work called for under the settlement agreements. To satisfy the requirements of the National Environmental Policy Act (NEPA) (42 U.S.C. Section 4321 et seq.) and the California Environmental Quality Act (CEQA) (Public Resources Code Parts 21000–21178.1), the Trustees are combining the restoration planning process provided for under CERCLA with the development of a programmatic Environmental Impact Statement (EIS) and an Environmental Impact Report (EIR).

This document is the Restoration Plan and programmatic EIS/EIR for the Montrose Settlements Restoration Program. The Restoration Plan has incorporated public and professional opinion to develop, evaluate, and select specific actions to restore injured resources and the lost services that the natural resources provide. Some actions will be initiated in the near-term. Other actions have been selected conditionally, because they must await the outcome of further study, testing, and public review prior to final selection and implementation. Thus the Restoration Plan has a range of selected restoration actions that together will form the basis of a comprehensive plan to restore the natural resources and services affected by the DDTs and PCBs at issue in this case.

This document will guide the MSRP restoration effort as a whole, as well as the specific restoration actions selected for near-term implementation. Thus, this Restoration Plan establishes a process for adaptive decision-making, and future NEPA and CEQA documentation will incorporate by reference (or in the terminology of NEPA “tier off of”) this programmatic EIS/EIR.

1.2 NEED FOR THE ACTION: DDT AND PCB CONTAMINATION AND NATURAL RESOURCE INJURIES IN THE SOUTHERN CALIFORNIA BIGHT

From the late 1940s to the early 1970s, Los Angeles area industries discharged approximately 2,000 metric tons (about 2,200 U.S. tons) of DDTs and PCBs into the ocean waters off the Southern California coast. Almost all of the DDTs released to the Southern California marine environment originated from the Montrose Chemical Corporation (Montrose) manufacturing plant in Torrance, California. The Montrose plant discharged waste into the Los Angeles County Sanitation Districts (LACSD) sewer collection system. Wastewater treatment methods employed at that time did not capture the DDTs prior to their discharge through ocean outfall pipes that empty into the Pacific Ocean off of White Point on the Palos Verdes Shelf. Montrose also dumped DDT-contaminated waste from barges into deep ocean waters in the San Pedro Basin near and possibly en route to Santa Catalina Island. In addition, large quantities of PCBs from numerous sources throughout the Los Angeles Basin were released into ocean waters through the LACSD and City of Los Angeles wastewater outfalls and the regional storm drain systems. Although DDTs were also released into the Southern California Bight through agricultural runoff and atmospheric deposition, these sources were found to be insignificant in comparison to the Montrose discharges.

In 1992 and 1993, surveys by the U.S. Geological Survey (Lee et al. 2002) found that more than 100 metric tons (110 U.S. tons) of DDTs and 10 metric tons (11 U.S. tons) of PCBs still remained in the sediments on the ocean bottom of the Palos Verdes Shelf. The highest concentrations of DDTs and PCBs were centered near the ends of the White Point outfalls, ranging between water depths of 40 to 80 meters (130 to 260 feet). Surveys conducted as part of the Southern California Bight 1994 Pilot Project (Schiff and Gossett 1998) showed that elevated concentrations of DDTs and PCBs in bottom sediments extended beyond the Palos Verdes Shelf into Santa Monica Bay and were also present in Los Angeles and Long Beach Harbors. The discharge and fate of these chemicals in the Southern California Bight is further described in Section 2 of this Restoration Plan.

1.2.1 Geographic Target Area

The geographic focus of the Trustees' natural resource damage assessment and restoration efforts is the marine region bordering the Southern California mainland known as the Southern California Bight (SCB) (Figure 1-1). For the purposes of the Restoration Plan, the SCB is defined as the area between Point Conception (north), Cabo Colonet, located south of Ensenada, Mexico (south), outside of the Cortez and Tanner Banks (west), and coastal watersheds (east). The SCB includes the Northern and Southern Channel Islands and surrounding waters.

The SCB is a unique, discrete marine ecosystem. Although the SCB has been significantly affected by human activities, it has numerous environmental restoration, preservation, and enhancement opportunities. The SCB has been studied extensively at the ecosystem level, and a large body of data is available to evaluate environmental issues at both the local and the regional levels.

The portion of the SCB known as the Palos Verdes Shelf is located off the Palos Verdes peninsula, which separates Santa Monica Bay and San Pedro Bay. The Palos Verdes Shelf is generally defined as the offshore area extending from Point Vicente in the northwest to Point Fermin in the southeast. This sub-region contains the most significant deposits of DDTs and PCBs in sediments from historical discharges and is also the focus of Superfund cleanup activities by the EPA. However, DDTs and PCBs have come to be distributed over a wide region (through movement of sediments, water, and uptake by mobile biological organisms) beyond the immediate area of the Palos Verdes Shelf. Also, as further described in Section 2, the natural resource injuries and lost services caused by the DDTs and PCBs discharged by the defendants have occurred over a broader area of the SCB. For this reason, the SCB, rather than just the Palos Verdes Shelf, forms the primary geographic area of focus for the Trustees' natural resource restoration actions.

1.2.2 Overview of Injuries to Natural Resources

Numerous independent studies have shown that DDTs and PCBs are still found at harmful levels in the marine life and birds of Southern California (e.g., Hickey and Anderson 1968, Risebrough et al. 1971, Gress et al. 1973, Lee and Wiberg 2002). During the Montrose litigation, the Trustees carefully evaluated the evidence of injury to a number of resources. From this evaluation, the Trustees narrowed their claim at trial to focus on (1) reproductive problems in bald eagles and peregrine falcons and (2) PCB/DDT contamination of fish that resulted in a commercial fishing ban and fish consumption advisories. Although the Trustees recognized that DDTs had adversely affected a variety of other species in the past, notably California brown pelicans and double-crested cormorants, the priority was to focus the trial and the damages claim on those injuries that were continuing.

DDTs and PCBs degrade slowly in the environment and biomagnify (become more concentrated) in animals at higher levels in the food web. When feeding on prey contaminated with DDTs and PCBs, animals at the top of the food web, such as bald eagles and peregrine

Figure 1-1. Geographic extent of the Southern California Bight.

falcons, can accumulate injurious concentrations of these chemicals, even when levels in the water column appear to be very low. DDTs in particular cause these birds to produce eggs with shells that are so thin that they break when the adults sit on them during incubation, or allow the developing embryos to dry out.

Many common sport fish caught from the ocean in the Los Angeles area (eight species or species groups) have levels of DDTs high enough that the State of California has issued fish consumption advisories, which are recommendations that people limit or avoid consumption of certain fish. A number of these sports fish also have concentrations of PCBs high enough to be of concern for human consumption. Consequently, the State of California has issued health advisories to limit or avoid consumption of these fish when caught at certain coastal locations in Los Angeles and Orange Counties. In addition, because of especially high levels of DDTs and PCBs in the white croaker, the State of California has imposed bag limits for this fish and has banned commercial fishing for white croaker in the vicinity of the Palos Verdes Shelf.

1.2.3 Coordination with Cleanup Actions

In addition to the Trustees' natural resource restoration efforts, the EPA and the DTSC are using a part of the settlement funds to attempt to reduce ongoing exposure to DDTs and PCBs. For example, these agencies are considering covering the contaminated sediments with clean sediments and conducting additional efforts to reduce public consumption and prevent commercial catch of contaminated fish. The selection, design, and implementation of EPA actions to remediate contaminated sediments are likely to take five years or more. (More information on these agencies' activities in this regard may be found by contacting the EPA at (800) 231-3075 or www.epa.gov/region9/features/pvshelf.)

If instituted, cleanup options under evaluation by the EPA would in theory minimize trophic transfer of DDT and PCB contamination in the local ecosystem; however, at present it appears not to be feasible to clean up all of the area contaminated with DDTs and PCBs. The studies conducted for the Trustees have indicated that the reservoir of DDTs and PCBs in the bottom sediments on the Palos Verdes Shelf and surrounding areas will likely continue to contaminate and injure marine life and birds over a large area of the SCB for many years to come. Thus, the selection and design of restoration actions must take into account the likelihood of long-term effects from the remaining DDTs and PCBs in the coastal food web.

1.3 PURPOSE OF THE ACTION: RESTORE INJURED NATURAL RESOURCES AND LOST SERVICES

The Trustees propose to undertake actions aimed at restoring key species and services to their baseline condition (i.e., the condition that would exist if the releases of DDTs and PCBs had not occurred). The Trustees further propose to undertake additional natural resource restoration actions to compensate the public for the lost use of injured natural resources from December 1980 (when CERCLA provisions became effective) until the time when those injured resources have recovered to as close to baseline as possible given available restoration funds. These actions are referred to as compensatory restoration. One key criterion in the planning of compensatory restoration is that the restoration approaches benefit the same or similar natural resources as those that sustained injury as a result of the DDT or PCB releases addressed in Montrose case. Restoration actions implemented under this plan would thereby accelerate recovery of the injured natural resources and the services they provide and provide compensation for the interim losses of resources and services.[5]

To accomplish these restoration objectives, the Trustees will implement a series of actions directed at a range of natural resources and services. The settlement agreements call for the Trustees to use settlement funds to restore, replace, or acquire the equivalent of the injured natural resources and/or the services provided by such resources. The final consent decree for the Montrose case further specifies that "[t]he Trustees will use the damages for restoration of injured natural resources, including bald eagles, peregrine falcons and other marine birds, fish and the habitats upon which they depend, as well as providing for implementation of restoration projects intended to compensate the public for lost use of natural resources" (page 5, lines 18–22).

In keeping with the settlement agreements and the laws and regulations governing natural resource damage assessment and restoration, the Trustees will target the following natural resource restoration actions: (1) primary restoration of specific natural resources still being injured by DDTs and PCBs (i.e., the bald eagle and peregrine falcon populations that historically inhabited the Channel Islands); (2) primary restoration/replacement of human use services that continue to be harmed (i.e., the public's ability to fish for clean fish where certain marine species are contaminated to levels that have prompted the State of California to issue consumption advisories); and (3) compensatory restoration of these resources and services as well as the seabirds and their habitats and the fish and their habitats for which there is evidence of past harm from DDTs or PCBs.

As an overarching element of the restoration program, the Trustees will conduct active public outreach and education aimed at informing and engaging the public on ways to participate in, benefit from, and enhance the restoration of the environment injured by the DDTs and PCBs that were the subject of these settlements. The Trustees will also continue to undertake a limited amount of study and research to ensure that the restoration actions ultimately taken represent an efficient and effective use of settlement funds and maximize benefits to natural resources and their services.

Section 2 provides the background and context necessary for understanding the natural resource restoration planning process for the MSRP.

1.4 PUBLIC INVOLVEMENT

As mentioned above, the restoration planning process is guided by NEPA and CEQA regulations. These regulations require significant public involvement to support and direct the planning process. Public review is an integral component of the MSRP. Public involvement was initiated through a scoping document released on August 24, 2001, which included notices of public meetings to discuss restoration planning. The document was disseminated to

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[5] Under the CERCLA regulatory framework, natural resource damages may include, "The compensable value of all or a portion of the services lost to the public for the time period from the discharge or release until the attainment of the restoration, rehabilitation, replacement, and/or acquisition of the equivalent of the resources and their services to baseline" (Title 43 Code of Federal Regulations [CFR] Part 11.80). In the Montrose settlements, no distinction was made between settlement funds for primary restoration and settlement funds for compensatory restoration. As a result, the Trustees will use this planning process to develop an appropriate mix of primary and compensatory restoration activities that will be conducted using the settlement funds.

approximately 500 recipients, including individuals, organizations, and government agencies, and was posted to the program web site. The Trustees also advertised the upcoming public meetings in local and area newspapers. The scoping document was followed by the publication of a Federal Register notice on October 9, 2001. The official public scoping period extended from October 9, 2001, to November 24, 2002.

The locations and dates of the MSRP public scoping meetings were as follows:

- **October 13, 2001:** Channel Islands National Park Headquarters
  Ventura, CA
- **October 21, 2001:** Cabrillo Sea Fair
  Cabrillo Marine Aquarium
  San Pedro, CA
- **November 1, 2001:** Ken Edwards Center
  Santa Monica, CA

In addition to the notice published in the Federal Register, the Trustees published a Notice of Preparation in the California State Clearinghouse on March 15, 2002. This established a second 30-day comment period, which extended from March 15, 2002, to April 15, 2002.

After the close of the official scoping period, the Trustees maintained open channels of communication with the public, other organizations, and government agencies. As the planning progressed, the Trustees initiated a second round of technical and public workshops to encourage roundtable review of the draft restoration program goals and objectives as well as the screening criteria and to solicit restoration project ideas. The locations and dates of the MSRP workshops were as follows:

- **January 9, 2003:** **Bird Technical Workshop**
  U.S. Fish and Wildlife Service Sacramento Office
  Sacramento, CA
- **January 22, 2003:** **Fish Technical Workshop**
  Long Beach Federal Building
  Long Beach, CA
- **January 27, 2003:** **Public Workshops**
  Cabrillo Marine Aquarium
  San Pedro, CA
  (Two sessions: morning and evening)

These workshops were followed by a March 17, 2003, public announcement further soliciting restoration ideas that was disseminated to the mailing list.

MSRP representatives also attend local and area outreach events to increase awareness of the project and the restoration planning process. Periodic updates and notices are disseminated through the MSRP mailing list, and updates are always available at the MSRP web site: www.montroserestoration.gov.

On April 8, 2005, the Trustees released the draft Restoration Plan and programmatic EIS/EIR for public review and comment. A 45-day comment period was provided, which ran through May 23, 2005. During this time, four public meetings were conducted in affected locations to accept comments on the draft Restoration Plan. The locations and dates of these public meetings were as follows:

- **Saturday, April 23, 2005:** 1:00 p.m.–3:00 p.m.
  Cabrillo Marine Aquarium
  John M. Olguin Auditorium
  3720 Stephen White Dr.
  San Pedro, CA 90731
- **Sunday, April 24, 2005:** 5:00 p.m.–7:00 p.m.
  Long Beach Aquarium of the Pacific
  Honda Theater
  100 Aquarium Way
  Long Beach, CA 90802
- **Thursday, April 28, 2005:** 10:00 a.m.–12:00 p.m.
  Long Beach Federal Building
  501 W. Ocean Blvd.
  Suite 3470
  Long Beach, CA 90802
- **Monday, May 9, 2005:** 7:00 p.m.–9:00 p.m.
  Channel Islands National Park
  Visitor Center Auditorium
  1901 Spinnaker Dr.
  Ventura, CA 93001

The MSRP sought comments on the individual restoration actions, the evaluation criteria, the restoration alternatives (including the proposed allocation of restoration funds across the different actions and categories of resources), and other aspects of the draft plan. Numerous comments were received. Section 9 of this plan summarizes the comments received and presents the Trustees' responses to the comments.

The public is encouraged to follow the MSRP restoration implementation process by accessing the program web site at www.montroserestoration.gov, by contacting program staff at (562) 980-3236, or by e-mailing staff at msrp@noaa.gov.

1.5 ADMINISTRATIVE RECORD

The Trustees have opened an Administrative Record (Record) for restoration activities. The Record includes documents relied on by the Trustees during the restoration planning performed in connection with the release of DDTs and PCBs in the Southern California Bight.

The Record is on file at the MSRP Long Beach office. Arrangements may be made to review the Record by contacting:

Trina Heard
501 W. Ocean Blvd., Suite 4470
Long Beach, CA 90802
(562) 980-4070

During the 1960s and 1970s, scientists began investigating observations of dramatic declines in marine-associated bird populations in Southern California and observations of tumors and fin rot in local marine fish. Although the causes were at first unknown, researchers began examining associations between elevated DDT concentrations in fish and California brown pelican eggs collected from the Southern California Bight (SCB) and observed adverse effects such as eggshell thinning and other abnormalities.

In the same period the federal and state governments instituted more stringent environmental requirements, including mandates to monitor for a broader range of toxic chemicals in wastewater discharges. Thus, a large body of new data on contaminants and their effects on marine life began to develop in the 1960s and 1970s.

By the mid-1980s, the National Oceanic and Atmospheric Administration (NOAA) began collecting and reviewing information on extremely high levels of DDTs and PCBs in the SCB. These contaminants occurred at several levels of the local ecosystem, including sediments, fish, marine mammals and birds. Information available at that time reported adverse effects on natural resources, including reproductive abnormalities in birds and concentrations of DDTs and PCBs in fish that exceeded the guidelines set by the Food and Drug Administration for interstate commerce. The State of California had already issued advisories that warned about the consumption of fish caught locally. On the basis of this information, NOAA issued an initial report in 1989, called the Pre-Assessment Screen. It concluded that the concentrations and quantities of DDTs and PCBs were sufficient to have the potential to cause injury to natural resources and announced that the agency would begin a natural resource damage assessment. Soon thereafter other federal and state agencies with natural resource trustee responsibilities joined in the damage assessment efforts.

The following sections provide a more detailed background on the natural resource damage assessment, the nature of the injuries to natural resources that the Natural Resource Trustees for the Montrose case (Trustees) asserted were caused by the DDTs and PCBs at issue in the case, the litigation, and the resulting settlements. An understanding of the Trustees' damage assessment case and the legal settlements establishes the context of and the limitations on the uses of settlement funds for natural resource restoration.

2.1 RELEASES OF DDTs AND PCBs INTO THE SOUTHERN CALIFORNIA BIGHT

Historically, DDTs and PCBs have been released to the Southern California marine environment through four different routes: (1) direct discharge to the ocean via public wastewater outfalls: (2) ocean dumping of wastes; (3) surface runoff, including runoff collected by storm drains; and (4) atmospheric transport and deposition. As discussed below, the most significant of these routes for releases of both DDTs and PCBs was the wastewater discharged through the Los Angeles County Sanitation Districts (LACSD) ocean outfalls near White Point on the Palos Verdes Shelf.

2.1.1 DDTs

The Montrose Chemical Corporation (Montrose) manufactured the pesticide DDT (referred to in this report as *DDTs* since the pesticide is not just one chemical but a mixture of several) at its facility located at 20201 South Normandie Avenue in Los Angeles, about 10 kilometers (6 miles) north of Los Angeles Harbor in Los Angeles County (Figure 2-1). The Montrose facility

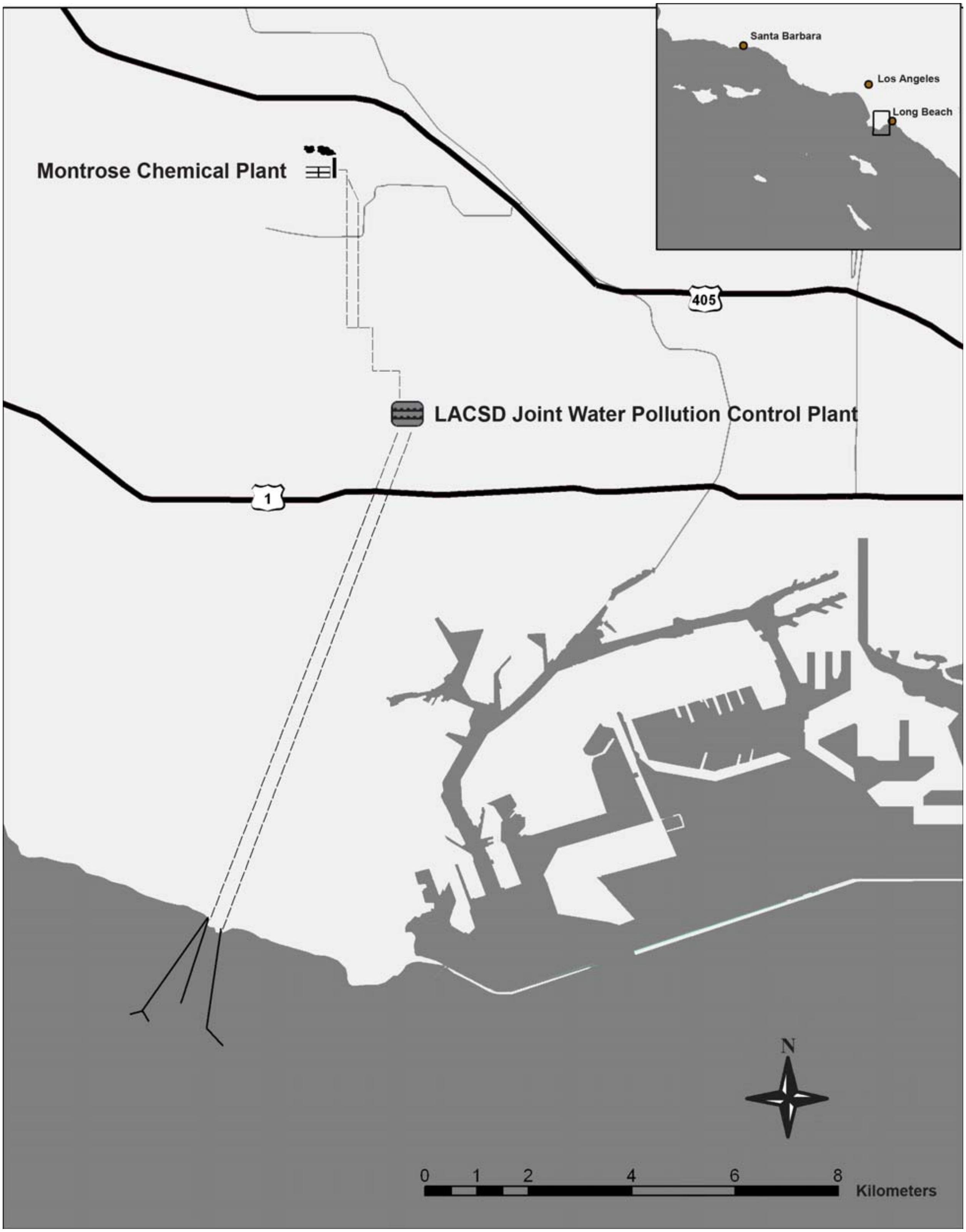


Figure 2-1. Location of Montrose plant, LACSD Joint Water Pollution Control Plant, and outfalls.

manufactured DDTs from 1947 to 1982. It was the only producer of DDTs in Southern California, and for much of that time it was the largest manufacturer of DDTs in the United States (NOAA et al. 1991). Although the sale of DDTs was banned in the United States in 1972, the Montrose facility continued to manufacture DDTs for export until 1982, when the plant was closed and its facilities dismantled (Metcalf and Eddy 1986, NOAA et al. 1991).

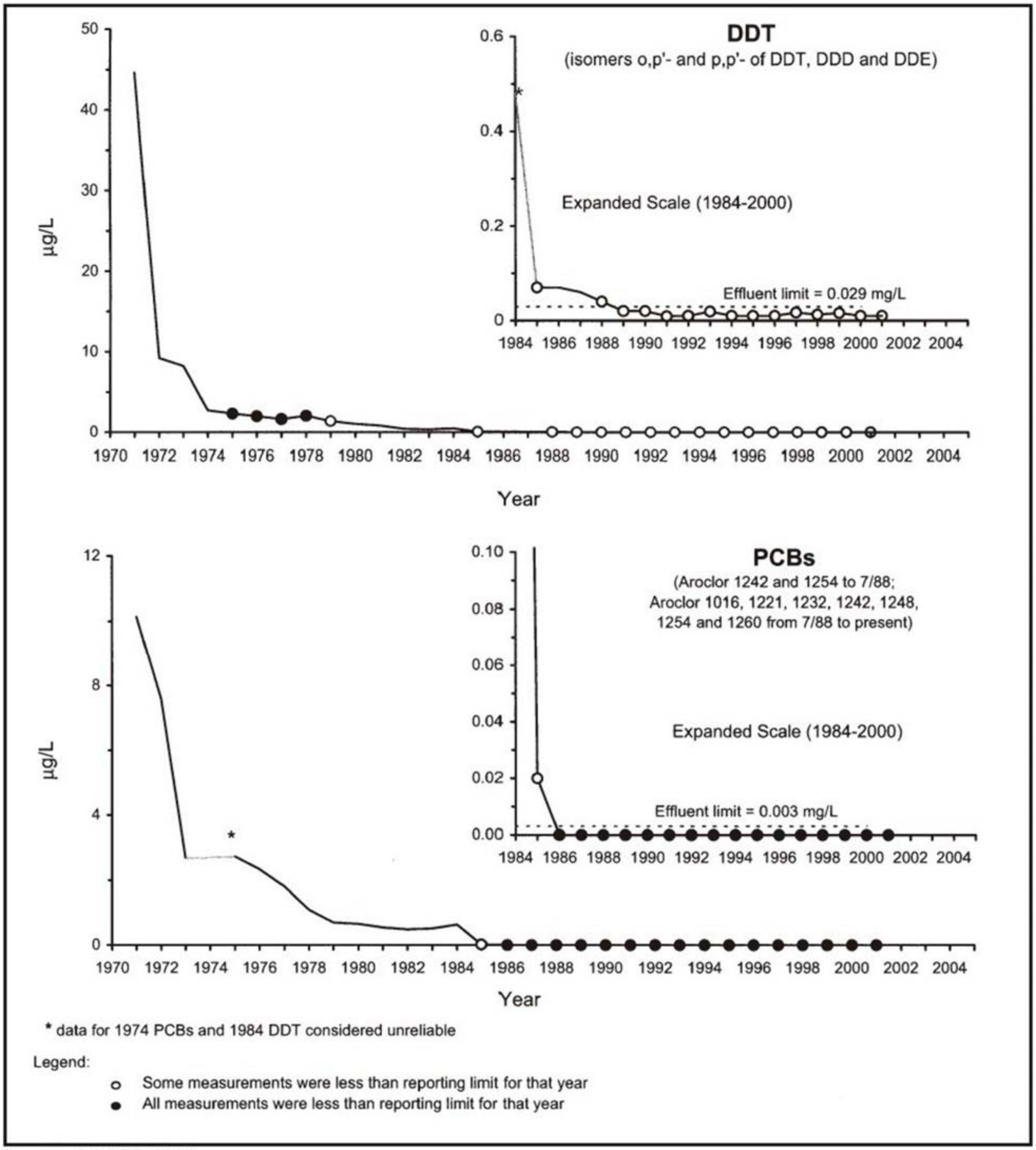
The Montrose plant's discharge was permitted by the City of Los Angeles. The releases of industrial waste containing DDTs from the Montrose plant entered the LACSD sewer collection system, which discharged the contaminants through the LACSD Joint Water Pollution Control Plant (JWPCP) outfalls offshore of White Point beginning in 1953. In the late 1960s and early 1970s, LACSD conducted an investigation of sources of DDTs and PCBs that were entering the sewer system. LACSD identified the Montrose facility as the sole major source of DDTs to its sewer system, and estimated that the discharge from the Montrose plant was contributing 654 pounds (about 300 kilograms) of DDTs per day to the LACSD system (Summers et al. 1988). Chartrand et al. (1985) estimated that 1,800 metric tons (about 2,000 U.S. tons) of DDTs were discharged from these outfalls into the Southern California Bight from 1953 to 1970.

Although the Montrose facility stopped discharging to the LACSD sewer system in 1971, when its permit was revoked, residual DDTs remained in the sewer system and outfalls for some time thereafter. Annual mass emissions of residual DDTs from the outfall pipes decreased rapidly from 10 metric tons (11 U.S. tons) in 1971 to 1 metric ton (1.1 U.S. ton) in 1974 and then more gradually to 0.2 metric tons (0.22 U.S. tons) in 1984 (NOAA et al. 1991). Similarly, DDT concentrations dropped from 45 parts per billion (ppb) in 1971 to about 3 ppb in 1974, and were near zero after 1984 (LACSD 2002) (Figure 2-2).

To provide a perspective on the magnitude of the Montrose DDT discharges, MacGregor (1974) compared the Montrose DDT discharges to other estimates of organochlorine (pesticide) discharges into the marine environment and found that the amount discharged annually from the JWPCP outfall into the SCB in the late 1960s was about 10 times the amount of chlorinated pesticides estimated to be carried into the Gulf of Mexico each year by the Mississippi River at that time.

In addition to discharges from the JWPCP outfalls, DDTs were also released to the SCB through direct ocean dumping of acid sludge that originated from the Montrose facility. It is estimated that between 1947 and 1961, acid sludge containing 350 to 700 metric tons of DDTs were dumped into the San Pedro Basin off of Santa Catalina Island by the California Salvage Company (Chartrand et al. 1985, MBC 1988). The barrels were punctured at sea to make them sink; this procedure undoubtedly released large amounts of DDTs to surface waters (NOAA et al. 1991). The locations of the two dump sites are shown on Figure 2-3.

DDTs were also released from the contaminated soils and facilities at the Montrose plant through release of DDT dust generated by plant activities. An estimated 1.3 metric tons (1.4 U.S. tons) of DDTs were deposited by atmospheric transport into the coastal ocean waters off of Southern California during 1973–1974 (Young et al. 1976). DDTs were also released from the Montrose plant through surface water runoff. Contaminated surface waters collected from the site were transported via storm drains into the Dominguez Channel and from there into the Consolidated Slip in Los Angeles Harbor.



Source: LACSD 2002

Figure 2-2. Concentrations of effluent constituents discharged to the ocean off Palos Verdes, 1971–2001.

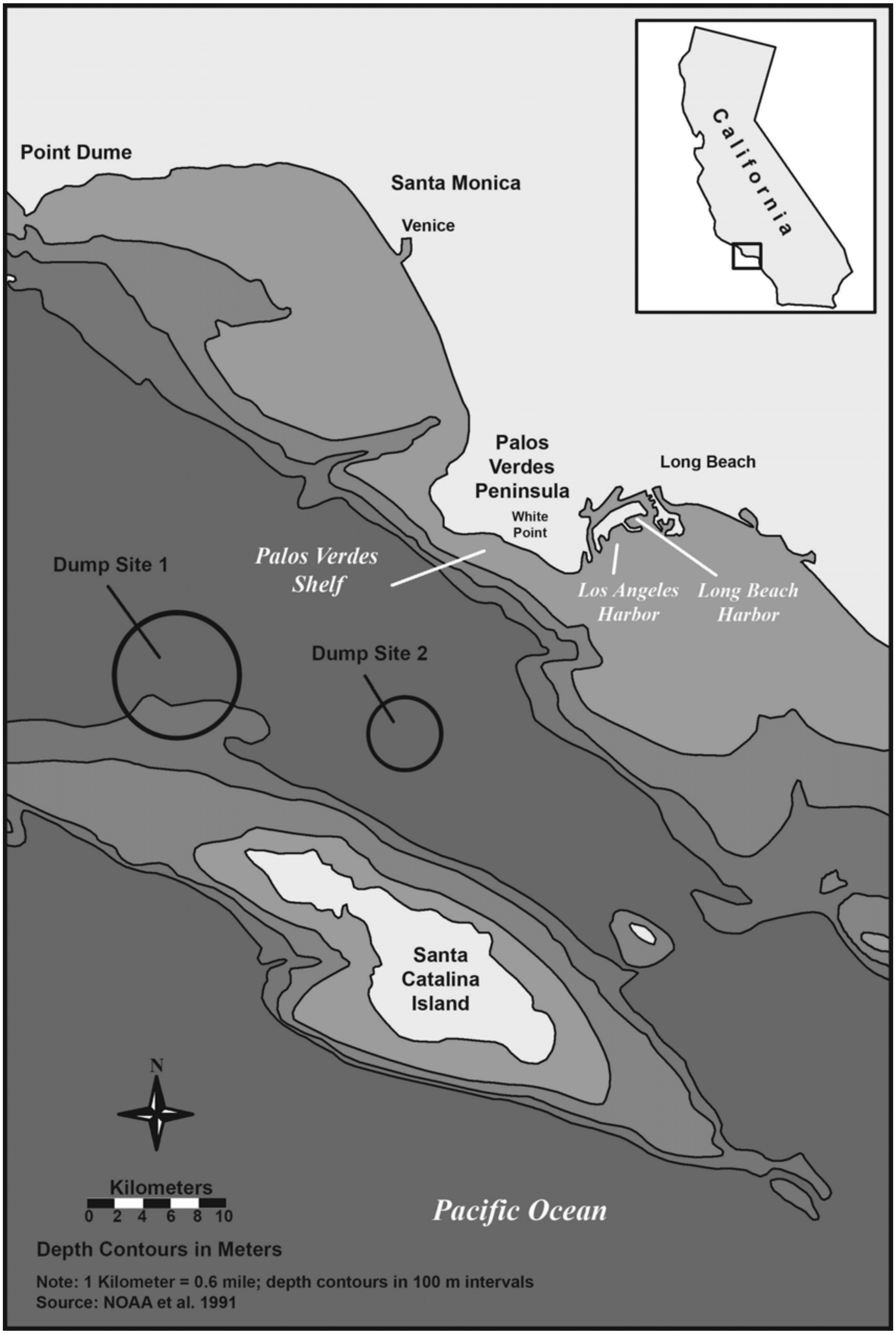


Figure 2-3. Palos Verdes Shelf, Los Angeles Harbor, Long Beach Harbor, and Dump Sites 1 & 2

2.1.2 PCBs

PCBs have been found in the Southern California marine environment since the late 1930s, with peak inputs into the SCB from 1965 to 1970 (Horn et al. 1974, Mearns et al. 1988). Similar to DDTs, PCBs were released by discharge through municipal wastewater outfalls, surface runoff, and atmospheric transport. PCB contamination was also documented at Dump Sites 1 and 2, but the specific PCB sources for the dump sites have not been identified (Lyons 1989, NOAA et al. 1991) (Figure 2-3).

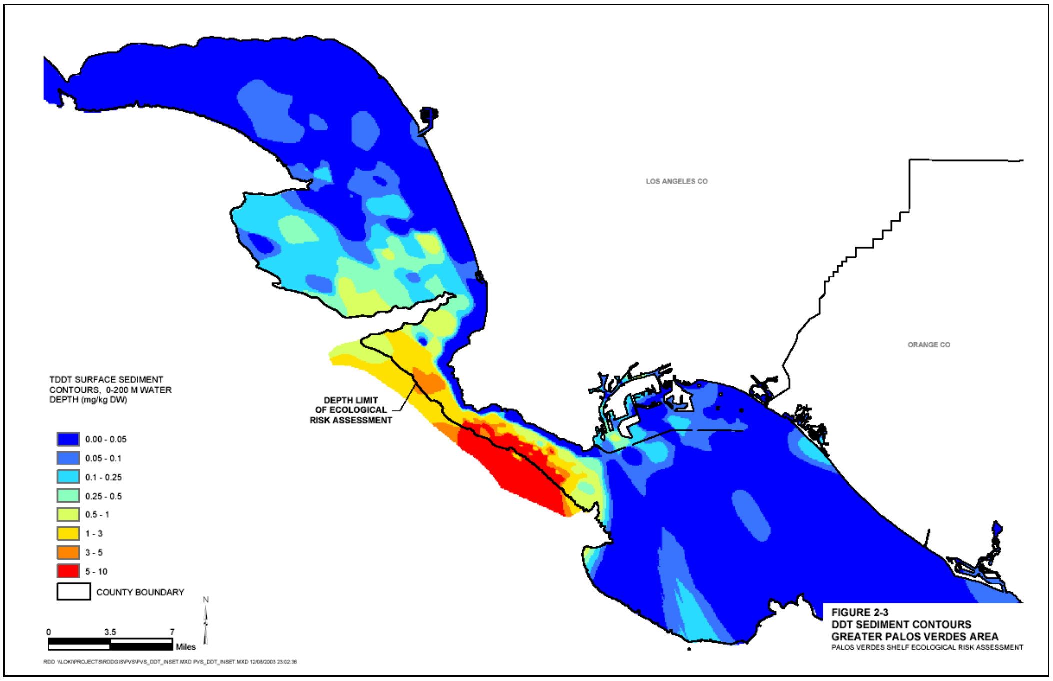
The LACSD wastewater outfalls on the Palos Verdes Shelf were the principal sources of releases of PCBs to the SCB (Young and Heeson 1980, NOAA et al. 1991). Concentrations of PCBs in the effluent from LACSD’s JWPCP reached 10 ppb by 1971 (LACSD 2001), with annual mass emissions in 1972 exceeding 116 metric tons (NOAA et al. 1991). There were numerous sources for the PCBs in the LACSD system during this period. In the late 1970s LACSD identified 16 industries as potential sources of PCBs. Significant sources included a Westinghouse Electric Company maintenance and repair facility in Dominguez Hills, and a Potlatch Corporation paper manufacturing plant in Pomona (NOAA et al. 1991).

2.2 DISTRIBUTION OF DDTS AND PCBS IN THE SEDIMENTS OF THE STUDY AREA

The sediments and sediment-associated biota of the Palos Verdes Shelf and surrounding region have been the subject of intense investigations by the Southern California Coastal Water Research Project, the LACSD, the U.S. Geological Survey (USGS), and others. Numerous past studies have shown that sediment and organism concentrations of DDTs and PCBs in the SCB have been among the highest ever reported for any coastal marine ecosystem (USEPA 2003).

As indicated in Figure 2-2, ongoing releases of DDTs and PCBs to the marine environment from the LACSD outfalls at White Point had declined dramatically in the 1980s and were virtually non-existent by the 1990s. Subsequent less-contaminated discharges from the White Point outfalls have placed cleaner effluent-affected sediment above the highly contaminated effluent-affected deposit; however, biological, chemical, and physical processes have modified and partly mixed the sediment, bringing contaminants from the deeper part of the effluent-affected deposit into the surface layers. These processes continue to occur even today (Lee and Wiberg 2002).

The spatial and depth distributions of DDTs and PCBs in shelf and slope sediments were extensively evaluated by the USGS, initially as part of the Trustees’ investigations for the natural resource damage assessment in the 1990s. Sediment data collected by USGS and LACSD provide the most complete coverage of the study area through 2001. The effluent-affected sediment deposit is most contaminated 20–30 centimeters (cm) (8–12 inches) below the sediment surface. This highly contaminated layer of the deposit, with concentrations of DDE (a metabolite, or breakdown, product of DDT) exceeding 10–100 parts per million (ppm), likely dates to the 1950s and 1960s, when the DDT manufacturer was discharging to the sewer system (Lee and Wiberg 2002). The overlying sediment, although less contaminated, still has widely distributed concentrations of DDE exceeding 1 ppm (Figure 2-4). Biological and physical mixing processes have likely combined older, more contaminated sediment with younger material to produce the surface layer. The results of USGS analysis of the temporal history of contamination levels at three locations on the Palos Verdes Shelf show that surface concentrations and total mass of DDE have remained



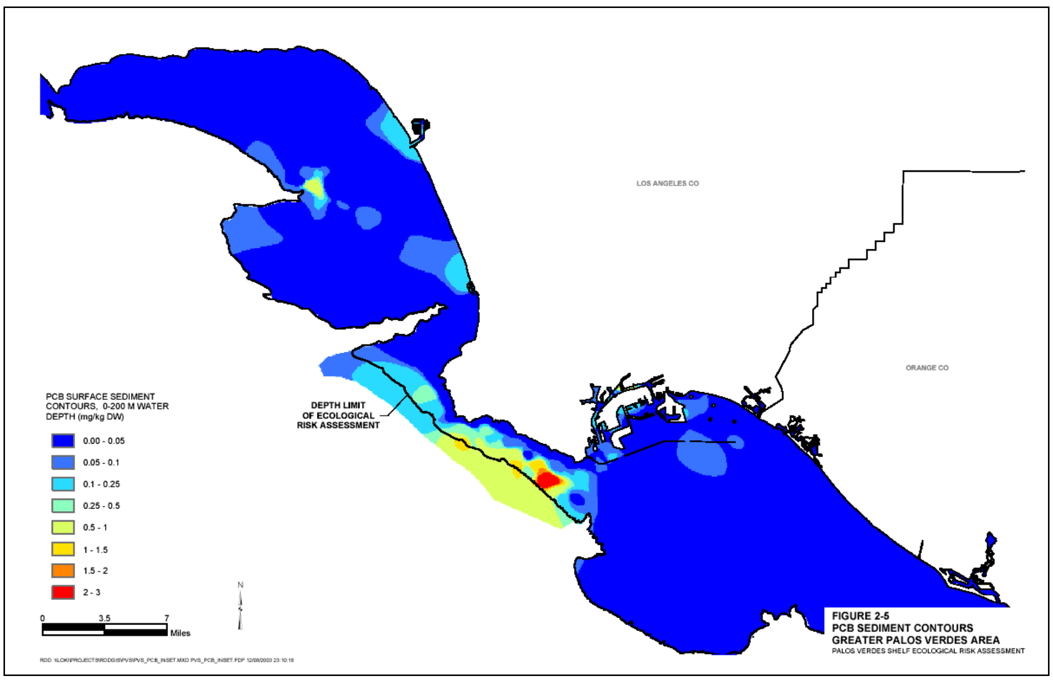


Figure 2-4. Distribution of DDTs and PCBs in surface sediments in and beyond the Palos Verdes Shelf.

Note: Distribution of DDTs and PCBs in surface (0–15 cm [0–6 inches]) sediments in and beyond the Palos Verdes Shelf region (USEPA 2003); the line representing the depth limit of the ecological risk assessment corresponds to a depth of 200 meters (660 feet).

(**Back of Figure 2-4**)

almost unchanged over the last 20 years at stations nearest the outfall, although both quantities appear to be decreasing at the more distant location studied (Lee et al. 2002).

Additional U.S. Environmental Protection Agency (EPA) evaluation of contaminant concentration data in horizons across the uppermost 15 cm (6 inches) of sediment shows a strong relationship between concentrations in the surface and the deeper, more contaminated sediments, reflecting the fact that contaminants at depth are being remobilized to the surface (USEPA 2003). The mixed surface sediment layer[1] represents the biologically active zone, that portion of the sediment where benthic (bottom) organisms are most abundant and where the greatest likelihood exists for exposure of benthic organisms and contaminant transfer up the food web. As part of its comprehensive evaluation of sediment and biological data trends for the ecological risk assessment, the EPA (2003) reported that within the Palos Verdes shelf study area, concentrations of DDTs and PCBs in surface sediments and tissues of marine organisms have decreased since the 1970s but have generally leveled off since the mid 1980s.

Transport of re-suspended sediments is considered an important process because contaminants such as DDTs and PCBs have strong affinities for particles. Thus, physical transport of sediments also results in dispersion of associated contaminants. In general, the most important processes governing the distribution and transport of sediment contaminants in the area appear to be a complex pattern of burial of older deposits by cleaner surface sediments, coupled with resuspension and desorption of contaminants, and redeposition of sediments and contaminants following the predominant currents northwestward along the continental shelf.

USGS researchers have also studied the processes that modify the seabed on the Palos Verdes shelf. Analysis of box-core samples of the seabed collected during field studies in the 1990s provided information about the physical and chemical properties of the sediment, biological mixing rates, and depositional history. Sherwood et al. (2002) developed a model to predict the evolution of DDE concentrations. Model predictions extending to 2050 indicate that most of the DDE present along the 60-meter depth northwest of the White Point outfall will remain buried and that surface concentrations will decrease slowly. The model also suggests that erosion near the southeast edge of the effluent-affected deposit is likely to reintroduce buried DDE into surface sediment and across the sediment-water interface.

As part of their ecological risk assessment, the EPA (2003) evaluated previous and more recent investigations of sediment contamination for trends in contaminant concentrations and distribution. Consistent with USGS findings, the EPA found that generally, concentrations of DDTs in surface layer sediment appear to be relatively constant as represented by the LACSD cores collected between 1991 and 2001.

Studies dealing with the Palos Verdes shelf region show a complex environment that is significantly impacted by anthropogenic processes. The studies also show that this area has partly recovered from the extremely high levels of contamination present in the early 1970s but that relatively high levels of contamination remain and continue to impact a number of animal

[1] The depth stratification for biological activity in the study area results in sediment layers with varying mixing rates. The surface layer (0-15 cm) is referred to by EPA as the complete mixing layer, in which sediment mixing largely occurs. The next layer (15-30 cm), experiences periodic mixing by deep burrowing organisms although rates are expected to be lower than in the top 15 cm (EPA 2003).

species. Finally, models indicate that natural recovery will proceed slowly (Lee and Wiberg 2002).

2.3 THE DAMAGE ASSESSMENT AND DETERMINATIONS OF INJURIES TO NATURAL RESOURCES

In 1990, six federal and State of California agencies signed a Memorandum of Agreement (MOA) forming a Co-Trustee Advisory Panel to pursue the Montrose damage assessment case. The following year the Trustees modified the MOA, and the Advisory Panel formally became known as the Southern California Marine Environment Trustee Council. The council, now known as the Montrose Trustee Council (referred to throughout this document as the "Trustees") had responsibility for coordinating all damage assessment activities. The state and federal agencies that compose the Trustees are:

- The California Department of Fish and Game
- The California Department of Parks and Recreation
- The California State Lands Commission
- The U.S. Fish and Wildlife Service
- The National Park Service
- The National Oceanic and Atmospheric Administration

In 1991, the Trustees issued a Draft Injury Determination Plan (NOAA et al. 1991), which was the culmination of months of work by technical working groups formed to closely examine potential injuries to natural resources. The plan was circulated for public comment, and based on the comments received (including comments from the defendants in the litigation) the Trustees approved an assessment plan for approximately 60 studies, including injury studies across several areas, such as bioaccumulation in fish tissues, benthic community alteration, and reproductive impairment in fish, birds, and marine mammals. The Trustees also conducted valuation and restoration planning studies.

Given the widespread contamination and long-term occurrence of DDTs and PCBs throughout the ecosystem, the Trustees selected resources and injuries that they felt were representative, rather than inclusive, of the potential injuries caused by the release of the contaminants. The Trustees' studies of potential biological injuries are summarized below.

2.3.1 Sediment

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) damage assessment regulations, the sea floor sediments are defined as being injured if they are contaminated to a level that causes injury to a biological resource (Title 43 Code of Federal Regulations [CFR] Section 11.62(b)(v)). Large areas (20 square miles [52 square kilometers] or more) of the Palos Verdes Shelf and slope were known to possess surface sediment concentrations of DDTs and PCBs in excess of concentrations that could cause injury to benthic organisms. Much higher concentrations, hundreds of times higher, resided only 12 to 18 inches below the sediment-water interface due to deposition.

Based on the public comments, the Trustees decided to try to isolate any effects of DDTs and/or PCBs on benthic organisms from the potential effects of the numerous other contaminants that co-occurred with the DDTs and PCBs. To accomplish this goal, the Trustees commissioned a two-tiered study. The first tier involved toxicity testing of sediments collected from the Palos Verdes Shelf to determine the combined toxicity of all contaminants in the sediments. The second tier involved toxicity testing of clean sediments spiked only with DDTs and PCBs to isolate the effects of these contaminants. Some of the tests showed acute mortality in spiked sediment exposures but not from the field-collected sediments, and one test showed a reduction in reproductive output of the test organism; however, other tests did not meet quality control standards and were deemed unreliable because of high mortality among the control animals (i.e., too many animals died during the test that were not exposed to the test contaminants).

The Trustees also commissioned a “weight-of-evidence” analysis of sediment toxicity that used already-published results rather than gathering new field or laboratory data. This type of analysis is a standard approach for sediment toxicity evaluation. The weight-of-evidence analysis concluded that the concentrations of DDTs and PCBs in the sediments of the Palos Verdes Shelf are sufficient to cause toxicity to benthic organisms.

2.3.2 Fish Reproduction

Under the CERCLA regulations for natural resource damage assessment, injury to a biological resource occurs when a statistically significant difference in reproductive success between control organisms and test organisms can be measured (43 CFR 11.62(f)(4)(v)(E)). Reduced spawning rate, lowered number of eggs per spawn, diminished fertilization rate, and increased early loss of eggs were all reported by Hose et al. (1989) as being associated with exposure of white croaker and kelp bass to contaminants in San Pedro Bay. These investigators suggested that white croaker with ovarian DDT concentrations greater than 4 ppm wet weight could not spawn.

Concentrations of DDTs and PCBs in fish were lower in the early 1990s, when the Trustees commissioned the studies, than they had been in the early 1980s. However, the rate of decline in concentrations had leveled off, and there was no evidence that the downward trend was continuing. This leveling meant that past improvements in DDT and PCB concentrations in fish could not be expected to continue into the future, and that current conditions might continue indefinitely. The existing DDT and PCB concentrations in fish ovaries were near or exceeding the 4 ppm threshold that local researchers had suggested for reproductive impairment. In addition to evaluating the possibility of reproductive impairment in fish during the 1990s, the Trustees evaluated whether reproductive impairment had occurred at any time after the passage of CERCLA in 1980. This evaluation included a time when DDT and PCB concentrations in fish were elevated high above the levels that existed in 1992.

The Trustees commissioned a study that included the evaluation of both field-collected fish and laboratory-dosed fish. This approach allowed an assessment of effects in the field as well as under controlled laboratory dosing to provide a rigorous test for a causal relationship between exposure to DDTs and PCBs and reproductive effects, if any. Kelp bass was selected as the test species. The study also included work to evaluate the physiological response of the fish and hormone binding mechanisms to allow an understanding of the mechanisms of toxicity.

The fish collected from the field did not show the anticipated difference from the laboratory-dosed fish in body burdens of DDTs and PCBs. Thus, this part of the investigation provided no information on the effects of contaminant exposure. The laboratory exposures also failed to provide a valid test of contaminant effects because confounding factors made it difficult to isolate the effects of the contaminants. The results of the fish studies were inconclusive, neither proving nor disproving that reproductive impairment was caused by the DDTs and/or the PCBs.

2.3.3 Birds

The Trustees investigated potential injuries to several bird species that inhabit the Southern California marine environment. Two species in particular, the bald eagle and the peregrine falcon, received special focus because they, as top predators, are especially vulnerable to the effects of contaminants such as DDTs and PCBs (which are magnified at higher levels in the food web).

Bald eagles were a resident breeding species on all of the California Channel Islands from before the turn of the century (Kiff 1980). Kiff (2000) reports evidence that bald eagles nested on Santa Catalina, Anacapa, Santa Cruz, and Santa Rosa Islands, and probably San Nicolas Island, until at least the 1950s. From the late 1800s to 1960, active or remnant nests of bald eagles were reported at a minimum of 35 different locations on the islands, making the Channel Islands a stronghold for this species in Southern California (Kiff 2000). The last confirmed nesting of an eagle on the Channel Islands was in 1949 on Anacapa Island (Kiff 1980). By the early 1960s, bald eagles had disappeared from all of the Channel Islands. Efforts were initiated in 1980 to reintroduce bald eagles on Santa Catalina Island; however, the reintroduced bald eagles experienced reproductive failure. The bald eagles on Santa Catalina Island continue to this day to exhibit reproductive injury and are not self-sustaining (see Appendix B).

The peregrine falcon is one of five falcon species that occur in California. Peregrine falcons in California prey almost exclusively on smaller birds of aquatic and terrestrial ecosystems. Peregrine falcons were relatively common throughout California in the early 1900s and were part of Native American history and culture. Kiff (1980) and Hunt (1994) present evidence for 15 documented pairs of peregrines on the California Channel Islands during the first half of the century and estimate that between 20 and 30 pairs nested on the Channel Islands prior to 1945. The population of peregrine falcons on the Channel Islands was eliminated between the mid-1940s and the early 1960s due to shooting, harvest for falconry, egg collecting, and DDT contamination (Kiff 2000). In the mid 1980s, efforts were initiated to reintroduce peregrine falcons to the Northern Channel Islands. These efforts have increased the number of pairs of peregrine falcons on the Channel Islands, and even though peregrine falcons now appear to be self-sustaining on the Northern Channel Islands, they have not fully recovered to historical levels throughout the Channel Islands.

The Trustees were concerned about two types of bird injury specified in the CERCLA regulations for natural resource damage assessment. First, the regulations define eggshell thinning in birds as an injury if the current eggshells are more than 15 percent thinner than pre-DDT era eggshells (43 CFR 11.62(f)(4)(v)(A)). The regulations also make specific mention of eggshell thinning injury in cases where birds have been exposed to DDTs. Second, any type of avian reproductive impairment that causes a reduction in the mean number of fledglings per nest is defined as an injury according to 43 CFR 11.62(f)(4)(v)(B).

It is generally accepted that DDTs cause eggshell thinning in birds (Hickey and Anderson 1968, Risebrough et al. 1971, Lundholm 1997). Strong correlations have been reported between concentrations of DDTs and eggshell thinning in seven families of birds, including pelicans, cormorants, herons, ducks, eagles, falcons, and gulls. Eggshell thinning has also been experimentally induced in three families of birds. When the use of DDT was banned in the United States, severely affected species such as the pelicans, ospreys, and eagles recovered in most areas of the country. In addition, geographical patterns of eggshell thinning across the United States are consistent with the locations of high environmental concentrations of DDTs. The final piece of evidence supporting the connection between DDTs and eggshell thinning is that attempts to experimentally induce eggshell thinning with other compounds such as PCBs, dieldrin, mercury, and lead have failed at concentrations of these compounds typically found in the environment.

Prior to commissioning their own studies, the Trustees reviewed data showing that the eggshells of certain SCB seabirds (e.g., California brown pelicans, double-crested cormorants, Brandt's cormorants, and western gulls) collected in the late 1960s were more than 15 percent thinner than eggshells collected during the pre-DDT era. In addition, eggshell abnormalities that had been shown to be consistent with the effects of DDTs were documented in two federally listed endangered species (the bald eagle and the light-footed clapper rail) for the SCB. PCBs were also known to cause other types of effects that could have reproductive consequences. These effects included toxicity to embryos in the egg and abnormalities in adult breeding behavior that could prevent effective reproduction.

High concentrations of DDTs and PCBs had been reported in the prey of Southern California bird species as well as in the birds and eggs themselves. Severe population reductions in several species of birds in the SCB began to be observed shortly after the start of DDT discharge into the SCB from the JWPCP outfalls and ocean dumping. The peregrine falcon disappeared from the Channel Islands by 1955, the bald eagle was extirpated from the Channel Islands by the early 1960s, the California brown pelican was driven to near extinction in the 1970s, and the double-crested cormorant population declined severely during the 1960s and 1970s. Releases of DDTs and PCBs from the LACSD outfall declined dramatically beginning in the early 1970s. By 1980, when Congress passed CERCLA, the California brown pelican and double-crested cormorant populations in Southern California were recovering. In contrast, neither the bald eagle nor the peregrine falcon had returned to the Channel Islands, even though both of these species were beginning to repopulate their historical ranges across the United States and worldwide.

Faced with the facts outlined above, the Trustees decided in the early 1990s that it was necessary to determine whether injuries to bird species in the SCB had been caused by and were continuing because of exposure to DDT and/or PCBs.

The Trustees commissioned a suite of studies consisting of investigations of (1) the organochlorine (i.e., DDTs and PCBs) contamination levels, reproductive success, and food habits of the bald eagles recently introduced onto Santa Catalina Island; (2) the organochlorine contamination levels, the reproductive success, and food habits of the peregrine falcons recently reintroduced to the Northern Channel Islands; (3) the long-term consequences of reduced reproduction on the populations of bald eagles and peregrine falcons; (4) eggshell thinning and organochlorine contamination levels in seabirds of the Channel Islands and comparatively in seabirds from along the west coast of North America; (5) the reproductive output of brown pelicans and double-crested cormorants in the SCB; and (6) a summary of effects of DDTs and PCBs on the birds of the SCB.

After considering the results of the commissioned bird studies and the interpretations of the Trustees' experts, the Trustees drew the following conclusions:

- As a result of the elevated levels of DDTs in the marine environment of the SCB, the eggshells of bald eagles and peregrine falcons have become so thin and/or otherwise so abnormal that reproduction of these bird species has been severely disrupted or has not occurred, since as early as the late 1940s. To this day, bald eagles on Santa Catalina Island continue to demonstrate reproductive failure.
- Because bald eagles and peregrine falcons are the top predators in their respective food webs, and because metabolites of DDT are magnified in their prey species, bald eagles and peregrine falcons are more severely affected than other species by the presence of DDTs in the marine environment.
- Many seabird species, including the California brown pelican and the double-crested cormorant, were severely impacted in the past by the discharges of DDTs to the coastal waters of the SCB.[2] However, the populations of these seabird species are generally recovering due to improved reproductive success since Montrose was stopped from discharging these contaminants into the LACSD system. For these other bird species, there was not conclusive evidence that reproductive problems meeting the definition of "injuries" within the CERCLA regulations were continuing.

2.3.4 Marine Mammals

Under the CERCLA regulations for natural resource damage assessment, both impaired reproductive capability and reduced immune response are considered injuries. A broad base of toxicological literature shows that compounds like DDTs and PCBs are capable of causing these types of effects (NOAA et al. 1991). Studies conducted in the 1970s in the SCB demonstrated an association between California sea lion females delivering non-viable premature pups and high concentrations of DDTs and PCBs (NOAA et al. 1991).

The vast majority of the marine mammal portion of the damage assessment was dedicated to investigating injury in California sea lions, a species that reproduces and resides at certain times on the Channel Islands. A comprehensive field study was undertaken to evaluate rates of premature pupping, rates of early life mortality, immune response, physiology, and contaminant body burdens in sea lions on San Miguel Island. In the final analysis, it was not possible to draw a cause and effect linkage between adverse effects on California sea lions and exposure to DDTs or PCBs. The Trustees decided not to put the work forward as part of the case because the causal linkage could not be established.

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[2] There is evidence that eggshell thinning occurred in California brown pelicans several years before it was first observed in 1969, because museum eggs collected from Anacapa Island in 1962 were found to be 26 percent thinner than eggs collected prior to 1946 (Anderson and Hickey 1970). Gress (1994) reported that the mean thickness of California brown pelican eggshells from the period 1986–1990 was 4.6 percent thinner than the pre-1947 mean (i.e., less than the regulatory definition of injury). Kiff (1994) further reports that 1992 California brown pelican eggs from Anacapa Island (18 eggs collected) was 3.6 percent thinner than the pre-1947 mean .

An important outcome of the work on marine mammals was the discovery that marine mammal carcasses, and probably placentas, are significant routes of DDT and PCB transfer through the food web. For example, marine mammal carcasses are eaten directly by bald eagles, and the carcasses and placenta of marine mammals are consumed by western gulls, which are subsequently preyed on by bald eagles and peregrine falcons. Contaminant concentrations in marine mammals may be so high that a small amount of consumption by a bird can represent a very large dose of contaminant.

2.3.5 Summary of Natural Resource Injury Findings

Based on the careful process undertaken by the Trustees, the information available, and the results of the studies commissioned as part of the damage assessment, the Trustees concluded that the following natural resource injuries had been occurring since before 1981 and were continuing to occur as a result of the historical releases of DDTs and PCBs at issue in the case:

- Water and Sediment Quality.[3] The concentrations of DDTs found in the water column over the Palos Verdes Shelf exceeded the standards established by the State of California in the California Ocean Plan. The highest concentrations of DDTs occurred near the sediments; concentrations were lower near the water surface. This characteristic indicated that the source of the unacceptable concentrations of DDT in the water column was the contaminated sediments, representing a per se injury under the CERCLA regulations for damage assessment. The sediments of the Palos Verdes Shelf could not provide the full range of functions normally performed by ocean floor sediments. Palos Verdes Shelf sediments in the effluent-affected layer carried quantities and concentrations of DDTs sufficient to trigger the fishing closure and advisories mentioned above. Pathway studies showed that these sediments and the contamination passed on through fish into the Palos Verdes Shelf food web were also the ultimate route of exposure to injured species of birds.
- Fishing. Kelp bass, white croaker, and other species of fish collected from numerous locations in the study area were carrying concentrations of DDTs in edible tissues that exceeded the guidelines and standards set by both federal and state agencies for safe consumption. A commercial closure for white croaker and recreational advisories for kelp bass, white croaker, black croaker, California scorpion fish, California corbina, queenfish, and several species of rockfishes and surfperches had been issued by the State of California. This injury represented a loss of natural resource value to the public and a per se injury under the CERCLA regulations for damage assessment. The human use values of these fish resources, namely the public's ability to catch and eat clean fish, continued to be harmed by the contamination.
- Bald Eagles. The Channel Islands (in particular, Santa Catalina Island) did not support a naturally reproducing population of bald eagles, as existed before the DDT releases. This injury was known because the bald eagles introduced onto Santa Catalina Island accumulated DDT at high concentrations and produced eggs that were structurally incapable of supporting the embryo without human intervention. Also, bald eagles had not yet returned to the other Channel Islands.

[3] The Trustees deferred to response actions by the U.S. Environmental Protection Agency to address these injuries, and thus did not specifically seek natural resource damages to restore water and sediment quality.

- Peregrine Falcons. The peregrine falcons reintroduced to the Northern Channel Islands had eggshells in 1992–1993 that were more than 15 percent thinner than peregrine eggshells from the pre-DDT era (Hunt 1994, Kiff 1994). The level of eggshell thinning found in peregrine falcons in the Northern Channel Islands was sufficient to affect the ability of the population to sustain itself. Also, peregrine falcons had not yet re-populated the Southern Channel Islands.

The Trustees therefore focused their efforts on obtaining damages for these ongoing injuries, with the goal of restoring these resources and their services to their baseline conditions (i.e., the conditions they would be in had the DDTs and PCBs never been released). In addition to seeking damages for ongoing injuries, the CERCLA regulatory framework provides for compensatory damages (i.e., damages to compensate the public for lost uses of resources during the period when they are below their baseline conditions). Targets for compensatory restoration actions may include certain resources that the evidence shows sustained past injuries from the DDTs and PCBs at issue in this case. The following resources in particular fall into this category:

- Fish. Concentrations of DDTs and PCBs in fish were lower in the 1990s, when the Trustees undertook fish injury studies, than they had been in the early 1980s, when a body of toxicological literature indicated that fish were being harmed by concentrations of these contaminants found in the Southern California coastal environment. Specifically, Hose et al. (1989) suggested an observed DDT concentration in ovaries associated with failures to spawn. Although the Trustee efforts to demonstrate that injuries were occurring and had occurred after the authorization of CERCLA were not conclusive, the Trustees consider fish and their habitats to be an appropriate target for compensatory restoration actions.
- Seabirds. As stated previously, many seabird species, including the California brown pelican and the double-crested cormorant, suffered dramatic declines in their populations as a result of the reproductive abnormalities caused by exposures to DDTs. Although the evidence is not conclusive regarding continuing injuries to these birds on the scale of the continuing injuries to bald eagles, the Trustees consider seabirds and their habitats to be an appropriate recipient for restoration actions. As a result of studies conducted by Fry (1994) and Kiff (1994), the Trustees have focused on those restoration projects that target seabirds that have demonstrated severe or significant eggshell thinning and/or seabirds whose DDT egg residues were significantly elevated in their colonies of the Southern California Bight. According to the data from these studies, the following seabirds are priority species for restoration: the double-crested cormorant, Brandt's cormorant, the California brown pelican, the western gull, the ashy storm-petrel, Cassin's auklet, the pelagic cormorant, and the pigeon guillemot. See Section 5.1.1 for a summary of the results of the seabird studies.

Through the natural resource damage assessment process as well as the litigation and settlements described in Section 2.4, the Trustees sought damages to fund restoration projects that are directly related to the injuries outlined above.

2.4 LITIGATION AND SETTLEMENTS

Following the preliminary investigations by NOAA mentioned at the beginning of this section,[4] the United States and the State of California (the governments), on behalf of the Trustees and the

[4] See Appendix E for a timeline of the natural resource damage assessment and litigation.

EPA, filed a complaint in federal district court in Los Angeles in June 1990 against eight defendants.[5] The complaint stated two claims under CERCLA. The first concerned the recovery of costs incurred by the United States in response to the release or threatened release of hazardous substances from the Montrose facility (upland site). The second sought declaratory relief and the recovery of response costs and damages for injury to natural resources in the areas offshore of Los Angeles and Long Beach, including the Palos Verdes Shelf, the Channel Islands, and the surrounding environment (offshore area) as the result of the release of hazardous substances. The complaint summarized the natural resource injuries to include fish, birds, and marine mammals. Almost immediately, the governments amended the complaint to add a ninth defendant: the LACSD, a publicly owned treatment works composed of fifteen local sanitation districts in Los Angeles County.[6]

After the governments filed the complaint, the Trustees developed detailed injury study plans and implemented numerous studies over the next three and a half years. The studies covered nine categories.[7] Complying with a court-ordered deadline, in October 1994 the governments produced 28 expert reports and designated 84 witnesses. The district court established a schedule for the defendants to question (depose) the governments' witnesses and to provide their own expert reports and for the governments to question the defendants' experts. This expert testimony occurred prior to trial.

Scarcely had the depositions of the governments' experts commenced when the district court granted the defendants' motion to dismiss the natural resource damage claim on the ground that the governments had filed the claim too late. The governments appealed this ruling successfully, and two years later, in mid-1997, the district court reinstated the natural resource damage claim. During the appeal process, an important event occurred: the EPA decided to expand its investigation to include the Palos Verdes Shelf.[8]

Prior to this event, the Trustees had included restoration of the contaminated sediments on the Palos Verdes Shelf in their claim as primary restoration. This development changed the complexion of the case. Because the EPA now assumed responsibility for any response activity that might be conducted for the contaminated sediments on the Palos Verdes Shelf, the EPA's response costs claim increased, and the Trustees' claim for damages decreased, as the Trustees were no longer considering primary restoration for the contaminated sediments. With the EPA now addressing that aspect of the case, the Trustees narrowed their focus to the injured birds, fish, the lost use of the injured resources, and the restoration necessary to address those injuries.

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[5] The defendants were Montrose Chemical Corp. of California; Atkemix Thirty-Seven, Inc.; Stauffer Management Company; ICI American Holdings, Inc.; Chris-Craft Industries, Inc.; Westinghouse Electric Corp.; Potlatch Corp.; and Simpson Paper Company.

[6] The governments alleged that LACSD had transported the hazardous substances through its sewer system to the Palos Verdes Shelf - a violation of CERCLA.

[7] Those categories were (1) distribution and character of the contaminated sediments; (2) foodweb/pathway; (3) injury to sediments; (4) injury to fish; (5) injury to birds; (6) natural recovery of the contaminated sediments; (7) feasibility of sediment restoration alternatives; (8) biological restoration alternatives; and (9) prospective interim lost use value. In addition, the Trustees developed a quality assurance program, a data report and a natural resource damage assessment cost report.

[8] Previously, EPA had focused its efforts on the upland site and its surrounding area.

The reinstatement of the case initiated two years of depositions of the governments' experts by the defendants. In early 2000, the district court judge newly assigned to the litigation accelerated the pace of the case. That judge ordered the defendants to produce their expert reports within two months and allowed the governments only six weeks to depose the defendants' experts. The judge set trial for early October 2000.

During the course of the litigation and prior to trial, the governments reached five settlements with three sets of defendants:[9] two with Potlatch and Simpson, two with LACSD and other local governmental entities;[10] and one with CBS Corp. (formerly Westinghouse). These settlements left four defendants.[11] The settlements totaled $67.2 million for the EPA and the Trustees.

Trial began on October 17, 2000. While the trial was ongoing, the governments and the remaining four defendants reached settlement. The final settlement provided $73 million for the EPA and the Trustees. Appendix F contains a summary of the Montrose settlements and how the recoveries were divided between the EPA and the Trustees. The total principal amount paid to the federal government and the state government from all settlements combined was $140.2 million.

2.5 LIMITATIONS ON USES OF SETTLEMENT FUNDS FOR NATURAL RESOURCE RESTORATION

After considering the results of the damage assessment efforts, the Trustees determined that the following general categories of restoration actions meet the provisions of the settlement agreements and the relevant federal rules governing natural resource damage assessment and restoration (43 CFR Part 11):

- Actions that restore the public's ability to fish for clean fish in the marine waters of the SCB.
- Actions that restore bald eagles and peregrine falcons to the Channel Islands.
- Actions that compensate the public for interim losses of these resources and services, and that restore interim losses of the seabirds and fish for which there is evidence of past injuries from exposures to the DDTs and PCBs at issue in this case.

Section 4 of this Restoration Plan describes the restoration goals and objectives as well as the strategies and planning process developed with public consultation.

[9]Due to EPA's decision to begin response actions related to the Palos Verdes Shelf, the parties amended the original consent decrees with Potlatch and Simpson and LACSD and the local governmental entities to address the changed role of EPA.

[10]The defendants named the 140+ local governmental entities as third party defendants. These entities were the municipalities that owned and operated sewage collection or storm water conveyance systems that discharged into the ocean.

[11]The governments had dropped one defendant from the case prior to the beginning of the trial. The remaining defendants were Montrose Chemical Corp. of California; Atkemix Thirty-Seven, Inc.; Aventis Cropscience USA, Inc. (formerly Rhone-Poulenc Inc., and corporate successor to Stauffer Chemical Company); and Chris-Craft Industries, Inc.

The study area is located within the Southern California Bight (SCB), an oceanic region bounded landward by the coast and seaward by the continental slope (Patton Escarpment). For the purposes of the Restoration Plan, the SCB is defined as the area between Point Conception (north), Cabo Colonet, located south of Ensenada, Mexico (south), outside of the Cortez and Tanner Banks (west), and coastal watersheds (east). The study area extends from Point Dume to Dana Point along the coast and includes the California Channel Islands and those Baja California Pacific Islands that lie within the SCB. To facilitate National Environmental Policy Act (NEPA) analysis and descriptions, the United States portion of the study area has been divided into three subareas: coastal, the Northern Channel Islands, and the Southern Channel Islands (Figure 3.0-1).

The coastal subarea has been further divided into the following six reaches:

- Coastal Reach 1: Pont Dume to Pacific Palisades
- Coastal Reach 2: Pacific Palisades to Palos Verdes Estates
- Coastal Reach 3: Palos Verdes Estates to Cabrillo Beach
- Coastal Reach 4: Cabrillo Beach to Orange County jurisdictional boundary
- Coastal Reach 5: Orange County jurisdictional boundary to Corona del Mar
- Coastal Reach 6: Corona del Mar to Dana Point

The two subareas of the Channel Islands are separated geographically and geologically, which can also relate to species distribution patterns. The Northern Channel Islands subarea includes four islands: San Miguel, Santa Rosa, Santa Cruz, and Anacapa.

The Southern Channel Islands subarea also includes four islands: Santa Barbara, San Nicolas, Santa Catalina, and San Clemente.

Management and ownership of the Channel Island falls under the jurisdictions of the Channel Islands National Park, the Channel Islands National Marine Sanctuary, the U.S. Navy, the Catalina Island Conservancy, and The Nature Conservancy. Land use, including management, is described in Section 3.5.

The following subsections summarize existing conditions according to major resource categories, including geology and earth resources (Section 3.1), oceanographic and coastal processes (Section 3.2), watershed and coastal water quality (Section 3.3), biological resources (Section 3.4), land use and recreation (Section 3.5), aesthetics and visual resources (Section 3.6), transportation (Section 3.7), air quality (Section 3.8), noise (Section 3.9), cultural resources (Section 3.10), and socioeconomics (Section 3.11).

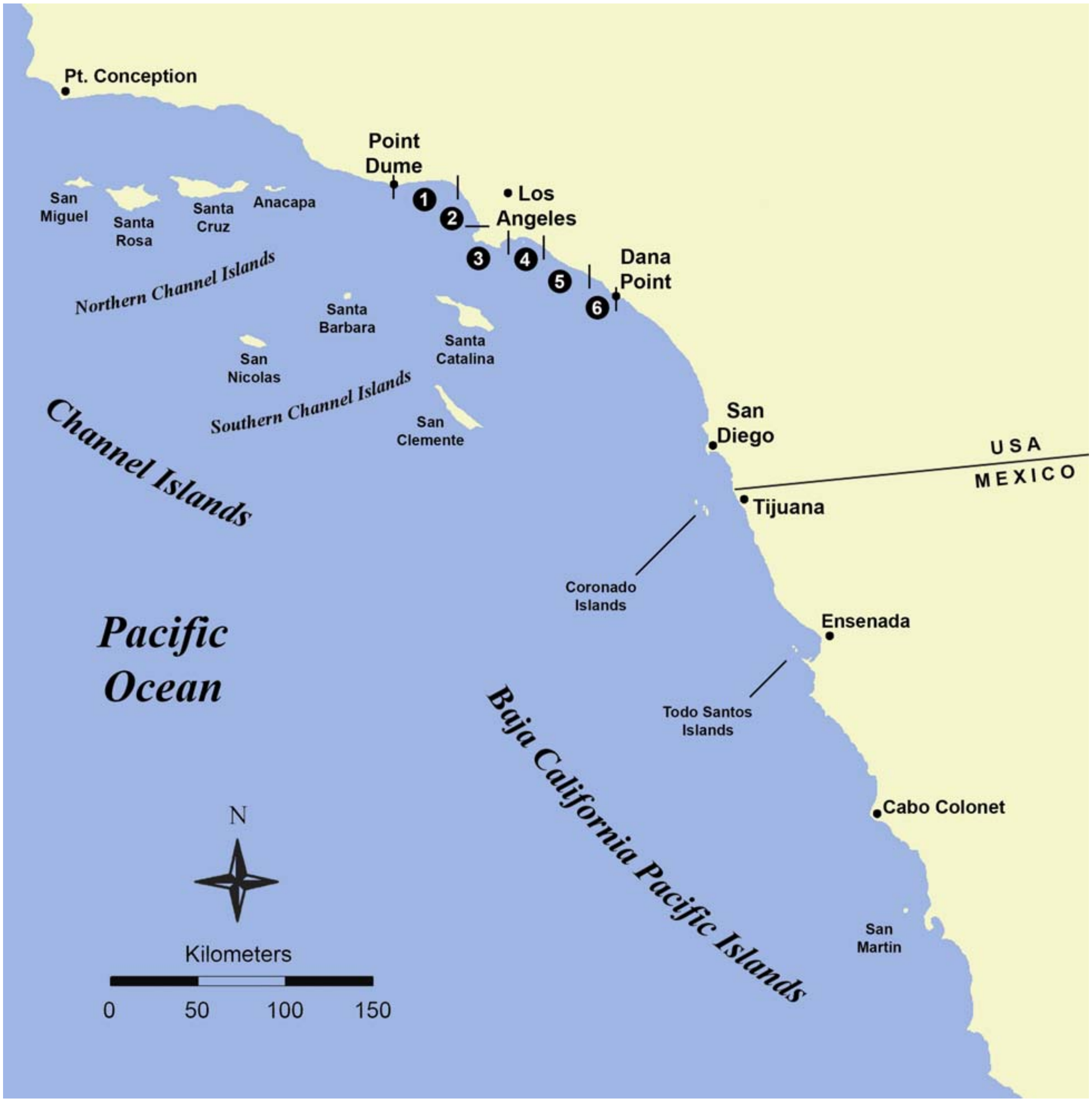


Figure 3.0-1. Study area for the Montrose Settlements Restoration Program with coastal and island subareas.

3.1 GEOLOGY AND EARTH RESOURCES

The study area consists of low lying coastal areas backed by uplifted mountain ranges and uplifted islands offshore (Figure 3.1-1). The shorelines of the coastal mainland are characterized by uplifted marine terraces, coastal bluffs, and "drowned" alluvial plains. The most extensive marine terraces within the study area are exposed along the sides of the Palos Verdes Hills and at Dana Point (California Coastal Commission 1987). The geology of the Channel Islands is predominantly of igneous and sedimentary origin (Thorne 1967, Schaffer 1993), and marine terraces occur along the coasts of these islands.

Three major geomorphic features occur in the marine environment within the Southern California Bight: the Santa Barbara Basin, and the Inner and Outer Borderlands (Dailey et al. 1993). These features include canyons, ridges, and basins defined by unique patterns of seismicity, fault types, sea floor topography, and bottom sediments (Figure 3.1-2). The Santa Barbara Basin is north of the study area. The study area includes the Inner Borderlands and shelf of the Outer Borderlands around the Channel Islands to depths of 200 meters (656 feet) in both areas.

3.1.1 Bathymetry and Topography

The shoreline topography and offshore bathymetry along the coastal reaches of the study area are shown in Figure 3.1-3. Elevations range from sea level along the coast to 451 meters (1,480 feet) in the Palos Verdes Hills. The width of the shelf along the coast varies from 1.9 kilometers (1.2 miles) to 22 kilometers (13.7 miles) and includes several marine canyons that intercept the shelf and slope. The nearshore portion of the study area consists geographically of Santa Monica Bay, Palos Verdes Shelf, San Pedro Bay, and the open coastal waters off Orange County.

Santa Monica Bay is characterized by a gently sloping continental shelf that extends to the shelf break at a water depth of approximately 80 meters (265 feet). At the break, the seafloor becomes steep along the slope but then flattens into the deep Santa Monica Basin in approximately 800 meters (2,630 feet) of water (Terry et al. 1956, SMBRP 1994). The Dume, Santa Monica, and Redondo Canyons bisect Santa Monica Bay.

The Palos Verdes Shelf is narrow and extends offshore to approximately 75 meters (245 feet) of water. The shelf ranges in width from 1.9 to 7.4 kilometers (1.2 to 4.6 miles). Features of the shelf and bathymetry in the vicinity of the Los Angeles County Sanitation Districts' Joint Water Pollution Control Plant (JWPCP) outfalls offshore of White Point are shown in Figure 3.1-4.

San Pedro Bay consists primarily of the Los Angeles/Long Beach Harbor complex and a relatively flat, wide shelf offshore. The development of the ports has involved a series of dredge-and-fill operations to deepen channels to accommodate deep-draft vessels and to provide fill for additional land areas for terminal development. Typical water depth in the outer harbor is approximately 15 meters (50 feet).

Relatively regular bathymetric features typical of open coasts characterize the coastal region adjacent to Orange County. Newport Canyon bisects the shelf offshore of Newport Bay. The shelf narrows downcoast of the canyon, and the nearshore bathymetry is largely shore-parallel along this reach of the SCB.

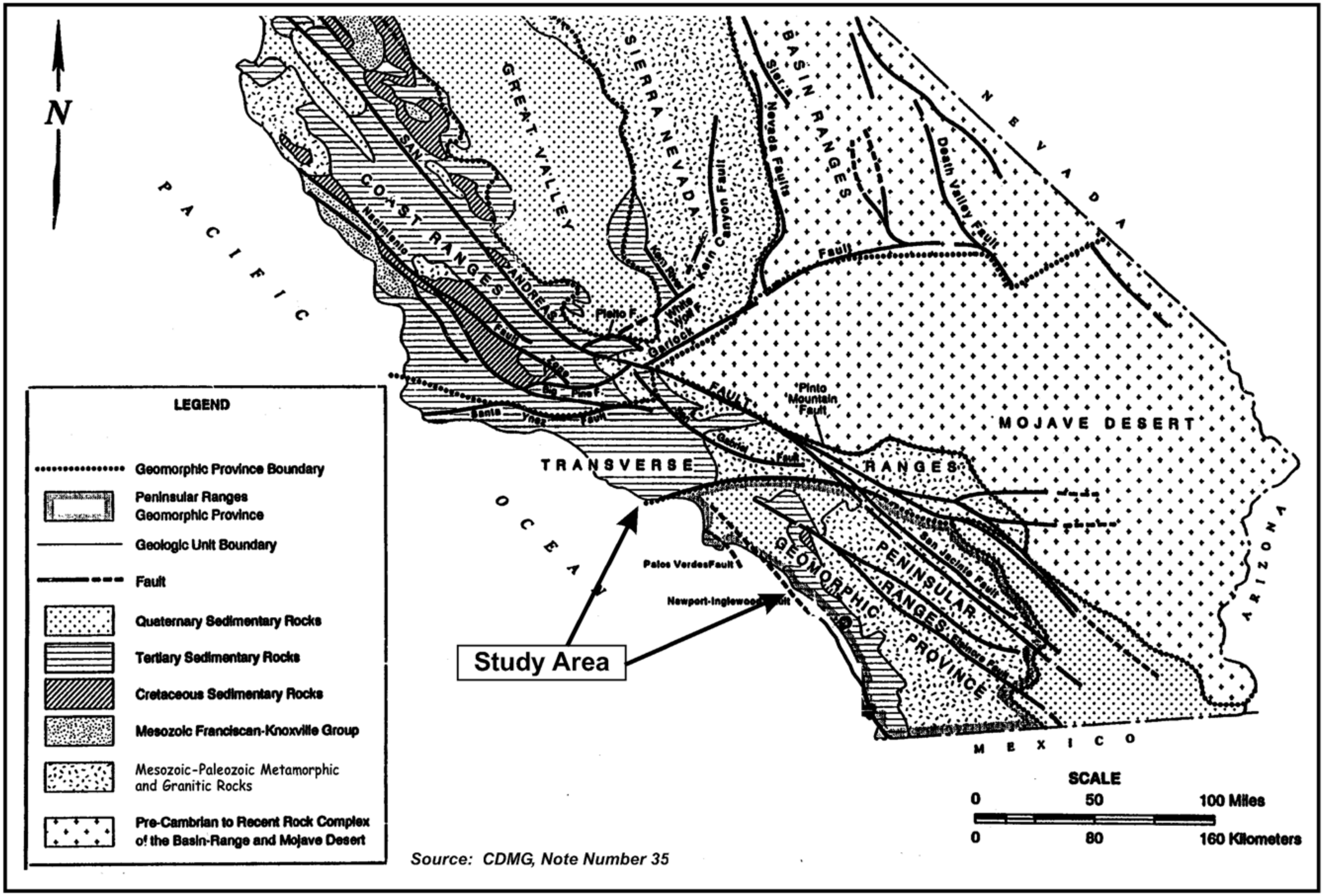


Figure 3.1-1. Geomorphic setting of the region.

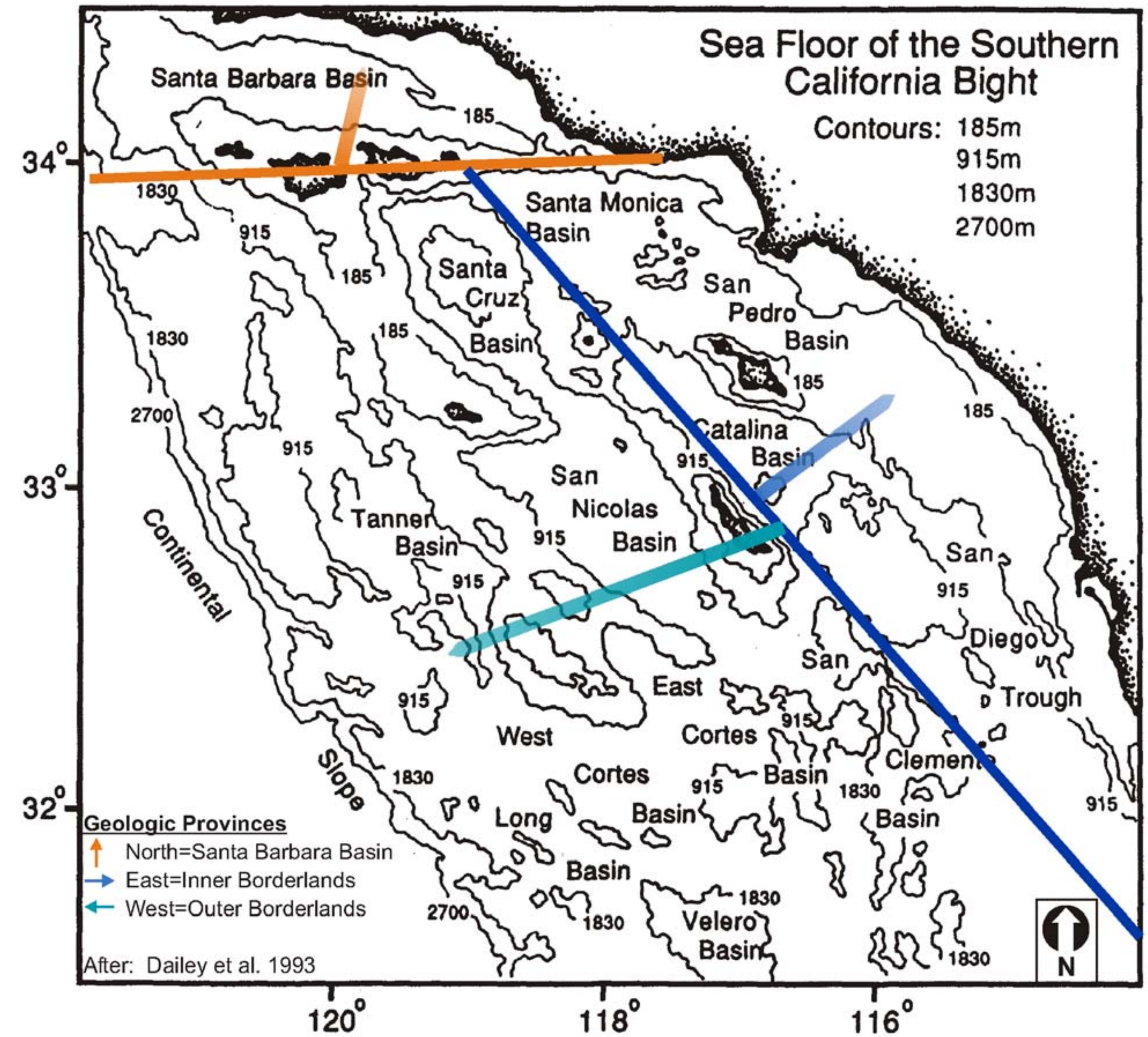


Figure 3.1-2. Major geologic provinces and seafloor characteristics of the Southern California Bight.

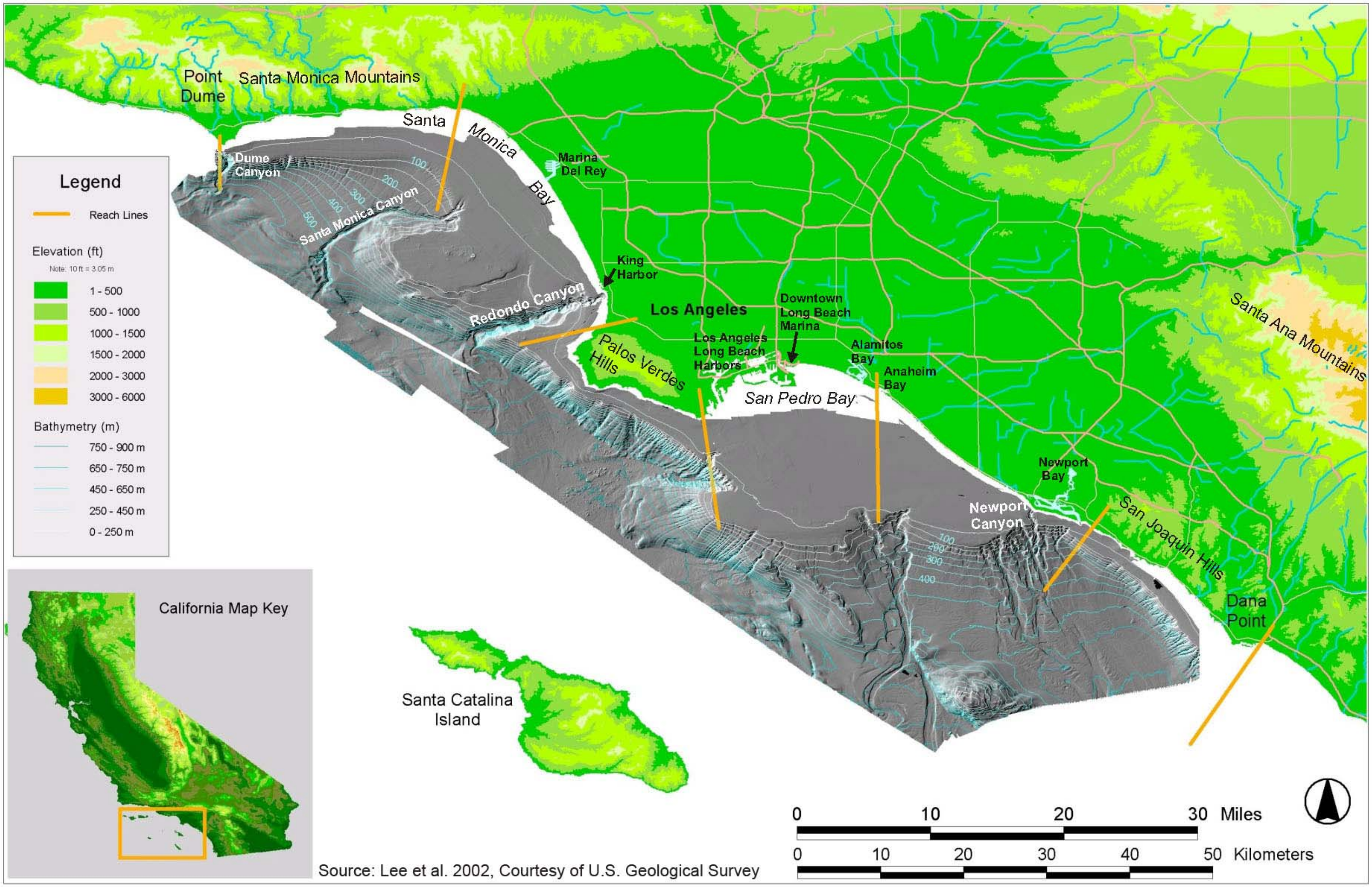


Figure 3.1-3. Elevation and bathymetry along the coastline from Point Dume to Dana Point.

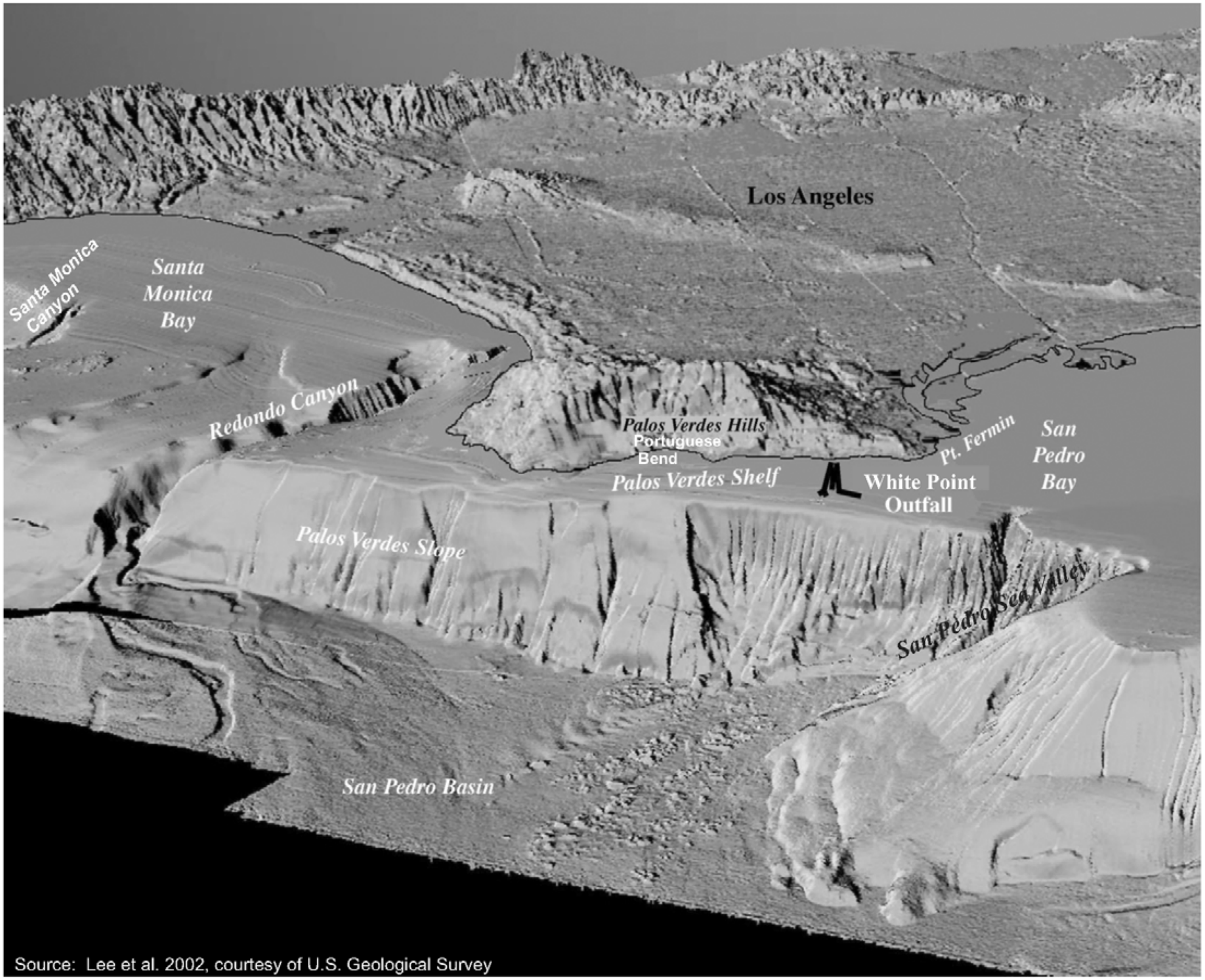


Figure 3.1-4. Oblique view of the Palos Verdes Shelf and slope based on multi-beam bathymetry.

The total land area of the Channel Islands is about 87,102 hectares (215,227 acres), with Santa Cruz being the largest island and Santa Barbara the smallest of the archipelago. Elevations range from sea level to the highest peak at Picacho Diablo on Santa Cruz Island, with an elevation of 747 meters (2,450 feet) (CINMS 2000).

The bathymetry of the Channel Islands forms a relatively wide shelf around San Miguel, San Nicolas, Santa Barbara, and Santa Rosa Islands (Figure 3.1-5). Anacapa and Santa Cruz Islands have a wider shelf on the north than the south sides of the islands. San Clemente and Santa Catalina Islands have relatively narrow shelves. The shelves drop off into basins adjacent to the islands (see Figure 3.1-5).

3.1.2 Shoreline Characteristics and Marine Sediments

Shorelines within the study area were classified into six summary categories: rocky shores, gravel beaches, riprap, sandy beaches, wetlands, and areas with artificial structures (e.g., wharves, piers, or seawalls). These categories, which are based on the California Department of Fish and Game (CDFG) and National Oceanic and Atmospheric Administration (NOAA) Environmental Sensitivity Index Geographical Information System (GIS) database, include shorelines along the seacoast as well as those associated with wetlands, bays, and harbors. Table 3.1-1 summarizes the highest elevation (above mean sea level) and the characteristics of the shorelines within each coastal reach of the study area. In general, shorelines bordered by mountains have rocky shores, shorelines bordered by coastal plains are mostly sandy beaches, and bays and harbors have extensive artificial substrates along their shorelines.

Table 3.1-1
Coastal Shore Elevation and Shoreline Types Within the Coastal Reaches of the Study Area

	COASTAL REACH					
	Reach 1	**Reach 2**	**Reach 3**	**Reach 4**	**Reach 5**	**Reach 6**
Elevation (meters)	427	122	427	61	91	244
Elevation (feet)	1,400	400	1,400	200	300	800
Shoreline Type (%)						
Artificial structure	0	23	0	65	43	10
Gravel beach	0	0	37	0	0	3
Riprap	28	27	1	28	11	22
Rocky shore	20	0	55	0	0	30
Sandy beach	49	46	7	6	15	35
Wetlands	2	4	0	1	30	0

Note: Calculated by MEC Analytical Systems, Inc., for NOAA from Environmental Sensitivity Index GIS data (NOAA and CDFG 2000).

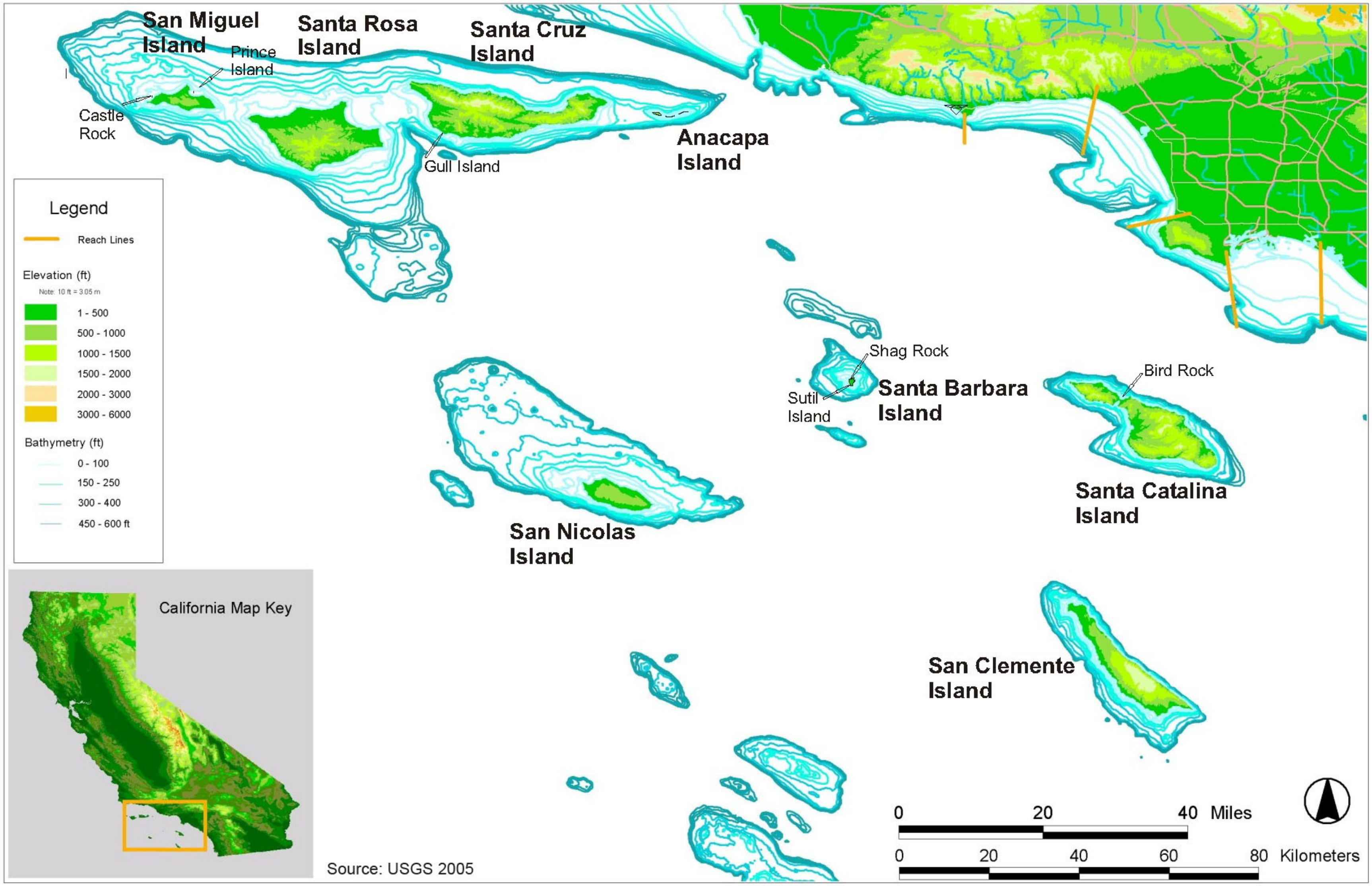


Figure 3.1-5. Elevation and bathymetry for Channel Islands.

Two primary types of sedimentary environments occur within the study area: soft-bottom and hard substrate. Soft-bottom areas range from sands to muds. Hard substrate includes gravel, cobbles, boulders, and exposed bedrock. Figure 3.1-6 illustrates seafloor characteristics based on backscatter soundings measured by the U.S. Geological Survey (Edwards et al. 2003). Human-made hard-bottom areas (e.g., the Hyperion and County Sanitation Districts of Orange County wastewater outfall pipelines and their associated rock ballast) are included in the figure.

Sediments of the inner shelf are usually coarse and fine sands, whereas those of the outer shelf tend to be silts and clays with localized intrusions of differing sediments (Thompson et al. 1993). Sources of sediment include coast bluff erosion, runoff from rivers and creeks, runoff through storm drains, and suspended solids discharged from wastewater treatment outfalls. The discharge of solids has decreased dramatically over the past 18 years with improvements to wastewater treatment (SCCWRP 1993).

Anthropogenic sources of sediment have included pollutants from wastewater outfalls and non-point source runoff from storm drains and rivers. Recent sediments include clay mineral and sand particles that are mixed with organic, chemical, and metal pollutants (Connolly and Glasser 2002). Sediments containing pollutants occur in Coastal Reaches 2 and 3:

- Coastal Reach 2: Anthropogenic sediments occur on the shelf in Santa Monica Bay; these sediments have been estimated to range in thickness from a few centimeters to 60 centimeters (24 inches) (Edwards et al. 2003).
- Coastal Reach 3: Effluent-affected sediments occur on the Palos Verdes Shelf northwest and offshore of the JWPCP outfall off of White Point (LACSD 2002). The size of the deposit is estimated to be more than 40 square kilometers (15 square miles). Within this deposit, concentrations of p,p'-DDE range up to several hundred parts per million (ppm), and concentrations of PCBs are as high as 15 ppm (LACSD 2002, Lee et al. 2002).

Many of the shores of the Channel Islands are characterized by rugged sea cliffs, waterfalls, stream canyons, and sea caves (NPS and Channel Islands National Park 2002). Shoreline platforms of wave-cut terraces with rocky or gravel beaches predominate; however, a few sandy beaches occur on most of the islands (Table 3.1-2). Rocky reefs extend offshore of much of the shorelines of the islands.

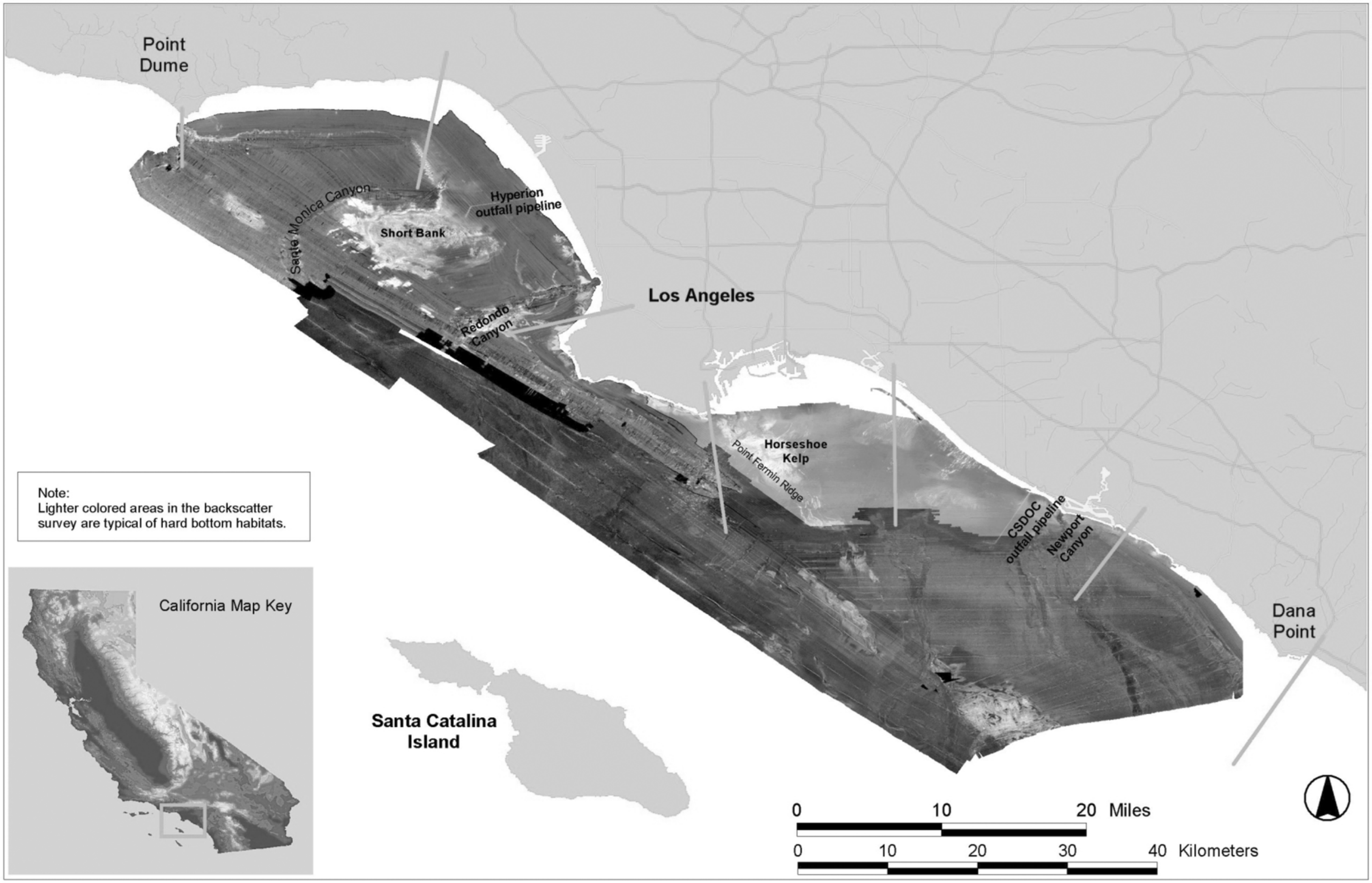


Figure 3.1-6. Multibeam backscatter image of seafloor characteristics along the coastline from Point Dume to Dana Point.

(Modified from Edwards et al. 2003.)

Table 3.1-2
Elevation, Size, and Shoreline Types for Channel Islands

	Island							
	San Miguel	**Santa Rosa**	**Santa Cruz**	**Anacapa**	**Santa Barbara**	**San Nicolas**	**Santa Catalina**	**San Clemente**
Elevation (meters)	252	483	742	283	194	277	648	599
Elevation (feet)	831	1584	2434	930	635	910	2125	1965
Area (hectares)	3,841	21,470	25,080	298	261	644	19,400	14,500
Area (acres)	9,491	53,051	61,972	737	644	1,591	47,937	35,830
Shoreline Type (%)								
Artificial structures	0	0	0	0	0	0	1	0
Gravel beach	0	1	9	13	10	6	45	35
Riprap	0	0	0	0	0	1	2	0
Rocky shore	69	63	71	86	88	59	41	58
Sand beach	31	35	20	1	2	34	10	6
Wetlands	0	1	0	0	0	0	0	0

Sources: NPS 1999, Power 1980.

3.1.3 Seismology

Several major faults occur within the study area (Figure 3.1-7), including well-known faults such as the San Andreas, Elsinore, and Whittier. However, less-known faults off the coast and along the shoreline are more likely to affect the SCB than well-known faults. Unmapped blind-thrust faults also represent an undefined potential hazard to the SCB (Simila 1993). Within the SCB, the Santa Barbara Channel Region, with its associated coast and islands, has been the most seismically active area off the shore of Southern California in the past 100 years. The San Pedro Basin, east of Catalina Island, has a moderate level of seismicity. The San Nicolas Basin has a low level of seismicity (Simila 1993).

The highest seismic gravity ratings occur along the Northern Channel Islands and along Coastal Reach 1. This hazard rating indicates that these areas are likely to experience earthquakes of significant magnitude between five and six times per century. Coastal Reaches 2 through 5 have moderate seismic gravity ratings with significant earthquakes predicted once per century. Coastal Reach 6 and Santa Catalina Island are predicted to have significant earthquakes on the order of once every 200 years. The seismic hazard rating is once per 300 years for the other Southern Channel Islands. However, the San Clemente fault zone is considered to be active and potentially hazardous (Reynolds 2003).

3.1.4 Liquefaction

Soil type is an important factor in determining earthquake hazard. Unconsolidated sediments, such as those that lie on the shelf regions of the Santa Monica and San Pedro Bays, may experience liquefaction (SCEC 1996). These marine soils are already saturated and when exposed to strong shaking may flow along a gradient (Kramer 1996). Seismic hazard zones associated with liquefaction also occur in areas of unconsolidated sediment along the shoreline, drainages, creeks, coastal lagoons, and embayments. Areas of greatest hazard include Malibu Lagoon, Marina Del Rey, and King Harbor within Coastal Reaches 1 and 2, Los Angeles/Long Beach Harbor and Alamitos Bay in Coastal Reach 4, Anaheim Bay, Huntington Harbor, Bolsa Chica wetlands, and Newport Bay in Coastal Reach 5, and creek drainages and Dana Point Harbor in Coastal Reach 6 (SCEC 1996).

3.1.5 Landslides

Pacific Palisades in Coastal Reach 2 is a well-known landslide area. Similarly, Portuguese Bend and Royal Palms on the Palos Verdes Peninsula are known landslide locations. Landslide materials represent a major source of sediments to the shelf. It has been estimated that landslide-derived sediments on the Palos Verdes Shelf range from 5.7 and 9.4 million metric tons (6.3 to 10.4 million U.S. tons) (Kayen et al. 2002). Mineralogical data indicate that at least 2.7 million metric tons (3 million U.S. tons) of landslide-derived sediment has mixed with the mid- and outer-shelf effluent-affected sediment layer off the Palos Verdes Peninsula (Kayen et al. 2002).

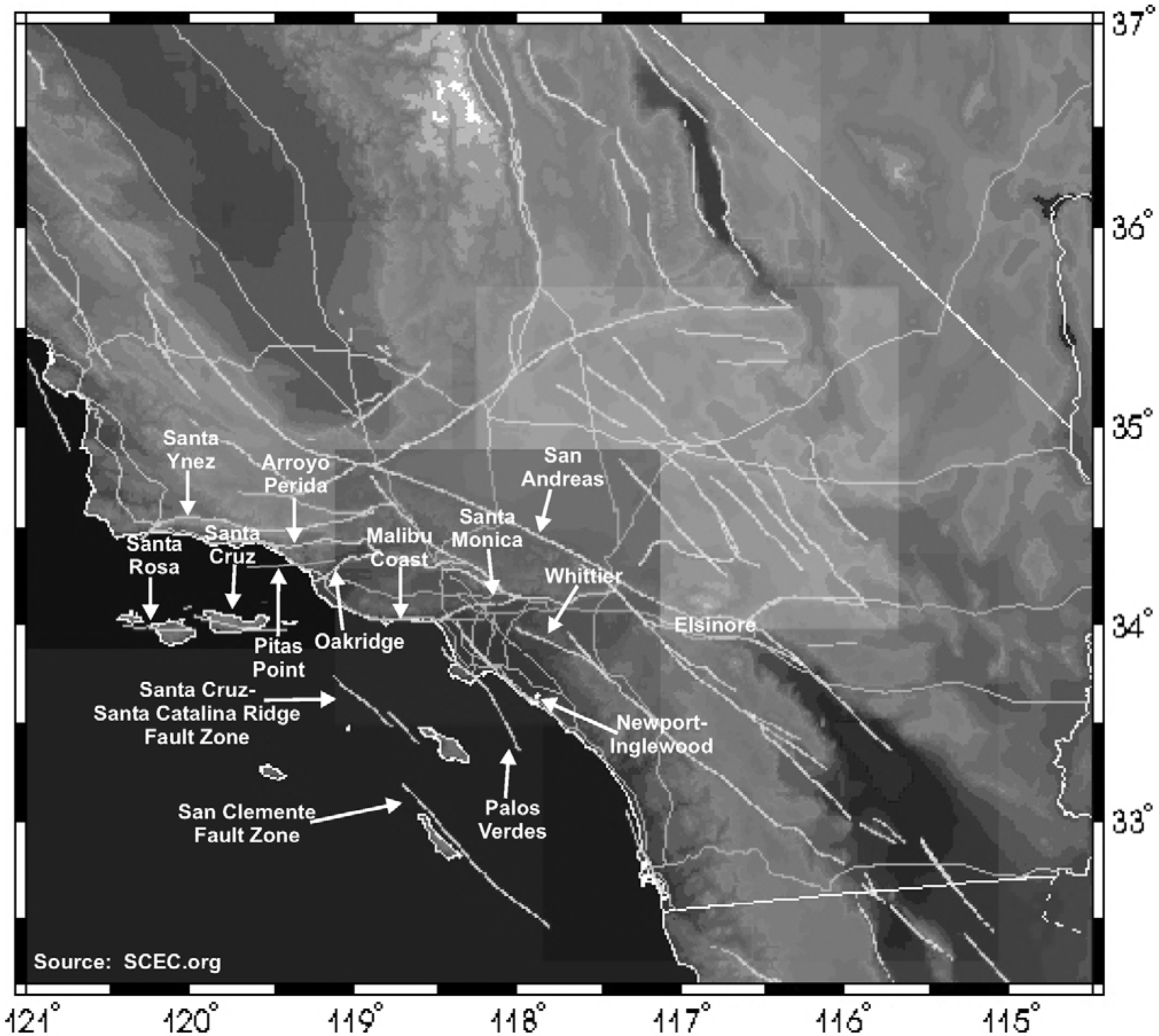


Figure 3.1-7. Major faults within the study area.

3.2 OCEANOGRAPHIC AND COASTAL PROCESSES

3.2.1 Currents and Tides

The California Current is a broad, equator-ward flow that brings cold water from the Gulf of Alaska down the coast along the seaward boundary of the SCB and turns shoreward near the U.S.-Mexico border (Hickey 1993). A branch of the California Current turns pole-ward into the SCB, where it is known as the Southern California Countercurrent. This countercurrent moves warm water from Southern California northwestward up the coast. This countercurrent is strongest in summer and fall when it can be eddy-like (Southern California Eddy) and rejoin the California Current, and in winter when pole-ward flow north can be continuous; during the spring this countercurrent appears to be absent.

The California Undercurrent, which flows approximately 240 to 270 meters (800 to 900 feet) below water surface with relatively high temperature and salinity, moves pole-ward over the continental slope; this undercurrent is the strongest during the summer. The undercurrent surfaces north of Point Conception during the fall and winter and is known then as the Davidson Current.

The California Current moves closer to shore during spring and away from shore during summer, which results in a predominantly equator-ward flow during summer and pole-ward flow during winter within the SCB (DiGiacomo and Holt 2003, Jackson 1986). No obvious seasonal structure has been observed in the flow (Noble et al. 2002).

Tides within the SCB are of a mixed, semidiurnal type consisting of two unequal high tides and two unequal low tides within a tidal period of 24 hours and 50 minutes. Table 3.2-1 shows the tide datums relative to mean lower low water (MLLW) based on data recorded at the NOAA tide station in Los Angeles Outer Harbor. These data show that the tides in San Pedro Bay have a tidal range of approximately 1.7 meters (5.5 feet) and a mean tidal level of approximately 0.9 meter (2.9 feet) MLLW. The tidal range and datums within the SCB vary slightly from those recorded in San Pedro Bay as a result of interactions with landforms.

Table 3.2-1
Tide Datums

Tide	Elevation (meters, MLLW)
Highest observed water level	2.43
Mean higher high water	1.68
Mean high water	1.45
Mean tide level	0.87
Mean low water	0.29
Mean lower low water	0.00
Lowest observed water level	-0.79

3.2.2 Wave Characteristics

The wave climate within the SCB is affected by the presence of numerous offshore islands, shallow banks, and coastal submarine canyons that partially shelter the coastline from deep ocean surface waves. The wave pattern within the SCB is thus spatially complex due to the reflection, refraction, diffraction, and dissipation of the incident deep ocean waves.

Wave climate within the SCB is composed of waves generated by extratropical storms, tropical storms, and southern hemisphere extratropical storms. Prefrontal winds and local winds also generate waves of shorter periods within the region.

Extratropical storm waves approach the SCB primarily from the general west during northern hemisphere winters. Generated by North Pacific low-pressure systems developed along the polar front, the extratropical storm waves are the predominant wave component affecting the SCB during winters.

Tropical storm waves generated by tropical cyclones approach the SCB from the southeast off the Mexican coast during northern hemisphere summers. These storms occur approximately 15 to 20 times a year and affect the SCB when taking a southeasterly track. Sheltering afforded by offshore islands, such as San Clemente Island, tends to reduce the wave energy for portions of the nearshore SCB.

Southern hemisphere swell generated by large South Pacific storm systems during southern hemisphere winters approaches the SCB from a south-southwest window. However, the long travel distances of these waves result in the characteristically narrow frequency bands, which enhance the capacity of the waves to amplify nearshore.

Prefrontal seas generated by strong winds prior to frontal passages approach the coasts in the SCB from the southeast. Wave data indicate that wave conditions over the SCB are produced primarily by deepwater waves approaching the SCB (CDIP 2003). These data demonstrate the dissipation of wave energy by island and headland shadowing, diffraction, refraction, and dissipation. Although swell from the south is present, its energy is negligible compared with that from the northwest and therefore does not appear in the directional wave spectrum.

3.2.3 Sediment Transport

Sediment transport within the SCB consists of littoral drift in the nearshore and sedimentation on and near the shelves. Littoral drift is composed of sediment transport in and near the surf zone in longshore and cross-shore directions driven primarily by wave-induced currents. Sedimentation on the continental shelves is driven by a combination of surface gravity waves, internal waves, and subtidal currents.

Sediment transport in the nearshore is normally evaluated as a component in the sediment budget within a littoral cell. Sediment transport in the Santa Barbara littoral cell is driven by the predominantly westerly waves. The southerly waves are to a large extent sheltered by the Channel Islands. The longshore transport rate along the Santa Barbara littoral cell was estimated to be approximately 214,100 cubic meters/year (280,000 cubic yards/year) in an eastward direction (SWQCB 1965).

Longshore sediment transport in the Santa Monica littoral cell is marked by predominantly downcoast drift with occasional upcoast reversals as a result of seasonal variations in wave approach direction. The net longshore drift is downcoast (southward) at a rate of approximately 146,000 to 191,000 cubic meters/year (191,000 to 250,000 cubic yards/year) off Santa Monica Beach (DMJM 1984, Ingle 1966), 151,000 cubic meters/year (198,000 cubic yards/year) off Dockweiler Beach, and 167,000 cubic meters/year (219,000 cubic yards/year) off Manhattan

Beach and Hermosa Beach (Landrum-Brown 1996). Approximately 153,000 to 306,000 cubic meters/year (200,000 to 400,000 cubic yards/year) were estimated to be lost to Redondo Canyon from both up- and downcoast beaches (Gorsline 1958).

Sediment transport on the Palos Verdes Shelf is characterized by predominant northwestward fluxes along the shelf, with occasional southeastward reversals. Shelf sediment is typically resuspended by gravity waves from the seabed and transported by prevailing currents at the time of resuspension. The currents that carry the suspended sediment are generally independent of wave conditions (Wiberg et al. 2002) and can include the currents produced by internal waves and tidal processes (Jones et al. 2002). It was estimated that the frequency of significant resuspension and transport is approximately 10 events per year in 60 meters (200 feet) of water on the shelf and 3 events per year in 90 meters (300 feet) of water beyond the shelf break

Sediment movement in the San Pedro littoral cell is obstructed by the presence of the Los Angeles/Long Beach Harbor complex, which alters the wave conditions near the beaches. The longshore transport rate along Peninsula Beach was estimated at approximately 41,000 cubic meters/year (54,000 cubic yards/year) in an upcoast (toward northwest) direction (Morris 1998). Farther downcoast off of Seal Beach and the beaches of Orange County, longshore sediment transport occurs in both directions with net drift directed to the downcoast (southeast) direction. The longshore transport rate has been estimated to be approximately 211,000 cubic meters/year (276,000 cubic yards/year) off of Surfside-Sunset Beach, 86,000 cubic meters/year (112,000 cubic yards/year) at the Santa Ana River mouth, and 97,000 cubic meters/year (127,000 cubic yards/year) off Newport Beach (Hales 1980).

Sedimentation on the continental shelves within the SCB is characterized by resuspension of sediment by wave action and transport by subtidal currents. Transport of the resuspended sediment in the nearshore portions of the shelves mostly follows the subtidal currents, which are largely directed parallel to the isobaths. In the deeper portions of the shelves where internal waves occur (e.g., near the shelf break off Santa Monica Bay), sediment has been observed to transport offshore across the shelf breaks and deposit on the continental slopes (Lee et al. 2002).

3.2.4 ENSO Events

El Niño Southern Oscillation (ENSO) events are climatic phenomena characterized by decreases in atmospheric pressure in the eastern tropical Pacific Ocean and easterly trade winds, and an increase in sea level on the west coast of North and South America (Chelton and Davis 1982). During an ENSO event, the equator-ward California Current is weakened, and the warmer, low-salinity Equatorial Countercurrent moves pole-ward into the North Pacific Ocean. Within the SCB, the ENSO condition causes increases in seawater temperature by several degrees Celsius above normal (Dailey et al. 1993), increases in sea levels (Chelton and Davis 1982, Flick and Badan-Dangon 1989), and more vigorous winter storms with pole-ward coastal winds (Hickey 1993).

3.2.5 Upwelling

Upwelling is an oceanographic process in which offshore winds move the surface water away from shore and the deep, anaerobic, and nutrient-rich water rises to replace the displaced surface water. Strong wind-driven upwelling occurs in the SCB in winter and early spring, which causes modifications to water properties such as salinity and temperature distributions in the water column within the SCB. One of the most significant upwelling events occurs off Point Conception, where strong wind-driven upwelling sends upwelled water into the Santa Barbara Channel and basins south of the Channel Islands, resulting in significant modification of water properties in the upper water columns in these regions (Hickey 1993, Atkinson et al. 1986).

3.3 WATERSHED AND COASTAL WATER QUALITY

The six coastal reaches within the study area of this project represent a large portion of the SCB. Watersheds in this area are diverse, ranging from large river systems, such as the Los Angeles and San Gabriel Rivers, to small, coastal streams. Most of the rivers and streams in these watersheds drain urbanized areas as they approach the coast, which impacts water quality along the coast. However, a few systems support diverse aquatic habitats and wildlife. Coastal features within the study area include bays, harbors, estuaries, wetlands, beaches, and open ocean. Several coastal wetlands are also found in the study area, including large wetlands such as Anaheim Bay, Upper Newport Bay, and the Bolsa Chica wetlands, the moderate-sized Ballona wetlands and Los Cerritos wetlands, and several smaller wetlands. In addition, recreational beaches can be found throughout the study area, occurring along lengthy stretches of coastal waters.

3.3.1 Watershed Descriptions

Regulatory Background

Within Coastal Reaches 1 through 6 (Figure 3.3-1), four Regional Boards have the responsibility for setting and enforcing water quality standards:

- The Central Coast Region (Region 3): The Central Coast Region is responsible for setting water quality standards in the study area on the Northern Channel Islands of San Miguel, Santa Rosa, and Santa Cruz.
- The Los Angeles Region (Region 4): The Los Angeles Regional Board covers Coastal Reaches 1 through 4, the Southern Channel Islands, and Anacapa Island.
- The Santa Ana Region (Region 8): The Santa Ana Region is responsible for all of Coastal Reach 5 and the northern third of Coastal Reach 6.
- The San Diego Region (Region 9): The San Diego Region is responsible for water quality standards within the southern two-thirds of Coastal Reach 6.

Under federal terminology, water quality standards must contain two components: (1) beneficial uses and (2) water quality objectives. Both of these must satisfy all of the applicable requirements of the California Water Code, Division 7 (Porter-Cologne Act) and the Clean Water Act (CRWQCB 1995a). These standards are regulated by the Regional Water Quality Control Boards.

A water body has beneficial use if it can be used for the benefit of people and/or wildlife (CRWQCB 1995b). Examples include drinking, swimming, industrial and agricultural water supply, and the support of freshwater and saltwater aquatic habitats. Definitions of the various beneficial uses listed in the basin plans are presented in Table 3.3-1. Table 3.3-2 summarizes beneficial uses by Coastal Reach for surface water bodies within the study area.

Land use source: NOAA 2000; 303(d) source: FWRCB 2005

Figure 3.3-1. Watersheds and impaired water bodies within the study area.

(Back of Figure 3.3-1)

Table 3.3-1
Beneficial Use Definitions for Water Bodies in the Study Area

Acronym	Use	Definition
MUN	Municipal and domestic water supply	Uses of water for community, military, or individual water supply systems, including but not limited to drinking water supply.
AGR	Agricultural supply	Uses of water for farming, horticulture, or ranching, including but not limited to irrigation, stock watering, or support of vegetation for range grazing.
PROC	Industrial process supply	Uses of water for industrial activities that depend primarily on water quality.
IND	Industrial service supply	Uses of water for industrial activities that do not depend primarily on water quality, including but not limited to mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
GWR	Ground water recharge	Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
NAV	Navigation	Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
POW	Hydropower generation	Uses of water for hydropower generation.
REC-1	Water contact recreation	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include but are not limited to swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
REC-2	Non-contact water recreation	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include but are not limited to picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
COMM	Commercial and sport fishing	Uses of water for commercial or recreational collection of fish, shellfish, or other organisms, including but not limited to uses involving organisms intended for human consumption or bait purposes.
WARM	Warm freshwater habitat	Uses of water that support warm water ecosystems, including but not limited to preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
COLD	Cold freshwater habitat	Uses of water that support cold water ecosystems, including but not limited to preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
EST	Estuarine habitat	Uses of water that support estuarine ecosystems, including but not limited to preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, or shorebirds).
MAR	Marine habitat	Uses of water that support marine ecosystems, including but not limited to preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals or shorebirds).
WILD	Wildlife habitat	Uses of water that supports terrestrial ecosystems, including but not limited to preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, or invertebrates), or wildlife water and food sources.
BIOL	Preservation of biological habitats	Uses of water that support designated areas or habitats, such as areas of special biological significance, established refuges, parks, sanctuaries, ecological reserves, or other areas where the preservation or enhancement of natural resources requires special protection.

Table 3.3-2
Summary of Beneficial Uses and Impairments Within Coastal Reaches and Channel Island Subareas of the Study Area

	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Offshore Channel Islands	Nearshore Channel Islands
Beneficial uses								
MUN	X	X	X	X	X		X	X
IND		X		X	X	X		
PROC				X				
NAV	X	X	X	X	X	X		X
GWR			I	X	I			X
AGR						X		X
REC 1	X, I	X, I	X, I	X	X, I	X	X	X
REC 2	X, I	X, I	X, I	X	X, I	X	X	X
COMM	X	X, I	X	X	X	X	X	X
WARM	X, I	X, I	X, I	X, I	X, I	X	X	
COLD	X			I				
EST	X	X		X	X		X	
MAR	X	X	X	X	X	X		X
WILD	X	X	X	X	X, I	X	X	X
BIOL	X	X		X	X		X	X
RARE	X	X	X	X	X	X	X	X
MIGR	X	X		X		X		
SPWN	X, I	X	X	X	X	X		X
SHELL	X	X	X	X	X	X		X
WET	X	X	X	X				
Impairments								
Abnormal fish histology				P				
Ammonia		P		P				
Beach closures	P	P	P	P				
Benthic community effects	P			P				
Coliform bacteria	P	P	P	P	P	P		
Debris		P						
DDT/PCB fish consumption advisory	P	P	P	P				
Enteric viruses	P	P						
Eutropic	P			P				
Exotic vegetation		P						
Fish barriers	P							
Habitat alterations		P						
Hydromodification		P						
Metals	P	P		P	P	P		
Nutrients (algae)	P			P				
Odors				P				
Polynuclear aromatic hydrocarbons (PAHs)		P		P				
Pathogens		P	P		P			
Pesticides		P	P		P			
Reduced tidal flushing		P						
Scum/foam	P			P				
Sedimentation	P							
Sediment toxicity		P		P				
Trash	P	P		P				

X = Present or potential beneficial use
P = Present
I = Intermittent beneficial use

The water quality objectives for surface waters in Coastal Reaches 1 through 6 are established by the Water Quality Control Plans for Regions 3 (Central Coast), 4 (Los Angeles), 8 (Santa Ana), and 9 (San Diego) (CRWQCB 1995a, 1995b, 1995c, and 1995d, respectively). The standards represent maximum levels that allow beneficial uses of the water basin to continue unimpaired.

Assembly Bill 411 includes new standards for concentrations of bacterial indicators that are used for beach postings and closures. The standards, known as the AB411 criteria, are applied in Southern California from April 1 through October 31, which represents the maximum public use period for Southern California beaches. The minimum protective bacterial concentrations are established by the AB411 criteria for waters adjacent to public beaches and public water-contact sports areas.

Watershed Descriptions

Watershed descriptions come from the Southern California Watershed Inventory (SCWI), which is part of the California Coastal Conservancy's Southern California Wetlands Recovery Project. SCWI has identified six major hydrologic units that discharge to the SCB within the six coastal regions defined in this project. The major hydrologic units are shown in Figure 3.3-1. The characteristics of the hydrologic units and the major watersheds and wetlands within them are presented in Table 3.3-3. The six major hydrologic units are:

- **Santa Monica Bay.** The Santa Monica Bay hydrologic unit covers an area of approximately 103,637 hectares (256,000 acres). The hydrologic unit is subdivided into 28 separate drainages that discharge to Coastal Reaches 1, 2, and 3.
- **Dominguez Channel.** The Dominguez Channel hydrologic unit covers an area of 4,102 hectares (10,131 acres). The Los Angeles Harbor is located within Coastal Reach 4.
- **Los Angeles River.** The Los Angeles River is a large hydrologic unit that encompasses 216,351 hectares (534,420 acres). The watershed drains into San Pedro Bay and is located within Coastal Reach 4.
- **San Gabriel River.** The San Gabriel River hydrologic unit covers an area of 183,778 hectares (453,960 acres). The main stem of the San Gabriel River discharges near the Los Angeles/Orange County Line. The mouth is located at the southern end of Coastal Reach 4.
- **Lower Santa Ana River.** The Lower Santa Ana River hydrologic unit covers an area of approximately 725,460 hectares (1,792,000 acres) and can be divided into two major watersheds. The Santa Ana River watershed of approximately 438,248 hectares (1,082,540 acres) and the San Diego Creek Watershed of approximately 39,900 hectares (98,560 acres). Both watersheds lie within Coastal Reach 5.
- **San Juan.** The San Juan hydrological unit covers an area of approximately 129,546 hectares (320,000 acres). The majority of the San Juan Hydrologic Unit lies within Coastal Reach 6. The two largest watersheds within this hydrologic unit are the Aliso Creek Watershed (7,876 hectares [19,456 acres]) and the San Juan Creek Watershed (34,693 hectares [85,696 acres]).

Table 3.3-3
Characterization of Watersheds and Coastal Features Within the Study Area

Hydrologic Unit	Watershed	Wetland	Approx. Size hectares (acres)	Harbor / Marina	Major Tributaries
			COASTAL REACH 1		
Santa Monica Bay	Santa Monica Bay		147,583 (364,554)		
	Ramirez Canyon		1,215 (~3,000)		None
	Solstice Creek		1,150 (2,842)		None
	Malibu Creek		28,241 (69,760)		Cold Creek, Las Virgenes Creek, Medea Creek
		Malibu Lagoon			Malibu Creek
	Las Flores Canyon		1,174 (2,899)		Little Canyon
	Tuna Canyon Creek		411 (1,016)		None
	Topanga Creek		5,091 (12,575)		Garapito Creek, Santa Maria Creek, Suttphur Creek
		Topanga Lagoon			Topanga Creek
			COASTAL REACH 2		
Santa Monica Bay	Santa Monica Bay		147,583 (364,554)		
	Santa Monica Canyon		11,127 (27,485)		Rustic Canyon
	Ballona Creek		23,059 (56,960)		Centinela Creek, Sepulveda Channel
		Ballona Lagoon			None
		Ballona Wetlands			Ballona Creek
				Marina Del Rey	None
				King Harbor	None
				Redondo Beach Marina	None
			COASTAL REACH 3		
Santa Monica Bay	Santa Monica Bay		147,583 (364,554)		
			COASTAL REACH 4		
Dominguez Channel	Dominguez Channel		4,102 (10,131)		Cerritos Channel
				Los Angeles Harbor complex	Dominguez Channel
Los Angeles River	Los Angeles River		216,351 (534,420)		Compton Creek, Rio Hondo
		Los Angeles River mouth			Los Angeles River
				Long Beach Harbor complex	Los Angeles River, Dominguez Channel
				Downtown Long Beach Marina	None
San Gabriel River			183,778 (453,960)		
	San Gabriel River	Hellman Ranch			San Gabriel River, Los Cerritos Channel
		Los Cerritos Wetlands			Los Cerritos Channel
				Alamitos Bay, Long Beach Marina	Los Cerritos Channel

Table 3.3-3
Characterization of Watersheds and Coastal Features Within the Study Area

Hydrologic Unit	Watershed	Wetland	Approx. Size hectares (acres)	Harbor / Marina	Major Tributaries
COASTAL REACH 5					
Santa Ana River			725,460 (1,792,000)		
	Anaheim Bay	Anaheim Bay			Bolsa Chica Channel, East Garden Grove-Wintersburg Channel
		Bolsa Chica Wetlands			Bolsa Chica Channel, East Garden Grove-Wintersburg Channel
	Talbert/Huntington Beach flood control channels	Huntington Beach Wetlands			Huntington Beach Channel, Talbert Channel
				Huntington Harbor	Huntington Beach Channel, Talbert Channel
	Santa Ana River		438,250 (1,082,500)		
		Santa Ana River Mouth Estuary	438,248 (1,082,540)		Santa Ana River
	San Diego Creek		39,900 (98,560)		San Joaquin Channel, Peters Canyon Wash, El Madera Irvine Channel
		Upper Newport Bay			Bonita Creek, San Diego Creek, Santa Ana-Delhi Channel, Big Canyon Wash
		San Joaquin Marsh			San Diego Creek
				Newport Harbor	Bonita Creek, San Diego Creek, Santa Ana-Delhi Channel, Big Canyon Wash
COASTAL REACH 6					
Santa Ana River			725,460 (1,792,000)		
San Juan			129,546 (320,000)		San Juan Creek, Arroyo Trabuco, Oso Creek
	Los Trancos / Muddy Creek		2,902 (7,168)		Los Tancos Creek and Muddy Creek
	Laguna Canyon		2,720 (6,720)		None
	Aliso Creek		7,876 (19,456)		Aliso Creek, Wood Canyon, Sulphur Creek, Aliso Hills Channel, & English Channel
	Salt Creek		1,580 (3,904)		Arroyo Salado
	San Juan Creek		34,693 (85,696)		San Juan Creek, Arroyo Trabuco, & Oso Creek
		San Juan Creek			San Juan Creek
				Dana Point Harbor	None

Source: Southern California Wetlands Recovery Project at http://eureka.regis.berkeley.edu/coast/dbs/profile and http://www.ocwatersheds.com/watersheds/introduction.asp accessed on 1/31/2003.

3.3.2 Coastal Reaches

The major watersheds and coastal features within each of the major hydrological units are characterized below by coastal reach. Under Section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop a list of water quality limited segments. These segments do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water on the lists and develop Total Maximum Daily Loads to improve water quality. The Section 303(d)-listed water bodies are shown in Figure 3.3-1.

Coastal Reach 1

Several watersheds discharge along Coastal Reach 1, from Point Dume to Pacific Palisades (Figure 3.3-1). The majority are small watersheds that drain the deep and narrow canyons of the Santa Monica Mountains. The largest watersheds in this area are Malibu Creek and Topanga Creek. No harbors or marinas are located within Coastal Reach 1.

Malibu Creek is the largest watershed within Coastal Reach 1 (Figure 3.3-1). It drains an area of approximately 28,241 hectares (69,760 acres) (Table 3.3-3). Urban land use dominates the watershed, particularly in the upper segments. However, a large portion of the watershed is protected within Malibu Creek State Park. Outflow from the drainage empties into Santa Monica Bay through Malibu Lagoon. The streambed of Malibu Creek has not been channelized.

Many of the pollutants of concern in the Malibu Creek watershed are from non-point sources. They include excess nutrients, sediment, and bacteria. Malibu Creek is on the 303(d) list for fish barriers, high coliform count, nutrients, scum/foam-unnatural conditions, benthic community effects, enteric viruses, and eutrophic conditions.

The Topanga Creek watershed lies to the east of Malibu Canyon at the eastern end of Coastal Reach 1. It encompasses an area of approximately 5,091 hectares (12,575 acres) (Table 3.3-3). Topanga Creek is the sole tributary to the Topanga Lagoon, which is located at the mouth of the Creek. Topanga Creek is on the state’s 303(d) list for excessive levels of lead.

Within Coastal Reach 1, 17 water bodies are on the state’s 2002 303(d) list. Two of these (Malibu Creek and Topanga Canyon Creek) are in watersheds that drain to the study area. The rest are coastal water features that include numerous beaches and one lagoon (Malibu Lagoon). Most of the beach sites are listed for exceedances of standards related to concentrations of DDTs and PCBs in fish tissue and subsequent fish consumption advisories. In addition, Dan Blocker Memorial Beach was listed due to exceedances of coliform bacterial levels.

Coastal Reach 2

Ballona Creek is the largest drainage within Coastal Reach 2 (Figure 3.3-1). The watershed encompasses an area of approximately 23,059 hectares (56,960 acres) (Table 3.3-3). A large majority of Ballona Creek is channelized and paved, and the creek contains little in-stream or riparian habitat. The creek discharges to the Ballona wetlands by four concrete culverts.

Santa Monica Canyon is located on the northeast border of Santa Monica Bay (Figure 3.3-1). This watershed encompasses an area of approximately 11,127 hectares (27,485 acres)

(Table 3.3-3). Two major drainages occur in the watershed: Santa Monica Canyon Creek and Rustic Canyon Creek.

Coastal Reach 2 contains 17 water bodies on the state's 2002 303(d) list. Four of these are classified as rivers: Santa Monica Canyon (listed for high coliform count and lead), the Pico Kenter storm drain (listed for ammonia, copper, enteric viruses, and high coliform counts), Ballona Creek (listed for cadmium in the sediment), and Ballona Creek estuary (listed for chlordane in fish tissue and sediment). One tidal wetland (Ballona Creek wetlands) and one beach site (Manhattan Beach) occur. The remainder of the water bodies on the 303(d) list within Coastal Reach 2 are classified as a bay or a harbor. Most of these are listed for high coliform counts. However, Marina Del Rey is listed for a variety of contaminants, including organochlorine pesticides (including DDTs), PCBs, metals, and sediment toxicity. In addition, the offshore and nearshore areas of all of Santa Monica Bay are included on the 303(d) list in Coastal Reach 2. The list for Santa Monica Bay includes DDTs and PCBs (in sediment and fish), chlordane, polynuclear aromatic hydrocarbons (PAHs), and sediment toxicity.

Coastal Reach 3

Coastal Reach 3 encompasses the seaward portion of the Palos Verdes Peninsula (Figure 3.3-1). The entire reach lies within the Santa Monica Bay hydrologic unit. However, no sub-watersheds discharge directly to the coast within Coastal Reach 3. Also, no marinas or harbors are located within the reach.

Coastal Reach 3 contains 12 water bodies on Palos Verdes Peninsula, all of which are classified as a coastal shoreline or beach. Nearly the entire beach area on the Palos Verdes Peninsula is listed on the 303(d) list (Figure 3.3-1). All of the water bodies listed except Lunada Beach, Palos Verdes Shoreline Park Beach, and Point Vicente Beach are in exceedance of standards for DDTs and PCBs. In addition, the entire Palos Verdes area is covered by a fish consumption advisory.

Coastal Reach 4

Three major hydrologic units discharge to the coast within Coastal Reach 4: the Dominguez Channel, the Los Angeles River, and the San Gabriel River (Figure 3.3-1).

The Dominguez Channel hydrologic unit covers an area of 4,102 hectares (10,131 acres) (Table 3.3-3). The main drainage in the basin is the Dominguez Channel, which flows south and empties into the Consolidated Slip area of Los Angles Harbor in San Pedro Bay. The Dominguez Channel is on the state's 303(d) list for ammonia, pesticides (including DDTs in fish tissue and sediment), chromium, ChemA contaminants, and benthic community effects. The Consolidated Slip is one of the most polluted areas of Los Angeles Harbor. It is listed for DDTs and PCBs (in fish tissue and sediment) several metals, chlordane, dieldrin, toxaphene, and sediment toxicity.

The Los Angeles River hydrologic unit drains an area of approximately 216,351 hectares (534,420 acres) (Table 3.3-3). Two main tributaries discharge to the lower sections of the Los Angeles River: Compton Creek, which drains an area northwest of the Los Angeles River main stem, and Rio Hondo, which drains an area to the northeast. The Los Angeles River is completely channelized except for one small reach in the middle portion of the river called the narrows. Both the Los Angeles River and Queensway Bay, where the river discharges, are listed for several contaminants.

The Los Angeles and Long Beach Harbors are located in San Pedro Bay at the mouths of the Dominguez Channel and the Los Angeles River (Figure 3.3-1). Extensive modification of the area has taken place since the late 1800s, and the Los Angeles/Long Beach Harbor complex is now one of the largest ports in the country. Influences on water quality in the area include two generating stations in the inner harbor areas, numerous non-process waste dischargers, secondary treated effluent from a public-owned treatment works, and runoff from the Los Angles River and the Dominguez Channel, which drains a highly industrialized area.

Due to inputs of contaminants from the above sources, combined with poor tidal flushing in some areas of the Los Angeles/Long Beach complex, contaminant levels have repeatedly exceeded the standards for the area. Both nearshore and offshore zones of all of San Pedro Bay are on the state's 303(d) list for sediment toxicity and the following contaminants that have been found in the bay's sediment: chromium, copper, DDTs, PCBs, PAHs, and zinc. San Pedro Bay is also on the 303(d) list for fish consumption advisories for excessive levels of DDTs and PCBs that have been found in fish tissue. The Los Angeles Harbor Consolidated Slip (which receives runoff from Dominguez Channel), the Main Channel, Fish Harbor, the Southwest Slip, the Inner Breakwater, and Cabrillo Beach are all on the 303(d) list for a variety of contaminants, including DDTs and other pesticides, PCBs, PAHs, metals, sediment toxicity, and benthic community effects. A similar list of contaminants is found on the 303(d) list for several areas in Long Beach Harbor, including the Main Channel, the Southeast Basin, the West Basin, Pier J, and the Breakwater.

The San Gabriel River watershed encompasses an area of approximately 183,778 hectares (453,960 acres) (Table 3.3-3). Flow is dominated by effluent from several municipal wastewater treatment facilities and urban runoff. However, the San Gabriel River estuary and the lower portions of the river are on the 303(d) list only for abnormal fish histology.

One lake is on the 303(d) list within Coastal Reach 4: Machado Lake, which is located in Harbor Regional Park. Machado Lake has been impacted by industrial waste products in the past and is on the 303(d) list for a variety of constituents, including organochlorine pesticides (including DDTs), PCBs, ammonia, eutrophic conditions, and trash. Also, two beaches within Coastal Reach 4 are on the 303(d) list: Inner and Outer Cabrillo Beaches. Both beaches are listed for the presence of fish consumption advisories due to excessive levels of DDTs and PCBs.

Coastal Reach 5

Coastal Reach 5 extends from the Orange County jurisdictional boundary just south of the San Gabriel River to Corona Del Mar. All of this area lies within the Santa Ana River hydrologic unit (Figure 3.3-1). Three major watersheds terminate along the coast within Coastal Reach 5: the Anaheim Bay/Bolsa Chica wetlands, the Santa Ana River (including the Talbert/Huntington Beach wetlands), and the San Diego Creek/Newport Bay system (Table 3.3-3). Also, several coastal wetlands occur within Reach 5, including Anaheim Bay, Huntington Harbor, the Bolsa Chica and Santa Ana River/Huntington Beach wetlands, and Newport Bay.

Of the watersheds that terminate in Coastal Reach 5, the Santa Ana River watershed is the largest. It drains an area of approximately 438,250 hectares (1,082,500 acres) (Table 3.3-3). Surface diversions and groundwater pumping have eliminated most of the dry weather surface flows and most of the Santa Ana River is effluent dominated (CRWQCB 1995c). The Orange County Water District diverts and recharges nearly all the dry weather flows in the Santa Ana

River at the groundwater recharge areas near Anaheim. Downstream of this area, the Santa Ana River is normally dry.

The San Diego Creek watershed encompasses approximately 39,900 hectares (98,560 acres) (Table 3.3-3). Other drainages to Newport Bay include the Santa Ana-Delhi Channel, which discharges at the north end of the bay.

Seven water bodies within Coastal Reach 5 are on the 303(d) list. Only one, San Diego Creek (Reach 2), is classified as a stream or river. San Diego Creek is on the 303(d) list for metals and toxicity from unknown point sources. This creek is the main tributary to Upper Newport Bay. The water quality issues in Newport Bay are primarily non-point in nature. They are discussed under wetlands in Section 3.4.

The remainder of the water bodies on the 303(d) list in Coastal Reach 5 are Seal Beach, Huntington Beach Harbor, and Huntington Beach State Park. All three are listed for excessive levels of bacterial indicators.

Coastal Reach 6

Coastal Reach 6 extends from Corona Del Mar to Dana Point. Two major hydrologic units occur within Coastal Reach 6: the Santa Ana River and San Juan Creek (Figure 3.3-1).

The Los Trancos/Muddy Creek watershed lies within the Santa Ana River hydrologic unit. The watershed covers an area of approximately 2,902 hectares (7,168 acres) and consists of two drainages: Los Trancos Creek and Muddy Creek (Table 3.3-3). The creeks drain the San Joaquin Hills and discharge to the beach at Crystal Cove State Park. Los Trancos Creek is on the state’s 303(d) list for excessive levels of fecal coliform bacteria. Beaches near the Los Trancos/Muddy Creek watersheds are on the state’s 303(d) list for elevated levels of bacterial indicators.

The remainder of the watersheds that discharge within Coastal Reach 6 lie within the San Juan hydrologic unit (Figure 3.3-1). The Laguna Canyon Watershed covers an area of 2,720 hectares (6,720 acres) (Table 3.3-3) and discharges at Laguna Beach. The main drainage in the watershed is the Laguna Canyon Channel. The coastline at Laguna Beach is on the 303(d) list for elevated levels of bacterial indicators.

Aliso Creek is the second largest watershed within the San Juan hydrologic unit (Figure 3.3-1). It covers an area of 7,876 hectares (19,456 acres) (Table 3.3-3). Aliso Creek, which discharges at Aliso Beach, is the main drainage in the watershed. Aliso Canyon Wash is on the 303(d) list. Also, Aliso Creek, its mouth, and the shoreline at Aliso Beach are listed.

The Salt Creek Watershed is the smallest within Coastal Reach 6 (1,580 hectares [3,904 acres]) (Table 3.3-3) and the smallest in Orange County (OCWCRD 2003). Arroyo Salado is the major drainage in the watershed. It discharges at Salt Creek Beach Park, just north of Dana Point (Figure 3.3-1). Land use in the watershed is primarily urban. Salt Creek is on the state’s 303(d) list for elevated bacterial indicators.

The San Juan Creek Watershed encompasses an area of 34,693 hectares (85,696 acres) (Table 3.3-3) and is the largest watershed within Coastal Reach 6 (Figure 3.3-1). San Juan Creek forms the main drainage in the watershed. Arroyo Trabuco and Oso Creek are major tributaries. At the mouth of San Juan Creek is the San Juan Creek wetland, which is discussed under wetlands in Section 3.4. San Juan Creek, its mouth, and the adjacent shoreline are on the state’s 303(d) list for elevated levels of bacterial indicators.

Dana Point Harbor, located in the City of Dana Point, is the only harbor within Coastal Reach 6. The Harbor's Baby Beach is on the state's 303(d) list for elevated levels of bacterial indicators.

Northern and Southern Channel Islands

The Northern and Southern Channel Islands have minimal water quality problems. Except for limited development within Avalon on Santa Catalina Island, land use on the islands is predominantly open space. Surface runoff on the islands drains to the coast from intermittently flowing creeks in small valleys and canyons or through sheet flow over the ground surface (CRWQCB 1995b). The only water feature on any of the islands that is on the 303(d) list is Avalon Beach on Santa Catalina Island, which is listed for bacterial indicators.

3.3.3 Coastal Water Characteristics

The surface temperatures of the coastal waters within Coastal Reaches 1 through 6 range from about 11^{o} to 23^{o} Centigrade (C) (52^{o} to 73^{o} Fahrenheit [F]) (CLADPW 1982). Surface temperatures are affected most by variations in the California Current and the Southern California Countercurrent. At a depth of approximately 60 meters (200 feet), water temperatures in the area range from 10^{o} to 15^{o} C (50 to 59^{o} F).

Historical levels of salinity have been fairly uniform in the surface waters of the SCB. Salinity ranges from 33.5 to 34.1 parts per thousand (ppt) in the California Current and from 33.4 to 34.6 ppt in the California Undercurrent (CLADPW and USEPA 1977). Within the study area, the salinity values of surface waters typically range from 32 to 34 ppt and tend to be fairly homogenous with depth, with differences of less than 1 ppt from surface to bottom waters.

Dissolved oxygen (DO) levels within the study area are usually highest in surface waters due to photosynthetic activity and contact with the atmosphere. At the surface, DO levels are generally near saturation, which varies with temperature and salinity. Historical DO values of surface water in the study area range from 5.0 to 11.6 milligrams per liter (mg/L). The pH of water along the Southern California coast generally has limited variability due to the high buffering capacity of seawater. Surface water pH values in the study area typically range from 7.5 to 8.6. As depth increases, pH levels decrease. A greater range of pH values is often observed in coastal embayments and estuaries due in part due to elevated levels of photosynthesis and respiration.

Turbidity is a result of particles suspended in the water column. In coastal areas and embayments, elevated turbidity levels can result from natural causes (e.g., plankton blooms, wave action, and watershed runoff) and from anthropogenic sources (e.g., urban runoff, wastewater discharge, and dredging disposal). Concentrations of contaminants are often higher in turbid waters due to adhesion to sediment particles. Turbidity levels generally are elevated in coastal embayments and lagoons due to shallow depths (mixing of bottom sediments), river discharges, storm water runoff, and algal blooms.

The density of seawater is a function of its temperature and salinity. Layers of distinctly different water densities (a pycnocline) can result from changes in temperature (a thermocline), salinity (a halocline) or a combination of the two. Pycnoclines form natural barriers to exchange of water between the two layers. Within the study area, a thermocline often develops in the spring as surface temperatures increase. When the surface temperature drops in the fall, the thermocline breaks down. Regional stratification may also occur (primarily in the spring) when storm water runoff produces a freshwater lens on the sea surface. Stratification is usually less distinct in shallow coastal embayments.

3.4 BIOLOGICAL RESOURCES

The distribution of marine habitats and species within the SCB is related to the complex hydrography and geology of the region. The mainland consists of rocky shores, sandy beaches, wetlands, and embayments of various types. Distributed between the mainland and the Channel Islands is a complex mosaic of submarine canyons, ridges, basins, and seamounts. This habitat complexity has contributed to abundant and diverse marine biota. More than 5,000 species of benthic invertebrates, 481 species of fish, and 496 species of algae and seagrasses occur within the SCB (Dailey et al. 1993). The SCB is also the seasonal residence of more than 200 species of coastal and offshore birds and 39 species of marine mammals.

Several sources of information were used to describe existing biological conditions within the study area. The primary sources of information were two regional surveys conducted in 1994 and 1998 (SCCWRP 2004); the data from the vicinity of the Palos Verdes Shelf were augmented by data from the Los Angeles County monitoring program for the wastewater outfall at Palos Verdes (LACSD 2002). Other important sources of information include the comprehensive volume *The Ecology of the Southern California Bight* (Dailey et al. 1993), monitoring programs conducted at the Channel Islands, information from the Southern California Wetlands Recovery Project (2004), environmental sensitivity index maps prepared by the CDFG, and several published and unpublished reports.

The discussion of biological resources is organized into three main subsections. Section 3.4.1 describes the marine and coastal habitats (pelagic, subtidal benthic, intertidal benthic, coastal wetlands, and the Channel Islands) that occur in the study area. Sections 3.4.2 through 3.4.5 discuss the animals of special relevance to the project (namely, fish, birds, marine mammals, and terrestrial mammals). Section 3.4.6 lists the threatened and endangered species in the study area. Because the injuries of the Montrose case focused on marine-associated species, terrestrial resources are not the primary focus of this discussion of biological resources. However, limited discussion of terrestrial resources is presented for the Channel Islands, as they represent breeding habitats for bald eagles, peregrine falcons, and a number of species of seabirds. Sensitive terrestrial species also are addressed, as appropriate, in the threatened and endangered species subsection.

3.4.1 Marine and Coastal Habitats of the Study Area

The marine environment is complex and three-dimensional; it supports a broad diversity of plants and animals. The Southern California marine environment includes 481 species of fish, over 5,000 species of invertebrates, over 400 species of marine macrophytes (plants and algae), 34 species of marine mammals, and 195 species of birds (Dailey et al. 1993). In this document, marine habitats are divided into pelagic, subtidal benthic (soft-bottom and hard-bottom), and intertidal benthic. This section also discusses coastal wetlands (sandy beach and rocky shoreline) and habitats on the Channel Islands (terrestrial, shoreline, and nearshore). The following sections provide brief descriptions of these habitats, discuss the fish and macrophytes associated with them, and outline how each habitat relates to the injuries of the Montrose case.

Pelagic Habitats

Pelagic habitats occur in open water and support free-swimming organisms. The pelagic zone provides important habitat for plankton, though plankton are not exclusive to pelagic habitats.

Plankton is a generic term that includes a broad and diverse group of plants and animals that are found everywhere in aquatic environments. Typically, the smallest plankton are microscopic plant organisms called phytoplankton. The most abundant and important components of phytoplankton are generally the diatoms and dinoflagellates, which range in size from a few micrometers to a few hundred micrometers. Larger planktonic animals include zooplankton, larvae of benthic invertebrates, and ichthyoplankton (larval fish and eggs). Bacteria, which play a critical role in the degradation of particulate organic matter, are also plankton.

Currents, water column stratification, and winds all can affect the movement and distribution of planktonic organisms. Plankton are generally short-lived organisms, or organisms that reside in the water column a short time (ranging from days to months). Thus, species composition and abundance patterns vary greatly on a seasonal and inter-annual basis in response to the fluxes of nutrients, trace elements, and other conditions that affect phytoplankton production.

The vast majority of life in the sea is dependent on the production of organic matter (photosynthesis) in the lighted surface layers (the euphotic zone). Ocean life is largely dependent either directly or indirectly on phytoplankton, tiny unicellular or colonial algae, and macrophytes (larger algae and plants). Phytoplankton provides over 90 percent of the basic organic material that supports marine food webs. Phytoplankton are grazed on by herbivorous zooplankton and small fishes such as anchovies, which in turn are fed upon by larger carnivorous creatures. Fish and seabirds also utilize pelagic habitats.

The role of plankton as a basis for pelagic food webs is critical in several of the restoration options considered in this Restoration Plan. Plankton communities appear to have much lower levels of DDT and PCB contamination than do benthic communities, which also act as the basis of some marine food webs. Fish species that primarily derive their food from plankton-based food webs tend to be lower in contamination than those that derive most of their food from benthic-based food webs. Thus, fish consumption advisories for pelagic fish species tend to occur in few areas and be less limiting than those applied to soft-bottom species (Table 3.4-1). This basic concept will be an important building block for restoring injuries to fish and fishing.

Table 3.4-1
Summary of Recreational Landings (Released Fish Excluded) and Fish Consumption Advisories for Species Targeted by Anglers in Southern California, 1999–2003

Species	Recreational landings (kg)			Consumption advisories
	Shore	Boat	Total	Most limiting (Number of Locations)[4]
Hard-Bottom Species				
Opaleye	47,783	72,317	120,100	
Sargo	9,606	14,752	24,358	
Kelp Bass	1,640	1,338,274	1,339,914	1 meal every 2 weeks (1)
Surfperches- BF[1]	152,770	29,441	182,211	1 meal a month (3)*
Surfperches – WCF[2]	21,886	712	22,599	1 meal a month (3)*
Rockfishes[3]	12,058	834,092	846,150	1 meal every 2 weeks (1)
California Sheephead	1,617	308,496	310,112	
Hard/Soft-Bottom Species				
Topsmelt	8,778	328	9,106	
Barred Sandbass	5,312	1,739,120	1,744,432	
Halfmoon	2,710	124,680	127,389	
California Scorpionfish	1,394	324,167	325,560	1 meal a month (2)
White Seabass	5,399	962,327	967,726	
Black Croaker	1,104	1,007	2,111	1 meal a month (2)
Pelagic Species				
Chub Mackerel	429,185	453,568	882,753	
Pacific Sardine	89,101	791	89,892	
Pacific Bonito	3,002	116,163	119,166	
Pacific Barracuda	1,031	1,632,729	1,633,761	
Yellowtail	91	1,544,432	1,544,523	
Soft-Bottom Species				
White Croaker	19,113	65,138	84,251	Do not consume (7)
Jacksmelt	41,690	25,170	66,860	
Yellowfin Croaker	58,574	8,779	67,353	
California Corbina	20,464	672	21,136	1 meal every 2 weeks (2)
California Halibut	27,285	1,478,456	1,505,741	
Shovelnose Guitarfish	45,502	23,189	68,691	
Queenfish	58,364	2,014	60,379	1 meal a month (3)

Note: Landings are divided into boat and shore modes, and fish species are organized into the habitats with which they are most frequently associated. Biomass estimates are developed from the Pacific Recreational Fisheries Information Network (RecFIN) data. Fishing advisories are as reported by California EPA's Office of Environmental Health Hazard and Assessment (OEHHA). "Shore" refers to all fishing from shore-based modes (beach/bank/pier), and "Boat" refers to boat-based modes 0 to 3 miles from shore. Species are grouped according to their habitats (based on the information presented in Allen 1999).

[1] The "Surfperches - BF" complex includes the following benthic feeding species of surfperch: white seaperch, barred surfperch, calico surfperch, pile perch, black perch, rainbow seaperch, dwarf perch, striped seaperch, and rubberlip seaperch.

[2] The "Surfperches - WCF" complex includes the following water column feeding species of surfperch: walleye surfperch, silver surfperch, spotfin surfperch, shiner perch, and kelp perch.

[3] The "Rockfishes" complex includes the entire *Sebastes* genus blue rockfish.

[4] Numbers indicate the number of locations (out of 11 possible locations) where fish consumption advisories are currently in place in the Southern California Bight. "Most limiting" refers to the advisory where the fewest meals per month are recommended for the species. Absence of a fish consumption advisory for a species may be due either to a lack of data or data indicating low concentrations of contaminants.

*Fish consumption advisories are given for surfperches as a group and are not broken into "BF" and "WCF" sub-categories.

Subtidal Benthic Habitats

Benthic habitats include the substrata and the boundary of the water column that is physically influenced by the substrata. Benthic habitats are typically characterized by water depth and substrate type. Within the SCB, both soft-bottom (i.e., sand and mud) and hard-bottom habitats (i.e., rock and sandstone reefs) are common and each type supports a unique biota. Organisms that live in the sediments are referred to as infauna, those that live on the surface are generally referred to as epifauna or epibenthic, and those that live near the bottom are generally called demersal.

Soft-bottom Habitats

Soft-bottom benthic communities show seasonal variability, with diversity and abundance typically highest in spring and summer and lowest in winter. Benthic communities can also be affected by winter storms (waves and rain) that can physically disrupt bottom communities and/or subsequent runoff that can transport sediment, debris, and nutrients to benthic habitats.

Soft-bottom communities show characteristic zonation related to water depth and (in the nearshore) wave energy and wave surge. Thus, regional surveys and monitoring studies have found distinct benthic communities organized along depth gradients (Jones 1969, Fauchald and Jones 1983, Thompson et al. 1987, Thompson et al. 1993, Diener et al. 1995, Bergen et al. 1999). Soft-bottom subtidal habitats in the SCB support several thousand benthic invertebrate species, which in turn are preyed upon by a variety of demersal fish species.

The types of benthic invertebrates living on and within sediment also vary according to sediment type, depth, and environmental stress. The Inner Shelf has fewer invertebrate species and smaller populations than the Middle and Outer Shelf assemblages. Polychaete worms and small, mobile crustaceans dominate the Inner to Middle Shelf infaunal communities. The infauna of the Outer Shelf include annelid polychaetes, echinoderms, bivalve mollusks, and crustacean ostracods. Epibenthic invertebrates of the Inner Shelf and Middle Shelf include echinoderms (e.g., sand stars and sea stars), crustaceans (e.g., rock crabs and hermit crabs), and mollusks (e.g., sea slugs and sea pens). The Outer Shelf epibenthic invertebrates include sea urchins, brittlestars, and rock shrimp.

Nearshore soft-bottom areas of the SCB support a high abundance of species such as flatfish, surfperch, and croakers. Middle and Outer Shelf species include numerous kinds of flatfish, sulpin, combfish, midshipman, and rockfish. The number of fish species caught, abundance, and biomass increase with water depth out to the Outer Shelf. In many cases, soft-bottom species derive much of there food from benthic infauna and are therefore more highly contaminated with DDTs and PCBs in areas where sediment contamination levels are high. For example, white croaker, which is typically found in soft-bottom areas and feeds primarily on benthic infauna has some of the highest levels of DDT and PCB contamination among the fishes commonly caught in the SCB. Thus, fish consumption advisories are more widespread and more limiting (i.e., “do not consume” in some areas) for this species than for other species (Table 3.4-1).

Eelgrass (*Zostera* spp.) is the primary plant species found in soft-bottom habitat; this species generally grows in beds on mud or sand in protected habitats such as bays, coastal lagoons, and estuaries. It is found from 0 to 6 meters (20 feet), but occurrences at depths shallower than 3 meters (10 feet) are rare, as turbidity from resuspension of fine sediments is a chronic problem. Eelgrass distribution is controlled by depth, substrate stability, and light (Backman and Barilotti

1976). Two species have been reported within the study area. *Z. marina* is the species most commonly reported within the SCB. *Z. asiatica* recently was reported in a few locations south of Point Conception; however, it generally ranges northward to Tomales Bay (Phillips and Echeverria 1990). The characteristics of these species intergrade, and it is not clear what species occur in the Channel Islands (CINMS 2000).

Eelgrass habitat is known to be ecologically important habitat for a variety of invertebrates and fish. Nearly twice as many invertebrates and fish have been reported to occur within eelgrass beds than on surrounding sand habitats (CINMS 2000). Eelgrass provides nursery habitat for a variety of recreationally and commercially important fish and shellfish. Baitfish, such as anchovies and other small fish (e.g., topsmelt), spend an extensive portion of their early life in eelgrass beds. Seabirds such as California brown pelicans and terns prefer baitfish and often forage on the invertebrates and fish associated with eelgrass beds. Waterfowl such as the black brant feed nearly exclusively on the plants. In addition to these apparent biological values, eelgrass plays an important role in stabilizing sediments, recycling nutrients, generating oxygen, and trapping suspended particulates.

Eelgrass beds are found along the coast of Southern California, including shallow water habitats in Los Angeles Harbor, Alamitos Bay, Anaheim Bay, Huntington Harbor, Newport Harbor, and Dana Point (MEC Analytical Systems 1997, MEC Analytical Systems 2000). Eelgrass also occurs in sheltered coves on Anacapa, Santa Cruz, and Santa Rosa Islands. It is not known at this time whether eelgrass occurs on the other Channel Islands.

Hard-bottom Habitats

Hard-bottom and rocky reef habitats are considered to be very productive ecosystems that support a variety of plants and animals. Natural hard-bottom habitats are common in the subtidal areas of the narrow mainland shelf, and they become more abundant as one proceeds from the southeast to the northwest along the coast. Hard-bottom habitats are especially characteristic around the Channel Islands (Thompson et al. 1993). The types of hard-bottom habitats include submerged rock and sand/mud platforms, deformed sedimentary substrate, and boulder and cobble fields. Rocky shores constitute about 20 percent of the SCB (Bakus 1989), but beyond the depth of 30 meters (98 feet) only about 3 percent of the sea floor is hard substrate (Thompson et al. 1993). The distribution of subtidal hard-bottom habitats is less well known than the distribution of intertidal hard-bottom habitats due to a lack of large-scale mapping studies. Often nearshore reefs are found where rocky intertidal habitat occurs; kelp beds are generally good indicators of subtidal reefs (Ambrose et al. 1989).

Many hard-bottom fish species derive their food via pelagic or kelp-based food webs (Cross and Allen 1993) and therefore are typically lower in DDT and PCB contamination than species associated with and feeding from soft-bottom habitats (LACSD 2002). Thus, fish consumption advisories for the hard-bottom species commonly targeted by Southern California anglers tend to be less broadly distributed (i.e., occurring in fewer locations) and less limiting than those applied to soft-bottom species (Table 3.4-1).

Artificial hard-bottom habitats have become common in the SCB either incidentally from development of coastal resources (e.g., construction of piers and wharves, offshore platforms and pipelines, and ocean outfalls) or by design to enhance fisheries, environmental mitigation, and/or recreational uses (e.g., artificial fishing reefs or sunken ships for scuba diving). Lewis and

McKee (1989) provides a list of the artificial reefs that the California Department of Fish and Game has built in the SCB. Many of the wastewater ocean outfalls provide large hard-bottom habitats that function as reefs. An ongoing scientific debate exists about whether artificial hard-bottom habitats contribute to greater productivity and biomass (e.g., Cross and Allen 1993). Some studies report comparable or greater fish density and biomass on artificial reefs than on natural reefs (e.g., Turner et al. 1969, Stephens et al. 1984, Jessee et al. 1985, Ambrose and Swarbrick 1989, Thompson et al. 1993). Other studies have found lower biomass on artificial reefs, which may be related to different reef sizes and complexity (Ambrose and Swarbrick 1989, DeMartini et al. 1989). Nonetheless, artificial reefs do alter the benthic community by providing habitat that displaces soft-bottom species and by recruiting reef-dwelling species. These effects of artificial reefs on local community structure, coupled with the fact that many reef-dwelling species derive there food from sources other than soft-bottom infauna (i.e., pelagic or hard-bottom macrophyte-based food webs) are important aspects of the options considered in this Restoration Plan.

In the SCB, the dominant macrophitic communities associated with hard-bottom habitats are kelp forests. These forests are typically dominated by the giant kelp (*Macrocystis pyrifera*) but include several hundred other species of marine algae. Giant kelp grows well in wave-exposed areas of nutrient-rich, cool water at depths of 6 to 36 meters (20 to 120 feet) (Leet et al. 1992). Kelp attaches to hard substrate by means of a holdfast. Kelp fronds originate from the holdfast and grow to the water surface. Each frond has several leaf-like blades with bladders that buoy the fronds in the water column. The density and abundance of the kelp canopy vary by location, season, and year. Kelp beds in Southern California commonly deteriorate to some degree during summer and fall when temperatures are higher and nutrient concentrations are lower (Foster and Schiel 1985, Tegner and Dayton 1987). Yearly variations in the spatial extent of kelp beds are common.

Although the spatial extent of kelp beds varies seasonally, persistence of kelp within a bed is related to hard substrate size and relief. Point Loma and La Jolla kelp beds in San Diego are typified by large, complex, and high rocky relief and almost always sustain kelp (persistence over large areas for longer than 10 years). Factors that affect kelp persistence include turbidity and/or sedimentation. Kelp are adversely affected by burial, scour, or reduced ambient light levels (Devinny and Volse 1978, Foster and Schiel 1985). Temperature and nutrient concentrations also contribute to yearly differences. El Niño conditions, which result in higher than average temperatures and low nutrient concentrations, have been linked to periodic widespread reductions in kelp canopy (Tegner and Dayton 1987, Dean and Jacobsen 1986).

The presence of kelp on a rocky habitat greatly enhances the community by providing food, shelter, substrate, and nursery areas for many species of fish and invertebrates. Invertebrates found in kelp beds are similar to those found in other hard-bottom habitats. They include lobster, sea stars, sea urchins, and mollusks. Brown, green, and red (fleshy and coralline) algae occur in kelp beds. Surfperch and rockfish (*Sebastes* spp.) usually dominate the fish assemblages (Ebeling et al. 1980, Foster and Schiel 1985, Bodkin 1986). Species generally associated with the kelp canopy include mysids, fouling organisms (e.g., bryozoans), gastropods and crustaceans living on and within the fronds, transient fish (e.g., mackerel [*Scombridae*], Pacific barracuda [*Sphyraena argentea*], Pacific bonito [*Sarda chiliensis*], silversides [*Atherinidae*]), and canopy-associated fish (e.g., kelp perch [*Brachyistius frenatus*], señorita [*Oxyjulis californica*], halfmoon [*Medialuna californiensis*], blacksmith (*Chromis punctipinnis*), rockfish, kelp bass [*Paralabrax* *clathratus*], and kelp fish [*Clinidae* spp.]) (Feder et al. 1974). California sheephead (*Semicossyphus pulcher*), garibaldi (*Hypsypops rubicunda*), and opaleye (*Girella nigricans*) are common in Southern California kelp beds (U.S. Navy 1997a, 1997b). Many kelp-bed fish species are also found in areas of shallower vegetated and unvegetated rocky reefs (Figure 3.4-1). However, the abundance of fish is greater on reefs with high densities of kelp compared to those with low kelp densities (Larson and DeMartini 1984, Cross and Allen 1993). Kelp beds also provide a large food supply for marine birds and mammals (Foster and Schiel 1985). Cormorants are the birds most closely associated with California kelp beds; however, gulls commonly scavenge on the surface canopy, and California brown pelicans and terns exploit schooling fish along the canopy's edge (Foster and Schiel 1985). Mammals such as sea lions, seals, and whales use kelp beds as transitory foraging areas (Foster and Schiel 1985). Kelp (genus *Macrocystis)* is commercially harvested for use in a variety of food products, pharmaceuticals, adhesives, paper products, paints and finishes, rubbers, and textiles (Bakus 1989).

Surfgrass (*Phyllospadix* sp.) generally forms beds on hard-bottom substrate in the lower intertidal and shallow subtidal zones, an area characterized by high turbidity and sedimentation. Surfgrass may form conspicuous beds in the low intertidal to shallow subtidal zones of rocky beaches and generally is found from about 0 to 6 meters (0 to 20 feet). Both the vegetative shoot density and the number of flowering shoots of surfgrass decrease with increasing depth, indicating that light is a limiting resource for both growth and reproduction (Williams 1995). Photoperiod and temperature are major environmental factors controlling reproduction in surfgrass. In Southern California, plants flower all year long, though most reproduction takes place between May and August, especially during June and July. Predators on surfgrass include grazers such as fish, particularly opaleye, and crabs (Williams 1995).

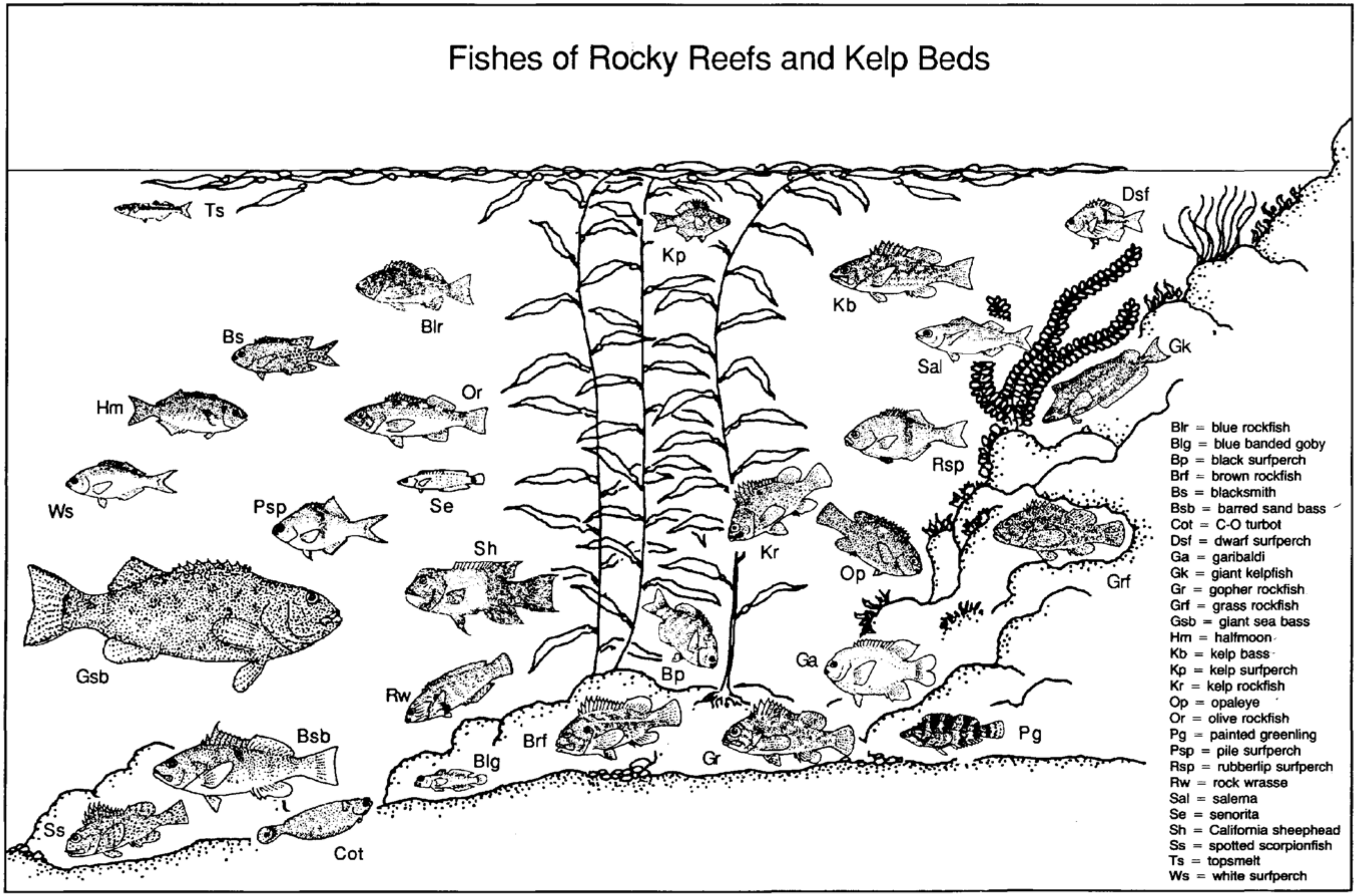
Surfgrass beds provide an important habitat for a diverse assemblage of algae, invertebrates, and fish (Stewart and Myers 1980). In the SCB, surfgrass serves as a nursery for the California spiny lobster (*Panulirus interruptus*) (Williams 1995, Engle 1979). Abundant species of fish found in surfgrass habitats on low-relief, sandstone rock include topsmelt (*Atherinops affinis*), blacksmith, walleye surfperch (*Hyperprosopon argenteum*), señorita, opaleye, and black perch (*Embiotoca jacksoni*) (DeMartini 1981). Garibaldi, surfperch, barred sand bass (*Paralabrax nebulifer*), the gorgonian (*Muricea californica*), California spiny lobster, brown algae (*Egregia menziesii* and *Eisenia arborea*), coralline algae, and a red alga (*Erythroglossum californicum*) are common to abundant in areas where reef and surfgrass are more developed.

Intertidal Benthic Habitats

Intertidal benthic habitats are those ocean bottom environments that exist between mean high tide and mean low tide (sometimes also called the littoral zone). Generally, about 70 percent of the mainland shoreline is sandy shores, and about 70 percent of all rocky shores in the SCB are found on the Channel Islands. Generalized summaries of the sandy beach and rocky intertidal habitats within the SCB are presented below.

Sandy Beach Habitat

Open coast sandy beaches are dynamic environments that undergo sand accretion in summer due to reduced wave energy and erosion in winter as a result of larger, higher-energy waves. This seasonal change in the amount of sand on the beach results in a greater variety and abundance of



Source: Thompson et al. 1993

Figure 3.4-1. Schematic diagram of fishes within rocky reef and kelp bed habitats.

invertebrates inhabiting the intertidal portion of the beach during late spring through summer. The benthic invertebrates in turn provide prey for a variety of shorebirds, including migratory species whose abundance increases in the SCB from summer through fall.

The dynamic nature of sandy beach habitats results in relatively low organic content in the sediments relative to subtidal soft-bottom areas. An inshore-offshore gradient occurs in the levels of DDT and PCB contamination in sediment because DDTs and PCBs adhere more readily to organic sediments and because the primary source of these contaminants (i.e., the White Point wastewater outfall) is in deep, offshore water (LACSD 2002). Thus, the lowest sediment contamination levels are in the intertidal areas, and the soft-bottom species that forage in these areas (e.g., California corbina) have lower contamination levels and consequently less pervasive and restrictive fish consumption advisories (Table 3.4-1).

Although more than 200 species of invertebrates have been reported from surveys of beaches within the SCB, most of these species have been washed ashore or dislodged from adjacent rocky habitats. It is probable that only about 20 species regularly occur on sandy beaches (Straughan 1982, Parr et al. 1978).

Common species of the upper intertidal habitat include insects such as beach hoppers (*Orchestoidea*) and worms such as the bloodworm (*Euzonus mucronata*), which can burrow deeply and is patchily distributed (Parr et al. 1978, Straughan 1982, Thompson et al. 1993). The middle to low intertidal is often dominated by the common sand crab (*Emerita analoga*).

Three species of fish are associated with sandy beach habitat. The best known is the California grunion (*Leuresthes tenuis*), which is managed as a game species by the CDFG. Grunion travel from their habitat in nearshore waters to spawn at night on sandy beaches on the first few nights following each new and full moon between March and August. Spawning occurs 1 to 3 hours after high tide with the eggs being deposited deep into the sand. The eggs are exposed on subsequent high tides, about 10 days later and as they are washed out of the sand they hatch. Grunion are most often found on long and gently sloping beaches with moderately fine grain size. The other two fish species associated with sandy beach habitat include the California corbina (*Menticirrhus undulatus*) and the barred surfperch (*Amphistichus argenteus*), which can often be found foraging for sand crabs in the shallow subtidal habitat of the lower beach (Cross and Allen 1993).

Rocky Shoreline Habitat

Rocky intertidal habitats are varied; they include submerged rock platforms, deformed sedimentary rock, and boulder cobble fields. The organisms of rocky intertidal communities show vertical zonation in response to the extremes of the physical environment (e.g., temperature, tidal exposure, surf exposure, availability, and type of substrate) and biological interactions (e.g., food availability, predation, and population density). The variability among these vertical strata results in different species compositions among rocky habitats: of the 315 species of macroinvertebrates found at 22 sites throughout the SCB, only 14 species were common to all sites (Littler 1979).

The upper intertidal is characterized by acorn barnacles (*Chthamalus*), periwinkles (*Littorina planaxis*), and the western sea roach (*Liga occidentalis*), which is a nearly terrestrial isopod. The middle intertidal zone is often referred to as the mussel zone, with its mussels (e.g., *Mytilus californiensis* and *M. galloprovincialis*) and barnacles (e.g., *Pollicipes polymerus)*. Several of the mid-intertidal species extend into the lower intertidal, and other species such as sea urchins (*Strongylocentrotus purpuratus*), ochre sea star (*Pisaster ochraceum*), bat star (*Asterina miniata*), sea hares (*Aplysia californica*), sand tube worm (*Phragmatopoma californica*), and algae are more abundant in the lower intertidal.

Only six species of fish are resident in the rocky intertidal zones of the SCB (Cross and Allen 1993). Wooly sculpin (*Clinocottus analis*), reef finspot (*Paraclinus nigripinnis*), rockpool blenny (*Hypsoblennis gilberi*) spotted kelpfish (*Gibbonsi elegans*), and California clingfish (*Gobiesox rhessodon*) spend all but their larval life in the intertidal, and the dwarf surfperch (*Micrometrus aurora*) often releases its young into tide pools. Most of these residents feed on small crustaceans and worms, and the opaleye is mostly herbivorous. Most of these fish are small and difficult to see, as they spend much of their time hiding in holes, crevices, or beneath algae.

Coastal Wetlands

Wetlands, which are areas of soft and marshy land, occur where aquatic habitats meet terrestrial habitats. The wetlands in the study area include mudflats, salt panne, saltwater marshes, and freshwater marshes. Wetlands provide many ecological benefits, such as improving water quality, reducing erosion and flooding, and providing habitat for wildlife. Coastal wetland habitats have declined over the past decades due to human population growth and development. However, the loss of wetland habitat and an increased appreciation of wetland benefits have resulted in increased efforts to restore coastal wetlands. Although the extent of wetlands in the SCB has been drastically reduced from historical levels, several coastal wetlands within the study area still support diverse plant and animal communities. Unfortunately, many of these wetlands suffer from restricted flows, habitat degradation, and polluted urban runoff.

Wetlands represent important habitats for over 200 species of resident and migratory birds as well as for a variety of other wildlife. The Southern California coastal wetlands provide important habitat for various bird species, including shorebirds, marsh birds, water birds, and terrestrial birds. Both year-round residents and migratory species use these habitats to breed and forage. Large numbers of migratory birds (including sandpipers, plovers, and many species of ducks) migrate to and from Southern California during the fall and spring months. Some of the bird species that migrate to Southern California wetlands in the summer include terns, avocets, stilts, and skimmers. A small suite of bird species, including great blue herons, mallards, and killdeer, are considered year-round residents of the Southern California coastal wetlands. Table 3.4-2 provides basic information on the size and habitat characteristics of wetlands in the study area.

Table 3.4-2
Summary of Wetland Size and Habitat Types in the Study Area

Wetland	Approximate Wetland Size (hectares/acres)	Open Water	Tidal Flats (non-vegetated)	Tidal Flats (vegetated)	Salt Marsh	Brackish/ Freshwater Marsh	Riparian	Seasonal Wetlands
Malibu Lagoon	37(92)	12 (28)			7 (18)		19 (46)	
Topanga Lagoon	0.85 (2)						0.85 (2)	
Ballona Lagoon	7 (16)	6 (15)	0.6 (1.5)[1]					
Ballona Wetlands	78 (192)		10 (24)	19 (48)	43 (105)		6 (15)	
Los Angeles River	95 (234)[2]					Present*		
Los Cerritos Wetlands	> 57 (140)	39 (95)	3 (8)[3]		8 (19)[4]	7 (18)		
Hellman Ranch	11 (27)		4 (10)[5]		6 (15)			0.8 (2)
Anaheim Bay	387 (956)	89 (220)	61 (151)		229 (566)	0.81 (2)	7 (17)	
Bolsa Chica Wetlands	365 (900)	69 (171)	144 (355)		149 (368)	2 (6)[6]		
Huntington Beach Wetlands	Total acreage data not available	5 (13)	2 (4)		51 (125)	Present*		
Santa Ana River Mouth Estuary	Total acreage data not available		9 (21)		60 (147)	Present*	Present*	
Upper Newport Bay	550 (1357)	366 (904)	27 (67)		155 (382)	2 (4)	0.8 (2)	
San Joaquin Marsh	153 (378)					59 (145)	30 (73)	65 (160)
San Juan Creek mouth	1 (3)						1 (3)	
Buena Vista Lagoon	90 (223)	51 (127)				15 (36)	Present*	6 (14)
Batiquitos Lagoon	212 (524)	141 (348)		34 (85)	40 (100)	3 (7)		

Notes:

Information provided in format of hectares (acres).

*Habitat present, but acreage data not available.

[1]Intertidal; numerous non-native species occupy the higher elevations.

[2]Brackish/freshwater and riverine habitats are present, but acreage data not available.

[3]Intertidal mud flats.

[4]Salt marsh (7.7 acres [19 acres]); salt pan: salt flats are present; acreage data not available.

[5]Tidal channel (1.2 hectares [3 acres]); salt panne: alkaline flats (2.8 hectares [7 acres]).

[6]Freshwater pond (0.4 hectares [1 acre]); freshwater marsh (2.0 hectares [5 acres]).

Source: Southern California Wetlands Recovery Project 2004.

Channel Islands

Terrestrial Habitats

The climate of the Channel Islands is cool and wet in the winter and hot and dry in the summer, though the extremes of temperature are moderated by the maritime influence of the ocean currents, which produce frequent fog. This mild maritime climate has allowed a number of species to persist on the islands even though their mainland counterparts are found near or to the north of San Francisco Bay, or have been completely extirpated on the mainland due to climatic and other factors (Raven 1967). Documentation of the original range and distribution of island endemics is complicated by the current domination of non-native plants that have “only become naturalized on the islands since their introduction by Euro-Americans during the last 200 years” (USFWS 1995b). The spread of non-native and invasive plants on the Channel Islands has been facilitated by overgrazing and trampling of native vegetation by domestic animals (Raven 1967, Thorne 1967, Philbrick 1980).

The general terrestrial native habitats of the Channel Islands are maritime scrub, island chaparral, grasslands, coastal dunes, riparian scrub, riparian woodlands, wetlands, and coastal bluffs. Several treatments of plant communities exist in the literature. Junak et al. (1995), as cited in NPS (1999), developed the detailed list of communities for the Northern Channel Islands based on these treatments. Scrub and non-native grassland communities dominate the landscapes of the Channel Islands. Woodlands are sparse on the islands, though they may have been more extensive before the island habitats were denuded by introduced grazers.

San Miguel Island was dominated by blowing dunes that buried fertile grazing lands through the late 1800s and early part of this century. However, evidence of a scrubland environment on the coast of San Miguel Island exists in the form of trunks that were carbonized in pre-historic fires and the evidence of forests represented by the fossilized “caliche forest” (Johnson 1980, NPS 1999). San Nicolas Island has a history of drought, vegetation stripping by herbivores, and dune formation that mirrors that of San Miguel’s. After vegetation stripping, blowing sands turned rocky coastal shores to sandy beaches and wiped out kelp forests that surrounded the islands. Today the islands have mostly recovered their rocky shores and kelp.

Only Santa Rosa, Santa Cruz, and Santa Catalina Islands have significant arborescent woodlands. Santa Rosa Island has been affected by dune formation after vegetation denudation, but one woodland exists on the north-central part of the island. A variety of oak species occur in woodlands on Santa Rosa, Santa Cruz, and Santa Catalina Islands along with endemic ironwood. A small woodland of the federally endangered Catalina Island mountain mahogany (*Cercocarpus traskiae*) grows on Santa Catalina Island in Wild Boar Canyon. Significant Bishop pine woodlands are found on three mostly north-facing slopes on Santa Cruz Island (Hobbs 1980). Riparian woodlands are uncommon in spite of the many suitable canyon streams because they have been impacted by erosion and vegetation denudation, though a few woody riparian species can be found on most islands (Minnich 1980).

Shoreline and Nearshore Habitats

The Northern Channel Islands experience strong northerly winds that produce active dunes on the windward side of the islands and a zone of strong onshore flow that leaves beaches rocky or gravelly (NPS 1999, Dailey et al. 1993). Sandy beaches account for 20 to 35 percent of the shoreline on San Miguel, Santa Rosa, and Santa Cruz Islands, and are more common on the lee side of the islands or in protected coves (Table 3.1-2).

The Southern Channel Islands have a combination of hard substrate, and sand and gravel beaches (Table 3.1-2). Rocky shores are a predominant habitat, and gravel and/or sandy beaches account for most of the remaining shoreline.

Ocean upwelling from deep basins on the south sides of the Northern Channel Islands provides a rich source of nutrients for plankton and the food chain that supports the island species. Kelp beds favor the northwest and south shores of these islands providing additional habitat and cover to support abundant marine and bird life.

3.4.2 Fish

Fish are an important resource relevant to the Montrose Settlements Restoration Program (MSRP). Although no direct impacts from DDTs and PCBs were demonstrated to have occurred on fish in the Montrose case, fish habitat was demonstrated to have been impacted by these chemicals in a way that compromised the services rendered by fish (Dixon and Schroeter 1998). The Southern California fish fauna comprises over 129 families with over 450 species (Cross and Allen 1993). This diverse assemblage of fish makes use of all habitats, from shallow wetlands and intertidal areas to open pelagic and deepwater benthic habitats (see Section 3.4.1 for more details). The fish assemblage also has a broad size range and a wide range of life-spans. For example, the blue-banded goby (*Lythrypnus dalli*) rarely exceeds 1 inch and typically lives no more than a year, whereas the giant (black) sea bass (*Stereolepis gigas*) may exceed 7 feet, reach a weight of 500 pounds, and live as long as 75 years (Love 1996). This diversity of fish in the SCB results in the broad ecological, recreational, and commercial value of this resource. Fish are important predators of all sizes of prey and are therefore an important structuring force in marine communities. Fish are a major prey item for birds, marine mammals, other larger fishes, and humans, and are therefore a principal transfer pathway of DDTs and PCBs through the food web to species in which the effects of the contaminants of the case were demonstrated (Figure 3.4-2). As a result, fish contamination advisories have been released for several of the fish species that anglers commonly target in the SCB (Table 3.4-1). The fish of the SCB also support important commercial and recreational fisheries and attract thousands of scuba and free divers to the inshore and offshore waters of the SCB every year for sightseeing, fish-counting, hunting, and underwater photography.

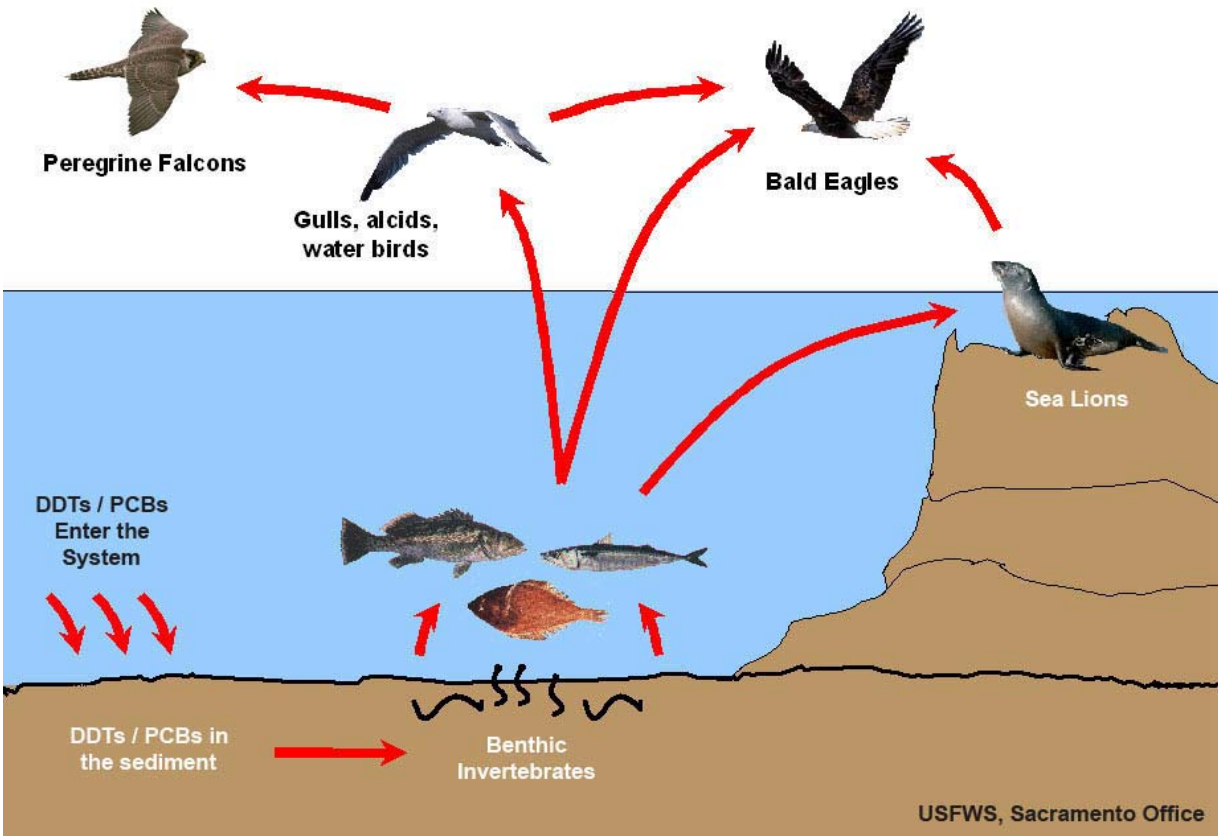


Figure 3.4-2. Major DDT/PCB pathways and the role of fish in the transfer of DDTs and PCBs to upper trophic levels.

The recreational fisheries of the SCB are of particular importance in the Montrose case because the court accepted the lost use of fish resources due to DDT- and PCB-related consumption advisories as an injury in the case. Recreational fishing occurs along the entire Southern California coast, from near Point Conception to the U.S.-Mexico border. The Marine Recreation Fisheries Statistics Survey from 1980 to the present (RecFin 2004) provides a basis for assessing where and how recreational fish species are caught and how the catch has changed over time.

Studies of seafood consumption by recreational anglers indicate that the fish consumption rate in Southern California exceeds the national average (Puffer et al. 1982). A study conducted in the early 1990s found that chub mackerel (*Scomber japonicus*) is the most frequently caught species, but the most frequently consumed species are kelp bass, barred sand bass, rockfishes, Pacific barracuda, and California halibut (*Paralichthys californicus*) (Allen et al. 1996). A more recent review of the fishes retained by anglers in the SCB based on data from the Pacific Recreational Fisheries Information Network (RecFIN 2004) found that the most commonly consumed fish were barred sand bass, Pacific barracuda, yellowtail (*Seriola lalandi*), California halibut, and kelp bass, and that chub mackerel were not the most commonly captured species (Table 3.4-1). Angler consumption rates of potentially contaminated species (e.g., white croaker) varied by ethnic group, indicating that health risk advisories should target the languages and habits of high-risk anglers.

3.4.3 Birds

Birds are another important resource relevant to the MSRP. Top predators such as the bald eagle (*Haliaeetus leucocephalus)* continue to be injured by the DDTs and PCBs that are the subject of the case. Also, seabirds were dramatically impacted by the past discharges of these contaminants and are in various states of recovery since the discharges were stopped. Bald eagles and peregrine falcons consume certain seabird species; thus, the impact of contamination on seabirds is important to understand not only for the potential for adverse impacts on their populations but also as a causative factor in the injury of top predators. DDT and PCB contamination in bald eagles, peregrine falcons, and seabirds, as considered in the case history, is addressed in Section 2.

Over 200 species of birds use coastal and/or offshore habitats within the SCB (Baird 1993). The number of birds fluctuates seasonally with migratory patterns. Seabirds (e.g., auklets, cormorants, gulls, pelicans, phalaropes, shearwaters, storm-petrels, skimmers, and terns) and grebes, loons, and sea ducks account for the greatest biomass of birds within the SCB. The distribution and relative abundance of selected species and groups of birds are described in the following subsections.

Bald Eagles

The bald eagle is currently federally listed as a threatened species. However, the U.S. Fish and Wildlife Service (USFWS) has proposed to de-list the bald eagle, as the birds have made a substantial recovery within their range, particularly on the mainland of the United States. The Pacific Bald Eagle Recovery Plan indicates that the most suitable habitat for recovery in Southern California is on the Channel Islands, particularly Santa Catalina and Santa Cruz Islands (USFWS 1986, Jurek 2000).

Historically, bald eagles occupied all of the Channel Islands in the SCB. From the 1800s to 1950, bald eagle nesting areas were reported from a minimum of 35 different locations on the islands, making the Channel Islands a stronghold for this species in Southern California (Kiff 2000). However, by the early 1960s, bald eagles had disappeared from the Channel Islands. The extirpation is believed to have resulted from a combination of factors, including egg collecting, hunting, urbanization, and DDE contamination (see Section 2.1).

Bald eagles reside along seacoasts, lakeshores, and major rivers. They are large birds, weighing between 10 and 14 pounds, with females typically weighing more than males. Bald eagles that breed in the southern United States are smaller in size than those that reside in the northern United States and Canada. They are a monogamous species, mating for life; however, if one partner dies, the other will select a new mate. The breeding season generally occurs between January and August. Bald eagles do not always breed every year. Nests are built in large trees and are often re-used year after year. Bald eagles lay from one to three eggs, which are incubated for 35 days. The length of time from when the eggs are laid to when all chicks are fledged (first flight) is 16 to 18 weeks. Hatched eagle chicks have a 50 percent survival rate during their first year. Bald eagles reach sexual maturity between the ages of 4 and 5 years, at which time they develop their distinctive white feathers on the head and tail. In the wild, the lifespan of a bald eagle is approximately 30 years.

Bald eagles are only partially migratory. In the winter, migration from their breeding grounds to nearby coastal areas only occurs if their fishing areas freeze over. They have also been known to migrate during the winter from northern breeding grounds to warmer southern regions. The bald eagle is a scavenger and predator of a variety of species. The diet of eagles on Santa Catalina Island consists mainly of pelagic fish snatched from the ocean surface; however, bald eagles also eat birds, mammals (mainly carcasses of sea lions and seals), and invertebrates as well (Garcelon 1994b). Diet is probably similar among individuals on all the Channel Islands (Sharpe and Garcelon 1999a, Valoppi et al. 2000). Adult bald eagles spend more time hunting and killing prey, whereas juveniles are more likely to scavenge and steal food due to their undeveloped hunting skills.

In 1980, the Institute of Wildlife Studies, the USFWS, and the CDFG initiated a program to reintroduce bald eagles to Santa Catalina Island (Figure 3.4-3). The MSRP Trustee Council has funded recent years of this program. Between 1980 and 1986, 33 chicks from wild nests were brought to the island, reared on artificial nest platforms, and released (Sharpe 2003). Several of these eagles have survived and formed nesting pairs. However, none of their eggs have been hatched normally to date, as the eggshells have been too thin for normal incubation, and would have broken under the weight of the adults. Also, the embryos have suffered water loss through the thin eggshells. From1989 to 2005, the population was maintained by collecting the eggs, transporting them to the San Francisco Zoo for artificial incubation, and re-introducing the chicks back to the nests. In 2005, an incubation facility was built on the island, and the eggs were hatched on-site.

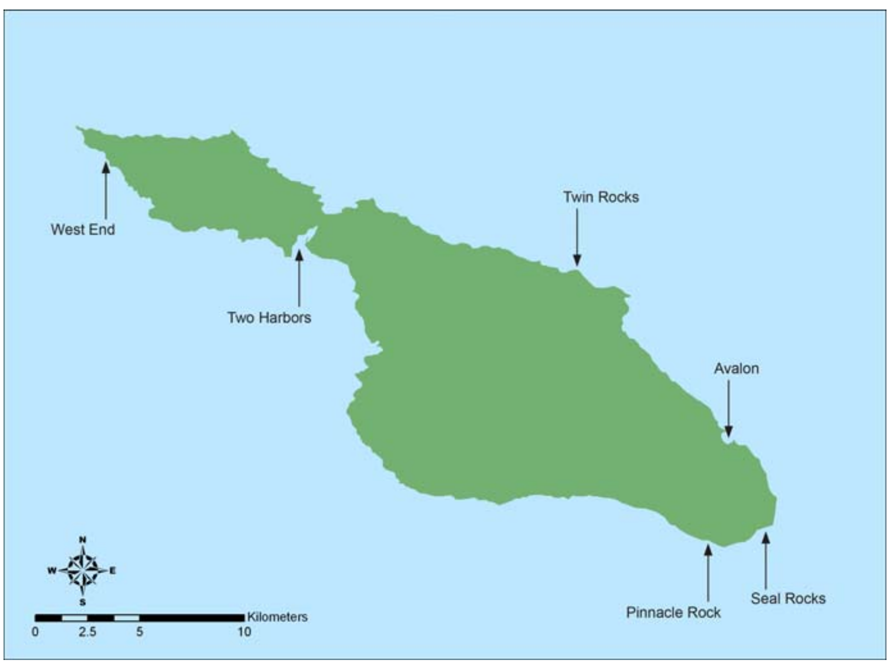


Figure 3.4-3. Active bald eagle territories and points of reference on Santa Catalina Island, California.

Golden Eagles

Prior to the 1990s, golden eagles (*Aquila chrysaetos*) were never known to be year-round residents of the Channel Islands. The species increased in abundance on the Northern Channel Islands because feral pigs provided an abundant food source. With little competition from bald eagles, golden eagles took up residence on several of the Northern Channel Islands. Feral pigs have since been eradicated from Santa Rosa Island, and the eradication of pigs from Santa Cruz Island began in 2005.

Golden eagles became a specific issue of concern on the Northern Channel Islands beginning in the 1990s, when they began preying on the endangered Santa Cruz island fox. In 1999 a program was initiated to capture golden eagles on Santa Cruz and Santa Rosa Islands and relocate them to the mainland in cooperation with the National Park Service and other agencies. From 1999 through September 2005, 19 males, 9 females, and 7 nestlings were removed from Santa Cruz Island and relocated, and 2 males, 1 female, and 3 nestlings were removed from Santa Rosa Island and relocated. As of September 2005, the best estimates are that 1 to 2 adult females, 1 adult male, and 2 to 3 sub-adults remain on Santa Cruz Island and only 1 adult female remains on Santa Rosa Island (Sharpe, pers. comm., 2005).

Peregrine Falcons

Peregrine falcons once numbered in the hundreds in Southern California, and between 20 and 30 pairs nested on the Channel Islands prior to 1945 (Kiff 1980, Hunt 1994). However, peregrine falcons had disappeared from the Channel Islands by 1955, and only two pairs were located in California in 1970 (see Section 2). The peregrine falcon has made a dramatic recovery since 1975, in large part due to an active release program conducted by the Santa Cruz Predatory Bird Research Group. Incubation of thin-shelled eggs removed from wild nests and a captive breeding program provided source birds for the release program. At least 719 peregrine falcons were released in California between 1978 and 1993 (Hunt 1994). Between 1985 and 1993, six peregrine falcon hatchlings were released at sites on San Miguel Island, and 17 hatchlings were released on Santa Catalina Island.

The minimum breeding age for peregrine falcons is 2 years. In 1987, the first reestablished peregrine falcon pair was recorded on San Miguel Island. In 1989, active nests were recorded on Anacapa and Santa Cruz Islands (Hunt 1994). Between 8 and 10 pairs were noted on the Northern Channel Islands between 1992 and 1994 (Hunt 1994). In 2004, approximately 21 peregrine falcon pairs were occupying breeding territories on six of the eight Channel Islands (PBRG 2004). The majority of the pairs (18 of 21) occur on the Northern Channel Islands (San Miguel, Santa Rosa, Santa Cruz, and Anacapa Islands), and 3 pairs occur on the Southern Channel Islands (2 pairs were recently confirmed on Santa Catalina Island and 1 on Santa Barbara Island). Peregrine falcons nest almost exclusively on cliff ledges that are associated with suitable foraging areas; they also have been observed nesting on man-made structures in urbanized areas (CINMS 2000).

The release program has had substantial success in increasing the population of peregrine falcons in California and the rest of the United States. The number of peregrine falcons in California increased from an estimated low of 5 to 10 breeding pairs in the early 1970s to a minimum of 167 occupied sites in 1998 (Herman et al. 1970, USFWS 1999). The Pacific Coast Recovery Plan for the peregrine falcon outlined a recovery goal of 120 pairs in California, including 5 pairs for the Channel Islands (USFWS 1982).

The peregrine falcon was de-listed from the List of Threatened and Endangered Species on August 25, 1999 (USFWS 1999). At the time of de-listing, the recovery goals had been met in California, though full recovery in some areas of California was impeded by ongoing elevated levels of DDTs (Jarman 1994, Walton 1997). Eggshells measured in 1992–1993 averaged 19 percent thinner than eggshells measured before 1947 and had elevated concentrations of DDE (Hunt 1994, Kiff 1994). Productivity rates are substantially lower when eggshells range between 17 and 20 percent thinner than normal (Peakall and Kiff 1988). It has been estimated that 1 ppm of DDE in the diet of peregrine falcons is sufficient to cause the eggshells to be 16 percent thinner, and 3 ppm of DDE results in eggshells that are 10 to 28 percent thinner (Enderson et al. 1982, Deweese et al. 1986, Hunt 1994). Peregrine falcons prey almost exclusively on other birds. Data collected in 1992 indicated that contamination in the food web was still at sufficient levels to result in substantial eggshell thinning on the Channel Islands.

As mentioned above, the peregrine falcon is a highly specialized feeder, concentrating almost entirely on other birds. Kiff (1980) reports that peregrine falcons prey on at least 22 species of birds on the Channel Islands and Coronado Islands. Dietary studies of peregrine falcons in 1992 and 1993 showed that gulls, alcids, and land birds constituted between 73 and 82 percent of their diet, depending on season (Hunt 1994). Grebes, shorebirds, and phalaropes constituted a smaller but still substantial part of their diet. Within these groups of birds, the species that accounted for 5 percent or more of the prey biomass included the California gull (*Larus californicus*), western gull (*Larus occidentalis*), Cassin's auklet (*Ptychoramphus aleuticus*), Xantus's murrelet (*Synthliboramphus hypoleucus*), unidentified grebes, red phalarope (*Phalaropus fulicaria*), rock dove (*Columba livia*), mourning dove (*Zenaida macroura*), and European starling (*Sturnus vulgaris*).

In 1998, eggs from eight peregrine falcon territories on the Northern Channel Islands were sampled to determine eggshell thinning. The average eggshell thinning for all territories on the Channel Islands was slightly below 17 percent. In most coastal Channel Island territories, eggshell thinning exceeded the 17 percent level, whereas the results in most inland Channel Island territories were less than this level (Walton 1999). These differences are likely a reflection of the higher levels of DDE in marine-oriented prey (i.e., seabirds) than terrestrial prey (i.e., land birds) (Walton 1999).

Seabirds

A total of 43 species of seabirds have been reported in the SCB (Baird 1993). These include albatrosses, alcids, cormorants, gulls, jaegers, pelicans, phalaropes, shearwaters, storm-petrels, skimmers, and terns. A total of 14 species of seabirds breed on the Channel Islands (Table 3.4-3). The following sections provide brief profiles of the different types of seabirds within the SCB. Foraging areas for selected seabirds are shown in Figure 3.4-4.

Alcids

This group of seabirds includes the common murre (*Uria aalge*), Xantus's murrelet, Cassin's auklet, Rhinoceros auklet (*Cerorhinca monocerata*), pigeon guillemot (*Cepphus columba*), and the tufted puffin (*Fratercula cirrhata*).

Common murres spend most of their time on the open ocean; they nest on sea cliffs and protected seacoasts (Baird 1993). They build no nests and lay their eggs on narrow rock ledges. They dive to depths of up to 100 meters (328 feet) and feed primarily on fish, shrimp, and squid. They have been extirpated from the Channel Islands, but were observed in 2004 in breeding plumage on Prince Island (Whitworth, pers. comm., 2004). Common murres may also be observed in the SCB in offshore areas. They are particularly vulnerable to entanglement in gill nets due to their underwater foraging behavior, oil spills because they spend long periods sitting on the water, and El Niño events that affect their food supply.

Table 3.4-3
List of Seabirds with Breeding Colonies on the Channel Islands

Common Name	Scientific Name	Status	Channel Islands							
			San Miguel	**Santa Rosa**	**Santa Cruz**	**Anacapa**	**Santa Barbara**	**San Nicolas**	**Santa Catalina**	**San Clemente**
Ashy storm-petrel	*Oceanodroma homochroa*	SSC	X		X	S	X		S	X
Black storm-petrel	*Oceanodroma melania*	SSC	S			S	X			S
Leach's storm-petrel	*Oceanodroma leucorhoa beali*		X				X			
California brown pelican	*Pelecanus occidentalis*	FE, SE	E		E	X	X			
Brandt's cormorant	*Phalacrocorax penicillatus*		X	X	X	X	X	X		X
Double-crested cormorant	*Phalacrocorax auritus*	SSC	X		E	X	X		E	
Pelagic cormorant	*Phalacrocorax pelagicus*		X	X	X	X	X			
Western gull	*Larus occidentalis*		X	X	X	X	X	X	X	X
Common murre	*Uria aalge*		E							
Pigeon guillemot	*Cepphus columba*		X	X	X	X	X			
Cassin's auklet	*Ptychoramphus aleuticus aleuticus*		X		X	X	E		X	
Rhinoceros auklet	*Cerrorhinca moncerata*	SSC	X							
Tufted puffin	*Fratercula cirrhata*	SSC	S		E	E	E			
Xantus's murrelet	*Synthiboramphus hypoleucus scrippsi*	SSC, ST	X		X	X	X		S	X

FE = Federal endangered
SE = State endangered, ST= State threatened
SSC = Species of Special Concern
Notes: X- Breeder; S- Suspected Breeder; E = Extirpated
Sources: Carter et al. 1992, Wolf 2002, Carter, pers. comm., 2003.

Xantus's murrelets are small, burrow-nesting seabirds (Unitt 1984) that establish colonies on crevices, ledges, and sometimes under dense vegetation. They are particularly vulnerable to nest predation by deer mice and introduced rats on some of the Channel Islands. This species is nocturnal and feeds mostly on fish such as anchovies, the larvae of other fish, and aquatic invertebrates (CINMS 2000). The worldwide breeding range of Xantus's murrelet is restricted to the Channel Islands and the west coast of Baja California, Mexico. Currently, this range consists of only 12 nesting islands scattered along 500 miles of coastline (Burkett et al. 2003). Historical accounts and literature from the 1940s indicate that Xantus's murrelet numbers have declined substantially. At present, the murrelet is considered an uncommon species, with approximately

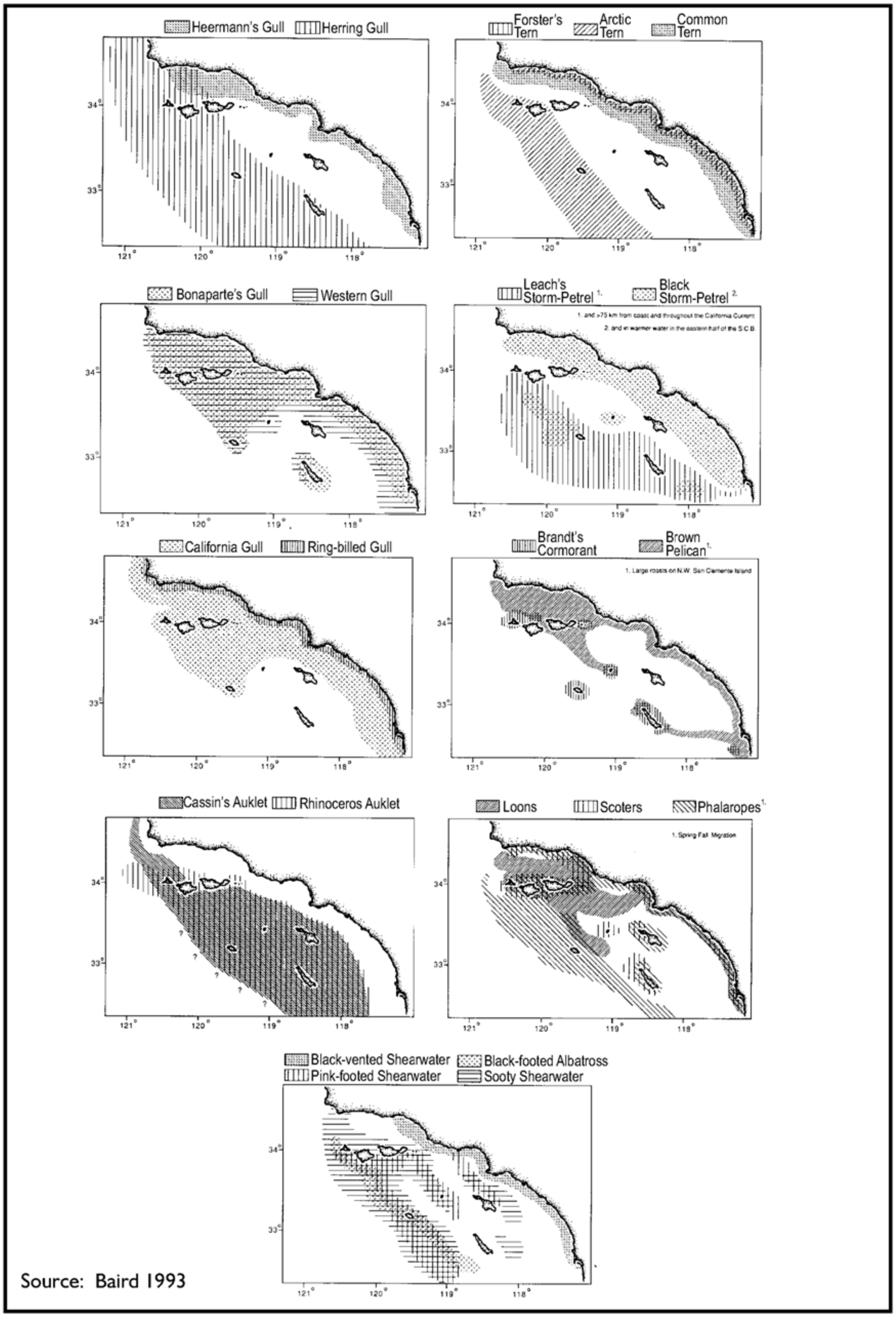


Figure 3.4-4. Most heavily used foraging areas for selected seabirds in the SCB.

3,000 breeding birds in California and less than 10,000 birds worldwide (Burkett et al. 2003). The California Fish and Game Commission made a finding in February 2004 to list the Xantus's murrelet as a threatened species under the California Endangered Species Act. This listing was finalized in June 2004 (CDFG 2004a).

In May 2004, the Xantus's murrelet was also listed as a candidate species for listing as a federally threatened species.

Cassin's auklets breed primarily on Prince Island (near San Miguel Island) and have been observed and may be breeding on other Channel Islands (Carter et al. 1992, Wolf 2002). During the breeding season, Cassin's auklets are dispersed from the midshelf seaward to 150 kilometers (93 miles) offshore. From August through October, following the nesting season, they are observed throughout the SCB (Briggs et al. 1987, Baird 1993). Cassin's auklets are small, burrow-nesting seabirds that are nocturnal and feed diurnally (mainly on copepods and euphasids) at sea, mainly offshore around the Channel Islands. The species is listed as a second priority Species of Special Concern (PRBO 2005).

Rhinoceros auklets are abundant during the winter months on offshore waters along the California coastline concentrating seaward of the shelf break, where they spend their time resting and foraging (Briggs et al 1987, Baird 1993). No historical data exist on breeding populations prior to 1991; however, in 1994, this species was recorded breeding on San Miguel Island (Carter, pers. comm., 2003). The species breeds colonially in burrows in maritime and inland grassy slopes, occasionally on flat ground on forest floors (CINMS 2000). It feeds mainly on small fish, and sometimes squid. Auklets are particularly vulnerable to oil spills because they spend a considerable amount of time sitting on the water (Briggs et al. 1987, Baird 1993).

The pigeon guillemot is more abundant north of Point Conception, but breeding colonies are located on San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara Islands, which form the southern limit of their breeding range (Baird 1993). This species can breed either in colonies or solitarily on cliffs and slopes, occasionally excavating a burrow; eggs are laid in natural crevices or holes (CINMS 2000). It feeds on small demersal fish (blennies and sculpins) and nearshore schooling fish.

Tufted puffins bred on the Channel Islands (Anacapa, Santa Barbara, and San Miguel Islands), the southernmost part of their breeding range, until they were extirpated in the mid-1900s. Recently, this species has been observed in small numbers on Prince Island near San Miguel Island (McChesney et al. 1995, Wolf 2002). The tufted puffin is listed as a first priority Species of Special Concern (PRBO 2005). It builds its nests in holes or crevices; it feeds by diving on fish, squid, and crustaceans and catching them while underwater (CINMS 2000).

Cormorants

This group of seabirds include the Brandt's cormorant (*Phalacrocorax penicillatus*), the double-crested cormorant (*Phalacrocorax auritus*), and the pelagic cormorant (*Phalacrocorax pelagicus*). These species spend most of their time on land roosting and typically forage within 1 kilometer (0.6 miles) of the shore (McChesney et al. 2000).

Brandt's cormorant is considered to be one of the most abundant seabirds in the SCB (Baird 1993). It breeds on all of the Channel Islands with the exception of Santa Catalina Island. This cormorant species is typically found within 10 kilometers (6.2 miles) of the shore and no further than 25 kilometers (15.5 miles) from the mainland or island roosts and colonies. It breeds on islands and gently sloping hillsides (CINMS 2000). The most heavily used foraging areas are around the Channel Islands (Briggs et al. 1987, Baird 1993). It feeds by diving and capturing fish. Although not listed, the Brandt's cormorant has been affected by human disturbance, habitat destruction, and DDE in their eggshells, which causes nesting failure (Gress et al. 1973, Hunt et al. 1980, Baird 1993).

Double-crested cormorants breed on San Miguel, Anacapa, and Santa Barbara Islands; they have been extirpated on Santa Cruz and Santa Catalina Islands (Carter et al. 1992, Wolf 2002). These cormorants were once abundant in the SCB; however, habitat destruction, the presence of DDE in their eggshells, and human disturbance have led to nesting failure and have contributed to population declines (Remsen 1978, Gress et al. 1973, Hunt et al. 1980, Baird 1993). Populations have increased since the 1980s; and breeding populations on the Channel Islands have numbered approximately 2,500 birds in the 1990s (Carter et al. 1992, Gress 1994, McChesney et al. 2000). Double-crested cormorants also have been observed roosting and foraging in the winter in the open water habitats of Bolsa Chica wetlands (Chambers Group 2000). It feeds on schooling fish, aquatic invertebrates, and (rarely) small invertebrates. It builds a nesting platform of sticks, seaweed, and other material and nests along the coast, around marshes or lakes, or on coastal cliffs (CINMS 2000).

Pelagic cormorants are found year-round in the SCB. They breed in small colonies primarily on the Northern Channel Islands and Santa Barbara Island. They are found along the north coast of the SCB, near Point Conception. Peak numbers occur in mid-winter (McChesney et al. 2000).

Gulls

This group of seabirds includes Bonaparte's gull (*Larus philadelphia*), Heermann's gull (*Larus heermanni*), the ring-billed gull (*Larus delawarensis*), the California gull, the herring gull (*Larus argentatus*), the western gull, and the black-legged kittiwake (*Rissa tridactyla*).

Bonaparte's gulls overwinter in the SCB from December through March, congregating along the coastal shores (Briggs et al. 1987, Baird 1993). These gulls forage along the mainland coast and around the Channel Islands.

Heermann's gulls are found in large numbers in San Diego County and along the beaches in the Santa Barbara Channel (Briggs et al. 1987, Baird 1993). Only small numbers of these gulls can be found over open water or near the Channel Islands; most forage within a few kilometers of the mainland shore.

Ring-billed gulls congregate in sheltered bays and estuaries along the mainland coast of the SCB. In winter, they rarely venture further than 1 kilometer (0.6 miles) offshore, and during late spring they migrate to the Rocky Mountain states to begin breeding (Baird 1976).

California gulls are abundant in the SCB along the shallow waters of the coast during the fall and winter months (Briggs et al. 1987, Baird 1993). They typically forage along the mainland coast and around the Northern Channel Islands. Peak numbers occur in the SCB from January through March. During the spring the birds migrate inland to begin breeding.

Herring gulls are found throughout the SCB on island and mainland beaches. During the winter, smaller populations are found on the beaches of San Diego and the eastern portion of the Santa Barbara Channel, and larger populations are found foraging west of the Santa Rosa–Cortes Ridge. Peak numbers occur from January through March (Briggs et al. 1987, Baird 1993).

Western gulls are found extensively throughout the SCB. They are one of the most abundant breeding seabirds in the SCB (McChesney et al. 2000). These birds breed during the months of April through August on all of the Channel Islands. Anacapa Island currently hosts approximately 5,000 breeding pairs (Martin, pers. comm., 2005), and from 1994–1996 western gull populations on Santa Barbara Island ranged from 2,500 to 4,100 breeding pairs. Western gulls also occasionally breed in small numbers along the Southern California mainland at North San Diego Bay, the La Jolla cliffs in San Diego County, Lower Newport Bay in Orange County, and Vandenberg Air Force Base in Santa Barbara County. Western gulls breed colonially, and nests are located on rocky cliffs or headlands on the ground. Western gulls are also found foraging year-round along the shallow waters of the SCB, such as in Anaheim Bay and Upper Newport Bay (MEC Analytical Systems 1995, MEC Analytical Systems 1997). They seldom venture further than 25 kilometers (15.5 miles) offshore of the shelf break. Periods of storms and ocean warming have contributed to population declines (Briggs et al. 1987, Baird 1993).

Black-legged kittiwakes are a Northern California resident species that occasionally migrates to the SCB during the winter. During this time large numbers of kittiwakes can be found on the open ocean, inshore waters, and along beaches and estuaries. A few individuals can be seen in the SCB throughout the year (Briggs et al. 1987, Baird 1993).

California Brown Pelicans

The California brown pelican (*Pelecanus occidentalis*) largely breeds on Anacapa Island in the Channel Islands. A smaller colony also exists on Santa Barbara Island. In 2002, the number of nests and fledglings produced by the Southern California nesting population was estimated at 6,440 and 3,220 individuals, respectively, though the number of nest attempts and fledglings produced is variable by year (the range is 628 to 6,440 and 372 to 6,390, respectively, during the past twenty years [1983–2002]) (Gress et al. 2003).

The Channel Islands also provide important nocturnal and diurnal roosting sites for this ground-nesting bird. High numbers of pelicans (up to 6,000) roost on Santa Barbara Island compared to other areas in the SCB (Baird 1993). Pelicans also roost on a variety of shoreline structures (such as offshore rocks and islands) where human disturbance and predation from mammals is limited. Along the coast of the SCB, pelicans primarily use artificial structures such as breakwaters or jetties. Some important mainland roosting sites are the breakwaters of Long Beach Harbor and Marina del Rey due to the length of the structures, which provide unlimited capacity and protection from winter surf (Strong and Jaques 2003). Higher numbers of pelicans roost on the mainland coast during the months of June through October, as the pelicans move away from their nesting sites. Abundances at roosting sites are affected not only by the time of the year but also by pulses of migration, large storm events (such as El Niño), or high localized abundances of prey. Non-existing or limited roosting habitat occurs from Point Dume to the Santa Monica breakwater (Strong and Jaques 2003). Figure 3.4-5 shows California brown pelican roosting sites along the Southern California coast.

California brown pelicans primarily forage in shallow waters residing within 20 kilometers (12.4 miles) of the mainland coast (Briggs et al. 1987, Baird 1993). These birds have a preference for warmer waters and have been known to concentrate at sea during the months of August through October, when surface temperatures are higher. The California brown pelican is listed as state and federally endangered and is further discussed in Section 3.4.6 of this report.

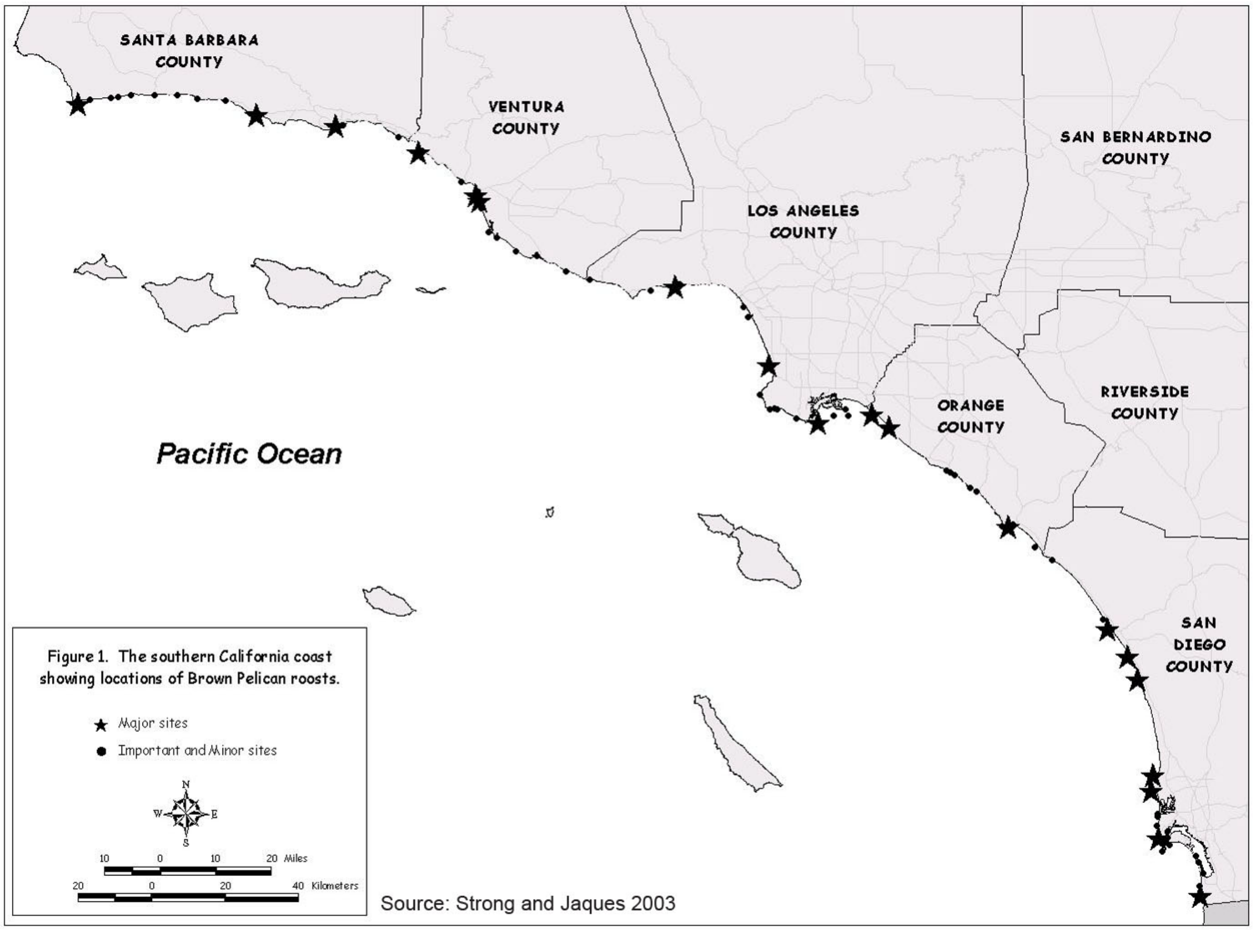


Figure 3.4-5. California brown pelican roosting sites along the Southern California coast.

Storm-petrels

This group of seabirds includes Leach's storm-petrel (*Oceanodroma leucorhoa*), the black storm-petrel (*Oceanodroma melania*), the ashy storm-petrel (*Oceanodroma homochroa*), and the least storm-petrel (*Oceanodroma microsoma*).

Leach's storm-petrels can be found nesting in small numbers on Prince Island (near San Miguel Island) and Santa Barbara Island in the SCB (Figure 3.1-5). A highly pelagic species, this storm-petrel is most numerous offshore of the central continental slope, where they spend most of their time foraging for food. Non-breeding Leach's storm-petrels are found more than 75 kilometers (46.5 miles) offshore during their mid-summer migration (Briggs et al. 1987, Baird 1993). Although the majority continue to migrate northwest, a few can be found during the winter months 100 kilometers (62 miles) offshore of Point Conception (Crossin 1974).

Black storm-petrels are found year-round in the SCB, preferring to forage in waters with warm surface temperatures. Small numbers of this species nest on Santa Barbara Island and Sutil Island; these constitute the entire breeding population of California (Pitman and Speich 1976, Baird 1993) (Figure 3.1-5). Peak numbers occur during the late summer months through the fall. The black storm-petrel is listed as a third priority Species of Special Concern (PRBO 2005).

The ashy storm-petrel is a sparrow-sized seabird endemic to California islands and a few adjacent mainland sites (Ainley 1995). Ashy storm-petrels are restricted to the northeast Pacific Ocean, breeding on islands from central to Southern California (with a few small colonies in Baja California and Northern California). Unlike most other storm-petrels, ashy storm-petrels are non-migratory, residing within the California Current system year-round. Approximately half of the world's population of ashy storm-petrels, which is estimated at less than 10,000 individuals, nest at the Farallon Islands, and half at the Channel Islands, primarily at San Miguel, Santa Barbara, and Santa Cruz Islands (Carter et al. 1992). During the past 20 years, this species has undergone a dramatic decline in abundance at its largest colony on the Farallon Islands (Sydeman et al. 1998). In the Channel Islands, ashy storm-petrels nest at scattered locations among talus, within rocky crevices in sea caves, and on steep, inaccessible cliffs (Hunt et al. 1979, Carter et al. 1992). The ashy storm-petrel is a globally rare seabird species. Currently, it has the following listings: "near threatened" by the World Conservation Union (Bird Life International 2000), Category 2 Candidate Species under the Endangered Species Act (USFWS 1994), and a Species of Management Concern by USFWS and CDFG.

Least storm-petrels are found in the SCB during the fall months. In the late 1980s, approximately 200,000 birds could be found during this time of year, usually in the warmer waters of the SCB (Briggs et al. 1987).

Skimmers and Terns

Skimmers and terns are seabirds that breed in coastal areas of the SCB. This group of seabirds includes the royal tern (*Sterna maxima*), elegant tern (*Sterna elegans*), common tern (*Sterna hirundo*), arctic tern (*Sterna paradisaea*), Forster's tern (*Sterna forsteri*), Caspian tern (*Sterna caspia*), black skimmer (*Rynchops niger*), and the California least tern (*Sterna antillarum browni*). Tern populations have been greatly reduced since the early part of the twentieth century due to human disturbance and destruction of their habitat. Human population growth has infringed on their nesting sites, which mainly occur on mainland beaches, estuaries, and lagoons

(Baird 1993). The California least tern has been listed as a federally Endangered Species and is discussed under threatened and endangered species (Section 3.4.6).

Royal terns nest in San Diego Bay and in Bolsa Chica Lagoon (Baird 1993). They are found in small numbers (a few hundred) along the shores of San Miguel, Santa Rosa, and San Clemente Islands during their non-breeding season. They are rarely found greater than 1 kilometer (0.6 miles) offshore preferring areas of warmer waters. Peak abundance is during the month of September. Royal terns are listed as a third priority Species of Special Concern (PRBO 2005).

Elegant terns have been observed nesting in San Diego Bay, Bolsa Chica Lagoon, and along the western riprap of Pier 400 in the Port of Los Angeles (Baird 1993, Chambers Group 2000). They have also been sighted courting along the Santa Margarita River estuary at Camp Pendleton. Non-breeding elegant terns are found on mainland beaches throughout Southern California, and are rarely sighted more than 4 kilometers (2.5 miles) offshore of the mainland, preferring areas of warmer waters. Numbers range in the several thousands and are on the increase. Northward migration to Northern California occurs during the late summer and fall (Baird 1993). The elegant tern is listed as a Species of Special Concern (PRBO 2005).

Common terns and arctic terns are migratory species and do not breed in the SCB. They are typically found west of the Santa Barbara channel to the Cortes Bank during their fall migration to South America, where they spend the winter. Common terns in the SCB usually occur within 25 kilometers (15.5 miles) of the mainland on coastal beaches and estuaries and forage close to shore. Arctic terns are more numerous than common terns over 25 kilometers (15.5 miles) offshore. Peak abundance for both species in the SCB occurs during their spring migration (April to May). Approximately 30,000 to 50,000 common and arctic terns were reported in the early 1990s (Briggs et al. 1987, Baird 1993) and these species today remain common visitors to the SCB.

Forster’s terns are typically found throughout the SCB foraging along mainland beaches, coastal bays, and estuaries during the late spring and summer (Baird 1993). They have been observed nesting in Upper Newport Bay and Bolsa Chica (MEC Analytical Systems 1997, Chambers Group 2000). This species can also be found up to 15 kilometers (9.3 miles) from the mainland shore. Approximately 500 Forster’s terns were found along the beaches and 80 at Bolsa Chica Lagoon during the early 1990s (Baird 1993).

Caspian terns are observed year-round in the SCB. They typically nest along the coast and in marshes, rivers, and inland lakes (NGS 1987). Nesting sites have been recorded at San Diego Bay (less than a thousand breeding pairs) and Bolsa Chica Lagoon (around two hundred breeding pairs) (CDFG 1980, Baird 1993, Chambers Group 2000). They also have been observed nesting in the Port of Los Angeles along Pier 400 (over 300 nests) (Port of LA 2005).

Black skimmer nesting sites are located at Bolsa Chica Lagoon (more than 300), Anaheim Bay, and San Diego Bay (Baird 1993, Chambers Group 2000). They are relatively common in the Bolsa Chica lowlands during migration and winter periods and have been observed nesting in the Port of Los Angeles along Pier 400 (183 birds) (Chambers Group 2000). The black skimmer is listed as a Species of Special Concern (PRBO 2005).

Other Seabirds

Other seabird species that are occasionally found in the SCB include the black-footed albatross (*Phoebastria nigripes*), Laysan's albatross (*P. immutabilis*), and the short-tailed albatross (*P. albatrus*); the northern fulmar (*Fulmarus glacialis*); the pomarine jaeger (*Stercorarius pomarinus*) and the parasitic jaeger (*S. parasiticus*); the red phalarope (*Phalaropus fulicaria*) and the red-necked phalarope (*P. lobatus*); and the pink-footed shearwater (*Puffinus creatopus*), sooty shearwater (*P. griseus*), Buller's shearwater (*P. bulleri*), black-vented shearwater (*P. opisthomelas*), and the short-tailed shearwater (*P. tenuirostris*). Water birds found in the SCB include the western grebe (*Aechmophorus occidentalis*) and Clark's grebe (*A. clarkii*); the Pacific loon (*Gavia pacifica*), common loon (*G. immer*) and the red-throated loon (*G. stellata*); and the surf scoter (sea duck) (*Melanitta perspicillata*) and the white-winged scoter (sea duck) (*M. fusca*).

3.4.4 Marine Mammals

The waters off the coast of California support numerous species of marine mammals, including sea lions and seals (pinnipeds), dolphins, whales, porpoises (cetaceans), and sea otters. Thirty-four species have been recorded in the SCB. Many of these species are common to the area, having established breeding populations or foraging grounds. Other species migrate through the SCB at certain times of the year, and many species are infrequent or rare (Bonnell and Dailey 1993). These marine mammals have varied diets, including pelagic and demersal fish, cephalopods, and crustaceans.

The following subsections summarize the more common marine mammals that occur in the SCB. This discussion covers species distribution, breeding populations (if they exist in the SCB), migratory patterns, and relevant dietary information. The last subsection reviews marine mammal strandings in Los Angeles County and Orange County based on the most recent data available.

Sea Lions and Seals

Six pinniped species are known to inhabit the SCB: the California sea lion (*Zalophus californianus californianus*), Pacific harbor seal (*Phoca vitulina richardsi*), northern elephant seal (*Mirounga angustirostris*), northern fur seal (*Callorhinus ursinus*), northern or Stellar sea lion (*Eumetopias jubatus*), and the Guadalupe fur seal (*Arctocephalus townsendi*). Of these, the California sea lion, Pacific harbor seal, northern elephant seal, and the northern fur seal have breeding populations within the SCB. Pacific harbor seals and northern elephant seals breed throughout the Channel Islands (Stewart et al. 1994, Bonnell and Dailey 1993). The breeding range of the California sea lion extends from the Channel Islands south to the Gulf of California in Mexico (Bonnell and Dailey 1993). Northern fur seals breed on San Miguel Island (USDI et al. 2002 [2003]). Although northern sea lions and Guadalupe fur seals once ranged extensively along California, they are rarely seen today in the SCB (Bonnell and Dailey 1993) and are not discussed further in this report.

Sea Otters

The normal range of the sea otter (*Enhydra lutris*) in California extends from the Santa Maria River north to Point Año Nuevo. In 1987, 69 sea otters were translocated to San Nicolas Island, within the SCB, in an attempt to rebuild the California population, which had greatly declined due to commercial hunting into the early 1900s. In recent years, it has been estimated that approximately 20 sea otters remain around the island. Quite a few of the sea otters died or were unaccounted for after a winter storm. Others migrated to the mainland and subsequently were returned to their range in central California (Bonnell and Dailey 1993).

It is estimated that sea otters in California can live up to 12–16 years (Pietz et al. 1988). Females usually have one pup every one or two years and give birth in the water. They care for their young for about six months. The pups reach sexual maturity in about 3 to 4 years. Dietary preferences are primarily macroinvertebrates, including mussels, crabs, clams, tunicates, abalone, and sea stars. Sea otters also prey on octopus (Estes et al. 1981, Ralls et al. 1988). They live in kelp beds and seldom forage more than 1 to 1.5 miles from shore.

Whales, Dolphins, and Porpoises

Several species of baleen and toothed whales may be seen offshore of Southern California. The whale species commonly seen in the SCB include grey (*Eschrichtius robustus*), blue (*Balaenoptera musculus*), fin (*Balaenoptera physalus*), minke, and humpback (*Megaptera novaeangliae*) whales. Uncommon whale species include beaked whale species, sperm (*Physeter macrocephalus*), killer (*Orcinus orca*), false killer (*Pseudorca crassidens*), pygmy sperm (*Kogia* breviceps), dwarf sperm (*Kogia simius*), northern right (*Balaena glacialis*), sei (*Balaenoptera borealis*) and Bryde’s whales (*Balaenoptera edeni*).

Dolphins and porpoises belong to the same order as toothed whales (*Odontocetes*). Common species within the SCB include common (*Delphinus delphis*), bottlenose (*Tursiops truncates*), northern right-whale (*Lissodelphis borealis*) and Risso’s (*Grampus griseus*) dolphins as well as Dall’s porpoise (*Phocoenoides dalli*). Two species, the harbor porpoise (*Phocoena phocoena*) and the striped dolphin (*Stemella coeruleoalba*, a tropical delphinid), mainly occur offshore on the outer continental shelf and are infrequent or rare visitors to the SCB.

3.4.5 Terrestrial Mammals

Three native terrestrial mammal species are found on the Channel Islands: the island fox (*Urocyon littoralus)*, which is federally endangered, the deer mouse (*Peromyscus maniculatus*), and the island spotted skunk (*Spilogale gracilis*).

The island fox, a diminutive relative of the mainland gray fox is distributed as six subspecies, one on each of the six largest California Channel Islands. Three of the subspecies occur on the Northern Channel Islands, within the boundaries of Channel Islands National Park: the San Miguel island fox, Santa Rosa Island fox, and the Santa Cruz Island fox. The latter occurs on both National Park Service (NPS) lands and lands owned by The Nature Conservancy on Santa Cruz Island. On the Southern Channel Islands, the San Nicolas Island fox and San Clemente Island fox occur on lands managed by the U. S. Navy, and the Santa Catalina Island fox occurs on lands managed by the Catalina Island Conservancy.

Island foxes have undergone a catastrophic decline on San Miguel, Santa Rosa, and Santa Cruz Islands (Coonan et al. 1998, Roemer 1999), as well as an unrelated catastrophic decline on Santa Catalina Island. The decline in populations on the Northern Channel Islands was caused by the recent appearance of golden eagles as a resident species on the island. Golden eagles are aggressive predators of terrestrial mammals and were never known to be year-round residents on the islands prior to the 1990s. A captive breeding program, designed to protect the subspecies from elimination by enhancing breeding, was initiated on all the Northern Channel Islands where fox populations declined. Efforts are currently under way to remove golden eagles on the Northern Channel Islands by live trapping and translocating the birds.

The fox decline on Santa Catalina Island was due to the introduction of distemper to the island, probably by a domestic dog. The Santa Catalina Island fox population has largely recovered, and the Catalina Island Conservancy is working to educate the public about the threat that domestic dog diseases pose to island foxes.

All of the Channel Islands (including Prince Island and Sutil Rocks) have native deer mice. Separate subspecies have been identified on each of the major islands, but the mice on Prince Island and Sutil Rocks are not known to be separate subspecies from the mice on San Miguel Island or Santa Barbara Island, respectively.

Island spotted skunks occur only on Santa Cruz and Santa Rosa Islands, having been extirpated from San Miguel Island. Little is known about the ecology of the Channel Islands spotted skunk. Skunk populations on Santa Cruz and Santa Rosa Islands appear to have increased substantially in conjunction with the decline of fox populations.

3.4.6 Threatened and Endangered Species

Several threatened and endangered species occur within the study area. Several of these species are associated with habitats that have become limited within the ranges of these species (e.g., coastal wetlands, riparian forests, or dune habitats). Other species are endemic to the Channel Islands and have been impacted by feral and/or exotic animals and human disturbance. In a few cases, the species were put into jeopardy by DDT contamination, human disturbance, and/or overexploitation.

Table 3.4-4 lists the threatened and endangered (federally and state-listed) plants of the Channel Islands. Table 3.4-5 presents the threatened and endangered (federally and state-listed) animals of the study area and the parts of the study area where they occur.

Table 3.4-4
Threatened and Endangered Plants of the Channel Islands

Common Name	Scientific Name	Status	San Miguel Island	Santa Rosa Island	Santa Cruz Island	Anacapa Island	Santa Barbara Island	San Nicolas Island	Santa Catalina Island	San Clemente Island
Hoffmann's rock cress	*Arabis hoffmannii*	FE		X	X	X				
Santa Rosa Island manzanita	*Arctostaphylos confertiflora*	FE		X						
Island barberry	*Berberis pinnata* ssp. *Insularis*	FE		X	X	X?				
San Clemente Island	*Castilleja grisea*	SE/FE								X

Table 3.4-4
Threatened and Endangered Plants of the Channel Islands

Common Name	Scientific Name	Status	San Miguel Island	Santa Rosa Island	Santa Cruz Island	Anacapa Island	Santa Barbara Island	San Nicolas Island	Santa Catalina Island	San Clemente Island
Indian paintbrush										
Soft-leaved Indian paintbrush	*Castilleja mollis*	FE	X	X						
Catalina Island mountain-mahogany	*Cercocarpus traskiae*	SE/FE							X	
San Clemente Island larkspur	*Delphinium variegatum* ssp. *Kinkiense*	SE/FE								X
Beach spectaclepod	*Dithyrea maritima*	ST	X					X		
Santa Cruz Island dudleya	*Dudleya nesiotica*	FT			X					
Santa Barbara Island dudleya	*Dudleya traskiae*	SE/FE					X			
San Nicolas Island buckwheat	*Eriogonum grande* var. *timorum*	SE						X		
Box bedstraw	*Galium buxifolium*	FE								X
San Miguel Island bedstraw	*Galium californicum* ssp. *Miguelense*	FE	X		X					
San Clemente Island bedstraw	*Galium catalinense* ssp. *Acrispum*	SE								X
Hoffmann's slender-flowered gilia	*Gilia tenuiflora* ssp. *Hoffmannii*	FE		X						
Island rush-rose	*Helianthemum greenei*	FE	X?	X	X				X	
Santa Cruz Island woodland star	*Lithophragma maximum*	SE/FE			E					X
San Clemente Island bird's-foot trefoil	*Lotus argophyllus* var. *adsurgens*	SE								X
Santa Cruz Island bird's-foot trefoil	*Lotus argophyllus* var. *niveus*	SE			X					
San Clemente Island lotus	*Lotus dendroideus* var. *traskiae*	SE/FE								X
San Clemente Island bush mallow	*Malacothamnus clementinus*	SE/FE								X
Santa Cruz Island bush mallow	*Malacothamnus fasciculatus* var. *nesioticus*	SE/FE			X					
Santa Cruz Island malacothrix	*Malacothrix indecora*	FE		X	X					
Island malacothrix	*Malacothrix squalida*	FE	X	X	X	X				

Table 3.4-4
Threatened and Endangered Plants of the Channel Islands

Common Name	Scientific Name	Status	San Miguel Island	Santa Rosa Island	Santa Cruz Island	Anacapa Island	Santa Barbara Island	San Nicolas Island	Santa Catalina Island	San Clemente Island
Lyon's pentachaeta	*Pentachaeta lyonii*	SE/FE							X	
Northern Channel Islands phacelia	*Phacelia insularis* var. *insularis*	FE	X	X						
Santa Cruz Island rock cress	*Sibara filifolia*	FE			E				E	X
Santa Cruz Island fringepod	*Thysanocarpus conchuliferus*	FE			X					

Notes:

E=Extirpated in these localities as reported by Philbrick 1980.

FE=Federally endangered

FT=Federally Threatened

SE=State Endangered

ST=State Threatened

X= extant

X?=location uncertain

Table 3.4-5
Threatened and Endangered Wildlife within the Study Area

Common Name	Scientific Name	Status	San Miguel Island	Santa Rosa Island	Santa Cruz Island	Anacapa Island	Santa Barbara Island	San Nicolas Island	Santa Catalina Island	San Clemente Island	Coastal Mainland
Invertebrates											
El Segundo blue butterfly	*Euphilotes battoidea allyni*	FE									X
Palos Verdes blue butterfly	*Glaucopsyche lygdamus palosverdesensis*	FE									X
White abalone	*Haliotis sorenseni*	FE	E	E	E	E	E	E	E	X	E
Fish											
Southern steelhead trout	*Oncorhynchus mykiss*	FE									X
Tidewater goby	*Eucyclogobius newberryi*	FE									X
Reptiles											
Island night lizard	*Xantusia riversiana*	FT					X	X		X	
Green sea turtle	*Chelonia mydas*	FT									M
Leatherback sea turtle	*Dermochelys coriacea*	FE	M	M	M	M	M	M	M	M	M
Loggerhead sea turtle	*Caretta caretta*	FT	M	M	M	M	M	M	M	M	M
Olive ridley sea turtle	*Lepidochelys olivacea*	FT									M
Birds											
Bald eagle	*Haliaeetus leucocephalus*	SE,FT	X	X	X	X	E	E	X	E	X
Belding's savannah sparrow	*Passerculus sandwichensis beldingi*	SE									X
California black rail	*Laterallus jamaicensis coterniculis*	ST									E
California brown pelican	*Pelicanus occidentalis californicus*	SE,FE	X	X	X	X	X	X	X	X	X
Coastal California gnatcatcher	*Polioptila californica californica*	FT									X
California least tern	*Sterna antillarum browni*	SE,FE									X
Least Bell's vireo	*Vireo bellii pusillus*	SE,FE									X
Light-footed clapper rail	*Rallus longirostris levipes*	SE,FE									X
Marbled murrelet*	*Brachyramphus marmoratus*	SE,FT									
Peregrine falcon	*Falco peregrinus anatum*	SE	X	X	X	X	X	X	X	X	X

Table 3.4-5
Threatened and Endangered Wildlife within the Study Area

Common Name	Scientific Name	Status	San Miguel Island	Santa Rosa Island	Santa Cruz Island	Anacapa Island	Santa Barbara Island	San Nicolas Island	Santa Catalina Island	San Clemente Island	Coastal Mainland
San Clemente loggerhead shrike	*Lanius ludovicianus mearnsi*	FE								X	
San Clemente sage sparrow	*Amphispiza belli clementeae*	FT								X	
Southwestern willow flycatcher	*Empidonax traillii extimus*	SE,FE									X
Western snowy plover	*Charadrius alexandrinus nivosus*	FT	X	X	X			X		X	X
Xantus's murrelet	*Synthliboramphus hypoleucus*	ST	X	X	X	X	X	X	X	X	
Mammals											
Pacific pocket mouse	*Perognathus longimembris pacificus*	FE									X
Island fox	*Urocyon littoralus*	ST,FE	X	X	X			X	X		
Southern sea otter	*Enhydra lutris nereis*	FT	E	E	E	E	E	X			
Guadalupe fur seal*	*Arctocephalus townsendi*	ST,FT									
Stellar sea lion*	*Eumetopias jubatus*	FT									
Sei whale	*Balaenoptera borealis*	FE	M	M	M	M	M	M	M	M	M
Blue whale	*Balaenoptera musculus*	FE	M	M	M	M	M	M	M	M	M
Fin whale	*Balaenoptera physalus*	FE	M	M	M	M	M	M	M	M	M
Humpback whale	*Megaptera novaeangliae*	FE	M	M	M	M	M	M	M	M	M
Right whale	*Balaena glacialis*	FE	M	M	M	M	M	M	M	M	M

Notes:
*Rarely seen throughout study area.
E=Extirpated in these localities
FE=Federally endangered
FT=Federally Threatened
M=Migratory
SE=State Endangered
ST=State Threatened
X=Extant
X?=location uncertain

3.5 LAND USE AND RECREATION

3.5.1 Coastal Land Use and Recreation

The coastal study area encompasses sixteen cities and a number of unincorporated communities in Los Angeles and Orange Counties (Figures 3.5-1 and 3.5-2). The cities are as follows (generally from north to south):

- City of Malibu
- City of Santa Monica
- City of Los Angeles
- City of El Segundo
- City of Manhattan Beach
- City of Hermosa Beach
- City of Redondo Beach
- City of Torrance
- City of Palos Verdes Estates
- City of Rancho Palos Verdes
- City of Long Beach
- City of Seal Beach
- City of Huntington Beach
- City of Newport Beach
- City of Laguna Beach
- City of Dana Point

Generally, the land uses along the coastline include public beaches, marinas, and/or harbors. Inland from the immediate coastline, the land use pattern is typically mixed, with residential and supporting commercial uses. Two key industrial ports (Port of Los Angeles and Port of Long Beach) are situated in Coastal Reach 4, and several parks are located in various reaches. The state, county, and local beaches that are within each of the six coastal reaches are identified in Figures 3.5-3 and 3.5-4. The beaches are often operated by a jurisdiction different from the adjacent city or community. Restoration projects on the immediate coastline require consultation with and approval by both jurisdictions, if applicable.

The Los Angeles, and Orange County coastlines have abundant recreational facilities. Much of the shorelines have been preserved as open space and/or for recreational uses. Favored recreational resources include state and county parks and beaches. Other recreational facilities include piers, golf courses, and small neighborhood parks.

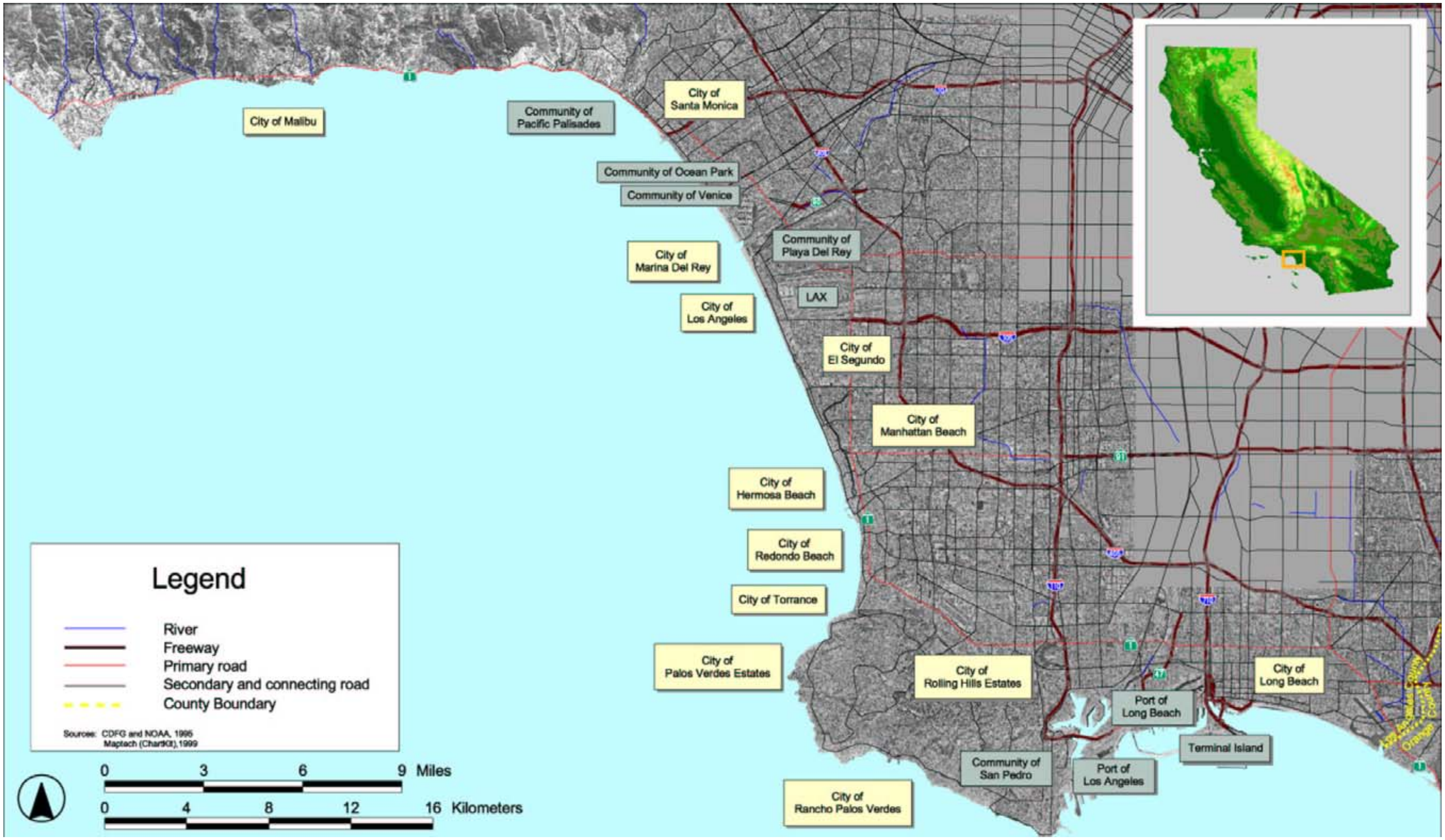


Figure 3.5-1. Coastal cities and communities, Los Angeles County.

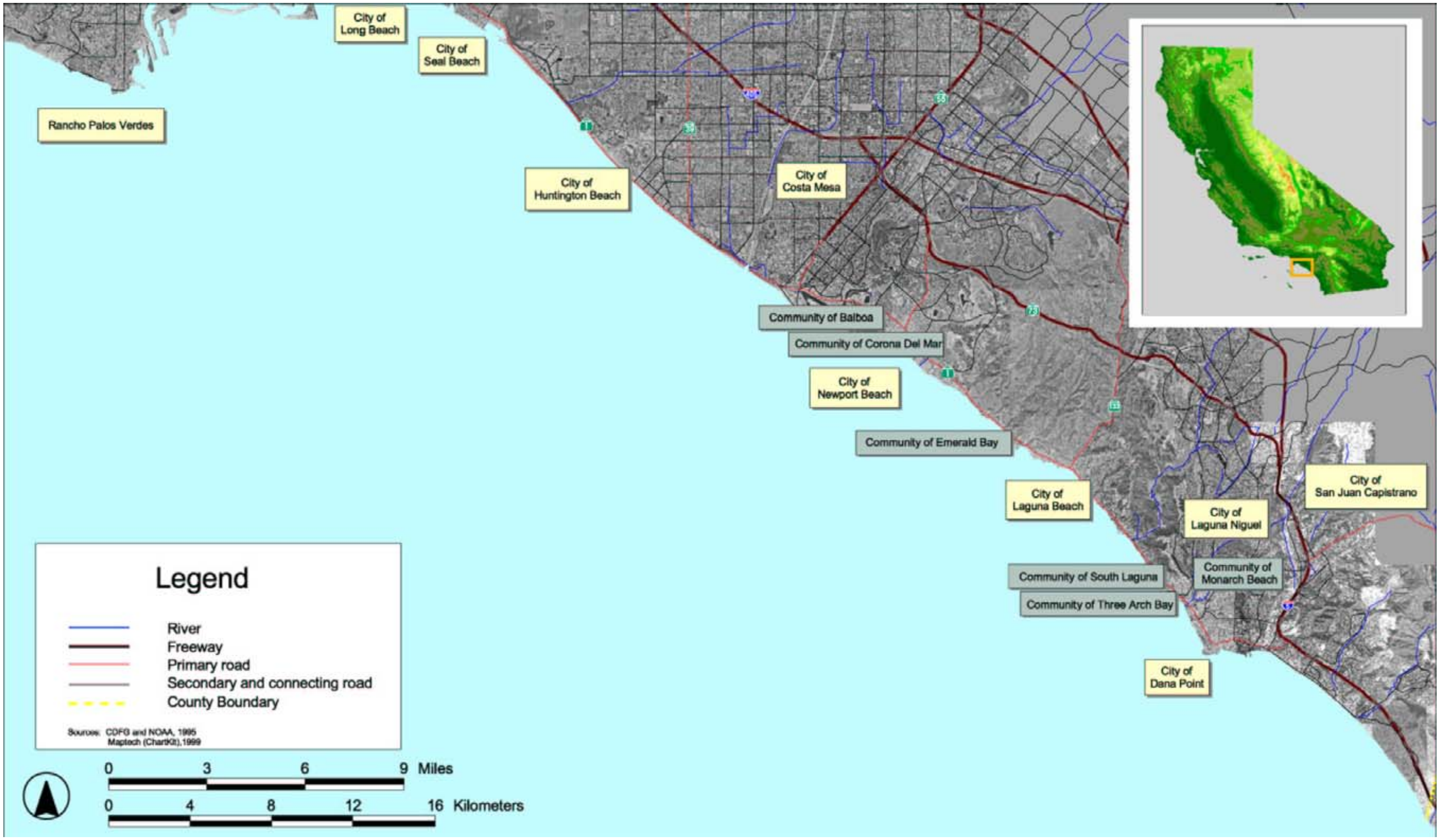
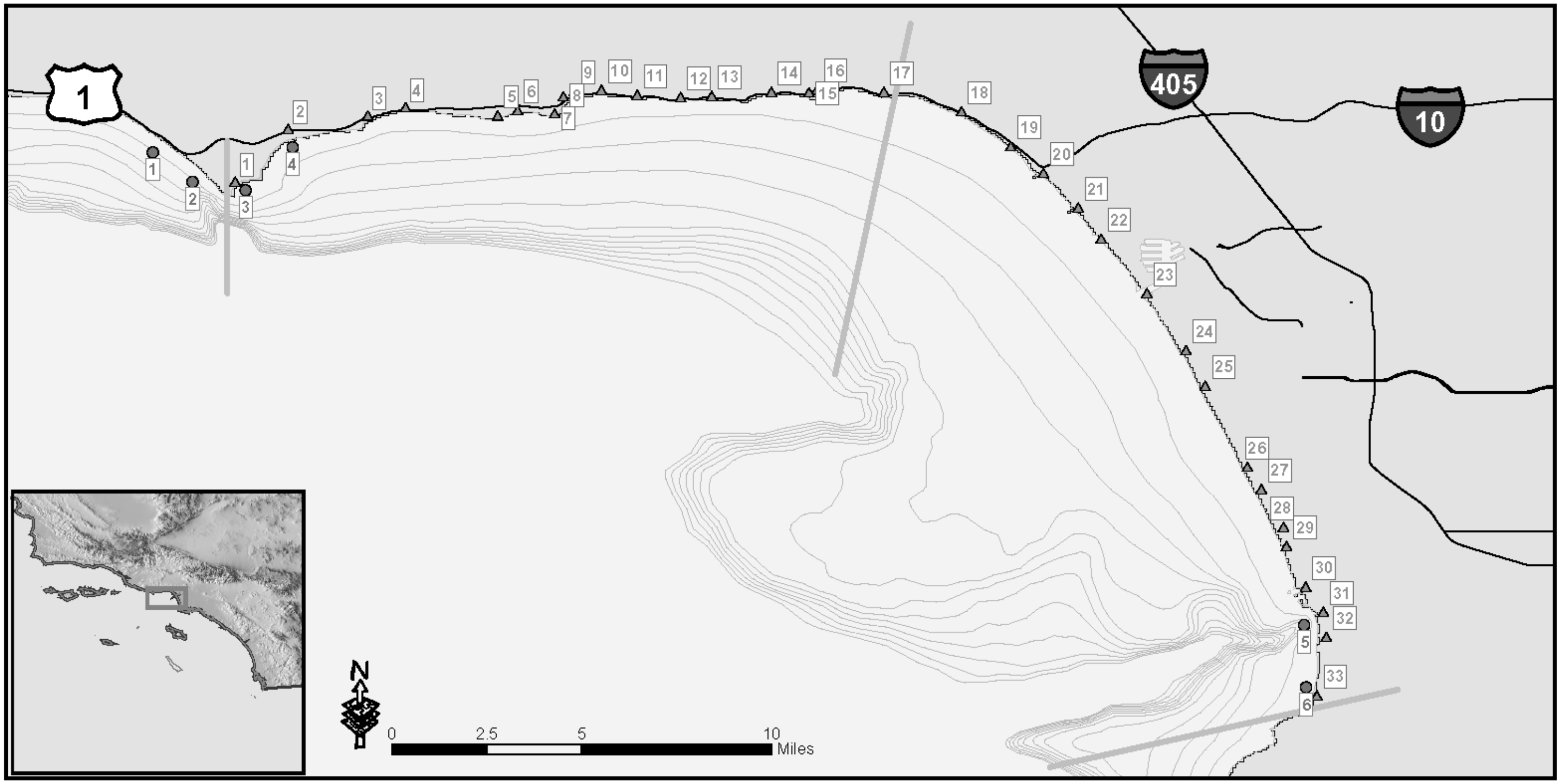


Figure 3.5-2. Coastal cities and communities, Orange County.



Legend

Bathymetry (ft)
Reach lines

Dive Sites

1 Leo Carillo State Beach
2 El Matador Beach
3 Point Dume (Free Zuma)
4 Paradise Cove
5 Redondo Submarine Canyon
6 Old Redondo Pier

Recreational Locations

1 Point Dume County Beach
2 Escondido Beach
3 Dan Blocker County Beach
4 Puerco Beach
5 Amarillo Beach
6 Malibu Beach
7 Malibu Lagoon County Beach
8 Malibu Pier
9 Surfrider County Beach
10 Carbon Beach
11 La Costa Beach
12 Las Flores Beach
13 Big Rock Beach
14 Las Tunas County Beach
15 Topanga State Park
16 Topanga County Beach
17 Will Rogers State Beach
18 Santa Monica State Beach
19 Palisades Park
20 Santa Monica Municipal Pier
21 Venice City Beach
22 Venice Fishing Pier
23 Marina del Rey
24 Dockweiler State Park
25 El Segundo Beach
26 Manhattan County Beach
27 Manhattan Beach Pier
28 Hermosa Beach
29 Hermosa Beach Pier
30 King Harbor
31 Redondo Beach Pier
32 Redondo County Beach
33 Torrance County Beach

Figure 3.5-3. Generalized locations of recreational resources, Coastal Reaches 1 and 2.

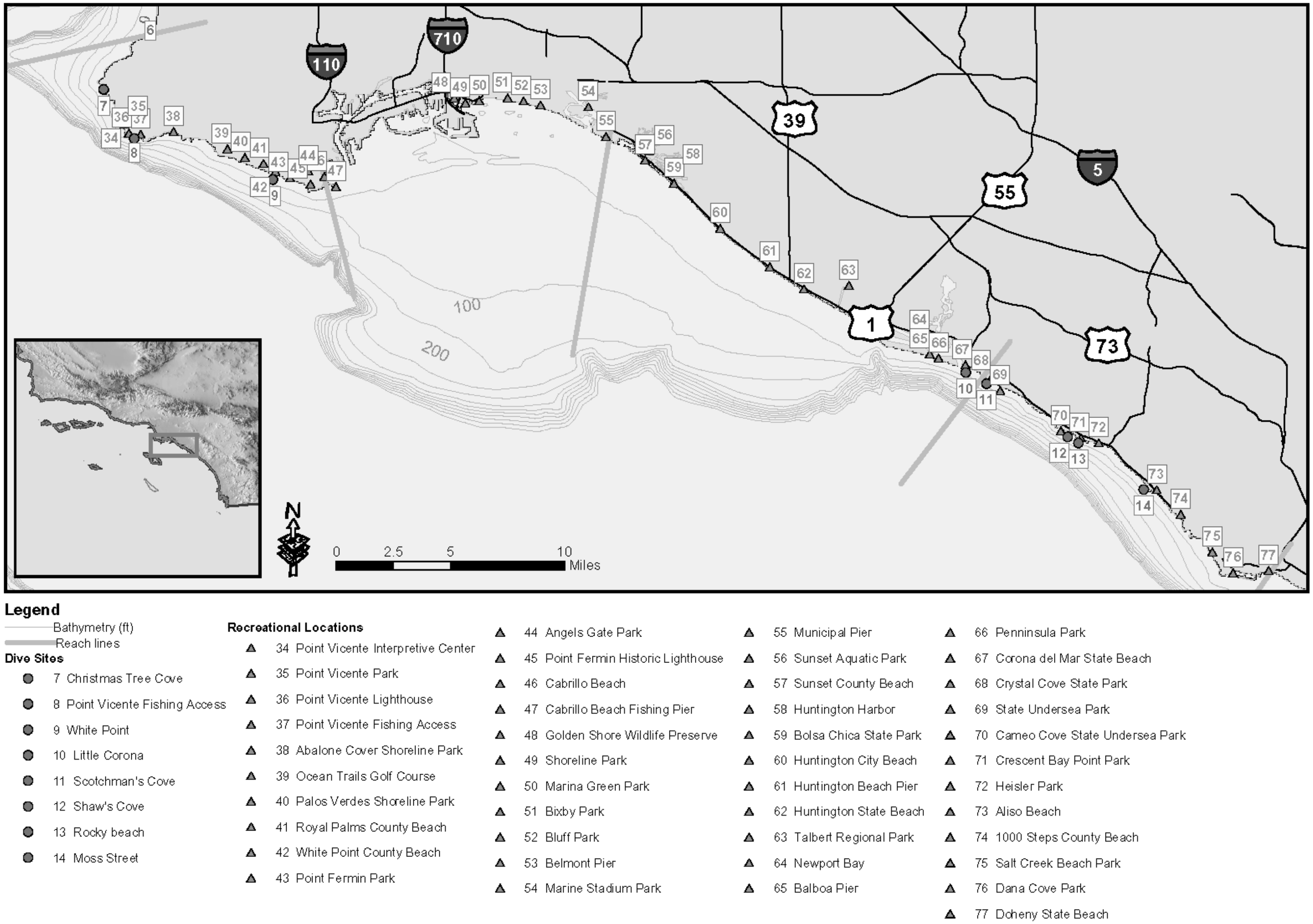


Figure 3.5-4. Generalized locations of recreational resources, Coastal Reaches 3, 4, 5, and 6.

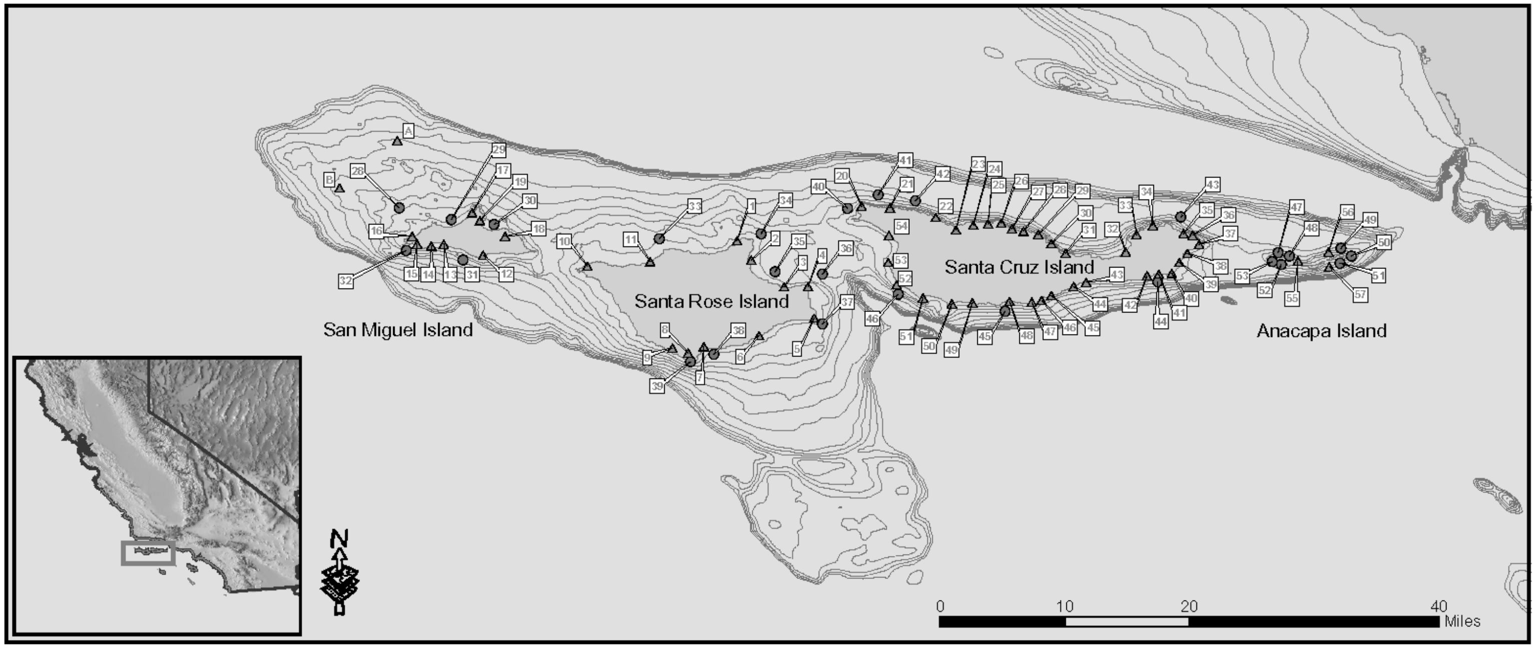
3.5.2 Land Use and Recreation on the Channel Islands

Northern Channel Islands

The Northern Channel Islands—San Miguel, Santa Rosa, Santa Cruz, and Anacapa—include four of the five islands in the Channel Islands National Park, which is operated by the NPS. The Nature Conservancy owns 76 percent of Santa Cruz Island, the largest of the Channel Islands; however, this island is under the jurisdiction of the NPS. The fifth island in the Channel Islands National Park, Santa Barbara, is located further south and is grouped with the Southern Channel Islands in this document. The Channel Islands National Park is the only national park in the study area. It includes the five islands and 1 nautical mile of marine waters surrounding the islands. In 1980, the U.S. Congress designated the islands and 50,000 hectares (125,000 acres) of the surrounding waters as a national park because of their unique natural and cultural resources. For this reason, the NPS has jurisdiction over the islands and surrounding waters. The parkland holds an Open Space land use designation as well as a National Marine Sanctuaries jurisdictional designation. The Channel Islands National Marine Sanctuary extends for 6 nautical miles surrounding these same islands.

For each of the Northern Channel Islands, the following discussion lists the island's relevant management agency, size, and available recreational opportunities. Opportunities for kayaking, ranger-led hikes, and educational programs are available on the park's islands. Some restrictions and closures are in force to protect sensitive species. Two popular dive sites—Wilson Rock and Richardson Rock—are located in the vicinity of the Northern Channel Islands but are not connected to one island. Figure 3.5-5 shows the dive sites and recreational sites on the Northern Channel Islands.

- Anacapa Island (NPS)
  - 283 hectares (699 acres)
  - Hiking trails, visitor center, lighthouse exhibits, primitive campground, and picnic areas
  - Opportunities for scuba diving, snorkeling, bird-watching, fishing, and observing marine mammals
  - Recreational areas: Frenchy's Cove, Winifield Scott Wreck, and East Fish Camp.
- San Miguel Island (NPS)
  - 3,774 hectares (9,325 acres)
  - Primitive campground, miles of hiking, and beaches
  - Ranger-led hikes, marine-mammal observation, beach exploration, and bird-watching
  - Recreational areas: Crook Point, Tyler Bight, Judith Rock, Adams Cove, Point Bennett, Harris Point, Cuyler Harbor, and Nifty Rock
- Santa Rosa Island (NPS)
  - 21,118 hectares (52,794 acres)
  - Hiking trails and primitive campground



Legend

Bathymetry (ft)

Recreational Sites

- 1 Carrington Point
- 2 Northeast Anchorage
- 3 Southeast Anchorage
- 4 Skunk Point
- 5 East Point
- 6 Ford Point
- 7 Johnson's Lee
- 8 South Point
- 9 S.S. Chickasaw Shipwreck
- 10 Sand Point
- 11 Brockway Point
- 12 Crook Point
- 13 Tyler Bight
- 14 Judith Rock
- 15 Adams Cove
- 16 Point Bennett
- 17 Harris Point
- 18 Cuyler Harbor
- 19 Nifty Rock
- 20 West Point
- 21 Painted Cave
- 22 Hazard's Anchorage
- 23 Cueva Valder Anchorage
- 24 Ledy's Harbor
- 25 Baby's Harbor
- 26 Diablo Anchorage
- 27 Fry's Harbor
- 28 Platt's Harbor
- 29 Twin Harbors
- 30 Pelican Bay
- 31 Prisoner's Harbor
- 32 Chinese Harbor
- 33 Coche Point
- 34 Potato Harbor
- 35 Scorpion Anchorage
- 36 Little Scorpion Anchorage
- 37 San Pedro Point
- 38 Hungyman's Anchorage
- 39 Smuggler's Cove
- 40 Yellow Banks Anchorage
- 41 Middle Anchorage
- 42 Sandstone Point
- 43 Valley Anchorage
- 44 Blue Banks Anchorage
- 45 Albert's Anchorage
- 46 Coches Prietos Anchorage
- 47 Bowen Point
- 48 Willows Anchorage
- 49 Laguna Harbor
- 50 Punta Arena
- 51 Morse Point
- 52 Pozo Anchorage
- 53 Kinton Point
- 54 Black Point
- 55 Frenchy's Cove
- 56 Winfield Scott Wreck
- 57 Eat Fish Camp
- A Wilson Rock
- B Richardson Rock

Dive Sites

- 28 Boomerang Bank
- 29 Simonton Cove
- 30 Cuyler Harbor
- 31 Wyckoff Lodge
- 32 Point Bennett
- 33 Brockway Point
- 34 Carrington Point
- 35 Bechers Anchorage
- 36 Skunk Point
- 37 East Point Shallows
- 38 Johnson's Lee
- 39 SS Chicksaw
- 40 Forney's Cove
- 41 Profile Point
- 42 Painted Cave
- 43 Wreck of the Peacock
- 44 Yellow Banks
- 45 Willows Anchorage
- 46 Pozo Anchorage
- 47 Goldfish Bowl
- 48 Frenchy's Cove
- 49 Cathedral Rock
- 50 Arch Rock
- 51 East Fish Camp
- 52 Cat Rock
- 53 Coral Reef

Figure 3.5-5. Dive sites and recreational sites, Northern Channel Islands.

  - Beach exploration, wildlife observation, ranger-led hikes, vehicle tours, and kayak beach-camping
  - Recreational areas: Carrington Point, Northeast Anchorage, Southeast Anchorage, Skunk Point, East Point, Ford Point, Johnson's Lee, South Point, S.S. Chickasaw shipwreck, Sand Point, and Brockway Point
- Santa Cruz Island (The Nature Conservancy: 76% ownership/NPS: 24% ownership)
  - 24,258 hectares (60,645 acres)
  - NPS land: observe wildlife, hike, camp
  - Marine resources: 125,000 acres for sailing, power boating, fishing, SCUBA diving, snorkeling, surfing, wildlife observation and bird watching
  - Recreational areas: West Point, Painted Cave, Hazard's Anchorage, Cueva Anchorage, Ledy's Harbor, Baby's Harbor, Diablo Anchorage, Fry's Harbor, Platt's Harbor, Twin Harbors, Pelican Bay, Prisoners' Harbor, Chinese Harbor, Coche Point, Potato Harbor, Scorpion Anchorage, Little Scorpion Anchorage, San Pedro Point, Hungryman's Anchorage, Smugglers' Cove, Yellow Banks Anchorage, Middle Anchorage, Sandstone Point, Valley Anchorage, Blue Banks Anchorage, Albert's Anchorage, Coches Prietos Anchorage, Bowen Point, Willows Anchorage, Laguna Harbor, Punta Arena, Morse Point, Pozo Anchorage, Kinton Point, and Black Point

Southern Channel Islands

The Southern Channel Islands—Santa Barbara, Santa Catalina, San Nicolas, and San Clemente—all have separate jurisdictions. Santa Barbara Island is the southernmost island in the Channel Islands National Park, and the island and its surrounding waters are under the jurisdiction of the NPS. Santa Catalina Island is owned by the Catalina Island Conservancy, with a small portion still belonging to the previous owner: the Santa Catalina Island Company. The island is also a part of the Los Angeles Park System. Santa Catalina Island is approximately 197 square kilometers (76 square miles). The island is the highest-visited island in California, with visitors coming for both the terrestrial and the marine environments. Both the island and the surrounding waters are under the jurisdiction of the Catalina Island Conservancy and Los Angeles County. Santa Catalina Island includes the City of Avalon, the only city on the Channel Islands. Avalon is the only place in the Channel Islands with permanent residents, excluding the U.S. Navy owned islands of San Nicolas and San Clemente. The land use designation in Avalon is Open Space, Residential, and Commercial. Areas of Special Biological Significance are designated at the east and west ends of the islands.

San Nicolas Island and San Clemente Island are owned and operated by the U.S. Navy. These islands are not open for public visitation; however, the surrounding waters are periodically open for diving expeditions. San Clemente Island has terrestrial amenities for S.E.A.L. operations and Underwater Demolition Team facilities. Other parts of the island are used for artillery storage and other naval activities. The island is included in the County of Los Angeles Land Use Policy and is designated as Open Space. Restoration projects on these islands would require coordination with the U.S. Navy and Los Angeles County.

For each of the Southern Channel Islands, the following discussion lists the agency with jurisdiction over the island, the size of the island, and the recreational opportunities available on the island. Three major dive sites—Osbourne Bank, Farnsworth Bank, and Tanner Bank—are located in the vicinity of the Southern Channel Islands but are not connected to one island. Figure 3.5-6 shows the dive sites and other recreational sites on the Southern Channel Islands:

- Santa Barbara Island (NPS)
  - 256 hectares (639 acres)
  - Hiking trails, visitor center, primitive campground, and picnic areas
  - Opportunities for scuba diving, snorkeling, bird-watching, fishing, and observing marine mammals
  - Recreational areas: Arch Point, Landing Cove, Canyon View Nature Trail, Sea Lion Rookery, Webster Point, Elephant Seal Cove, and the Santa Barbara Island Light.
- Santa Catalina (Los Angeles County, Catalina Island Conservancy)
  - 19,472 hectares (48,680 acres)
  - Sport fishing, yachting, snorkeling, scuba diving
  - Camping, hiking, biking
  - Recreational areas: Two Harbors, Avalon, Seal Rocks, Church Rock, Salta Verde Point, China Point, Ben Weston Beach, Little Harbor, Catalina Harbor, Lobster Bay, Iron Bound Bay, Starlight Beach, and Parsons Landing
- San Nicolas (U.S. Navy)
  - 5,632 hectares (14,080 acres)
  - Part of Pacific Missile Range
  - Access by special arrangement only
  - Diving areas surround the island, but use is restricted
- San Clemente (U.S. Navy)
  - 14,336 hectares (35,840 acres)
  - Access by special arrangement only
  - Diving areas surround the island, but use is restricted

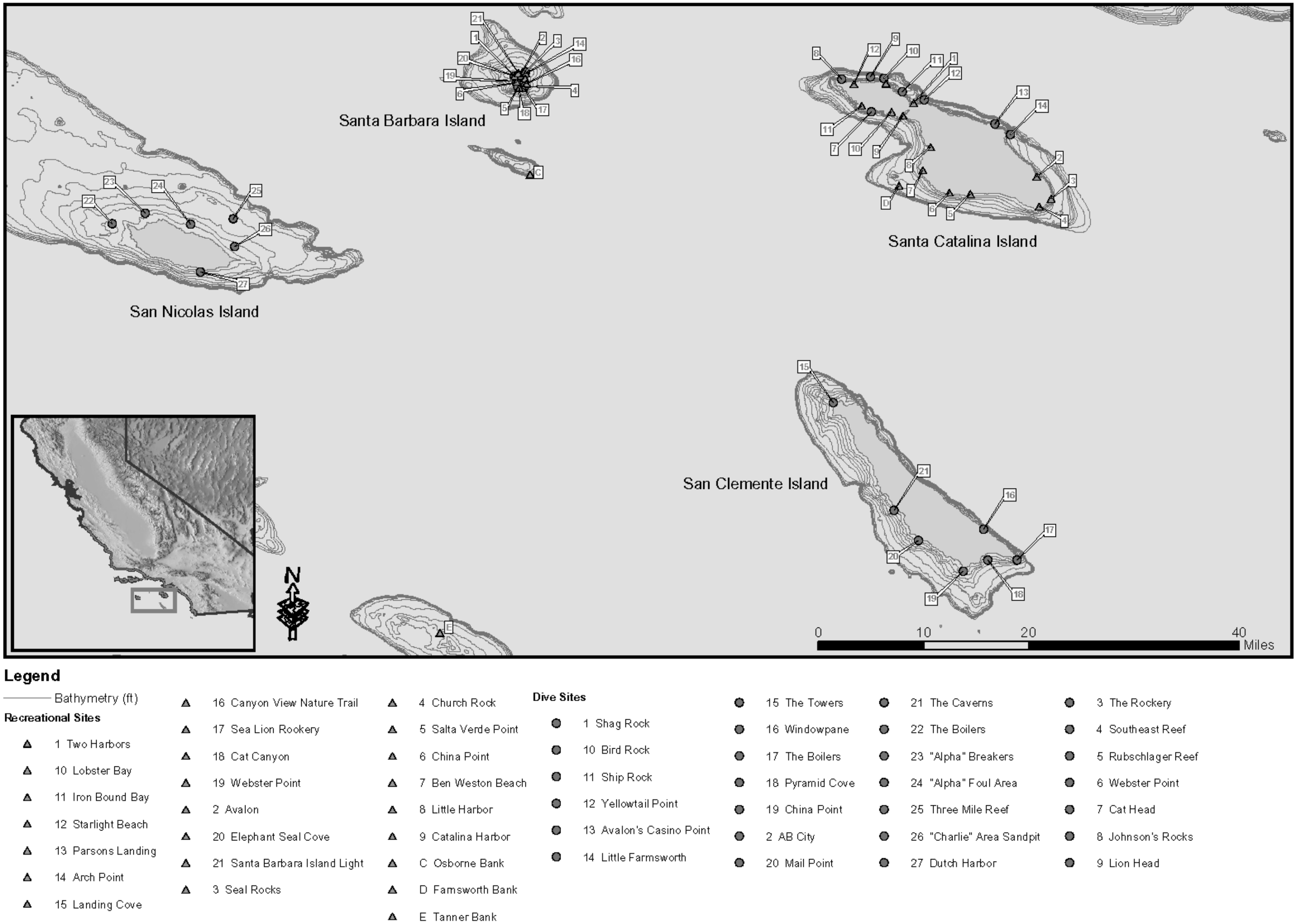


Figure 3.5-6. Dive sites and recreational sites, Southern Channel Islands.

3.6 AESTHETICS AND VISUAL RESOURCES

3.6.1 Coastal Aesthetics and Visual Resources

The coastline from the Ventura County line to the San Diego County line is a scenic stretch of Southern California; the terrain ranges from rocky cliffs to sandy beaches. Picturesque views from the coast include the Pacific Ocean and, in clear weather, many of the Channel Islands. The islands are known for their gorgeous land views and diversity as well as their striking underwater variety and abundance of life.

California state scenic routes are designated and managed by the California Department of Transportation Office of State Landscape Architecture. A scenic highway includes the road and the right-of way as well as a scenic corridor. The scenic corridor is the area visible from the road and generally adjacent to the right-of-way with scenic, historical, or aesthetic characteristics. The California Scenic Highway Program designates highways using the following nine categories:

- Officially Designated State Scenic Highway
- Officially Designated County Scenic Highway
- Officially Designated State Scenic Highway and National Scenic Byway
- Officially Designated State Scenic Highway and All American Road
- Eligible State Scenic Highway—Not Officially Designated
- Unconstructed State Highway Eligible for Scenic Designation
- Historic Parkway
- Connecting Federal Highway
- Connecting Federal Highway and National Scenic Byway

State goals for scenic highways include preserving the visual, biological, and ecological resources; preventing conditions that compromise aesthetic resources; encouraging development that contributes to aesthetic qualities; encouraging historical preservation; and encouraging community civic groups to create programs that increase local interest in the visual resources.

This section describes the varying coastline visual characteristics from Point Dume to Dana Point. Figure 3.6-1 shows representative photographs of the various types of scenic views in the study area, including undeveloped coastline, sandy beach, pier and boardwalk, mixed-use residential/commercial, rugged cliffs, marina, and port/harbor.

3.6.2 Channel Islands Aesthetics and Visual Resources

Figure 3.6-2 shows representative photographs of the Channel Islands.

Northern Channel Islands

The coastlines of the Northern Channel Islands include sandy and rocky beaches, cliffs, tide pools, and sandy and rocky sea caves. Inland, the islands are home to rugged mountains, scenic fields, deep canyons, and year-round streams. The land and underwater diversity of these islands

Undeveloped Coastline/Sandy Beach
Photo taken in Malibu Beach. Source: City of Malibu

Pier/Boardwalk
Photo of Santa Monica Pier. Source: http://www.schonlau.net/images/smshore.jpg

Mixed Use Residential/Commercial
Photo of Malibu Pier. Source: City of Malibu

Rocky Cliffs
Photo taken in Rancho Palos Verdes. Photo taken by: Mary Donovan

Marina
Photo taken at Marina del Rey marina. Photo taken by Nitsa.

Port/Harbor
Photo of Port of Long Beach. Source: Port of Long Beach

Figure 3.6-1. Representative photographs of the Los Angeles and Orange County coastline environment.

Figure 3.6-1 BACK

Figure 3.6-2. Representative photographs of the Channel Islands.

Figure 3.6-2 BACK

creates an aesthetically stimulating experience that is vastly different than the nearby California coast. The pristine natural beauty of the Channel Islands is visually pleasing to visitors.

No Eligible State Scenic Highways or Officially Designated State Scenic Highways are located on the Northern Channel Islands.

Southern Channel Islands

The Southern Channel Islands also provide diverse and beautiful underwater scenery. The land forms and diversity of Santa Catalina Island are similar to those of the Northern Channel Islands. The land forms of San Clemente and San Nicolas Islands are relatively flat, and do not exhibit the rugged hills and cliffs of the other islands. The land forms of Santa Barbara Island include both flat areas and rugged cliffs.

No Eligible State Scenic Highways or Officially Designated State Highways are located on the Southern Channel Islands.

3.7 TRANSPORTATION

3.7.1 Coastal Transportation

Coastal access is readily available along most of the coastline of Los Angeles and Orange Counties. The beach can be accessed via a variety of major highways, roads, paths, and sandy trails. Much of the coastline is lined with roadways, boardwalks, and trails. Several ports offer transportation to the Channel Islands. Once on the islands, developed roadways allow car traffic around many of the islands, and dirt trails allow hiking and biking.

The counties or cities with jurisdiction along the coastline areas each have general plans that include a circulation element. This element identifies the roads and highways within the jurisdictional boundaries as well as the programs and policies in place to provide an effective transportation network. Any restoration project that would affect transportation or involve roadways would need to consider the land use and circulation elements of the applicable general plans.

3.7.2 Channel Islands Transportation

The Channel Islands do not have extensive roadway networks.

Santa Catalina Island has the most developed roadway system of all of the Channel Islands. The island has primary and secondary roadways that traverse the length of the island and several maintenance roads/trails that increase the accessible areas of the island.

Santa Rosa, Anacapa, San Miguel, Santa Barbara, and Santa Cruz Islands do not have primary or secondary roadways but have dirt roads and/or trails. These islands are owned by the NPS and are accessible to the public for recreational purposes.

The remaining two Channel Islands, San Nicolas and San Clemente, are owned and operated by the U.S. Navy. These islands have roadways that are maintained by the Navy, but the roadways are not open to the public.

Access to the Channel Islands is available through various transport companies leaving from the California coast. Air travel to Santa Rosa and Santa Catalina Islands is also available.

3.8 AIR QUALITY

"Air pollution" is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants may adversely affect human or animal health, reduce visibility, damage property, or reduce the productivity or vigor of crops and natural vegetation.

The U.S. Environmental Protection Agency (EPA) has identified seven air pollutants of nationwide concern: carbon monoxide (CO); ozone (O_3); nitrogen dioxide (NO_2); particulate matter equal to or less than 10 microns in size (PM_{10}), which is also called respirable particulate and suspended particulate; fine particulate matter equal to or less than 2.5 microns in size ($PM_{2.5}$); sulfur dioxide (SO_2); and lead (Pb). These pollutants are collectively referred to as criteria pollutants.

The federal Clean Air Act (Title 42 United States Code Sections 7401–7671q) requires the adoption of national ambient air quality standards (NAAQS) to protect the public health and welfare from the effects of air pollution. The NAAQS have been updated as needed. Current standards are set for CO, NO_2, SO_2, O_3, PM_{10}, $PM_{2.5}$, and Pb. Areas are classified under the federal Clean Air Act as either "attainment" or "nonattainment" areas for each criteria pollutant based on whether or not the NAAQS have been achieved. In 2004, the Santa Barbara County remained unclassified for all criteria pollutants. Ventura County was classified as a nonattainment area for O_3, unclassified for PM_{10}, CO, and NO_2, and as an attainment area for SO_2. Los Angeles and Orange Counties were classified as nonattainment areas for O_3, PM_{10}, and CO, unclassified for NO_2, and as attainment areas for SO_2. San Diego County was classified as a nonattainment area for O_3, unclassified for PM_{10}, CO and NO_2, and as an attainment area for SO_2 (CARB 2005).

The State of California Air Resources Board (CARB) has established additional standards, which are generally more stringent than the NAAQS; CARB has also set standards for sulfates, hydrogen sulfide, and "visibility-reducing particles." In 2004, the areas from Santa Barbara to San Diego remained unclassified for CO, NO_2, SO_2, sulfates, Pb, hydrogen sulfide, and visibility-reducing particles. These areas were classified as nonattainment areas for 0_3, PM_{10}, and $PM_{2.5}$, except for Santa Barbara County, which was unclassified for $PM_{2.5}$ (CARB 2005).

3.9 NOISE

3.9.1 Overview and Noise Standards

Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment. The A-weighted noise scale, which measures noise levels in decibels (dBA), weighs the frequencies to which humans are sensitive. Because decibels are measured on a logarithmic scale, a doubling of the energy of a noise source equates to a 3 dBA increase in noise level.

People tend to compare an intruding noise with the existing background noise. If the new noise is readily identifiable or considerably louder than the background or ambient noise levels, it usually becomes objectionable. An aircraft flying over a residential area is an example. In the presence of normal environmental background noise, an average healthy ear can readily detect a 5 dBA change in noise level. A 10 dBA change is usually perceived as a doubling, or halving, of the noise level.

3.9.2 Coastal Noise Generators and Sensitive Receptors

The existing noise environment and additional noise sources associated with the six coastal reaches are summarized in Table 3.9-1 (MSRP 2003).

Table 3.9-1
Baseline Noise Environment, Noise Generators, and Sensitive Noise Receptors in the Study Area

Coastal Reach	Baseline Noise Environment	Noise Generators	Sensitive Receptors
1	Surf, Residential, Commercial	No major noise generators	Malibu Pier and beaches Surfrider beach Coastline recreation
2	Residential, Commercial	Santa Monica Municipal Airport Los Angeles International Airport Traffic and roadways	Recreational beaches Boardwalks and piers
3	Residential, Commercial	No major noise generators	Residential development Point Fermin Park Abalone Cove Beach Park Portuguese Bend Co-op Preschool Long Point Resort Hotel
4	Commercial	Port of Los Angeles Port of Long Beach	Residential development Long Beach Pier
5	Surf, Residential, Commercial	Naval Weapons Stations Huntington Harbor Traffic and roadways	Seal Beach NWR Bolsa Chica Ecological Reserve
6	Residential, Commercial	Harbor at Dana Point Amtrak trains	Crystal Cove State Park Laguna Coast Wilderness Park

NWR = National Wildlife Refuge

3.9.3 Noise Generators and Sensitive Receptors on the Channel Islands

Six of the eight Channel Islands are protected ecologically sensitive areas: Santa Catalina, San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara Islands. These islands preserve a diverse range of plant and animal species that are noise sensitive. Each of these six islands is available at some level for recreational use to the public, which has expectations of a natural, low-noise environment. The plant and wildlife species on these islands are all sensitive receptors.

The remaining two Channel Islands, San Nicolas and San Clemente, are owned and operated by the U.S. Navy and are used for training. Naval operations such as bombing and target practice can generate high noise levels. The underwater areas surrounding the islands are periodically used for recreational purposes, including whale watching and diving, and host many species that are noise sensitive.

3.10 CULTURAL RESOURCES

This section presents an overview of the historical and cultural resources that are likely to be found in the coastal areas of Los Angeles and Orange Counties. Future restoration projects must be aware of potentially significant cultural resources that may be located within these coastal and offshore areas. These resources include archaeological sites and historic sites listed on the National Register of Historic Places that are near the coast.

3.10.1 Prehistoric Overview

The initial occupation of the Southern California coast appears to have occurred as early as 10,000 years ago (Jones 1992).

Southern California coastal archaeological sites increase dramatically in number after about 8,000 years ago, a period when sites associated with the Milling Stone Horizon appear (Wallace 1955). Research in Southern California demonstrates that this period was marked by regional differentiation, adaptation to local conditions, and more permanent habitation.

The Late Prehistoric period, spanning from approximately 1,500 years ago to the mission era, is the period associated with contemporary Native American groups known as the Chumash and the Gabrieliño (Wallace 1955). Juan Rodriguez Cabrillo was the first documented European to make contact with these groups in 1542.

3.10.2 Historic Overview

The Chumash and Gabrieliño were virtually ignored between Cabrillo's visit and the Spanish Period, which began in 1769. Missions were established at San Gabriel in 1771, San Juan Capistrano in 1776, and San Fernando in 1797. By the 1800s, the majority of the Chumash and Gabrieliño mainland population had entered the Spanish mission system (Jackson 1999), with the island populations entering somewhat later.

The pueblo Nuestra Señora la Reina de los Angeles de Prociuncula (Los Angeles) was founded in 1781, and grew slowly based primarily on cattle ranching. The first civilian land grants in the Los Angeles area were awarded in 1784 to Manuel Nieto (Rancho Los Alamitos) and Jose Maria Verdugo (Rancho San Rafael). By the mid-1800s, hunters, settlers, and ranchers, made their way to the area, and ranching became an economic mainstay.

In 1821, colonial New Spain became the independent Republic of Mexico. Economic competition and political tension between the new Mexican republic and the Catholic Church became intense, and the missions were secularized beginning in 1831 (Rolle 1998). In 1845, Governor Pio Pico moved the capital of California to Los Angeles, and in 1850 California gained statehood.

Attracting settlers during the late nineteenth and early twentieth centuries, the beautiful California coastline became accessible by rail and quickly became a mecca for industrial, commercial, residential, and recreational uses. The coastline continues to serve these uses into the twenty-first century.

3.10.3 Archaeological Resources

Onshore Sites

Archaeological surveys and excavations over the past century have revealed a diverse and extensive cultural landscape. Hundreds of archaeological sites have been identified along the Southern California coast; the major concentrations are in the vicinity of bays, estuaries, lakes, streams, marshes, and at the mouths of canyons (Altschul and Grenda 2002). Four key locations in Los Angeles and Orange Counties have been identified: (1) from the vicinity of Malibu Lagoon, south to Malibu Point, and north to the Ventura County line; (2) Santa Monica Bay, in the vicinity of Marina del Rey and the Ballona Lagoon; (3) the southern portion of San Pedro Bay, in and around Seal Beach, Long Beach, and Huntington Beach and the Bolsa Chica Lagoon; and (4) the vicinity of Newport Bay (Jones 1992).

Thousands of archaeological sites have been identified on the Channel Islands. Due to the lack of abundant terrestrial resources, island sites tend to concentrate along the island fringes, particularly on the shores of the islands' small, protected inlets (Jones 1992).

Offshore Sites

Over 100 prehistoric underwater archaeological sites have been identified off the coast of Southern California (Masters and Schneider 2000). Although the majority of underwater sites identified are located offshore of San Diego County, underwater sites are also likely to occur in the waters offshore of Los Angeles and Orange Counties.

Shipwrecks

As of June 2001, the California State Lands Commission listed 156 shipwrecks off the Los Angeles County coast (ships built between 1853 and 1945) and 37 shipwrecks off the Orange County coast (ships built between 1837 and 1944). Shipwrecks tend to cluster in Santa Monica Bay, San Pedro Bay, and Newport Bay; the shipwrecks involve schooners, oil screws, steamboats, barges, masted ships, ferries, military craft, tankers, submarines, and sailboats. The general locations of these shipwrecks can be seen on Figure 3.10-1.

3.10.4 Historic Resources

The area encompassing the Los Angeles and Orange County coastlines and the Channel Islands contains a variety of historic resources, including an assortment of structures, features, and cultural landscapes, most associated with late-nineteenth- and early-twentieth-century shipping and rail industry, early-twentieth-century residential and commercial development, and coastal tourism and recreation. Many of these resources are likely to have historic significance, but have yet to be evaluated.

3.11 SOCIOECONOMICS

The section provides a summary of the socioeconomic state of the coastal cities within the study area. This information is largely presented in tables, which present the demographic and economic data from the 2000 Census (http://factfinder.census.gov) that pertain to the 19 coastal cities within Los Angeles and Orange Counties. The study area includes cities along the coast of both counties and extends inland for approximately 3.2 kilometers (2 miles). Communities such

Source: California State Lands Commission 2005.

Figure 3.10-1. Generalized locations of known shipwrecks.

as Venice and Playa del Rey are within 3.2 kilometers (2 miles) of the coastline yet are part of the larger City of Los Angeles. Accordingly, the tables in this section include the City of Los Angeles as a line item. This jurisdiction encompasses a substantially larger area and population than any of the other 80+ cities in Los Angeles County and dwarfs the areas and populations of the other coastal cities.

Avalon City, on the island of Santa Catalina, is also included under Los Angeles County data. It is the only portion of the Channel Islands for which demographic data are available; the remaining islands have small populations because they are parklands or are limited to military personnel.

3.11.1 Population and Age

Table 3.11-1 shows the total population and median age of the cities within the study area. Most of the cities within the study area have relatively small populations, with many having significantly less than 20,000 residents. The obvious exception is Los Angeles, which extends many kilometers (miles) inland from the coast. The smallest city, Rolling Hills, with 1,871 residents, accounts for only 0.02 percent of the total population of Los Angeles County. Only a few cities show larger populations. Long Beach, the largest city within the study area, forms 4.85 percent of the population of Los Angeles County and significantly exceeds the population of Huntington Beach, the second largest city, which forms 1.99 percent of the total population of Orange County.

The median ages within the study area are substantially higher than the respective county averages. In Los Angeles County, the median age is 32 years. In comparison, the median age in the Cities of Palos Verdes Estates (46.7 years), Rancho Palos Verdes (44.7 years), and Rolling Hills (47.7 years) is significantly higher. In Orange County, with an average median age of 33.3 years, the tendency of median ages to be higher in the study area is most pronounced in the Cities of Laguna Beach (43.4 years) and Seal Beach (54.1years).

Table 3.11-1
Los Angeles and Orange Counties: Population and Age (2000)

Jurisdiction	Total Population	% Total County Population	Median Age
Los Angeles County	9,519,338	100%	32
Avalon *	3,127	0.03%	33.7
El Segundo	16,033	0.17%	36.4
Hermosa Beach	18,566	0.20%	34.2
Long Beach	461,522	4.85%	30.8
Los Angeles	3,694,820	38.81%	31.6
Malibu	12,575	0.13%	42.9
Manhattan Beach	33,852	0.36%	37.7
Palos Verde Estates	13,340	0.14%	46.7
Rancho Palos Verdes	41,145	0.43%	44.7
Redondo Beach	63,261	0.66%	36.7
Rolling Hills	1,871	0.02%	47.7
Santa Monica	84,084	0.88%	39.3
Signal Hill	9,333	0.10%	33.4
Torrance	137,946	1.45%	38.7
Orange County	2,846,289	100%	33.3
Costa Mesa	108,724	1.14%	32.0
Dana Point	35,110	0.37%	39.8
Huntington Beach	189,594	1.99%	36.0
Laguna Beach	23,727	0.25%	43.4
Newport Beach	70,032	0.74%	41.6
San Clemente	49,936	0.52%	38.0
Seal Beach	24,157	0.25%	54.1

*Located on Santa Catalina Island in the Channel Islands. The remaining islands in the Channel Islands group are either Naval Stations or National Parks.

Source: U.S. Census Bureau Census 2000 information accessed at http://factfinder.census.gov

3.11.2 Race and Ethnicity

Table 3.11-2 shows the racial and ethnic characteristics of the study area. The majority of the population within the coastal cities is white, with much smaller proportions of other racial or ethnic minorities. Apart from the Cities of Long Beach, Signal Hill, and Avalon, all of the cities within the study area showed white populations much greater than that of the respective county averages, ranging from 59.2 percent (Torrance) to as high as 92.2 percent (Newport Beach).

It should be noted that “Hispanic” refers to ethnicity and is not a racial category. Thus, persons can be considered Hispanic regardless of race. Due to this overlap, racial and ethnic categories total in excess of 100 percent. With regard to Hispanic populations, apart from the Cities of Los Angeles, Avalon, Long Beach, Signal Hill and Costa Mesa, all of the cities within the study area showed much lower levels than that of the respective county averages, ranging from 15.9 percent (San Clemente) to as low as 4.5 percent (Rolling Hills).

3.11.3 Income, Household Size, and Poverty Status

Table 3.11-3 shows the income, household size, and poverty status within the coastal study area. The majority of cities in the study area show median household income levels that are significantly above their respective county averages, with some cities such as Rolling Hills, Palos Verdes Estates, and Malibu showing extremely high income levels. Within the study area, only Avalon City, Los Angeles, Long Beach, and Seal Beach show median household income levels that are below their respective county averages. Although the average household sizes of all of the cities within the study area were below their respective county average household sizes, within the Cities of Hermosa Beach (1.95 persons), Santa Monica (1.83 persons), and Seal Beach (1.83 persons) the average household sizes were substantially below the respective county averages.

The majority of the cities in the study area show poverty levels that are substantially below their respective county averages, dramatically lower in the case of Rolling Hills (0.0 percent) Palos Verdes Estates (1.1 percent), and Rancho Palos Verdes (2.0 percent). The Cities of Long Beach, Los Angeles, and Costa Mesa, at 19.3 percent, 18.3 percent, and 8.2 percent, respectively, are the only cities within the study area that showed poverty levels that were above their respective county averages. The City of Signal Hill, at 13.6 percent, is only marginally below its county average.

Table 3.11-2
Los Angeles and Orange Counties: Race and Ethnicity (2000)

Jurisdiction	Total Population	White	Black /Af. American	Am. Indian Alaskan Nat.	Asian	Nat. Hawaii /Pacific Is	Some Other Race	Hispanic or Latino (Of any Race)
Los Angeles County	9,519,338	48.7% 4,637,062	9.8% 930,957	0.8% 76,988	11.9% 1,137,500	0.3% 27,053	23.5% 2,239,997	44.6% 4,242,213
Avalon *	3,127	71.6% 2,240	0.7% 23	1.0% 32	0.6% 19	0.2% 7	20.4% 637	46% 1,437
El Segundo	16,033	83.6% 13,405	1.2% 187	0.5% 75	6.4% 1,028	0.3% 47	3.5% 562	11.0% 1765
Hermosa Beach	18,566	89.6% 16,632	.8% 150	.4% 74	4.4% 817	0.2% 41	1.7% 312	6.7% 1253
Los Angeles	3,694,820	46.9% 1,734,036	11.2% 415,195	0.8% 29,412	10.0% 369,254	0.2% 5,915	25.7% 949,720	46.5% 1,719.073
Long Beach	461,522	45.2% 208,410	14.9% 68,618	.5% 3,881	12.0% 55,591	1.2% 5,605	2.06% 95,107	35.8% 165,092
Malibu	12,575	91.9% 11,558	0.9% 113	0.2% 27	2.5% 313	0.1% 12	1.7% 210	5.5% 689
Manhattan Beach	33,852	89.0% 30,124	.6% 208	.2% 70	6.0% 2,043	0.1% 41	1.2% 415	5.2% 1756
Palos Verde Estates	13,340	78.3% 10,488	1.0% 132	0.1% 18	17.1% 2,286	0.1% 16	0.6% 80	2.8% 378
Rancho Palos Verdes	41,145	67.2% 27,660	2.0% 815	0.2% 62	25.9% 10,676	0.1% 41	1.2% 497	5.7% 2339
Redondo Beach	63,261	78.6% 49,735	2.5% 1,592	0.5% 295	9.1% 5,756	0.4% 224	4.4% 2,762	13.5% 8524
Rolling Hills	1,871	79.8% 1,493	2.0% 38	0% 0	14% 262	0.5% 9	1.2% 22	4.5% 85
Santa Monica	84,084	78.3% 65,832	3.8% 3,176	1.5% 396	7.3% 6,100	0.1% 86	6.0% 5,019	13.4% 11,304
Signal Hill	9,333	45.5% 4,245	13.0% 1,212	0.6% 55	16.5% 1,539	2.1% 194	16.2% 1,510	29.0% 2707
Torrance	137,946	59.2% 81,605	2.2% 3,022	0.4% 560	28.6% 39,462	0.3% 481	4.6% 6,307	12.8% 17,637

Source: U.S. Census Bureau Census 2000 information accessed at http://factfinder.census.gov

Table 3.11-2
Los Angeles and Orange Counties: Race and Ethnicity (2000)

Jurisdiction	Total Population	White	Black /Af. American	Am. Indian Alaskan Nat.	Asian	Nat. Hawaii /Pacific Is	Some Other Race	Hispanic or Latino (Of any Race)
Orange County	2,846,289	64.8% 1,844,652	1.7% 47,649	0.7% 19,906	13.6% 386,785	0.3% 8,938	14.8% 421,208	30.8% 875,579
Costa Mesa	108,724	69.5% 75,542	1.4% 1,520	0.8% 845	6.9% 7,501	0.6% 656	16.6% 18,018	31.8% 34,523
Dana Point	35,110	87.2% 30,633	0.8% 288	0.6% 201	2.5% 884	0.1% 36	5.9% 2,080	15.5% 5440
Huntington Beach	189,594	79.2% 150,194	0.8% 1,527	0.6% 1,224	9.3% 17,707	0.2% 456	5.8% 11,019	14.7% 27,798
Laguna Beach	23,727	92.0% 21,826	0.8% 190	0.4% 86	2.1% 494	0.1% 20	2.2% 524	6.6% 1570
Newport Beach	70,032	92.2% 64,583	0.5% 371	0.3% 179	4.0% 2,804	0.1% 83	1.1% 792	4.7% 3,301
San Clemente	49,936	87.9% 43,905	0.8% 385	0.6% 307	2.6% 1,317	0.1% 69	5.1% 2,552	15.9% 7,933
Seal Beach	24,157	88.9% 21,477	1.4% 347	0.3% 73	5.7% 1,386	0.2% 43	1.3% 309	6.4% 1,554

*Located on Santa Catalina Island in the Channel Islands. The remaining islands in the Channel Islands group function as Naval Stations or National Parks.

Source: U.S. Census Bureau Census 2000 information accessed at http://factfinder.census.gov

Table 3.11-3
Los Angeles and Orange Counties: Income, Household Size and Poverty Level (2000)

Jurisdiction	Total Population	Median Household Income ($)	% Above/Below County Average	Average H'hold Size	Number of Families Below Poverty Level in 1999	% Of Families Below Poverty Level in 1999
Los Angeles County	9,519,338	42,189	0.0	2.98	311,226	14.4
Avalon *	3,127	33,327	-21.0	2.65	66	9.2
El Segundo	16,033	61,341	45.4	2.27	122	3.1
Hermosa Beach	18,566	81,153	92.4	1.95	61	1.7
Los Angeles	3,694,820	36,687	-13.0	2.83	147,516	18.3
Long Beach	461,522	37,270	-11.7	2.77	19,512	19.3
Malibu	12,575	102,031	141.8	2.39	103	3.2
Manhattan Beach	33,852	100,750	138.8	2.34	173	2.0
Palos Verde Estates	13,340	123,534	192.8	2.67	44	1.1
Rancho Palos Verdes	41,145	95,503	126.4	2.66	248	2.0
Redondo Beach	63,261	69,173	64.0	2.21	616	4.0
Rolling Hills	1,871	**200,000	374.1	2.90	0	0.0
Santa Monica	84,084	50,714	20.2	1.83	911	5.4
Signal Hill	9,333	48,938	16.0	2.56	289	13.6
Torrance	137,946	56,489	33.9	2.51	1,642	4.5
Orange County	2,846,289	58,820	39.4	3.00	46,894	7.0
Costa Mesa	108,724	50,732	20.2	2.69	1,892	8.2
Dana Point	35,110	63,043	49.4	2.41	320	3.4
Huntington Beach	189,594	64,824	53.7	2.56	2,081	4.3
Laguna Beach	23,727	75,808	79.7	2.05	164	2.8
Newport Beach	70,032	83,455	97.8	2.09	356	2.1
San Clemente	49,936	63,507	50.5	2.56	604	4.6
Seal Beach	24,157	42,079	0.3	1.83	194	3.2

*Located on Santa Catalina Island in the Channel Islands. The remaining islands in the Channel Islands group function as Naval Stations or National Parks.

** Median Household Income for Rolling Hills city is at least $200,000 and up.

Source: U.S. Census Bureau Census 2000 information accessed at http://factfinder.census.gov

The Natural Resource Trustees for the Montrose case (Trustees) first began to envision possible approaches for natural resource restoration during the damage assessment and litigation period in the 1990s. As specific evidence of the injuries caused by the DDTs and PCBs was collected, it became important to begin identifying potential actions that could restore the natural resources to their baseline conditions (that is, the conditions the natural resources would be in were it not for the contamination at issue), and to compensate for the loss of services resulting from injuries to natural resources. Using several potential restoration actions as examples, the Trustees estimated damages in terms of the cost of the potential restoration actions that could make the resources whole again and compensate for interim losses. Potential restoration actions considered for this purpose included replacing contaminated fish stocks using constructed reefs and re-establishing bald eagles and peregrine falcons in the Channel Islands using methods that have been successful elsewhere.

Although examining potential restoration actions and their estimated costs was a crucial step in settling the Montrose case, the final consent decree neither prescribes specific restoration projects that must be implemented nor dictates the distribution of funding among the different injured resources or between primary and compensatory restoration actions.[1] Thus, within the framework of an overarching goal to restore injured resources to their baseline conditions and compensate for interim lost services, the settlements provide latitude to develop explicit restoration objectives and strategies for achieving the goals. This section explains the restoration goals that the Trustees seek, discusses the specific objectives and strategies that the Trustees propose for attaining the restoration goals, and describes the process the Trustees are following to plan the work of the Montrose Settlements Restoration Program.

4.1 GOALS, OBJECTIVES, AND STRATEGIES OF THE MONTROSE SETTLEMENTS RESTORATION PROGRAM

For this plan, a *goal* is a broad statement about a long-term desired outcome that may or may not be completely attainable. An *objective* is a measurable outcome to be achieved in a specific time frame to help accomplish a desired goal. *Strategies* address the process rather than the endpoint, and are approaches for accomplishing the goals and objectives.

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[1] Restoration actions may be categorized as either primary or compensatory.
Primary restoration actions are taken to return injured natural resources and lost services to their respective baselines. For instance, if a contamination release has impaired the ability of biological organisms to reproduce, actions that restore the injured organisms' reproductive function to the level that would exist were it not for the release are considered primary restoration. An example of a primary restoration action is the removal of the injurious contamination from the organisms' environment.
Compensatory restoration actions are taken to compensate for interim losses of natural resource services pending recovery. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulatory framework, compensatory restoration claims are recovered as "compensable damages." The regulations describe these damages as, "The compensable value of all or a portion of the services lost to the public for the time period from the discharge or release until the attainment of the restoration, rehabilitation, replacement, and/or acquisition of the equivalent of the resources and their services to baseline" (Title 43 Code of Federal Regulations [CFR] Part 11.80).

4.1.1 Restoration Goals

The overarching goals of the Montrose Settlements Restoration Program (MSRP) have been constant throughout the damage assessment and restoration effort, and appear in the final consent decree for the case. The overall goals of the MSRP are to:

- Restore, replace, rehabilitate, or acquire the equivalent of the injured natural resources and the services those resources provide to their respective baselines (the conditions they would be in were it not for the injuries from the contaminants of the case); and
- Provide compensatory restoration for the interim lost services of the injured natural resources.

The Trustees give highest priority to the first goal, the primary restoration of resources that still show evidence of injury or lost services; nevertheless, it is not the Trustees' intent to forgo compensatory restoration actions until all injured resources have fully recovered to their respective baselines. In fact, the Montrose settlements made no distinction between settlement funds for primary restoration and settlement funds for compensatory restoration. Many of the potential approaches being considered to address the injuries and lost services of the Montrose case may serve as either primary or compensatory restoration, or as both (depending on the scale of the actions and whether they simply bring an injured resource back to baseline or go beyond it to make up for past losses).

The Trustees used this planning process to develop an appropriate mix of primary and compensatory restoration actions to be conducted using the settlement funds. For restoration actions that are compensatory in nature, the Trustees sought restoration approaches that benefit the same or similar natural resources as those that sustained injury as a result of the DDTs and PCBs released in the Montrose case. This approach was applied, for instance, in the evaluation criteria presented in Section 5 for seabird restoration, in which higher priority was given to projects that benefit seabird species for which there have been documented effects from the Montrose contaminants (i.e., DDT-induced eggshell thinning).

4.1.2 Restoration Objectives

The final consent decree for the Montrose case states: "The Trustees will use the damages for restoration of injured natural resources, including bald eagles, peregrine falcons and other marine birds, fish and the habitats upon which they depend, as well as providing for implementation of restoration projects intended to compensate the public for lost use of natural resources." The restoration objectives for the MSRP (i.e., the specific targets or milestones that help accomplish the overall goals) have been formulated with this consent decree provision in mind and with consideration of the input from the public during the restoration planning workshops. The MSRP restoration objectives are:

- Restore fishing services within the Southern California Bight (SCB)
- Restore fish and the habitats on which they depend within the SCB
- Restore bald eagles within the SCB
- Restore peregrine falcons within the SCB
- Restore seabirds within the SCB

Of the two fish-related objectives, one addresses human use (restoring anglers' ability to catch fish that are low in contamination), and the other aims for ecological results. When the Trustees initially sorted and categorized the many restoration ideas they had compiled, there was often little practical distinction between projects benefiting fish and fish habitat and projects benefiting fishing as a human use. Therefore, for the purpose of evaluating restoration ideas in categories, these two fish-related objectives have been combined into a single broad category labeled "fishing and fish habitat." Thus, the evaluation of restoration ideas (described in Section 5) is organized into four categories (fishing and fish habitat, bald eagles, peregrine falcons, and seabirds) (described in Section 6) that encompass the five restoration objectives listed above.

4.1.3 Restoration Strategies

In addition to restoration goals and objectives, the Trustees have identified three strategies that embody their approach for optimizing the results of the MSRP. These strategies are:

- Follow an adaptive approach to restoration through iterative planning, implementation, and monitoring to optimize restoration results
- Promote public involvement in restoration planning and implementation
- Coordinate with other regional resource management and restoration programs and take advantage of regional partnerships to gain efficiency and avoid duplication of effort

Restoration planning is only one step in achieving the most effective natural resource restoration possible within the limits of available funding. The MSRP operates as an adaptive restoration program. This plan provides an overall framework for selecting and implementing restoration actions over the life of the MSRP, and establishes a significant initial phase of restoration actions to be undertaken during the first five years following its adoption (see Section 6). This plan will be followed by design, implementation, and monitoring of several restoration projects, leading to subsequent review and evaluation of results and other new information, and revision of the Restoration Plan as restoration progresses.

Throughout this iterative planning and implementation process, the Trustees will continually seek to involve the public, including interested groups and the expert scientific community. The Trustees will also coordinate MSRP efforts with other organizations that are conducting work of a similar nature and seek opportunities to collaborate.

4.2 DEVELOPING THE RESTORATION PLAN

The approach and assumptions used in developing this Restoration Plan have been derived from a number of sources: current conditions, including the ongoing injuries and the continued presence of contamination, the CERCLA regulatory framework, the Trustees' experience with past natural resource damage assessment (NRDA) restoration plans, certain provisions in the Montrose settlements, and close coordination with the U.S. Environmental Protection Agency (EPA) on the progress of its feasibility study on sediment remediation.

The CERCLA regulations (43 CFR Part 11) provide guidance on the restoration planning process, including the evaluation and selection of restoration alternatives. Under 43 CFR Part 11.82, these provisions require the authorized official (in this case the Trustees) to develop a reasonable number of possible restoration alternatives linked to the injured natural resources and the services those resources provide and then select the alternative determined to be the most appropriate based on all relevant considerations, including several suggested factors (further described at the beginning of Section 5). As has been done in previous restoration planning efforts, the Trustees are using the CERCLA regulatory framework as a guide and adapting the criteria and the evaluation approach to the specific circumstances of the case.

Preparation of the Restoration Plan has been conducted using the following approach:

- Develop restoration goals, objectives, and strategies
- Compile injury benchmark information
- Project future trends in contaminant levels and distribution
- Solicit and formulate a wide range of restoration ideas
- Complete a Tier 1 (screening) evaluation of preliminary restoration ideas that leads to a synthesized set of potential restoration actions/approaches for detailed evaluation
- Complete a Tier 2 (detailed) evaluation of potential restoration actions/approaches from Tier 1, including a National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) analysis
- Develop the restoration alternatives and identify the preferred alternative

The soundness of this approach was discussed at the restoration planning workshops and received support from the interested public and the technical community.

The first of these seven elements is addressed above in Section 4.1. The remaining six are addressed below.

4.2.1 Compiling Injury Benchmark Information

An important early aspect of planning was the gathering and compiling of background information for all resource categories useful to restoration planning. This element included a review of the historical and recent literature and data (including studies specifically conducted as part of the damage assessment) and the performance of studies to fill critical data gaps. This information has been synthesized to develop environmental benchmark information against which the performance of different restoration project actions will be assessed. This benchmark information (both existing and future) will also be used to assess the environmental impacts of the restoration project alternatives. The efforts associated with this element are described in more detail below.

Historical and Recent Literature and Data

Several sources of information were reviewed to prepare the benchmark information, including reports, journal articles, environmental impact reports (EIRs) and environmental impact statements (EISs), recent monitoring reports, environmental databases, resource management plans, and restoration plans. Some of the key information sources included:

- California Department of Fish and Game (CDFG) environmental sensitivity index maps for oil spill response

- The CDFG database on locations of artificial reefs and kelp beds
- Information on watersheds and wetlands compiled by the State Coastal Wetlands Recovery Project
- Seabird and marine mammal monitoring information from the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (USFWS), the National Park Service (NPS), and the U.S. Geological Survey (USGS)
- Resource management and restoration plans for the Channel Islands
- USGS seafloor mapping and information on seismic hazards
- Marine Recreational Fishing Statistical Survey
- Information from wastewater outfall monitoring programs
- The technical studies and reports associated with the damage assessment

Data Gap Studies in Progress or Completed

The Trustees have conducted or are in the process of conducting five data gap studies to provide information to enhance their ability to make sound restoration planning decisions. These five studies are briefly described below.

Santa Catalina Island Bald Eagle Reintroduction Study

In 1980 the USFWS and the Institute of Wildlife Studies (IWS), with the cooperation of the CDFG and the Santa Catalina Island Conservancy, initiated efforts to reintroduce bald eagles to Santa Catalina Island. These efforts are ongoing, as the bald eagles inhabiting Santa Catalina Island continue to experience reproductive problems (see Appendix B). Because of their role in the legal case, the Trustees began contributing funding toward this program during the natural resource damage assessment and litigation phase in the 1990s, and have continued to support the program since the final legal settlement to maintain current conditions until this Restoration Plan is completed.

The purpose of this data gap study is to learn from the ongoing efforts to maintain breeding bald eagles on Santa Catalina Island. Information for the study is gained from monitoring the status of the bald eagle population on Santa Catalina Island, including contaminant levels, reproductive behavior, reproductive success, and feeding behavior. This information is critical for understanding the nature of the continuing injury to bald eagles on the island and will be used to guide restoration planning for this species. Annual reports on the Santa Catalina Island bald eagle program are available from the MSRP Administrative Record.

Northern Channel Island Bald Eagle Feasibility Study

This approximate five-year study was initiated in summer 2002 to determine the feasibility of recolonizing the Northern Channel Islands with bald eagles. A separate Feasibility Study/Environmental Assessment was completed for this study (MSRP 2002). The study consists of the following actions:

- Releasing 12 captive-bred or translocated wild nestlings each year for five years on Santa Cruz Island (using techniques developed on Santa Catalina Island)
- Monitoring contaminant levels in released birds, their eggs, and their food to determine whether the concentrations of DDTs and PCBs present may be affecting the ability of the eagles to reproduce successfully

The information from this data gap study will be used to evaluate whether a bald eagle reintroduction program should be implemented on the Northern Channel Islands.

Peregrine Falcon Survey of Santa Catalina Island

A survey conducted in 1992 found nine pairs of peregrine falcons nesting on several of the Northern Channel Islands; however, the extent to which peregrine falcons have become re-established on the Southern Channel Islands has until recently been uncertain. The Trustees undertook a formal survey of Santa Catalina Island in 2004 to determine whether peregrine falcons are nesting and reproducing there. The survey results indicated that two pairs of peregrine falcons have established territories and are nesting on Santa Catalina Island; however, no successful hatching or fledging of chicks was observed on the island (PBRG 2004).

Fish Contamination Study

A comprehensive fish collection and analysis study was initiated in 2002 to examine existing contaminant concentrations in fish from Ventura to Dana Point in the waters off of Ventura, Los Angeles, and Orange Counties. Fish collection has been conducted in several phases from 2002 to 2004. During the first phase, concentrations of DDTs, PCBs, dieldrin, chlordanes, and mercury were measured in 24 species of fish collected from 29 locations. Data from individual fish were generated for organochlorines, and data from composite samples within species and by location were obtained for mercury. A second phase of analysis will involve filling the data gaps identified by the results from the first phase, and evaluating the need for conducting follow-up individual-level analyses for mercury. This study is a joint project with the EPA, and funding is provided by both MSRP and the EPA.

The purpose of the study is to provide more complete information on the existing geographic patterns of contaminant concentrations in a variety of fish that are caught by both recreational and subsistence anglers in the SCB. The study data will be used for a variety of restoration planning purposes, including the identification of possible restoration projects. The data also will also be made available to the public to enable people to make more informed decisions about where to fish and the types of fish they consume.

Angler Study

Together, MSRP and the EPA also designed and implemented a survey and gathered qualitative information on fishing and fish consumption practices and preferences from people who fish, whether for recreation or subsistence, in the coastal waters from Point Dume to Dana Point. The angler study was conducted at fishing piers, beaches, jetties, and boat docks. The information collected by the study addresses angler demographics, fishing preferences, fish preparation techniques, and fish consumption rates and patterns. The purpose of this study was three-fold:

- To gain a better understanding of which recreational and subsistence anglers are being impacted by the contamination associated with the Montrose case, as well as how they get their information on fish and fishing
- To collect information on how many meals of fish per month are consumed by recreational and subsistence anglers, and how they prepare their fish for consumption
- To gain insights on the fishing preferences of these anglers (i.e., the types of fish they seek and their typical fishing locations)

The Trustees will use the information from the angler study to plan restoration projects that increase opportunities to fish for cleaner fish and to help guide the development of more effective public outreach and education programs that reduce public exposure to DDTs and PCBs from fish.

4.2.2 Projecting Future Trends in Contaminant Levels and Distribution

An important part of the restoration planning process is consideration of what the future conditions of contamination will be within the study area. It is challenging to project future changes in the concentrations and geographic distribution of DDTs and PCBs in the environment of the SCB. The Trustees have considered evidence that natural factors (e.g., the gradual burial of the more highly contaminated sediments over time) are altering levels of biological exposures to these contaminants over time. The Trustees have also coordinated closely with the EPA in their efforts to study the feasibility of taking remediation actions to reduce the availability of these contaminants.

In addition to the ongoing data gap studies described above, the Trustees have consulted with scientific experts within and outside their agencies to obtain the best estimates and projections into the future of the likely trends in continued contaminant exposures. The Trustees convened a workshop in May 2004 to review recent monitoring data and observations on levels of DDTs and PCBs in sediment, marine mammals, bald eagles, and other receptors. The purpose of the workshop was to evaluate trends in exposures, particularly related to ongoing observations of bald eagle reproductive impairment on Santa Catalina Island. One major variable to be considered is whether the potential remediation of the sediment contamination by the EPA is likely to significantly alter biological exposures to DDTs and PCBs and if so, within what time frame. The EPA efforts are described below.

Coordination with the EPA

The Trustees and the EPA were co-plaintiffs in the Montrose case, and have continued their coordination since the final settlements, collaborating on and co-funding the studies described above. In addition, MSRP staff work closely with the EPA to ensure consistency in their respective programs, and to avoid duplication of effort.

The EPA has a two-pronged approach to its Superfund responsibilities for the offshore areas of DDTs and PCBs stemming from the Montrose releases. The first is an “institutional controls” program that uses non-engineering measures to address the human health risks associated with consumption of contaminated fish from the Palos Verdes Shelf. Non-engineering measures include public outreach and education. The second is an “in situ” response program that is currently at the remedial investigation/feasibility study stage. The remedial investigation report will describe the conditions of the site, and the feasibility study will examine the technically feasible solutions to containing the DDT- and PCB-contaminated sediments over portions of the Palos Verdes Shelf. Only the second of these programs addresses “source control” of contamination, but both programs are briefly described below.

Institutional Controls

In a 2001 EPA Superfund Action Memorandum, the EPA established a program of institutional controls (ICs) as initial actions to address the immediate human health risks associated with the consumption of contaminated fish from the Palos Verdes Shelf. These ICs involve information and enforcement measures designed to affect human activities in such a way as to reduce exposure to the contaminants related to or at a site, and are usually applied in concert with other methods aimed at physical site remediation. The ICs consist of three primary components: (1) public outreach, (2) monitoring, and (3) enforcement. These three components complement each other to maximize the effectiveness of the EPA’s goal of protecting human health. Currently, the ICs program is envisioned to be a ten-year program with a budget of $7.8 million.

The objectives of the public outreach IC component are to reduce the health risks associated with eating contaminated fish by (1) increasing public awareness and understanding of fish consumption advisories and restrictions and (2) building local capacity to address fish contamination issues. The EPA also convened a Seafood Contamination Task Force, now known as the Fish Contamination Education Collaborative (FCEC), which is a consortium of federal, state, and local government agencies; local institutions; and community-based organizations. The FCEC is a means of coordinating the development and implementation of a public outreach program with direct involvement at all levels. FCEC also serves as a decision-making body for the public outreach and education component of the ICs program and advises the EPA on other Palos Verdes Shelf IC activities. The EPA started the full implementation of the public outreach and education program in January 2003.

The IC monitoring component consists of the EPA’s co-funding of the two fish-related data gap studies previously described and two additional fish-related contamination studies: a study of white croaker contamination levels in the ocean to assess the need for changes in the current commercial catch ban designation, and a study of the white croaker being sold in local ethnic fish markets to assess whether contaminated white croakers are reaching these markets. The sampling of white croaker from the ocean for the commercial catch ban study and the additional sampling from local fish markets were completed in 2004. The results from the laboratory analysis of all of these fish are expected in late 2005 or early 2006.

The EPA has designed an enforcement program to meet two goals: (1) to prevent to the extent practical the commercial catch and sale of contaminated fish from the catch ban area on the Palos Verdes Shelf and (2) to ensure that white croaker are not caught at or near the Palos Verdes Shelf in violation of CDFG regulations that establish a daily bag limit for these fish for sport fishers.

Once the monitoring results become available, the EPA will work closely with appropriate state agencies and interested stakeholders to interpret the results and identify specific enforcement needs that address the problems, if necessary.

Sediment Remediation

The EPA conducted the Palos Verdes Shelf Pilot Capping Project in 2000 to assess the feasibility of capping DDT-contaminated sediment on the Palos Verdes Shelf with cleaner material. The goal would be to reduce the ongoing inputs of DDTs and PCBs into the food web. The pilot cap placement project was completed in September 2000. Sediment was deposited at three 45-acre areas (capping cells) at depths of 150 to over 200 feet, for a total area of 135 acres northwest of

Figure 4-1. Sites where EPA conducted a pilot capping study in 2000. (Dashed line indicates region designated as the "area of highly contaminated sediments" by USGS [Lee et al. 2002]. Further analyses by the EPA have shown that contaminated sediments exist beyond this area.)

the Los Angeles County Sanitation Districts' outfall system (Figure 4-1) (USEPA 2003). An environmental monitoring program collected data before, during, and after cap placement to address key questions about the feasibility of capping on the Palos Verdes Shelf. The results of the Palos Verdes Shelf Pilot Capping Project will be used to evaluate the short-term results of capping DDT-contaminated sediment with clean sediment. The project will also determine how these results are affected by variables such as cap material, placement method, and water depth. In 2006, the EPA will use the results from the pilot project, along with other relevant information, to decide whether or not to propose full-scale capping as a cleanup action for the site.

Assumptions Regarding Future Contamination Distributions and Exposures

In light of the data and consultations identified above, the Trustees have made certain assumptions for the purposes of developing this Restoration Plan. At this time, the EPA has not determined the feasibility of a full-scale cap for sediment remediation. The EPA's overall goal is to reduce most if not all DDT/PCB levels in fish tissues to below health-based levels of concern as well as to levels that are protective of ecological receptors (Schauffler, pers. comm., 2003). The EPA anticipates that a remedy will be selected in 2006. Changes in contaminant concentrations throughout the food web would be realized gradually as the sediment source is controlled.

In light of the uncertainties associated with the remedial actions on the Palos Verdes Shelf and environs, several technical assumptions were formulated relative to future contaminant distributions and concentrations. Restoration planning must have a reasonable understanding of both current and future conditions so that effective decisions can be made regarding where and what type of actions should be implemented to achieve the desired restoration goals and objectives. Furthermore, an evaluation of the benefits and the likelihood of success of potential restoration projects will require a comparison of the existing conditions with the expected future conditions.

Several assumptions are listed below regarding future contaminant distributions and concentrations. These assumptions will be updated and/or revised in the future based on the results of the current data gap studies, upcoming regional monitoring, and the ultimate decisions made by the EPA. As discussed earlier, the Trustees will adaptively manage this restoration program based on updated information about and assumptions on contaminant concentrations.

The assumptions made for this Restoration Plan regarding future conditions were as follows:

- **Substantial reductions in the levels of DDTs and PCBs in marine sediments will not occur for many decades without human intervention.** Three key processes affect the contaminant concentrations in the surface layer of sediment at any given time: the recent history of sediment deposition or erosion, bed mixing through bioturbation, and loss of sediment through resuspension and desorption during storm events. According to recent mathematical modeling, it is predicted that most of the p,p'-DDE (the most abundant isomer of DDE and a persistent component of DDT) immediately northeast of the White Point outfall will remain buried and that surface concentrations will gradually decrease as DDE degrades to its decay products (Sherwood et al. 2002). However, the modeling also predicts that erosion will occur along the southeast edge of the existing effluent deposit, which, in addition to causing bio-diffusion, will reintroduce DDE to the sediment surface.

- **Sediment remediation on the Palos Verdes Shelf will reduce, but not eliminate, DDT and PCB contamination within the SCB.** If capping is selected as the remediation alternative, the cap would only be implemented on the parts of the Palos Verdes Shelf that are of the greatest concern. Other areas of contamination would remain uncovered and bioavailable.
- **Only limited sediment remediation is planned for other areas with DDT and PCB contamination.** With the exception of sediment remediation within the Consolidated Slip of the Inner Los Angeles Harbor and possibly upstream in Dominguez Channel, no other sediment remediation is planned within Los Angeles or Long Beach Harbors. However, maintenance dredging within the harbors may continue to result in reduced sediment contaminant concentrations relative to historical concentrations. No capping and/or other sediment remediation is planned within Santa Monica Bay, at the two historical sites where DDTs and PCBs were disposed of by dumping off of Santa Catalina Island, or within or offshore of coastal wetlands within the SCB.
- **Sediment remediation will take more than a decade to implement.** No capping or other sediment remediation would be implemented before 2006 on the Palos Verdes Shelf, and remediation could take up to 15 years to complete.
- **Maintenance may be required to ensure the benefits of sediment remediation.** Areas to the north of White Point on the Palos Verdes Shelf, particularly at Portuguese Bend and Royal Palms Park, have known geologic hazards such as landslides. These processes, together with earthquakes, have the potential to disrupt a sediment cap and potentially liberate higher concentrations of DDTs and PCBs. Severe storms also have the potential to erode a sediment cap.
- **Substantial reductions in DDT and PCB contamination in the food web would take more than a decade to achieve after the implementation of sediment remediation.** Concentrations of p,p'-DDE and PCB in bottom-feeding fish such as the white croaker will decrease after sediment remediation on the Palos Verdes Shelf and in the Consolidated Slip in Los Angeles Harbor. However, elevated concentrations in fish will persist for several years after sediment remediation, due to the life span of fish contaminated prior to remediation. Also, p,p'-DDE and PCB concentrations in surface sediments will be lower, but still above background concentrations off the Palos Verdes Shelf and extending north into Santa Monica Bay. In addition, elevated concentrations of DDTs and PCBs would be expected to persist for longer than a decade in some marine mammals, bald eagles, and seabirds due to their longer life spans and their foraging preferences.
- **Seafood consumption advisories are likely to remain in effect for many years.** Advisories warning against consumption of white croaker and other fish will likely continue for many years even after sediment remediation.
- **Reproductive impairment of bald eagles on Santa Catalina Island will likely continue for the foreseeable future.** Contaminant concentrations in carcasses of marine mammals and in many species of seabirds that are fed upon by bald eagles will continue to impact the species for the foreseeable future, even in the event that the EPA undertakes a sediment source control effort. In part, this continuing impairment will result from the relatively long life spans of marine mammals. Levels of DDE in bald eagle eggs laid on Catalina Island

from the 1980s to 2004 have fluctuated, but have not fallen below the thresholds associated with reproductive injuries.

- **Seabirds in general and peregrine falcons in particular have been and will likely continue to recover from contaminant injuries over time.** Most seabirds feed upon pelagic fish, which have experienced substantial reduction in DDTs and PCBs tissue concentrations since the ban on the discharge of these contaminants through the LACSD ocean outfall near White Point. Peregrine falcons, which feed almost exclusively on birds, will experience reductions in contaminant concentrations and impairments with the passage of time due to cleaner food resources. Contaminant concentrations in scavenging seabirds, such as gulls, may persist for more than a decade due to their habit of foraging on marine mammal carcasses, which are expected to remain high in contaminants for decades or longer (see above).

4.2.3 Soliciting and Formulating a Wide Range of Restoration Ideas

Active involvement of the interested public and the scientific community has been an integral part of the restoration planning process. This involvement has included the public review and comment periods associated with the NEPA/CEQA process (described later), outreach and education activities, and restoration planning workshops. These latter two activities are described below. Public outreach and involvement will continue throughout the restoration planning cycle and during the implementation of specific restoration actions.

A number of potential restoration concepts were originally explored during the damage assessment phase of the Montrose case. On settlement of the case, the Trustees initiated an effort to gather as broad a range of additional potential ideas as possible from the public, including members of the scientific community and various public interest groups. Some of the ideas were put forward in brief conceptual terms, and others were submitted in the form of concrete proposals. At this planning stage, the solicitation was an effort to gather “ideas” rather than formal proposals for funding, so all submittals were treated as ideas without concern regarding who would implement them or how they would be implemented. Specific decisions about who will ultimately implement projects and how the funding will be administered will not be made until after the completion of the Restoration Plan.

Four roundtable workshops were held in January 2003 with various stakeholders, including representatives from governmental and non-governmental agencies, academicians, scientists, and local residents. Over 80 individuals attended the January 2003 workshops. The purpose of the workshops was to:

- Review and obtain feedback on draft program goals and objectives
- Review and obtain feedback on the draft screening and evaluation criteria for restoration concepts
- Brainstorm on preliminary restoration concepts and ideas

Two workshops were held with technical experts, including academic researchers, resource agencies, and public entities involved with monitoring. The technical workshops covered all three purposes noted above and included additional discussion on restoration concepts for injured resources. One of the technical workshops focused on restoration ideas for injured bird resources, and the other focused on ideas for restoring fishing and fish habitats.

Two additional general public workshops were held to cover both bird and fishing injuries. These workshops were attended by representatives from governmental and non-governmental agencies, homeowner associations, environmental groups, environmental consultants, and residents. The public workshops were announced in local newspapers and were advertised on the MSRP web site.

The comments received from both the technical and the public workshops were considered in the preparation of this document. Notes from these workshops can be found in the MSRP Administrative Record (MSRP 2004).

4.2.4 Completing a Tier 1 Evaluation of Preliminary Restoration Ideas

The breadth and number of potential restoration ideas gathered was so large that the Trustees developed a two-tier evaluation process. The first screening level of evaluation, referred to as Tier 1, is described in detail in Section 5 of this Restoration Plan. Section 5 presents the criteria developed to evaluate the restoration ideas and summarizes the results of the evaluations. The complete record of all of the initial restoration ideas and the Tier 1 evaluation is not contained in this document, but has been placed separately in the Administrative Record for the case (MSRP 2004).

4.2.5 Tier 2 Evaluation of Restoration Ideas

The result of the Tier 1 screening evaluation was a set of 17 potential restoration actions, some specific and some still conceptual. These actions were then put through a more rigorous evaluation process, the Tier 2 evaluation. The Tier 2 evaluation is described in detail in Section 5, and the full evaluations for each action are in Appendices A–D of this Restoration Plan.

4.2.6 Developing the Restoration Alternatives and Identifying the Preferred Alternative

To facilitate public review and analysis of the alternatives for the comprehensive restoration program, the restoration ideas carried into Tier 2 were assembled into three comprehensive alternatives spanning all the restoration categories: fishing and fish habitat, bald eagles, peregrine falcons, and seabirds. The alternatives analysis, including the presentation of the Trustees' preferred comprehensive restoration alternative, is presented in Section 6.

4.2.7 Public Participation

Public participation in the Trustees' decision-making efforts is not only a requirement of the federal regulations for natural resource damage assessment and restoration (43 CFR Part 11) but is also an important aspect of the NEPA and CEQA requirements. Because this document is both a Restoration Plan and a programmatic EIS/EIR, the evaluations of the efficacy of the potential restoration actions and approaches include evaluations of the potential environmental consequences, as mandated by NEPA and CEQA. These are presented in Section 7.

Compliance with NEPA and CEQA procedural requirements occurred as follows. A Notice of Intent to conduct restoration planning and to prepare an EIS was published on October 9, 2001

(Federal Register, Vol. 66, No. 195). Three public meetings were held (on October 13, October 21, and November 1, 2001) to gather public comments on the scope of the Restoration Plan and programmatic EIS/EIR and restoration ideas. The NEPA public scoping comment period ended on November 24, 2001. A CEQA Notice of Preparation for the Restoration Plan and programmatic EIS/EIR was published in the California State Clearinghouse on March 15, 2002, and the public comment period ended 30 days later on April 15, 2002.

Public comments were sought on the draft version of this Restoration Plan and programmatic EIS/EIR during a 45-day review period from April 8 to May 23, 2005. A Notice of Availability was published in the Federal Register and in the California State Clearinghouse on April 8, 2005. The Trustees conducted public meetings on the draft Restoration Plan and programmatic EIS/EIR on April 23, April 24, April 28, and May 9, 2005. After the close of the public comment period, the Trustees considered and responded to public comments, made changes to the plan to address the comments received, and released this Restoration Plan and programmatic EIS/EIR as a final document in October 2005.

4.3 FUTURE FUNDING CONSIDERATIONS

The amount of funding ultimately available for natural resource restoration in this case is subject to certain variables. As described in Section 2.4, the final consent decree for the Montrose case contains a provision at Paragraph 11.C whereby the United States and the State of California have agreed that, under certain conditions, $10 million of the $43 million provided for response actions by the EPA and the California Department of Toxic Substances Control (DTSC) may be used either (1) by the EPA or DTSC for response actions or (2) by the Trustees for natural resource restoration. This $10 million and the interest it is accruing is being held in a court registry account until such time that the EPA makes a decision on the in situ response action for this case (that is, the response action that addresses the contamination remaining in situ in the sediments on the Palos Verdes Shelf). This provision of the consent decree states:

> In the event EPA makes a response action selection determination to not select any “in-situ” response action... then all funds retained in the Court Registry Account… shall be paid from the Court Registry Account to the Trustees.

In other words, should the EPA ultimately make a decision not to pursue any cleanup action for the contaminated sediments, then $10 million plus interest of the $43 million in settlement funds earmarked for response actions would instead go to the Trustees for additional natural resource restoration. The EPA currently estimates that it will reach its decision in 2006.

As explained in Section 4.1.3 and Section 6.2, this Restoration Plan provides a guide for commencing natural resource restoration actions and adapting to new information as it becomes available. Since it is too early to know whether the $10 million of “swing money” will be made available for natural resource restoration, the Trustees have developed alternative sets of restoration actions based upon a commitment of approximately $25 million over the first several years of implementation. Subsequent revisions of this plan will consider how accrued interest from the settlements and the swing money (if made available) may be utilized for additional natural resource restoration in the future.

During the early stages of restoration planning, the Natural Resources Trustees for the Montrose case (Trustees) compiled about 100 potential restoration ideas. Some of the ideas in this initial inventory were outdated or were no longer applicable, as they had been identified years earlier during the damage assessment phase of the case; other ideas proposed guidelines or management plans that were more appropriately the responsibilities of other jurisdictions; and yet other ideas were variations on similar themes and could be combined. The Trustees edited, sorted, and reorganized this initial inventory of ideas before undertaking systematic evaluation. A complete compilation of all the original restoration ideas and a description of how they were sorted and organized into the lists described in this section has been placed in the Montrose Settlements Restoration Program (MSRP) administrative record (MSRP 2004).

After editing, sorting, and reorganizing the initial inventory of ideas, approximately 50 potential restoration ideas remained. To select actions from among such a large number of ideas, the Trustees developed a two-stage evaluation process. The first stage, Tier 1, consisted of a screening-level analysis of all of the restoration ideas.

The principal objective of the Tier 1 evaluation was to refine and narrow the list of restoration ideas within each resource category (see below) to a reasonable number of the most promising candidate restoration actions. The Tier 1 evaluation consisted of a limited, systematic analysis of each restoration idea and the rating of each idea's relative capabilities to achieve the restoration goals of the Montrose case. The result was a list of ideas arranged from most to least promising within each category, with the most promising ideas then advancing to a detailed evaluation and environmental impact analysis in the subsequent evaluation step, Tier 2.

To facilitate evaluation and to ensure that a diverse set of restoration ideas were carried forward for further consideration, the Trustees organized the restoration ideas into general resource categories. In the public scoping document prepared at the outset of restoration planning (MSRP 2001), the Trustees suggested the following general types of restoration actions:

- Cleaner fish for anglers: projects to restore fishing injured by DDTs and PCBs
- Continued reintroduction of bald eagles to Santa Catalina Island
- Expansion of efforts to reintroduce bald eagles to all the Northern Channel Islands
- Restoration of peregrine falcons on the Channel Islands
- Wetlands and estuarine projects to benefit resources injured in the Montrose case
- Seabird projects

Considering the input received during the scoping and the initial planning phase, the Trustees refined the general categories of restoration actions into the following:

- Fishing and fish habitat restoration projects
- Bald eagle restoration projects
- Peregrine falcon restoration projects
- Seabird restoration projects

In addition to restoration ideas that fell within these four categories, the Trustees received ideas to create and implement general public outreach and education programs, as well as several specific research proposals. Public outreach programs and research proposals are addressed separately later in this section, as they differ in their fundamental nature from actions whose purpose is to directly restore injured natural resources and lost services.

5.1 TIER 1 CRITERIA AND PROCESS

5.1.1 Developing Criteria

Federal natural resource damage assessment and restoration regulations at Title 43 Code of Federal Regulations (43 CFR) Part 11 provide guidance on the selection of restoration alternatives. Specifically, under 43 CFR Part 11.82, these federal procedures require the authorized official (in this case the Trustees) to develop a reasonable number of possible restoration alternatives linked to the injured natural resources and the services those resources provide, and then select the alternative determined to be the most appropriate based on all relevant considerations. The federal procedures list the following factors to consider:

- Technical feasibility
- The relationship of the expected costs of the proposed actions to the expected benefits from the restoration, rehabilitation, replacement, and/or acquisition of equivalent resources
- Cost-effectiveness
- The results of any actual or planned response actions
- The potential for additional injury from the proposed actions, including long-term and indirect impacts, to the injured resources or other resources
- The natural recovery period
- The ability of the resources to recover with or without alternative actions
- The potential effects of the proposed actions on human health and safety
- Consistency with relevant federal, state, and tribal policies
- Consistency with relevant federal, state, and tribal laws

This list is not a fixed list of the factors required of all natural resource restoration plans, but rather is a list of the potentially relevant factors to consider in developing evaluation criteria that are tailored to each restoration planning effort. Additional factors may be considered (for instance, this list does not include an explicit factor for evaluating the nexus between a potential restoration action and the injuries of a case). The Trustees considered these factors and other evaluation criteria developed for previous natural resource restoration plans. The Trustees then developed six criteria suited to this case and sought public input on those criteria during the public scoping of this plan in 2002 and 2003.

Table 5-1 summarizes the relationship between the six evaluation criteria (and their subcomponents) utilized in the Montrose Restoration Plan and the list of factors to consider from the federal regulations (43 CFR Part 11). For the Tier 1 evaluation step in which a large number of potential actions were screened, the Trustees limited the evaluation to the first four of these six criteria.

Table 5-1

Relationship between MSRP Evaluation Criteria and Evaluation Factors Listed in the Federal Natural Resource Damage Assessment Regulations (43 CFR Part 11)

MSRP Evaluation Criteria	Factors Listed under 43 CFR Section 11.82(d) Incorporated into Corresponding MSRP Criteria
Nexus • Nature of action • Location	Not listed
Feasibility • Technical feasibility • Potential institutional or administrative barriers to an action's implementation • Degree of ongoing operation and maintenance needed to ensure intended results	• Technical feasibility • Consistency with relevant state, federal, or tribal policies and laws
Resource Benefits • Degree to which injured natural resource values and services are improved by the action • Degree to which benefits are measurable • Duration of benefits • Conservation status of resource(s)	• Relationship of the expected costs of the proposed actions to the expected benefits from the restoration • Results of any planned or actual response actions • Natural recovery period • Ability of the resources to recover with or without alternative actions
Ecosystem Benefits • Degree to which action leads to sustainable improvements in broader ecological functions	• Relationship of the expected costs of the proposed actions to the expected benefits from the restoration • Results of any planned or actual response actions • Natural recovery period • Ability of the resources to recover with or without alternative actions
Environmental Acceptability • Potential beneficial and adverse environmental effects	• Potential human health and safety effects • Potential for additional injury resulting from the proposed action, including long-term and indirect impacts
Cost • Includes possible partnerships	• Relationship of the expected costs of the proposed actions to the expected benefits from the restoration • Cost-effectiveness

The Trustees considered these an initial set of evaluation criteria for distinguishing the capabilities of the different potential actions to achieve the restoration objectives. The Trustees determined that the characteristics most important at the screening stage were the link between a potential restoration action and the injuries of the case (i.e., the nexus), feasibility, and potential benefits. The Trustees organized these characteristics into four specific Tier 1 evaluation criteria, which are described separately below.

Criterion 1: Nexus

Criterion 1 concerns the relationship between a potential action and the natural resource injuries and lost services of the Montrose case. The strength of a potential action's connection to the injuries of the Montrose case was evaluated by considering both the nature of the proposed action (i.e., whether it addresses injured resources or services that were lost) and the location of the proposed action.

To evaluate the nature of the proposed action, the Trustees evaluated the degree to which the fundamental objective of a potential action focuses on restoring one or more of the natural resources and services identified for restoration in the final Montrose case consent decree, which states: "The Trustees will use the damages for restoration of injured natural resources, including bald eagles, peregrine falcons, and other marine birds, fish and the habitats upon which they depend, as well as providing for implementation of restoration projects intended to compensate the public for lost use of natural resources" (United States v. Montrose, No. CV 90-3122-R [C.D. Cal 2001]).

The Trustees also considered the location of a potential action. Locations that provide benefits in proximity to where specific natural resource injuries and service losses are occurring or have occurred (i.e., in the Southern California Bight [SCB]) were given highest consideration. This consideration did not always equate to actions proposed at the immediate sites of injury, as contamination is still at issue, but after considering the limitations of ongoing contamination, greater value was placed on projects that are as close as feasible to sites of the original injury/lost services.

For the nexus criterion, the seabird category presented a special situation. A large number of potential actions benefit one or more species of seabirds, and specific evidence of injuries from DDTs and PCBs varies from species to species. For this reason, the Trustees adopted an evaluation approach for the seabird category that considers evidence of injury for each seabird species in addition to the nature of the proposed action and its location.

After consideration of the foraging ecology of seabirds in the SCB, the Trustee Council concluded that it was likely that most, if not all, species of seabirds using the SCB had been exposed to DDTs or PCBs. Across different species, this exposure either caused documented evidence of adverse injury (specifically, eggshell thinning), documented elevated DDT levels in eggs, or the injury was unknown. Severe eggshell thinning is documented when mean eggshell thickness is determined to be at least 15 percent reduced when compared to the thickness observed in pre-1947 museum specimens. The seabird species in the SCB for which there was evidence of severe eggshell thinning (as defined above) are the double-crested cormorant, Brandt's cormorant, the California brown pelican, and the western gull (Kiff 1994). A study in 1992 demonstrated that even though seabird populations in the SCB were not experiencing continued severe eggshell thinning (with the exception of the double-crested cormorant), individual eggs of the ashy storm-petrel, western gull, and Cassin's auklet were measuring greater than 15 percent thinner than pre-1947 values (Kiff 1994). The 1992 study also found highly significant differences in mean eggshell thickness ($p < 0.01$) compared to pre-1947 values for the double-crested cormorant, the ashy-storm petrel, Cassin's auklet, and the western gull, as well as significant differences ($p < 0.05$) in mean eggshell thickness for the pelagic cormorant.

The Trustees also considered information regarding elevated DDT levels in seabird eggs in the SCB compared to eggs of the same or closely related species at distant colonies along the Pacific coast. Fry (1994) reported that total DDT egg residues were significantly elevated in the SCB colonies compared to other colonies for the following species: the western gull, the double-crested cormorant, the pigeon guillemot, and the ashy storm-petrel. Xantus's murrelets were also documented as having elevated residues of DDTs in their eggs on Santa Barbara Island (Fry 1994).

The Trustees assigned nexus ratings to different seabird species of the SCB after considering the above information regarding eggshell thinning and DDT levels in seabird eggs. A high nexus rating was given for those projects targeting species with severe or significant eggshell thinning and/or for which DDT egg residues were significantly elevated in the SCB colonies. Consequently, the following seabirds received a high nexus and are considered priority species for restoration: the double-crested cormorant, Brandt's cormorant, the California brown pelican, the western gull, the ashy-storm petrel, Cassin's auklet, the pelagic cormorant, and the pigeon guillemot. The Trustees assigned a moderate rating to projects aimed at a species whose eggs did not show severe or significant eggshell thinning but had elevated levels of DDTs in eggs (e.g., Xantus's murrelet). The Trustees gave the lowest ratings to projects directed at species that were likely exposed but for which no known evidence existed of severe or significant eggshell thinning or elevated levels of DDTs.

In addition to eggshell thinning and DDT data, the Trustees also considered the conservation status of a seabird species when determining priority seabirds for restoration. For example, the California brown pelican and Xantus's murrelet are considered priority species for restoration based on their and endangered and threatened status, respectively.

Criterion 2: Feasibility

Criterion 2 concerns the likelihood that the benefits associated with potential actions will be achieved in actuality. The feasibility of a potential action refers to a number of considerations relating to the likelihood that the action will be completed and will produce its intended results. For this criterion, the Trustees considered three sub-factors:

- An action's technical feasibility (i.e., the practical question of an action's ability to be built and/or implemented as envisioned)
- Potential barriers to an action's implementation (e.g., regulatory hurdles or public acceptance)
- The degree of ongoing operation and maintenance needed to ensure that the action continues to produce the intended results

Criterion 3: Resource Benefits

Criterion 3 concerns the benefits of a potential action to specific injured natural resources/lost services. Specifically, the Trustees considered how effective each action would be in restoring the specific injured natural resources and lost services at issue in the Montrose case. For the purposes of Tier 1, evaluation of the Criterion 3 was isolated from considerations of feasibility or cost and included consideration of four sub-factors:

- The degree to which injured natural resource values and services are improved by the action
- The degree to which benefits are measurable
- The duration of the benefits
- The conservation status of the resource(s) receiving benefits

Criterion 4: Ecosystem Benefits

Criterion 4 concerns the degree to which a potential action leads to sustainable improvements in broader ecological functions. By design, some actions are narrowly focused on benefiting a particular resource (e.g., fish stock enhancement or fishing access improvements are intended specifically to benefit specific fishing services and not to have broader benefits on fish habitat). Under this criterion, the Trustees gave a higher rating to actions that not only benefit a targeted resource but also benefit multiple species or resources or employ an ecosystem approach to restoring resources and services.

5.1.2 Process for Applying the Criteria within Each Restoration Category

In the Tier 1 evaluation, each restoration idea was evaluated only in relation to the other ideas within the same category, as it is the Trustees intent to carry forward several ideas from all of the categories to maintain a diverse set of alternative actions. Thus, a peregrine falcon project was evaluated against other peregrine falcon projects, but not against bald eagle, seabird, or fishing projects.

Once all the restoration ideas within each category were evaluated, the ideas and their ratings were arranged in an ordered list, with those considered most promising at the top of the list. Tier 1 was not simply a pass/no pass evaluation; sometimes the most promising elements of two or more ideas were combined into a single stronger action. The following sections describe the specific considerations and results of the Tier 1 evaluation by category.

5.2 TIER 1 EVALUATION OF FISHING AND FISH HABITAT RESTORATION IDEAS

There were 21 wide-ranging restoration ideas evaluated within the fishing and fish habitat category. Many of them represented variations on common themes, and as a result the Trustees found it useful to organize and consolidate restoration ideas according to five common themes: habitat manipulation, stock enhancement, public access, marine protected areas, and public outreach and education.

5.2.1 Fish Habitat Manipulations

Habitat manipulations encompass three sub-themes or approaches, each of which arises from several individual project ideas. The first approach involves some variation of artificial reef creation, the second approach involves kelp forest restoration, and the third approach involves restoring wetland habitats. Reef construction and kelp forest restoration are primarily directed toward changing habitats from open, sandy-bottom habitats that produce or attract soft-bottom feeding fishes, which generally contain higher concentrations of DDTs and PCBs, to hard-bottom and structured habitats that produce/attract fish species that forage in the water column or on reef-based food items and generally contain lower concentrations of these contaminants. Wetland restoration has more general aquatic habitat benefits that, if properly designed, include some general and less area- or site-specific improvements to fishing via the contribution of estuarine/wetland habitats to fish production.

In applying the Tier 1 criteria, the various artificial reef approaches rate high. Because fish, fish habitat, and the services that fish provide to anglers are integrally linked, the MSRP restoration objectives target not just improvements to fishing services but also to fish and the habitats on which they depend. Constructing artificial reefs in areas where fish consumption advisories exist for soft-bottom-feeding species but not for water-column-feeding species accomplishes both the fishing and the fish habitat objectives of the restoration. Thus, reef construction provides a habitat-based solution to increase the relative abundance of fish that provide maximal health benefits and pose minimal health risks in areas affected by advisories.

Relative to the predominant expanses of soft-bottom and other types of hard-bottom habitats in the Southern California marine environment, kelp forests are relatively rare, with an average total of approximately 88 square kilometers (34 square miles) of canopy coverage in the Southern California Bight, including the Northern and Southern Channel Islands (Murray and Bray 1993). This coverage constitutes approximately 0.1 percent of the 78,000-square-kilometer (30,116-square-mile) area of the SCB (Dailey et al. 1993). Increasing the extent of kelp beds along the Southern California coast would provide conditions that favor the production of water-column feeding fishes that are less likely to feed from contaminated benthic (sediment) communities and may therefore be less likely to accumulate contaminants. However, kelp forest rehabilitation by itself (i.e., out-planting of kelp and other algae species in the absence of other actions to create suitable substrate) is not viewed as a sustainable approach to restoring habitat in part because of the transient nature of kelp-forest canopies (Dayton et al. 1992).Thus, “stand-alone” approaches to expanding kelp beds (e.g., the out-planting of kelp) in the absence of other actions do not rate as high as artificial reef development approaches that incorporate into their design the promotion of natural recruitment of kelp. Nevertheless, the out-planting approach might be investigated at a later date as an add-on component to artificial reef development should it be found that such out-planting methods accelerate the creation of self-sustaining kelp communities.

The restoration of full tidal exchange wetland and estuarine habitats has broad ecological benefits including benefits to several species of marine fish. However, based on analysis of factors influencing marine fish production at local and regional scales, the Trustees estimate that creation of artificial reefs at sites where consumption advisories are in place would have more direct, measurable benefits to the specific lost fishing services of the case. Although wetlands and estuaries are clearly important habitats for some fishes, the link between production of fish by newly restored estuarine habitats and changes in fishing services for the anglers that are most affected by fishing advisories is difficult to establish (Appendix A3). However, contributing to wetland restoration may be viewed as fulfilling the MSRP fish habitat objective by increasing the amount and quality of what is currently an important but limited aquatic habitat in the region. Furthermore, this approach could be directed to specifically benefit popular sport fish species known to depend on coastal estuarine habitat at critical life stages (e.g., California halibut) and species that are at particularly low population levels (e.g., spotted sand bass). For this reason, wetland restoration was carried forward into detailed Tier 2 evaluation.

5.2.2 Stock Enhancement

Stock enhancement ideas for restoring fishing services (ideas 7, 8, and 15 in Table 5-2) include two approaches. One is a "put-and-take" approach, whereby fish are cultured until they reach a legal or nearly-legal size and then are released in marine waters near fishing locations where fish consumption advisories are in place. In theory, these fish would be much lower in contaminants and would be caught instead of existing fish that are contaminated (the released fish could be tagged so the angler would know which fish were safe to eat). Although the put-and-take approach has some positive features, its sustainability is limited because of its high and long-term operational and maintenance costs. For this reason, restoration ideas involving this put and take form of stock enhancement were not carried forward to the Tier 2 evaluation.

A second stock enhancement approach is to use captivity-reared fish to re-build populations of fish that have reached critically low levels of abundance or to increase the availability of popular sport fish that are typically lower in contamination. The effectiveness of this approach for marine species is uncertain, though there may be some potential for successful stock enhancement of some estuarine-dependent species (e.g., the California halibut or the spotted sand bass).

When considered as isolated projects, the hatchery-based approaches to restoration did not rate as high as other approaches for fulfilling the MSRP restoration objectives and were not carried forward to Tier 2.

5.2.3 Fishing Access Improvements

Several restoration ideas in this category proposed improving fishing services by creating or improving public access to fishing sites where anglers are likely to catch fish lower in contaminants (see ideas 5 and 14 in Table 5-2). These improvements could entail building new or extending existing fishing structures, operating fishing barges, and other similar approaches.

When evaluated apart from fish habitat improvement projects, fishing access projects only partially fulfill the restoration objectives of the case and thus are not rated high overall. Developing fishing access in association with the creation of artificial reefs links fishery improvements to anglers and thus is more highly rated. For this reason, stand-alone fishing access improvement projects were not carried forward to the detailed Tier 2 evaluation; however, fishing access improvements have been incorporated as potential design components to enhance the public benefits of artificial reef creation projects in the Tier 2 evaluation.

5.2.4 Marine Protected Areas

Marine Protected Areas (MPAs) are sections of the ocean set aside for various conservation, restoration, recreational, and fisheries management purposes. The MPA concept spans a broad range of management options, from designation of ecological preserves to the application of limited fishing or biota collection restrictions. MPAs may, among other things, help rebuild depleted fisheries and improve fish catch outside of their boundaries, thus enhancing fishing services.

Two fishing restoration ideas proposed for MSRP funding suggested the use of MPAs as a means of restoring both fishing and fish habitats. One idea is that the Trustees contribute funds to support a more comprehensive implementation (i.e., monitoring, public education, and enforcement) of the newly established Channel Island MPAs. The other idea is for the Trustees to pursue, in partnership with other appropriate entities, the future establishment of MPAs in closer proximity to the areas affected by the contaminants of the Montrose case (i.e., closer to the Palos Verdes Shelf).

Of the two specific MPA ideas, only the idea of providing implementation support to the existing Channel Islands MPAs was carried forward for detailed Tier 2 evaluation. Because these MPAs already exist this proposal is readily achievable, and strengthening the management and evaluation of the Channel Island MPAs would contribute to MSRP goals by clarifying the “spillover” benefits of MPAs to fishing and fish stocks outside their boundaries, which may ultimately benefit fishing services throughout California. The idea of creating new MPAs in the Palos Verdes Shelf region did not receive a high feasibility rating, as the Trustees consider the likelihood of successfully implementing new MPAs to be uncertain at this time. This idea was not carried forward to Tier 2.

5.2.5 Public Outreach and Education on Fishing

Public outreach and education activities are key components of MSRP restoration activities on a number of levels (see Section 5.4.1). Under the category of fishing and fish habitat restoration, public outreach and education activities were proposed as a specific approach to restoring lost natural resource services by providing information to people that allows them to make knowledgeable choices about where to fish, what to fish for, and how to prepare fish for consumption. Because contamination levels are not uniform but vary by location and species of fish, adequate fish contamination data would make it possible to identify and promote optimal fishing services and thus increase public use and enjoyment of fish services. This type of activity would transcend current outreach efforts, which focus on warning the public about where they should avoid fishing or which fish they should avoid catching and eating.

Although a public information program on fishing services would not provide any fish habitat benefits, the concept rated high enough with respect to nexus, feasibility, and resource benefits to be brought forward to the Tier 2 evaluation.

5.2.6 Other Fishing and Fish Habitat Ideas

Several other ideas evaluated in Tier 1 did not rate as high overall as the four combined ideas that have been carried forward to Tier 2. Each of these ideas is discussed briefly below.

- **Convert decommissioned oil platforms to artificial reefs.** This idea did not rate high enough to be brought forward to Tier 2 because of regulatory feasibility issues and its appropriateness for MSRP implementation. This idea calls for modifying existing permit requirements to allow decommissioned oil platforms to remain in place; however, there would be no need for MSRP funding given that the decommissioning is the responsibility of platform owners/operators. Also, the locations of these platforms would not make fishing readily accessible to shore-based anglers. Finally, there is a potential that chemical contaminants in shell mounds (formed over time under platforms as encrusting invertebrates fall from the platform support surfaces and accumulate on the bottom) may need to be addressed.

- **Restoring overgrazed seashore in Abalone Cove.** This idea did not rate high in the areas of technical and regulatory feasibility. The culturing and out-planting techniques suggested raised technical practicability issues and long-term sustainability is uncertain.
- **Provide transportation for anglers to areas with "clean" fish.** This idea raised operational and regulatory feasibility issues (e.g. concern that such a program could be sustained financially and whether local communities would object to out fluxes/in fluxes of anglers) as well as concerns that benefits to anglers would likely be short-term and highly dependent on many use and preference factors beyond the control of the program.
- **Restore white abalone.** This idea did not have a strong nexus to the injuries of the case.
- **Clean up Consolidated Slip.** This idea did not meet the requirements of the final Montrose consent decree, which prohibits use of settlement funds for response actions in the "onshore areas," which the U.S. Environmental Protection Agency and the State of California continue to pursue.
- **Create a 50-acre wetlands and wildlife preserve within the Consolidated Slip.** This idea did not rate high overall, principally on technical feasibility grounds (creating wetlands out of uplands). In addition, the nexus to the injuries of the case was moderate since higher, intertidal type of wetlands would not likely function as good habitat for the species of fish, such as California halibut, commonly caught by marine anglers.
- **White croaker commercial market certification program.** This idea did not rate high in the areas of operational feasibility and ecosystem benefits. The feasibility issues that such a program would present include having a verifiable system to ensure the integrity of the certification that white croaker for sale are in fact clean.

The results of the Tier 1 evaluation of fishing and fish habitat restoration ideas are presented in Table 5-2. Several separately listed ideas pertaining to reefs, kelp, and fishing access were combined into a single concept for the purposes of Tier 2 evaluation.

Table 5-2
List of Ideas to Restore Fishing and Fish Habitats

Idea No.	Fishing and Fish Habitat Restoration Ideas	Pass to Tier 2?
1	Construct artificial reefs and fishing access improvements	Yes
2	Provide public information to restore lost fishing services	Yes
3	Restore full tidal exchange wetlands (several potential locations)	Yes
4	Augment funds for implementing Marine Protected Areas in California	Yes
5	Operate fishing barge(s) over existing or constructed reef(s)	Merge concept with #1
6	Create protected shallow water habitat in existing harbor areas	No
7	Supplement near-shore fisheries in areas affected by the contaminants of the case with clean, hatchery-raised fish	No
8	Spotted sand bass hatchery program	No
9	Restore depleted kelp beds of Malibu and Palos Verdes	Merge concept with #1
10	Convert decommissioned oil platforms to artificial reefs	No
11	Establish new Marine Protected Areas within the Palos Verdes Shelf region	No
12	Restore overgrazed seashore in Abalone Cove	No
13	Provide transportation for anglers to areas with “clean” fish	No
14	Improve public amenities and fishing access at Marina del Rey, White Point Beach, Point Vicente, and Point Fermin	Merge concept with #1
15	Giant sea bass hatchery program	No
16	Restore white abalone	No
17	Restore algae (kelp) on Palos Verdes coast	Merge concept with #1
18	Protect and restore Ormond Beach wetlands	Merge concept with #3
19	Clean up Consolidated Slip	No
20	Restore/create 50-acre wetlands and wildlife preserve within the Consolidated Slip of Los Angeles Harbor	No
21	White croaker commercial market certification program	No

5.3 TIER 1 EVALUATION OF BIRD RESTORATION IDEAS

Three categories of bird resources were considered separately for the purposes of this Restoration Plan: bald eagles, peregrine falcons, and seabirds.

5.3.1 Bald Eagles

The Trustees are funding two ongoing studies for bald eagles in the SCB (see Section 4.2.1). The outcomes of the studies will influence the ultimate selection of bald eagle restoration actions within this Restoration Plan. Nevertheless, the Trustees were able to refine some of the initial restoration options through Tier 1 evaluation, irrespective of future study results. These results are presented below.

All of the restoration ideas for bald eagles fell into three main concepts: (1) restoring bald eagles to the Northern Channel Islands, (2) restoring bald eagles to Santa Catalina Island, and (3) restoring bald eagles to the mainland.

- Restoring bald eagles to the Northern Channel Islands. In 2002, the Trustees initiated a multi-year study to investigate the feasibility of re-establishing bald eagles on the Northern Channel Islands. This study, described in an Environmental Assessment released by the Trustees (MSRP 2002), seeks to determine whether current levels of DDTs in the marine environment surrounding the Northern Channel Islands have declined sufficiently to allow a self-sustaining population of bald eagles to once again occupy this habitat. Because the young bald eagles hacked onto Santa Cruz Island under this study will not attain reproductive age for several years, the outcome of the study will not be known within the time frame of the development of this Restoration Plan. For this reason, the Trustees will continue to retain options in support of restoring bald eagles to the Northern Channel Islands, including maintaining a bald eagle captive breeding program and releasing additional eagles. These options were further explored within the context of the Tier 2 evaluation; however, final decisions on whether to implement additional actions will be made once the outcomes of the Northern Channel Islands (NCI) Feasibility Study are known (in or around 2008). Once the Trustees decide on a specific course of action, they will document it and provide the public an opportunity for review and comment.
- Restoring bald eagles to Santa Catalina Island. This concept entails continuing and/or modifying the ongoing program to restore/maintain bald eagles on Santa Catalina Island in addition to completing the NCI Feasibility Study. This program was initiated in the early 1980s by the Institute for Wildlife Studies, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, and other parties, independent of the governments' natural resource damage assessment case against the Montrose defendants. The MSRP began funding this effort after the settlement in 2001 as a data gap study (see Section 4.2.1). Although DDT discharges virtually ceased many years ago, exposure to the residual levels of DDTs still present in the environment have thus far prevented the Santa Catalina Island bald eagles from successfully reproducing without human intervention. Annual collection of eggs from the nests of Santa Catalina Island bald eagle pairs, artificial incubation of the eggs, and fostering of chicks back into the nests are required to maintain this population. In recent years, the Trustees have assumed full funding of this program to ensure that the option of maintaining a population of bald eagles on Santa Catalina Island received consideration

within this Restoration Plan. The current program and any additional options to restore this population were rated high enough to be brought forward to detailed analysis in the Tier 2 evaluation**.**

- Restoring bald eagles on the mainland. The third concept entails restoration of bald eagles at one or more sites on the mainland of Southern California and Baja California. The goal of this concept would be to promote and enhance breeding and wintering opportunities in general geographic proximity to, but not in the Channel Islands. This concept could include such actions as the enhancement of nesting and foraging habitat, protection of nest and roosting trees, and reintroduction of eagles into suitable, but unoccupied, habitat. Several specific ideas for this concept were proposed, including the reintroduction of eagles to the Baja California coastline and enhancement of foraging habitat at Ken Malloy Harbor Regional Park, located on the Palos Verdes Peninsula.

  In the Tier 1 evaluation, the mainland bald eagle restoration concept did not rate as high as the Northern Channel Island and Santa Catalina Island concepts for nexus and resource benefits. Mainland restoration of bald eagles was not found to have a strong nexus to the Montrose case (as the bald eagle injuries occurred and continue to occur in the Channel Islands). Furthermore, because bald eagle populations on the mainland of California are already recovering from past decline (Jurek, pers. comm., 2004), and because intensive urbanization throughout the greater Los Angeles metropolitan region leaves suitable bald eagle breeding habitat extremely scarce, the potential benefits did not rate as high as the benefits associated with the other two concepts. Thus, the mainland bald eagle restoration concept was not carried forward to Tier 2 evaluation. The results of the Tier 1 evaluation of bald eagle restoration ideas are presented in Table 5-3. The two ideas brought forward to Tier 2 were further developed and renamed as described in Section 5.5, Section 6, and Appendix B.

Table 5-3
List of Ideas to Restore Bald Eagles

Idea No.	Bald Eagle Restoration Project Ideas	Pass to Tier 2?
1	Restore bald eagles to the Northern Channel Islands	Yes
2	Restore bald eagles to Santa Catalina Island	Yes
3	Restore bald eagles on the mainland	No

5.3.2 Peregrine Falcons

A total of five restoration ideas for peregrine falcons were analyzed within the Tier 1 evaluation. These ideas ranged from restoring peregrine falcons to the Southern Channel Islands to forming a management group to address peregrine falcon–related issues. The project ideas fell into the following five concepts: (1) restoration of peregrine falcons to the Southern Channel Islands, (2) restoration of peregrine falcons on the Baja California Pacific Islands, (3) acquisition and enhancement of peregrine falcon habitat on the Palos Verdes Peninsula, (4) creation of a peregrine falcon management group, and (5) enhancement of foraging habitat for peregrine falcons at Ken Malloy Harbor Regional Park.

The first concept involves the restoration of peregrine falcons to the Southern Channel Islands. It is estimated that historically up to 30 pairs of peregrine falcons nested on the Channel Islands prior to 1945 (Hunt 1994). The first re-established pair of peregrine falcons was recorded in 1987 on San Miguel Island. Although peregrine falcons have resumed nesting on all the Northern Channel Islands, up until recently no nesting observations have been confirmed for peregrine falcons on the Southern Channel Islands, with the exception of Santa Barbara Island. To confirm the anecdotal accounts of the presence of breeding peregrine falcons on Santa Catalina Island, the Trustees funded a survey of the island in 2004 (PBRG 2004). The survey confirmed the presence of two pairs of peregrine falcons on Santa Catalina Island, although successful breeding was not observed. Coupled with observations of increasing numbers of peregrine falcons throughout the Channel Islands, the Trustees brought forward two different approaches for evaluation in Tier 2 for the restoration of peregrine falcons to the Channel Islands: implement active peregrine falcon restoration (Appendix C1) and monitor the recovery of peregrine falcons (Appendix C2).

The Trustee Council also brought forward the concept of restoring peregrine falcons populations on the Pacific islands off of Baja California, Mexico. By increasing the number of peregrine falcons on these islands, the recovery of this species on the Channel Islands may occur faster due to an increase in dispersing juveniles from the Baja California Pacific Islands. The Trustees further explored this concept within a Tier 2 evaluation (Appendix C3).

The concept of enhancing foraging habitat for peregrine falcons on the Southern California mainland (ideas 3 and 5 in Table 5-4) was not selected for Tier 2 evaluation. This decision was largely due to the successful recovery of peregrine falcons on the mainland. The Trustees received two specific restoration ideas for habitat enhancement on the Palos Verdes Peninsula; however, because peregrine falcons in this area are not limited by foraging habitat, the benefits associated with this concept are expected to be minimal.

The final concept of creating a management group to work on peregrine falcon issues was likewise not carried forward to the Tier 2 evaluation. Although the presence of such a group would be useful in coordinating regional issues, the creation of a management group would not result in on-the-ground restoration of peregrine falcons. This concept does not further the Trustees' goal of restoring the peregrine falcon population on the Channel Islands.

The results of the Tier 1 evaluation of peregrine falcon restoration ideas are presented in Table 5-4.

Table 5-4
List of Ideas to Restore Peregrine Falcons

Idea No.	Peregrine Falcon Restoration Project Ideas	Pass to Tier 2?
1	Restore peregrine falcons to the Channel Islands	Yes, divided into two actions: implement active restoration and monitor ongoing recovery
2	Restore peregrine falcons to the Baja California Pacific Islands	Yes
3	Acquire and enhance peregrine falcon habitat on the Palos Verdes Peninsula	No
4	Create a peregrine falcon management group	No

Table 5-4
List of Ideas to Restore Peregrine Falcons

Idea No.	Peregrine Falcon Restoration Project Ideas	Pass to Tier 2?
5	Enhance foraging habitat for peregrine falcons at Ken Malloy Harbor Regional Park	No

5.3.3 Seabirds

Eighteen restoration ideas receiving consideration fell within the category of seabird restoration. The Trustees evaluated these projects against the criteria and rating considerations identified in Section 5.1.

For the nexus criterion, the seabird category presented a special situation, given the large number of proposed actions that would benefit one particular species of seabird or group of similar seabirds. Not all seabirds proposed for restoration can be clearly shown to have been impacted by DDTs and/or PCBs. The Trustees concluded that they would consider injury evidence for seabirds species by species and rank higher those projects that benefit species having an injury associated with these contaminants (see Section 5.1.1).

The seabird projects that were carried forward to Tier 2 represented a diverse set of ideas to restore seabird populations in the SCB. The majority of the projects that were carried forward include some form of habitat restoration, creation, or enhancement that would provide benefits to multiple species. The highest-rated projects also demonstrated a high degree of feasibility and benefit, as demonstrated by similar projects that have been successfully carried out elsewhere.

Several other ideas evaluated in Tier 1 did not rate as high overall as the eight ideas that were carried forward to Tier 2. These other ideas are described briefly below.

- **Restore ashy storm-petrels to the Southeast Farallon Island.** This idea did not rate as high as other seabird projects primarily due to its location outside of the SCB. Although this project targets a priority species for restoration (the ashy storm-petrel), other projects targeting ashy storm-petrels within the SCB received higher ratings with respect to nexus.
- **Create mainland nesting habitat for colonial seabirds.** This idea did not pass Tier 1 due to a relatively weak nexus to the injuries of the case (see Section 5.1.1). Although the benefits of this idea were considered high for the target species, this idea did not rate high in the ecosystem benefits category because it focuses on certain colonial seabirds.
- **Create cormorant nesting platforms.** Although this idea rated high for nexus, benefits were not considered long term due to the necessary maintenance on such platforms. This idea also received a lower rating in the category of ecosystem benefits since it would be designed solely to attract nesting cormorants.
- **Fund a California brown pelican patrol/enforcement position.** This idea did not pass Tier 1 because the benefits were anticipated to last only as long as the project was in place, and would therefore not be self-sustaining. This idea also received a lower rating in the category of ecosystem benefits, as it would primarily target California brown pelicans.
- **Enhance nesting habitat for shearwaters in New Zealand.** This idea did not pass Tier 1 due to a relatively weak nexus and a location outside of the SCB (see Section 5.1.1).

- **Reintroduce tufted puffins to Prince Island.** This idea did not pass Tier 1 due to a combination of factors. This species received a lower nexus rating and is not considered a priority for restoration (see Section 5.1.1). This idea also received a lower rating in the category of ecosystem benefits, as it focuses on the reintroduction of a single species.
- **Purchase Bird Rock off of Santa Catalina Island.** This idea did not pass Tier 1 because its benefits to the priority seabirds and ecosystem are expected to be low. Given its proximity to Santa Catalina Island, seabirds on the 1.3-acre Bird Rock receive a high level of disturbance from human activity (e.g., from kayakers and boaters). It is also highly unlikely that Bird Rock would be developed in the future; therefore, purchase of the Rock would not provide substantial long-term benefits to seabirds.
- **Create a Geographic Information System (GIS) atlas of California brown pelican roost sites.** Although this project targets a priority seabird, the atlas would cover areas outside of the SCB, as a similar atlas is currently being created for Southern California. Because this idea would target areas outside of the SCB, it received a relatively low nexus rating. The benefits of this atlas are expected to be lower than on-the-ground restoration projects for California brown pelicans because it would largely be a planning tool for events such as oil spills and would need to be updated on a periodic basis. This idea also received a lower rating in the category of ecosystem benefits, as it focuses only on the roosting locations of California brown pelicans.
- **Enhance nesting habitat for grebes and loons in Northern California.** This idea proposes to reduce human disturbance at nesting locations. This idea did not pass Tier 1 due to a relatively weak nexus (see Section 5.1.1). Also, implementation of this idea would occur outside of the SCB. In addition, this idea received a lower rating in the category of ecosystem benefits, as it focuses on reducing human disturbance at particular nesting colonies.
- **Attract common murres to Prince Island.** This idea did not pass Tier 1 due to a relatively weak nexus (see Section 5.1.1). Common murres do not currently breed in the target area, and the feasibility of the idea is uncertain. This idea also received a lower rating in the category of ecosystem benefits, as it focuses on the restoration of one species.
- **Attract California brown pelicans to Prince Island and Scorpion Rock.** This idea was evaluated separately for the two locations. Although the nexus rated high for both locations, the benefits of the idea received a low rating. California brown pelicans are currently not limited by available breeding habitat on Anacapa and Santa Barbara Islands; therefore, no substantial benefits are anticipated from establishing breeding at these locations. This idea also received a lower rating in the category of ecosystem benefits, as it focuses on the restoration of one species.

The results of the Tier 1 evaluation of seabird restoration ideas are presented in Table 5-5.

Table 5-5
List of Ideas to Restore Seabirds

Idea No.	Seabird Restoration Project Ideas	Pass to Tier 2?
1	Restore seabirds to San Miguel Island	Yes
2	Restore alcids to Santa Barbara Island	Yes

Table 5-5
List of Ideas to Restore Seabirds

Idea No.	Seabird Restoration Project Ideas	Pass to Tier 2?
3	Restore seabirds to San Nicolas Island	Yes
4	Restore seabirds to Scorpion and Orizaba Rocks	Yes
5	Restore seabirds to Baja California Pacific Islands	Yes
6	Create/enhance/protect California brown pelican roost habitat	Yes
7	Implement an entanglement reduction and outreach program to protect seabird populations	Yes
8	Restore ashy storm-petrels to Anacapa Island	Yes
9	Restore ashy storm-petrels to the Southeast Farallon Island	No
10	Create mainland nesting habitat for colonial seabirds	No
11	Create cormorant nesting platforms	No
12	Fund a California brown pelican patrol/enforcement position	No
13	Enhance nesting habitat for shearwaters in New Zealand	No
14	Reintroduce the tufted puffin to Prince Island	No
15	Purchase Bird Rock off of Santa Catalina Island	No
16	Create a GIS atlas of California brown pelican roost sites	No
17	Enhance nesting habitat for grebes and loons in Northern California	No
18	Attract common murres to Prince Island	No
19	Attract California brown pelicans to Prince Island and Scorpion Rock	No

5.4 TIER 1 EVALUATION OF OUTREACH PROGRAMS AND RESEARCH PROPOSALS

5.4.1 Outreach Programs

Effective public communication and involvement is an integral element of the MSRP. Public outreach and education activities are a means for achieving several goals: ensuring transparency and public involvement in the planning and implementation of the restoration program; improving utilization of and thus increasing human use services provided by natural resources; and potentially benefiting natural resources themselves by modifying human actions that can cause injuries. For the purposes of this restoration plan, the Trustees are not classifying proposals for public outreach and education work as a separate natural resource restoration category. Instead, the Trustees are including outreach ideas submitted for consideration in developing a comprehensive and coordinated public outreach and education program that will ensure the accuracy and consistency of messages, establish effective partnerships with other programs sharing common goals, and support the restoration goals of the MSRP.

In response to solicitations for restoration ideas during the initial stages of restoration planning, the Trustees received several proposals that MSRP funds be used to support existing outreach and education programs that raise awareness of regional environmental issues and stewardship on a broader scale. These programs are listed in Table 5-6. To the extent that such programs may support MSRP restoration goals (e.g., through the development of educational materials specific to the injuries and restoration of the Montrose case) or the utilization of facilities and staff in direct support of MSRP outreach goals, the programs are being retained for funding consideration. However, the Trustees are not evaluating such programs against specific projects that restore fishing and fish habitat, bald eagles, peregrine falcons, and seabirds. Rather, as the MSRP outreach program proceeds, these proposals will receive consideration as a means of implementing outreach objectives.

5.4.2 Research Proposals

The received several proposals that MSRP funds be used for scientific investigations designed to fill gaps in our current understanding of the pathways Trustees and exposures of biota to DDTs and PCBs in the SCB as well as gaps in our understanding of the conservation status and recovery of seabirds. These proposals are listed in Table 5-6.

One of the goals identified in this restoration plan is to conserve as much of the funding as possible for actual on-the-ground restoration. Although many important questions remain unanswered regarding the fate and effects of DDTs and PCBs in the marine ecosystem, the Trustees seek to limit expenditures on scientific investigations to those deemed essential to informed restoration decision-making, design, and implementation. Rather than passing these research proposals through tiered evaluation, the Trustees will retain them for consideration in a stepwise fashion as planning and decision-making proceed and specific data needs become apparent.

Table 5-6
List of Public Outreach and Research Ideas

Outreach Ideas	
1	Provide funds for the Channel Islands National Park/ Sanctuary educational programs
2	Provide funds for the Center for Marine Studies educational programs
3	Expand the existing educational program of the Marine Mammal Care Center
4	Develop interdisciplinary curriculum/activity guide for middle school grade levels
5	Provide funds for construction of an interpretive center at White Point Nature Preserve
Research Ideas	
1	Monitor DDT/PCB concentrations in peregrine falcons
2	Marine mammal monitoring/sampling program in the Los Angeles area
3	Enhancement of restoration efforts for birds through collection and assessment of pinniped carcasses
4	Seabird monitoring • Implement a comprehensive seabird monitoring program (contaminant concentrations, population, effectiveness of MPAs in protecting populations) • Expand monitoring of seabird populations at Northern Channel Islands • Augment seabird monitoring of Anacapa Restoration Program funded by the American Trader Restoration Council
5	Determine current DDT/PCB concentrations in seabird eggs within and adjacent to the SCB
6	Analysis of impacts to seabirds from chronic releases of DDT and PCBs into SCB
7	Increase scope and monitoring of brown pelican nesting area closures

5.5 TIER 2 EVALUATION

Seventeen actions were brought forward from the Tier 1 evaluation for detailed evaluation in Tier 2:

Fishing and Fish Habitat

- Construct artificial reefs and fishing access improvements
- Provide public information to restore lost fishing services
- Restore full tidal exchange wetlands (several potential locations)
- Augment funds for implementing Marine Protected Areas in California

Bald Eagles

- Complete the NCI Bald Eagle Feasibility Study before deciding on further restoration actions
- Complete the NCI Bald Eagle Feasibility Study; regardless of its outcome, continue funding Santa Catalina Island Bald Eagle Program

Peregrine Falcons

- Restore peregrine falcons to the Channel Islands
- Monitor the recovery of peregrine falcons on the Channel Islands
- Restore peregrine falcons to the Baja California Pacific Islands

Seabirds

- Restore seabirds to San Miguel Island
- Restore alcids to Santa Barbara Island
- Restore seabirds to San Nicolas Island
- Restore seabirds to Scorpion and Orizaba Rocks
- Restore seabirds to Baja California Pacific Islands
- Create/enhance/protect California brown pelican roost habitat
- Implement an entanglement reduction and outreach program to protect seabird populations
- Restore ashy storm-petrels to Anacapa Island

5.5.1 Tier 2 Criteria

For the Tier 2 evaluation, the Trustees expanded on the set of criteria used in Tier 1 to distinguish how well the different potential restoration actions achieve the restoration objectives. Four of the criteria for evaluating actions in the Tier 2 evaluation are identical to those used in the Tier 1 evaluation:

- **Criterion 1: Nexus** (relationship to the natural resource injuries and lost services of the Montrose case)
- **Criterion 2: Feasibility** (likelihood that potential benefits will be achieved in actuality)

- **Criterion 3: Resource benefits** (benefits to specific injured natural resources and lost services)
- **Criterion 4: Ecosystem benefits** (degree to which the actions lead to sustainable improvements to broader ecological functions)

Among these criteria, the Trustees consider the nexus and resource benefits to be of paramount importance.

In the Tier 2 evaluation the Trustees considered two additional factors:

- **Criterion 5: Environmental acceptability.** All of the restoration actions under consideration are intended to improve the natural and human environment. Nevertheless, there can be environmental trade-offs in any project and the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), and other requirements mandate full consideration and disclosure of potential environmental consequences. Actions are evaluated to determine whether they have no significant impacts to the environment, have impacts that may be easily mitigated to non-significance, or are likely to result in significant impacts that require substantial mitigation commitments.
- **Criterion 6: Cost.** Cost estimates were developed for each action. If an action being evaluated is still conceptual (e.g., an artificial reef program) and is scalable, estimates of incremental components were developed. For the actions ultimately selected, the Trustees may pursue partnerships to increase the effectiveness of the projects and reduce their costs.

5.5.2 Results of the Tier 2 Evaluation

All of the actions evaluated individually in Tier 2 were found to satisfy the evaluation criteria and are considered reasonable approaches to restoration, though some are still conceptual and would require further evaluation and impact assessment on development of greater project specificity. The complete write-ups of the Tier 2 evaluations are lengthy and have been provided in Appendices A–D.

All 17 actions cannot be included within a single comprehensive restoration plan alternative, as some are mutually exclusive (e.g., the two bald eagle actions) and available funding is not sufficient to cover all the projects. The ultimate aim of this Restoration Plan is to identify alternative combinations of these individual actions and to select one alternative that optimizes restoration of natural resources and services within the constraints of available funds.

As a final step in developing this Restoration Plan, the Trustees assembled different combinations of the individual restoration actions from Tier 2 into comprehensive alternatives for comparison and analysis. In the next section, the 17 potential restoration actions are first summarized, and then the comprehensive alternatives assembled from different combinations of these actions are described.

This section describes the 17 individual restoration actions that underwent detailed evaluation and National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) analysis. Because the full evaluations of all 17 actions are lengthy, only their summaries are provided here (Section 6.1); the complete write-ups have been placed into four appendices:

- Appendix A (Fishing and Fish Habitat Restoration Actions)
- Appendix B (Bald Eagle Restoration Actions)
- Appendix C (Peregrine Falcon Restoration Actions)
- Appendix D (Seabird Restoration Actions)

The reader is directed to these appendices for a more thorough discussion of each of the 17 restoration actions.

To facilitate review of this Restoration Plan, the Natural Resource Trustees for the Montrose case (Trustees) assembled different combinations of these individual restoration actions into two comprehensive restoration plan alternatives and a "no action" alternative that address the entire range of resources and services to be restored. These three alternatives are evaluated and compared in Section 6.2 to illustrate the trade-offs involved in emphasizing different restoration priorities. The alternatives consist of Alternative 1 (No Action), Alternative 2 (Preferred), and Alternative 3.

Section 7 presents the NEPA/CEQA analysis of potential environmental consequences, including the cumulative impact analysis and the other discussions mandated by NEPA/CEQA for the three alternatives.

6.1 SUMMARIES OF THE INDIVIDUAL ACTIONS THAT RECEIVED DETAILED EVALUATION

This section provides summaries of the 17 restoration actions resulting from the Tier 1 and Tier 2 evaluations. Ten of the restoration actions are of a sufficient level of detail and specificity that they will not need further NEPA/CEQA environmental review beyond this Restoration Plan. The remaining seven restoration actions are still under development and will require supplemental NEPA and/or CEQA documentation before implementation (Table 6-1).

The discussions of costs that accompany the descriptions of the restoration actions are not action-specific allotments of Montrose Settlements Restoration Program (MSRP) funding, as they do not reflect potential cost-sharing opportunities and do not factor in contingencies. Even without contingencies factored in, the sum of all of these individual cost estimates exceeds the available MSRP funding. The Trustees will fund $25 million in restoration work during Phase 1 of implementation (years 2005–2010), allocated among actions that restore fishing and fish habitat, bald eagles, peregrine falcons, and seabirds. The Trustees will also pursue funding partnership opportunities where appropriate.

Table 6-1
Restoration Actions for Which this Programmatic EIS/EIR Constitutes Complete NEPA/CEQA Review

Restoration Actions Evaluated in Tier 2	Actions for Which this Plan Represents the Complete NEPA/CEQA Analysis	Actions That Would Require Additional NEPA and/or CEQA Analysis if Pursued
Fishing and Fish Habitat		
Construct artificial reefs and fishing access improvements		✓
Provide public information to restore lost fishing services	✓	
Restore full tidal exchange wetlands		✓
Augment funds for implementing Marine Protected Areas in California	✓	
Bald Eagles		
Complete the NCI Bald Eagle Feasibility Study before deciding on further restoration actions		✓
Complete the NCI Bald Eagle Feasibility Study; regardless of its outcome, continue funding Santa Catalina Island Bald Eagle Program	✓	
Peregrine Falcons		
Restore peregrine falcons to the Channel Islands		✓
Monitor the recovery of peregrine falcons on the Channel Islands	✓	
Restore peregrine falcons to the Baja California Pacific Islands	✓	
Seabirds		
Restore seabirds to San Miguel Island		✓
Restore alcids to Santa Barbara Island	✓	
Restore seabirds to San Nicolas Island		✓
Restore seabirds to Scorpion and Orizaba Rocks	✓	
Restore seabirds to Baja California Pacific Islands	✓	
Create/enhance/protect California brown pelican roost habitat		✓
Implement an entanglement reduction and outreach program to protect seabird populations	✓	
Restore ashy storm-petrels to Anacapa Island	✓	

CEQA = California Environmental Quality Act
EIR = Environmental Impact Report
EIS – Environmental Impact Statement
NCI = Northern Channel Island
NEPA = National Environmental Policy Act

6.1.1 Fishing and Fish Habitat Restoration Actions

Construct Artificial Reefs and Fishing Access Improvements

Constructed reefs have often been employed as a means of recruiting and/or producing fish as mitigation for environmental impacts. An MSRP-constructed reef program would have the added specific objectives of recruiting and/or producing fish lower in DDTs and PCBs for anglers to catch and displacing highly contaminated soft-bottom species from a fishing location (Figure 6-1). For this reason, the geographic placement of reefs will require that the predominant reef-dwelling species in the area not be limited or less limited by fish consumption advisories than the predominant soft-bottom species. Several critical design considerations will also guide the location and development of all restoration reefs (including degree of sediment contamination, existing fishing pressure and accessibility, suitability for kelp recruitment and establishment, and consideration of other human uses). Thus, in this Restoration Plan, constructed reefs and fishing access improvements are evaluated as a general action in Tier 2 rather than as a set of site-specific actions. This action will require supplemental analysis, siting, design, and public and environmental review prior to implementation.

A complementary part of this action will be to implement various fishing access improvements (e.g., improvements to piers) to facilitate and encourage fishing in the areas where habitat manipulation is performed. Together, reef construction and fishing access improvements can target fishing sites where the continued impact of contamination is greatest (i.e., where fish consumption advisories are in effect), measurably improve the opportunities for catching fish lower in contamination, and do so in a self-sustaining manner. Access improvements can also act as compensatory restoration for past losses in fishing opportunities resulting from fish consumption advisories by enhancing the quality of the fishing experience.

The costs of this action are scalable. That is, the more funds that are made available, the more reef and access improvements that can be implemented. Depending on reef size, whether and what type of fishing access improvements are included, and potential cost sharing with partners, the Trustees estimate potential costs of $1 million to $4 million per site, and propose an objective of constructing two to three reefs in the initial implementation phase of the Restoration Plan.

Additional information on this action can be found in Appendix A1.

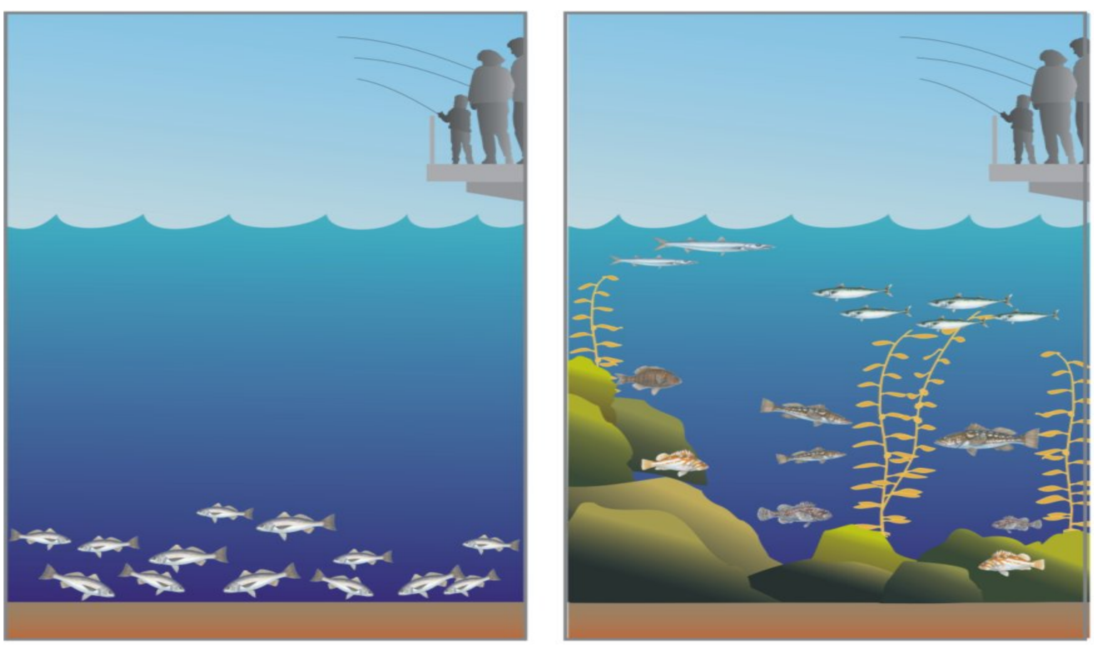


Figure 6-1. Changes in fish community structure with the placement of an artificial reef.

Provide Public Information to Restore Lost Fishing Services

The goal of this action is to build on the public outreach and education work initiated by the U.S. Environmental Protection Agency (EPA) through the establishment of the Fish Contamination Education Collaborative (FCEC). The FCEC is a federal, state, and local partnership project that addresses public exposure to contaminated fish in the Southern California coastal area. The FCEC focuses on educating the public about the human health hazards associated with DDT and PCB contamination in fish. In particular, the FCEC provides information to help people reduce their exposures to DDTs and PCBs from the fish they eat.

The Trustees will expand this ongoing effort to increase fishing services by providing information to anglers that allows them to make sound decisions about where and for which species to fish. The Trustees will also provide outreach materials that establish the link between the ecology and life history of a particular species and its tendency to bioaccumulate contaminants. This information will enable people to make knowledgeable choices about where, when, and for which species to fish and in doing so will minimize anglers' exposure to contaminants, regardless of where they fish. This action has a strong nexus to the ongoing loss of natural resource services caused by the contaminants of the case (which have led to the imposition of state fishing advisories and other limitations on the human use values of fish).

The costs of this action, which will include both public information work and periodic monitoring of fish to supplement the fish contamination survey currently being completed, are scalable. Clear opportunities exist to collaborate with the ongoing EPA-funded efforts to inform the public about fish contamination and safe fish preparation and consumption. This action will expand these efforts by focusing on the link between fish ecology and life history and the risks they impose on their consumers. In particular, the action will identify the fish species that are free of consumption advisories and the locations where anglers can catch them. Thus, this action would directly and effectively address the human use fishing losses associated with the Montrose case.

Additional information on this action can be found in Appendix A2.

Restore Full Tidal Exchange Wetlands

Wetlands restoration was evaluated as a general action that will require further planning and site selection. Because large-scale wetlands restoration is costly and numerous entities are involved in coastal wetlands restoration in the Southern California region, the presumption is that MSRP funds will be used to augment efforts at a specific larger-scale restoration project in the region. In particular, MSRP funding will be directed at habitat restoration that seeks to promote the production of commonly caught coastal fish species, such as the California halibut. Several wetland restoration sites in the region at different stages of planning and funding could serve this purpose.

The benefits from estuarine wetlands habitat restoration and improved fish catch services for anglers who fish in surrounding coastal areas are not as readily measurable or likely as substantial as the benefits from constructed reefs. However, the restoration of coastal estuarine wetlands contributes to the overall restoration of fish and their habitats, as identified in the Montrose consent decree. By including wetland restoration among the fishing and fish habitat actions, the Trustees will provide a more diverse method of addressing the ongoing injuries and lost services and compensating for interim losses. It is also conceivable that fishing benefits could be derived from coastal wetlands restoration if they are designed to create new fishing sites.

The costs of this action are scaleable and proportional to the size and complexity of the action undertaken. Existing large-scale wetlands restoration work involving significant engineering (such as the work at Bolsa Chica in Orange County) can cost several tens of millions of dollars, not including land acquisition costs. Given the limits of MSRP funding, restoration funds will be best used to complement funding from other sources in achieving larger-scale habitat improvements. The specifics of the site and the nature of the wetlands restoration work will be guided by the MSRP goals and objectives for restoring fishing and fish habitat. The Trustees will inventory current coastal wetlands restoration planning efforts and funding gaps in Southern California and identify a project or projects where MSRP funds will help realize broad-scale accomplishments. Once a specific project is identified, further NEPA and/or CEQA analysis will be performed. Such analysis will likely be part of the broader documentation by the lead agency or agencies for the overall wetlands restoration effort to which MSRP funds will be contributed.

Additional information on this action can be found in Appendix A3.

Augment Funds for Implementing Marine Protected Areas in California

The goal of this action is to improve the fish habitat function in Southern California by augmenting funds needed to evaluate and implement Marine Protected Areas (MPAs) as part of an ecosystem-based management approach for fishery resources. The primary focus of this action will be to provide needed funds for implementation of the recently established Channel Islands network of MPAs to ensure that they provide the best possible basis for further implementations of MPA networks throughout California. Although this action will provide specific benefits to the fish habitats adjacent to the Northern Channel Islands, the action will also provide longer-term benefits for fishing and fish habitats throughout California by helping to generate sound empirical underpinnings for the site and design of future networks of MPAs. The recently established network of MPAs in the Channel Islands is currently the most appropriate area for such an effort because those MPAs were specifically designed to evaluate the utility of using MPAs as a management tool. If MPA networks are established along mainland coasts in the future, the Trustees will consider directing additional funds to their implementation and/or evaluation during the next phase of restoration, particularly if they are established in Southern California.

Through this action, MSRP funds will contribute to the goals of (1) ensuring that the MPAs function as intended (i.e., through effective public awareness and enforcement efforts) and (2) measuring the impacts (positive and negative) of MPAs on fishing services. The Trustees propose to contribute approximately $500,000 toward these MPA efforts over five year to fill, in part, funding gaps identified by the implementing agencies. Depending on the findings of the monitoring efforts, the effective management of MPAs in the Northern Channel Islands may ultimately lead to the expanded use of this fisheries management tool throughout California, including the Palos Verdes Shelf region.

Additional information on this action can be found in Appendix A4.

6.1.2 Bald Eagle Restoration Actions

Bald eagle restoration throughout the Channel Islands presents a special situation because the bald eagles introduced to and currently nesting on Santa Catalina Island continue to exhibit reproductive injuries caused by ongoing exposures to DDTs and PCBs. Also, even though bald eagles historically inhabited most of the Channel Islands, we do not yet know if they would have greater success reproducing on islands other than Santa Catalina Island (none of the Santa Catalina Island bald eagles has established territories on any of the other Channel Islands). Thus, selecting restoration actions requires consideration of interrelated factors and depends ultimately on the outcome of the ongoing Northern Channel Islands (NCI) Bald Eagle Re-establishment Feasibility Study (referred to as the NCI Bald Eagle Feasibility Study). This section describes the two contrasting options for bald eagle restoration addressed in this plan.

Complete the NCI Bald Eagle Feasibility Study Before Deciding on Further Restoration Actions

Under this course of action, the Trustees will defer making longer-term decisions on bald eagle restoration until the NCI Bald Eagle Feasibility Study results are known (in or around 2008). Also, the Trustees will discontinue funding for the Santa Catalina Island Bald Eagle Program during the interim period until the results of the NCI Bald Eagle Feasibility Study are known. At that point, the Trustees will re-evaluate all potential options for bald eagle restoration, including actions that might be taken even if bald eagles are not able to reproduce on their own anywhere in the Channel Islands. The remaining bald eagle restoration funds could then be used on any of the Channel Islands. This action conserves limited restoration funds until sufficient information is known on the ability of the environments on the different Channel Islands to support bald eagles.

This course of action is modified from the one proposed in the draft Restoration Plan and programmatic EIS/EIR, which was released for public comment in April 2005. The modification is a result of the Trustees' consideration of the public comments received. In the draft Restoration Plan and programmatic EIS/EIR, the Trustees had proposed that the restoration of bald eagles proceed only if it was ultimately found that they are able to reproduce on their own in the Northern Channel Islands. If the results of the NCI Bald Eagle Feasibility Study indicated that there were no territories in the Channel Islands where bald eagles could reproduce unaided, the preferred course of action proposed in the draft Restoration Plan called for the bald eagle restoration efforts to cease and the remaining funds to be either set aside or used for seabird restoration.

The Trustees received diverse and opposing public comments on the advisability of bald eagle restoration given the continued observation of contaminant effects on Santa Catalina Island. However, predominantly the public comments expressed the desire to maintain the presence of bald eagles on the Channel Islands regardless of whether or not they can reproduce successfully on their own. After considering the public comments and the evaluation criteria for this Restoration Plan (particularly the preference that actions have long-term benefits and minimal ongoing operation and maintenance requirements), the Trustees modified the preferred action for bald eagles to provide for a re-examination of all options once the results of the NCI Bald Eagle Feasibility Study are known, rather than predetermining subsequent actions. The re-examination will be conducted with opportunity for public review and comment in a subsequent document.

The results of the NCI Bald Eagle Feasibility Study are expected to be known in or around 2008. If the results show that the birds released on Santa Cruz Island are able to fledge chicks without human intervention, the Trustees may continue releasing and monitoring bald eagles on Santa Cruz Island. The Trustees anticipate that if eagles can successfully reproduce on the Northern Channel Islands, then eagles will eventually repopulate the rest of the Channel Islands, including Santa Catalina Island. The general methods for additional hacking and monitoring would be the same as those outlined in the Feasibility Study for Reestablishment of Bald Eagles on the Northern Channel Islands (MSRP 2002).

In light of the continuing high levels of contamination in bald eagles on Santa Catalina Island, continued funding of the Santa Catalina Island Bald Eagle Program over the near term is unlikely to achieve the goal of long-term restoration of bald eagles to the Channel Islands. Thus, during the interim period until the NCI Bald Eagle Feasibility Study is completed, the Trustees have chosen to focus restoration efforts on the Northern Channel Islands, which continue to hold the potential for long-term restoration, and discontinue funding of the Santa Catalina Island Bald Eagle Program.

Even without continued Trustee funding for the current Santa Catalina Island Bald Eagle Program, it is highly likely that bald eagles will remain on the island for several years despite their inability to hatch offspring naturally. Bald eagles in the wild typically live for 25 to 30 years, and Santa Catalina Island currently supports 15 to 20 birds of a wide range of ages. There are currently five active bald eagle nesting territories on the island, and the Institute for Wildlife Studies reports that two birds are currently establishing a new territory near Avalon. Even assuming that the Santa Catalina Island bald eagles fail to hatch new chicks in the coming years, bald eagle experts do not expect that the eagles will immediately break their pair bonds and abandon their Santa Catalina Island territories. Rather, it is likely that bald eagles will remain on the island, with their numbers diminishing gradually over a period of as many as 10 years or longer as some of the birds die and are not replaced by others or certain bald eagle pairs break their pair bonds and leave after several years of failing to produce chicks.

Thus, the Trustees anticipate that bald eagles will still inhabit several of the Channel Islands, including Santa Catalina Island, when the NCI Bald Eagle Feasibility Study results are known in or around 2008. If the results of the NCI Bald Eagle Feasibility Study indicate that bald eagles throughout the Channel Islands still experience reproductive impairment due to the persistence of DDTs and PCBs in their diets, the Trustees would explore various options for further bald eagle restoration on one or more of the Channel Islands, including Santa Catalina Island. Some options may not be as costly as the current egg manipulation and chick fostering work being conducted on Santa Catalina Island. For example, the Trustees could fund a monitoring and hacking program to maintain a non-breeding bald eagle presence on the Channel Islands (and thus maintain their human use and ecological services) for as long as funds remain available or until contaminant levels decline to a level that would support naturally reproducing eagles.

The Trustees will release a subsequent NEPA/CEQA document for public review and input once the results of the NCI Bald Eagle Feasibility Study are known. The document will be released between 2008 and 2010 and will outline the next steps for bald eagle restoration on the Channel Islands.

To fund this course of action, a total of $6.2 million will be allocated for bald eagle restoration on the Channel Islands. This allocation would cover the costs of the Santa Catalina Island Bald

Eagle Program through 2005 (approximately $1.2 million spent since 2001) and the ongoing NCI Bald Eagle Feasibility Study (approximately $3.3 million). After funding these two efforts, the balance remaining would be approximately $1–2 million. The Trustees will defer a decision on how to use these remaining funds until the results of the NCI Bald Eagle Feasibility Study are known. At that time, the Trustees will consider a range of restoration options and decide on the best course of action. Additional funds could be used on any of the Channel Islands.

Additional information on this course of action can be found in Appendix B.

Complete the NCI Bald Eagle Feasibility Study; Regardless of its Outcome, Continue Funding Santa Catalina Island Bald Eagle Program

This course of action would continue to maintain bald eagles on Santa Catalina Island through human intervention (e.g., egg manipulation, incubation, and chick fostering) for as long as funds remain available. Under this course of action, which is not an interim but a longer-term action, efforts to restore bald eagles to the Channel Islands would focus on the continuous maintenance of the Santa Catalina Island bald eagle program for as many years as funds are available, with the hope that eventually the Santa Catalina Island birds' exposures would decline to a level that would allow them to reproduce on their own. Maintenance of the bald eagles on Santa Catalina Island would be favored over efforts to repopulate the Northern Channel Islands due to the existing infrastructure and ongoing program on Santa Catalina Island. Under this course of action, financial support of the Santa Catalina Island program would continue after 2005. The NCI Bald Eagle Feasibility Study would also continue until its results were known.

Under this course of action, the Trustees propose to allocate a total of $10 million for bald eagle restoration on the Channel Islands. Approximately $4 million would be used through the end of the NCI Bald Eagle Feasibility Study (supporting both the NCI and Santa Catalina Island programs), leaving approximately $6 million to place into a long-term endowment or other financial mechanism to support the continuation of the Santa Catalina Island Bald Eagle Program for as long as possible or until such time as the birds are able to reproduce successfully on their own. The $6 million would fund approximately 22 years of restoration efforts on Santa Catalina Island if the average annual cost remains at approximately $270,000. This estimate does not include any interest that may be generated.

Additional information on this course of action can be found in Appendix B.

6.1.3 Peregrine Falcon Restoration Actions

Restore Peregrine Falcons to the Channel Islands

The goal of this action is to accelerate the recovery of peregrine falcons to the Channel Islands. For the last several years, the number of peregrine falcon pairs has been steadily increasing on the islands, though recolonization on the Southern Channel Islands has been slower than on the Northern Channel Islands for reasons not yet fully understood. Because the majority of the known occupied territories in 2004 occurred on the Northern Channel Islands (18 of 21), this 5-year action would involve active restoration of peregrine falcons to the Southern Channel Islands through hacking techniques. Implementation of this action would consist of releasing 10 birds per year on Santa Catalina Island, for a total of 50 birds over a 5-year period. A monitoring component would also be developed for this action. Should this action be selected, further action-specific NEPA and/or CEQA analysis would be prepared. A 5-year active restoration program for peregrine falcons on the Southern Channel Islands would cost an estimated $603,000 plus the costs of additional monitoring.

Additional information on this action can be found in Appendix C1.

Monitor the Recovery of Peregrine Falcons on the Channel Islands

This action proposes to develop a comprehensive program to monitor the recovery of the peregrine falcon on the Channel Islands. This program would monitor the distribution, number of pairs, reproductive success (i.e., productivity), recruitment, foraging behavior, and dispersal of peregrine falcons on the Channel Islands. An essential part of this program would also include contaminant analysis of addled eggs and eggshell measurements, particularly in light of the lack of current data on levels of eggshell thinning and the potential ongoing effect of DDT contamination. The monitoring program would be designed such that data are comparable to previous studies on the Channel Islands (such as the study conducted in 1992). The scope of the monitoring program (including its frequency and intensity) would be developed in consultation with experts. The estimated cost for comprehensive monitoring to occur twice within Phase 1 of implementation is $250,000.

Additional information on this action can be found in Appendix C2.

Restore Peregrine Falcons to the Baja California Pacific Islands

The goal of this 5-year action is to restore peregrine falcons on the Baja California Pacific Islands. Possible actions would include comprehensive surveys of the islands, efforts to reduce impacts from human disturbance, and habitat enhancement. Peregrine falcons have historically nested on the Baja California Pacific Islands but experienced a sharp decline similar to peregrine falcons nesting in the United States. Although peregrine falcons have resumed nesting on some Baja California Pacific Islands, the current status of this species on these islands is largely unknown. The estimated cost for this action over 5 years is $547,000.

Additional information on this action can be found in Appendix C3.

6.1.4 Seabird Restoration Actions

Eight actions for restoring seabirds and their habitats were evaluated in detail. One of the eight actions, Restore Seabirds to Baja California Pacific Islands, was subdivided into four separate sets of actions addressing seabird restoration in four separate island groups.

Restore Seabirds to San Miguel Island

This action aims to restore seabird nesting habitat on San Miguel Island in the Channel Islands National Park by eradicating the introduced black rat (*Rattus rattus*) over a period of approximately 5 years. San Miguel Island and its associated islets, Prince Island and Castle Rock, support regionally important and diverse seabird colonies, including one-third of the breeding seabirds in the Channel Islands. Introduced rats are responsible for approximately 40 to 60 percent of all bird and reptile extinctions from islands and are known to have ecosystem-wide impacts on California islands. Target bird species for restoration include burrow/crevice nesting seabirds such as the ashy storm-petrel, Cassin's auklet, and Xantus's murrelet, as well as other seabirds such as the western gull, Brandt's cormorant, and pigeon guillemot. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of all of these species in the Southern California Bight (Kiff 1994, Fry 1994).

Because of the presence of several endemic species on San Miguel Island, including the federally endangered island fox, this action will require substantial planning and the development of a comprehensive mitigation program. The National Park Service, with the assistance of the Trustees, will prepare a supplemental Environmental Impact Statement for this action that will undergo public review and comment. The supplemental document will detail the specific methodologies of the action, the expected benefits and impacts, and the proposed mitigation measures to reduce potential impacts. Estimated costs for this action are $2.5 million to $3 million.

Additional information on this action can be found in Appendix D1.

Restore Alcids to Santa Barbara Island

The goal of this action is to re-establish, over a period of 5 years, a once-active Cassin's auklet breeding population on Santa Barbara Island that was decimated by cats brought to the island in the late 1800s. Efforts to re-establish this colony will include using social facilitation methods (e.g., vocalization playback systems to attract other individuals), installing nest boxes, and improving habitat through the removal of non-native vegetation from historical nesting areas and revegetation with native plants. The state-threatened Xantus's murrelet will also be targeted for restoration on the island. Santa Barbara Island is home to the largest colony of Xantus's murrelets in California despite a documented population decline over the last 20 years. Because some Xantus's murrelet nest sites have been lost due to reduction in shrub cover on the island, this action will provide secure nesting area for this species. The main objectives of this habitat restoration effort will be to benefit Cassin's auklets and Xantus's murrelets by: (1) increasing recruitment, (2) increasing reproductive output, and (3) decreasing egg and chick mortality by providing safe breeding habitat. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of both of these species in the Southern California Bight (Kiff 1994, Fry 1994). The estimated cost of this action is $602,000.

Additional information on this action can be found in Appendix D2.

Restore Seabirds to San Nicolas Island

The goal of this action is to restore western gull and Brandt's cormorant colonies on the U.S. Navy–owned San Nicolas Island by eradicating feral cats over a period of approximately 4 years. Eggshell thinning and /or elevated levels of DDTs were documented in the eggs of both of these species in the Southern California Bight (Kiff 1994, Fry 1994).

Introduced predators, particularly feral cats and rats, are one of the greatest threats to seabird populations on islands. Feral cats are directly responsible for a number of extinctions and extirpations on islands across multiple taxa. The U.S. Navy has funded limited cat removal on San Nicolas Island in the past to protect endangered species and sensitive seabird colonies. This action will include expanding these efforts with the goal of eradicating cats from the island.

The successful eradication of cats from the island would result in increases in the currently reduced western gull and Brandt's cormorant colonies on the island. In addition to seabirds, San Nicolas Island supports a large number of endemic species, including at least 20 plant species, 25 invertebrates, one reptile, three birds, and two mammals. Collateral benefits to the island ecosystem are anticipated from the cat removal. The estimated cost of this restoration action is $1.8 million.

Additional information on this action can be found in Appendix D3.

Restore Seabirds to Scorpion and Orizaba Rocks

The goal of this 5-year effort on Scorpion and Orizaba Rocks (off Santa Cruz Island) is to restore seabird habitat through the removal of non-native vegetation, the installation of artificial nesting boxes, and reductions in human disturbance. This action will directly benefit the following nesting or roosting species: Cassin's auklet, ashy storm-petrel, Xantus's murrelet, California brown pelican, and double-crested cormorant. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of these species in the Southern California Bight (Kiff 1994, Fry 1994). This action will also directly benefit rhinoceros auklets.

This action will involve the elimination of invasive plants (e.g., ice plant) and the restoration of native plants such as tree sunflower, buckwheat, and purple needlegrass. Nest boxes will be installed to provide a stable and secure nesting area for Cassin's auklets, Xantus's murrelets, and ashy storm-petrels. Disturbance reduction efforts will be implemented to protect nesting and roosting seabirds from human disturbance. Signs will be deployed around the rocks and at the visitor center on Santa Cruz Island informing the public about the nesting seabirds and the closure of the rock. The estimated cost of this restoration action is $326,000.

Additional information on this action can be found in Appendix D4.

Restore Seabirds to Baja California Pacific Islands

The Baja California Pacific Islands in Mexico support 17 species and 8 subspecies of breeding seabirds, 10 of which also breed on the California Channel Islands. These birds range freely across the U.S./Mexico border. Of these 10 shared species or subspecies, 5 have special status listings in the United States as endangered species, threatened species, or species of special concern. Restoration efforts would target a suite of seabirds, including the Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, ashy storm-petrel, and Xantus's murrelet. Nine of the ten islands identified in Figure 6-2 are being considered for seabird restoration, as described below.

Additional information on these actions can be found in Appendix D5.

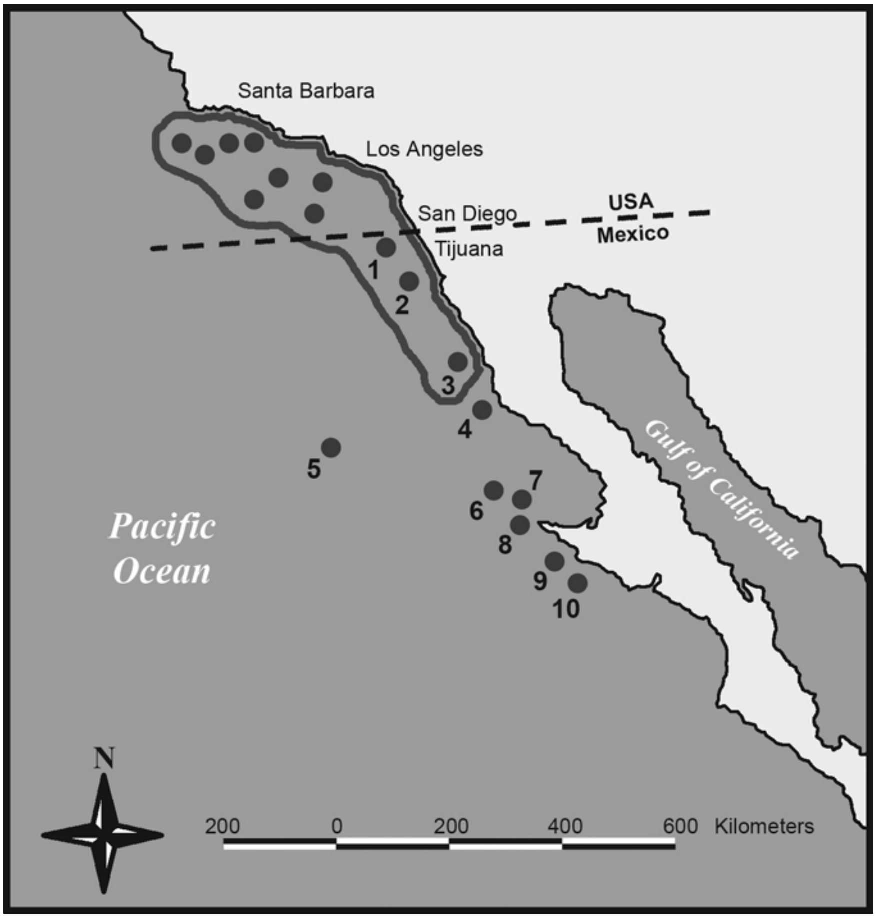


Figure 6-2. Baja California Pacific Islands.

Identification of Islands: (1) Coronado (2) Todos Santos (3) San Martín (4) San Jeronimo (5) Guadalupe (6) San Benito (7) Cedros (8) Natividad (9) San Roque (10) Asunción. The solid line indicates the islands located within the Southern California Bight.

Coronado and Todos Santos Islands

The goal of this action is to restore seabird populations on Coronado and Todos Santos Islands. These islands are oceanographically considered part of the Southern California Bight. To maximize restoration efforts on these islands, which are in close proximity to each other, a combined 5-year restoration action is proposed. Restoration actions will include using social attraction techniques (including decoys and vocalizations), improving nesting opportunities with artificial nests, shielding lights, and reducing human disturbance. The target species for restoration on these islands are Brandt's cormorants, double-crested cormorants, California brown pelicans, western gulls, Cassin's auklets, ashy storm-petrels, and Xantus's murrelets. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of these species in the Southern California Bight (Kiff 1994, Fry 1994). This action will also directly benefit pelagic cormorants and black storm-petrels.

Recent eradication efforts have been undertaken on Coronado and Todos Santos Islands to remove non-native fauna and restore the island ecosystem. The success of these efforts provides a unique opportunity to facilitate seabird recolonization and recovery on these islands. The estimated cost of this restoration action is approximately $1 million.

Guadalupe Island

The goal of this 4-year action is to eradicate feral cats and restore seabird populations on Guadalupe Island. This action will target a suite of seabirds, including Cassin's auklet, Brandt's cormorant, Xantus's murrelet, and western gull. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of these species in the Southern California Bight (Kiff 1994, Fry 1994). Although outside of the Southern California Bight, Guadalupe Island is biogeographically affiliated with coastal Southern California and a part of the critically endangered California coastal sage and chaparral ecoregion. World renowned for its high level of biodiversity, Guadalupe Island supports 34 endemic plants, 2 endemic subspecies of seabirds, 10 endemic land birds, 11 endemic land snails, and at least 18 endemic insects.

Feral cats are a significant threat to seabird populations on Guadalupe Island. Introduced prior to 1880, cats are responsible for the likely extinction of the endemic Guadalupe storm-petrel and the likely extirpation of many other seabird populations from the main island of Guadalupe. Proven techniques used worldwide in recent cat removal programs will be employed in this action. This effort will have both immediate and permanent conservation benefits for seabirds that use the Southern California Bight as well as for the unique ecosystem of Guadalupe Island. The estimated cost of this restoration action is approximately $1.1 million.

San Jeronimo and San Martín Islands

The goal of this 5-year action is to enhance the recovery of seabird colonies following the removal of introduced species on San Jeronimo and San Martín Islands. San Martín Island is oceanographically considered part of the Southern California Bight, whereas San Jeronimo Island is just south of this boundary. To maximize restoration efforts on these islands, a combined action is proposed. Activities on San Martín Island would focus on restoring the California brown pelican, double-crested cormorant, and Brandt's cormorant colonies by reducing human disturbance through signage, public education, and a re-design of the trail system on the island to avoid the colonies. Efforts on San Jeronimo Island would focus on restoring the extirpated Brandt's cormorant colony through social attraction efforts (e.g., decoys) and reducing human disturbance. Additional restoration actions for Cassin's auklets and Xantus's murrelets will include shielding light sources, constructing a boardwalk to stop the destruction of burrows by fisherman walking through the colony, and controlling waste on the island. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of these species in the Southern California Bight (Kiff 1994, Fry 1994). The estimated cost of this action is $751,500.

San Benito, Natividad, Asunción, and San Roque Islands

The goal of these 5-year actions is to restore seabird colonies on the central Baja California Pacific Islands. The San Benito, Natividad, Asunción, and San Roque Islands are clustered around the Vizcaíno Peninsula in central Baja California. Restoration efforts will target a suite of seabirds, including Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, and Xantus's murrelet. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of these species in the Southern California Bight (Kiff 1994, Fry 1994). These 5-year restoration actions include rehabilitation of degraded habitat, social attraction of target species (both decoys and playback systems), use of artificial burrows, reduction in human disturbance through signage, shielding of lights around fishing villages, and waste management.

The estimated budgets for these actions range from approximately $700,000 to $1,000,000.

Create/Enhance/Protect California Brown Pelican Roost Habitat

The goal of this action is to restore critical non-breeding habitat for the California brown pelican by enhancing and protecting coastal roosts along the Southern California mainland. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of this species in the Southern California Bight (Kiff 1994, Fry 1994). Improvements to communal roosts will provide positive benefits to California brown pelicans by reducing the energy costs associated with commuting between prey and roosts as well as flushing and relocating due to human disturbance. This action will consider the creation of new roost habitat, such as a floating dock or a similar structure. Several locations are under consideration for the creation of new habitat, including Batiquitos Lagoon in San Diego County. This action is scalable and the costs can have a considerable range. The estimated costs range from $50,000 to $2 million, depending on the type of action.

Additional information on this action can be found in Appendix D6.

Implement an Entanglement Reduction and Outreach Program to Protect Seabird Populations

The goal of this action is to benefit the California brown pelican and other seabirds by reducing injury from entanglement with fishing line. Entanglement in fishing line and the hooking of California brown pelicans by anglers is a major factor affecting their survival. Seabirds may eat the same fishes being targeted by anglers or may be attracted to the bait at the end of the fishing lines. This action would involve expanding the American Trader Trustee Council's Seabird Entanglement Education and Outreach Program to the fishing piers and wharfs in Southern California where entanglement is a concern. The goal of the program is to provide information in the form of brochures, signs, and wildlife guides that heighten public awareness about the potential hazards to seabirds from fishing tackle and monofilament line. The signs will help promote public awareness and educate anglers about ways to reduce their chances of hooking birds and what to do if one is hooked. The seabirds that will benefit from this action include California brown pelicans, cormorants, and gulls. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of these species in the Southern California Bight (Kiff 1994, Fry 1994). The estimated cost for this action is $22,000.

Additional information on this action can be found in Appendix D7.

Restore Ashy Storm-Petrels to Anacapa Island

The goal of this 5-year action is to facilitate breeding for populations of the rare ashy storm-petrel on Anacapa Island. Eggshell thinning and/or elevated levels of DDTs were documented in the eggs of this species in the Southern California Bight (Kiff 1994, Fry 1994). The suitability of Anacapa Island as breeding habitat for the ashy storm-petrel has been significantly enhanced due to the eradication of the black rat in 2003. Black rats were known to occupy prime nesting habitat on Anacapa Island and likely prevented the ashy storm-petrels from breeding over large portions of suitable habitat. Ashy storm-petrels were mist-netted on Anacapa Island in 1994, but to date no active nests have been found (Whitworth et al. 2003). Recorded vocalizations and nest boxes will be used to attract the ashy storm-petrels. Ashy storm-petrels are also known to nest on the adjacent Santa Cruz Island (Carter et al. 1992).

This action will benefit a priority seabird that is limited in distribution and has experienced significant population declines. The establishment of a breeding colony of ashy storm-petrels on Anacapa Island will contribute to the recovery of this species. The estimated cost of this action is $609,000.

Additional information on this action can be found in Appendix D8.

6.2 RESTORATION ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

6.2.1 Development of Alternatives

Under NEPA, CEQA, and the federal National Resource Damage Assessment regulations (Title 43 Code of Federal Regulations [CFR] Part 11.82(c)), the Trustees must consider a range of possible restoration alternatives, including a natural recovery alternative with minimal management actions (i.e., a “no action” alternative). The 17 individual actions evaluated in detail represent a range of options for addressing the specific injuries of the Montrose case. As a final step in developing this Restoration Plan, the Trustees assembled different combinations of the individual restoration actions from Tier 2 into comprehensive alternatives for comparison and analysis.

Not all 17 actions can be included within a single comprehensive Restoration Plan alternative, as some are mutually exclusive (e.g., the two bald eagle actions) and available funding is not sufficient to cover all the actions. The ultimate aim of this Restoration Plan is to identify alternative combinations of these individual actions and to select one preferred alternative that optimizes restoration of natural resources and services within the constraints of available funds. However, one or more actions that are included in the preferred alternative may later unexpectedly prove to be infeasible. If this happens, then actions from the Tier 2 list that were not included in the original alternatives may be substituted as replacements, since all were found to satisfy the evaluation criteria.

Recognizing that this Restoration Plan covers a set of actions that are broad in scope and in some cases still only conceptual, this document has been prepared as a programmatic Environmental Impact Statement (EIS)/Environmental Impact Report (EIR). This programmatic EIS/EIR undertakes general analysis of the restoration program and will be linked to any further action-specific environmental documentation as necessary. The Trustees will proceed by implementing a specific set of actions for the first 5-year phase of restoration (Phase 1). At the end of Phase 1, progress will be assessed and the remaining restoration funds will be allocated. The planning for this subsequent phase of restoration (i.e., Phase 2) will be conducted in or around 2010 with public involvement; however, the Phase 2 planning will not necessarily require the preparation of a new programmatic EIS/EIR.

6.2.2 Allocation of Restoration Funds Among Resource Categories

One important consideration in this Restoration Plan is how available funds should be distributed between the different natural resources and services identified for restoration in the final Montrose consent decree. The decree itself did not specify how restoration funds should be allocated. During the natural resource damage assessment in the 1990s, the Trustees attempted to estimate the costs of restoring injured natural resources and lost services to their baseline level (primary restoration) and compensating for interim lost natural resource services (compensatory restoration). These previous restoration scaling estimates are a part of the administrative record for the damage assessment. They do not provide a useful guide for allocating restoration funding at this stage because: (1) the final settlement was not based on the scaling estimates per se, (2) the recovery status of the injured natural resources has changed in the intervening years since the scaling was performed, and (3) the Trustees have developed a more specific understanding of potential restoration actions in each resource category targeted for restoration.

The final settlements provided a principal amount of approximately $30 million for natural resource restoration. Interest accruing in the settlement accounts provides an additional source of restoration funding. In addition, additional settlement funds ($10 million plus interest) that may be used for EPA response actions could instead be allocated to natural resource restoration depending on the outcome of the EPA's ongoing remedial investigation (see Section 4.3). These funds are referred to as "swing money," as they may be used by either the EPA or the Trustees depending on the EPA's final cleanup decision.

In the summer of 2004, the Trustees commissioned an audit of the Montrose settlement accounts to determine their current balances and interest rates and to develop a reasonable projection of funds available in the future. The audit identified an estimated balance of restoration funds in the settlement accounts of $38 million as of July 2004 (not including the swing money). Interest is currently accruing at 1.75%, adding approximately $700,000 per year to the accounts. Ongoing restoration program operating costs are comparable to the interest currently accruing. The Trustees propose to commit approximately $25 million during the first 5 years (2005–2010) of restoration implementation under this Restoration Plan. After 5 years, several uncertainties should be resolved, including the outcome of the NCI Bald Eagle Feasibility Study and the EPA's cleanup decision. The Trustees will then assess progress and allocate the remaining restoration funds in Phase 2.

The Trustees have allocated the $25 million for Phase 1 among the four restoration categories: fishing and fish habitat, bald eagles, peregrine falcons, and seabirds. Consideration was given to the potential costs of restoring those resources still experiencing injuries due to the contaminants of the case. The continued presence of DDTs and PCBs in the marine environment and the uncertain outcomes of ongoing data gap studies (Section 4.2.1) limit the Trustees' ability to accurately project these costs. Considering the likely costs of actions and the uncertainties, the Trustees reached consensus on a proposal to allocate the initial $25 million on an approximately equal basis between fishing and fish habitat restoration and bird restoration as follows:

- $12 million for fishing and fish habitat restoration actions, and
- $13 million for bald eagle, peregrine falcon, and seabird restoration actions.

This overall commitment (approximately $25 million) and its allocation are built into the restoration alternatives discussed below. The costs of the fish and bald eagle data gap studies presently being conducted were assumed to be a part of the overall $25 million to be earmarked for Phase 1.

6.2.3 Alternative 1 (No Action)

For the purposes of this plan, the No Action Alternative assumes that the Trustees would not intervene to restore injured natural resources and compensate for lost services for any of the affected resources of the Montrose case. Instead, the Trustees would rely on natural processes for the gradual recovery of the injured natural resources and would only take the limited action of monitoring natural recovery.

The principal advantages of this approach are the ease of implementation and the absence of monetary costs. Although natural recovery may eventually occur for many of the injured resources, the recovery may take a significantly longer period of time than would recovery under an active restoration scenario. Also, the interim losses of natural resource services would not be compensated under the No Action Alternative. In addition, certain events, such as the extirpation of bald eagles and the introduction of exotic species in the Channel Islands, have led to consequences for other natural resources that may not be addressed under a natural recovery alternative. Because feasible restoration actions have been identified that would address the injuries and lost services of the case, the No Action Alternative as an overall approach across all resource categories does not fulfill the goals of this Restoration Plan. However, this does not preclude selection of natural recovery as an option for specific resources (e.g., peregrine falcons) within the overall framework of a comprehensive restoration alternative.

6.2.4 Alternative 2 (Preferred)

After considering the 17 potential restoration actions evaluated in detail and the available funds, the Trustees assembled the following diverse set of actions to generate Alternative 2:

Fishing and Fish Habitat Restoration
Construct artificial reefs and fishing access improvements
Provide public information to restore lost fishing services
Restore full tidal exchange wetlands
Augment funds for implementing Marine Protected Areas in California
Bald Eagle Restoration
Complete the NCI Bald Eagle Feasibility Study before deciding on further restoration actions
Peregrine Falcon Restoration
Monitor the recovery of peregrine falcons on the Channel Islands
Seabird Restoration
Restore seabirds to San Miguel Island
Restore alcids to Santa Barbara Island
Restore seabirds to San Nicolas Island
Restore seabirds to Scorpion and Orizaba Rocks
Restore seabirds to Baja California Pacific Islands • *Coronado and Todos Santos Islands*

The Trustees have concluded that conducting these actions will most effectively address the continuing injuries and lost services of the Montrose case and compensate for past injuries within the limits of funding allocated during Phase 1 of restoration implementation. This combination of actions represents the Trustees' preferred alternative. Further explanation of why this collection of actions is preferred follows.

Fishing and Fish Habitats

For the fishing and fish habitat resource category under this alternative, the Trustees will conduct a diverse set of four actions that addresses both the restoration of human uses (fishing services) and the restoration of fish habitats. In particular, one of the actions, "construct artificial reefs and fishing access improvements," effectively addresses both the need to restore lost fishing services and the need for fish habitat in close proximity to areas affected by the contaminants of the case. For this reason, this action will receive greater funding emphasis within this category than the other three actions (see Appendix A).

The degree to which each of these four actions fulfills all six of the MSRP evaluation criteria varies, but all of the actions are considered sufficient to satisfy the criteria for selection. "Construct artificial reefs and fishing access improvements" rates high for nexus, resource benefits, and ecological benefits. "Provide public information to restore lost fishing services" rates high for nexus, feasibility, resource benefits, and cost. "Restore full tidal exchange wetlands" rates high for feasibility and ecological benefits. "Augment funds for Marine Protected Areas in California" rates high for feasibility, resource benefits, and ecological benefits.

Bald Eagles

For the bald eagle resource category under this alternative, the Trustees fund the Santa Catalina Island Bald Eagle Program only through 2005, complete the NCI Bald Eagle Feasibility Study to determine whether bald eagles placed on the Northern Channel Islands can reproduce on their own, and only then decide what additional bald eagle restoration will be conducted. This alternative discontinues funding for the Santa Catalina Island Bald Eagle Program during the interim period until the results of the NCI Bald Eagle Feasibility Study are known (in or around 2008). At that point, the Trustees will re-evaluate all potential options for bald eagle restoration, including measures that may be taken even if bald eagles are not able to reproduce on their own anywhere in the Channel Islands (see Section 6.1.2).

This bald eagle restoration approach better fulfills the restoration goals and objectives and the MSRP evaluation criteria than the bald eagle restoration approach considered under Alternative 3, which would continue funding the Santa Catalina Island Bald Eagle Program even though these birds cannot reproduce on their own. The bald eagle restoration approach under Alternative 2 better fulfills restoration goals and objectives because the MSRP evaluation criteria give preference to actions that have a long duration under the resource benefits criterion and actions that require less ongoing operation and maintenance under the feasibility criterion. In other words, the preferred bald eagle restoration approach, which focuses on restoring naturally reproducing bald eagles on the Channel Islands, has greater potential to realize long-term, self-sustaining benefits.

Peregrine Falcons

For the peregrine falcon resource category, this alternative provides for recovery with monitoring. This approach recognizes the evidence that, with the aid of prior release efforts and natural recruitment, peregrine falcons are recovering on the Channel Islands. The number of breeding pairs on the Channel Islands has increased from nine pairs in 1992 (Hunt 1994) to approximately 21 breeding pairs in 2004 (PBRG 2004). Lack of successful breeding on the Southern Channel Islands might be indicative of continuing contaminant-caused injuries in that region; however, if this were the case, further hacking of peregrine falcons would not effectively address this issue. The Trustees also recognize that peregrine falcons benefit from seabird restoration, as an increase in the numbers of seabirds increases the availability of the preferred prey of peregrine falcons. For these reasons, the Trustees did not include active restoration of peregrine falcons to the Channel Islands as part of the preferred alternative; however, restoration funds will be used to monitor the continued recovery of this species on the Channel Islands.

Seabirds

For the seabird resource category, this alternative incorporates a diverse set of actions that provides significant benefits to several species of seabirds. Evaluation of past data indicates that the seabird species benefiting from these actions have demonstrated eggshell thinning and/or elevated levels of DDTs in their eggs (Kiff 1994, Fry 1994). Although the seabird actions not included in this alternative also have a strong nexus to the Montrose case and would benefit seabirds injured by the contaminants of the case, insufficient funding is available at this time to fund all the restoration actions evaluated in Tier 2. Among the MSRP evaluation criteria, the degree of resource benefits best distinguishes the different seabird actions. Therefore, the Trustees have selected those actions that they consider to provide the greatest restoration benefits within the limits of funding.

Should one or more of the seabird actions requiring supplemental analysis later be determined to be inadvisable to pursue, the MSRP will provide public notice and use the available funds to proceed with one or more of the other seabird actions that met the Tier 2 criteria but were not incorporated into this alternative. The Trustees will also seek partnerships to reduce the costs of individual actions. Depending on the level of cost sharing, the Trustees may be able to implement additional seabird actions not currently included in Alternative 2.

Summary of Alternative 2

After consideration of the restoration goals and objectives, the MSRP evaluation criteria, the current status of injured resources, and the continuing presence of contamination, the Trustees believe that Alternative 2 represents the optimal distribution of funding for natural resource restoration across the demonstrated injury categories and for the purposes of both primary and compensatory restoration (Figure 6-3).

6.2.5 Alternative 3

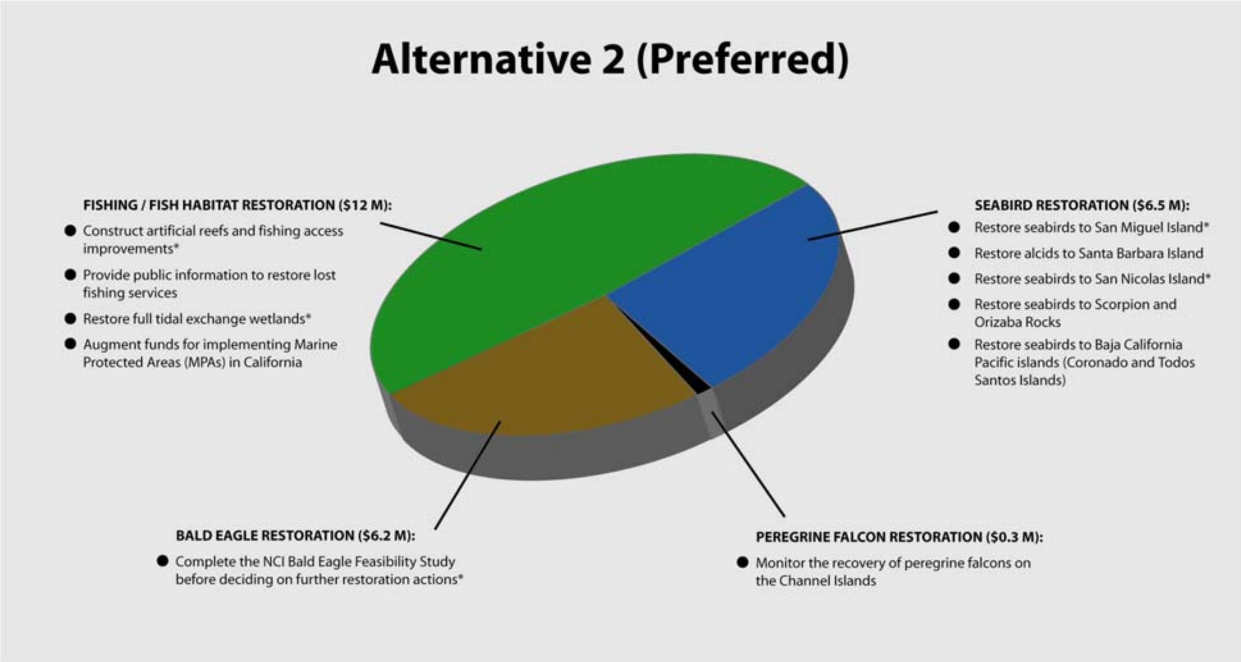
The Trustees assembled another comprehensive alternative for consideration and comparison in this Restoration Plan. Alternative 3 consists of the following set of actions:

Fishing and Fish Habitat Restoration
Construct artificial reefs and fishing access improvements
Provide public information to restore lost fishing services
Bald Eagle Restoration
Complete the NCI Bald Eagle Feasibility Study; Regardless of its Outcome, Continue Funding Santa Catalina Island Bald Eagle Program
Peregrine Falcon Restoration
Monitor the recovery of peregrine falcons on the Channel Islands
Seabird Restoration
Restore alcids to Santa Barbara Island
Restore seabirds to Scorpion and Orizaba Rocks
Restore seabirds to Baja California Pacific Islands • *Coronado and Todos Santos Islands*
Restore ashy storm-petrels to Anacapa Island

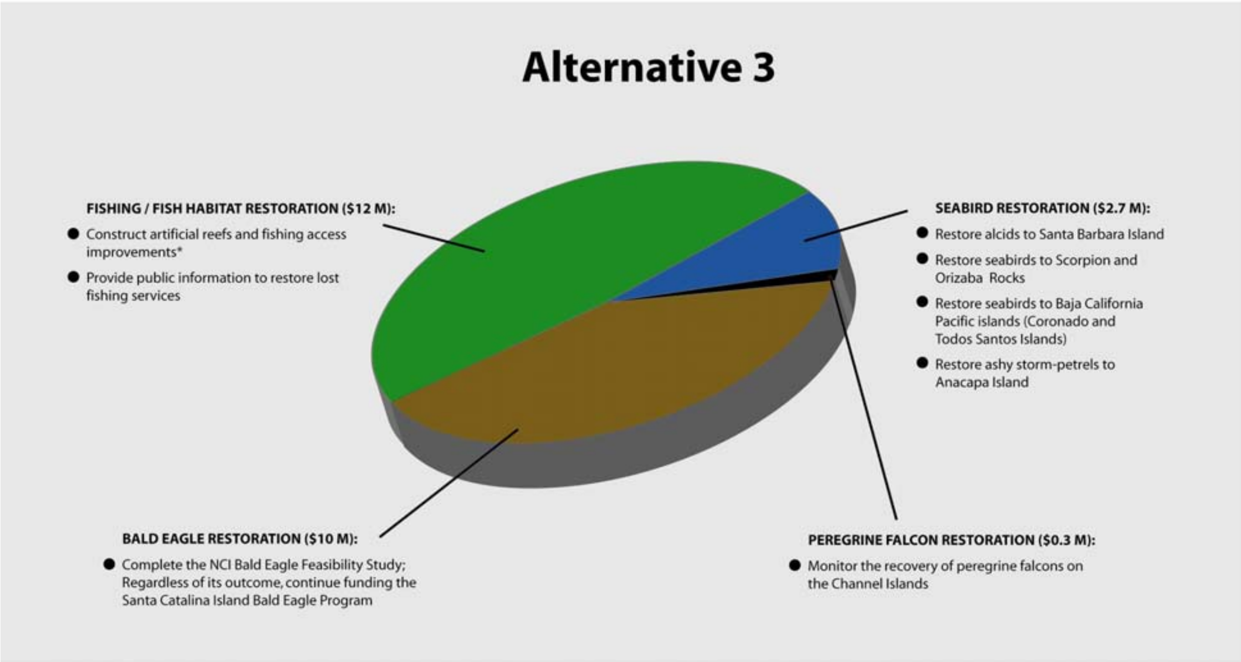
In this alternative, the Trustees would fund a narrower range of actions that would place greater emphasis on primary restoration of injuries and lost services. For the actions that are scaleable (e.g., the two fishing restoration actions), greater levels of funding would be available to each individual action identified in Alternative 3 than in Alternative 2, as available funds within that category would be distributed across fewer actions.

For the fishing and fish habitat category under this alternative, the Trustees focus restoration efforts on the two actions that most directly address the continuing loss of fishing services from contaminated fish. The remaining two actions evaluated in the fishing and fish habitat category, Restore Full Tidal Exchange Wetlands and Augment Funds for Implementing Marine Protected Areas in California, are not included in this alternative, as they restore fish habitats in ways that are not as directly linked to the continuing loss of fishing services of the Montrose case but instead serve to restore fish habitats as specified in the Consent Decree.

For the bald eagle category under this alternative, the Trustees would fund the continued human intervention (i.e., egg manipulation and chick fostering) needed to sustain a bald eagle presence on Santa Catalina Island for many years to come. The Trustees would also complete the NCI Feasibility Study. Funds for seabird restoration would be commensurately reduced. This bald eagle restoration option, considered in the broader context of the need to restore a wide range of injured resources, does not rate as high against the MSRP evaluation criteria as the preferred bald eagle option under Alternative 2. This is because the MSRP evaluation criteria give preference to actions with long term benefits that do not require continuous operations and maintenance. Since it remains to be determined whether DDTs and PCBs have attenuated sufficiently in the Northern Channel Islands to allow bald eagles to be self-sustaining, the Trustees prefer to await the conclusion of the NCI Study before committing further restoration funding for bald eagles.



* These actions require further detailed development and subsequent NEPA and/or CEQA analysis prior to implementation.



* These actions require further detailed development and subsequent NEPA and/or CEQA analysis prior to implementation.

Figure 6-3. Illustration of the collective restoration actions and funding distributions proposed under Alternative 2 (Preferred) and Alternative 3.

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6.2.6 Summary of the Alternatives

Table 6-2 lists the 17 potential restoration actions that received detailed evaluation and indicates how they are assembled into the two comprehensive alternatives and the No Action Alternative for this Restoration Plan and programmatic EIS/EIR. Each alternative allocates approximately $25 million in restoration funding to cover data gap studies and the initial 5 years of restoration implementation (Phase 1). Alternative 2 distributes funding across a wide range of actions that are both primary and compensatory in nature. Alternative 3 focuses greater effort on primary restoration by (1) targeting fish restoration for human use (fishing) benefits and (2) reserving greater funding for long-term intervention to maintain bald eagles in the Channel Islands despite continuing reproductive injuries (thus reducing funds available for seabird actions). The Trustees' preferred alternative is Alternative 2.

Table 6-2
Comparison of Restoration Alternatives

Potential Restoration Actions	Alternative 1 (No Action)	Alternative 2 (Preferred)*	Alternative 3*
Fishing and Fish Habitat Restoration		$12 million	$12 million
Construct artificial reefs and fishing access improvements		•	•
Provide public information to restore lost fishing services		•	•
Restore full tidal exchange wetlands		•	
Augment funds for implementing Marine Protected Areas in California		•	
Bald Eagle Restoration		$6.2 million	$10 million
Complete the NCI Bald Eagle Feasibility Study Before Deciding on Further Restoration Actions		•	
Complete the NCI Bald Eagle Feasibility Study; Regardless of its Outcome, Continue Funding Santa Catalina Island Bald Eagle Program			•
Peregrine Falcon Restoration		$0.3 million	$0.3 million
Restore peregrine falcons to the Channel Islands			
Monitor the recovery of peregrine falcons on the Channel Islands		•	•
Restore peregrine falcons to the Baja California Pacific Islands			
Seabird Restoration		$6.5million	$2.7 million
Restore seabirds to San Miguel Island		•	
Restore alcids to Santa Barbara Island		•	•
Restore seabirds to San Nicolas Island		•	
Restore seabirds Scorpion and Orizaba Rocks		•	•
Restore seabirds to Baja California Pacific Islands • *Coronado and Todos Santos Islands* • *Guadalupe Island* • *San Jeronimo and San Martín Islands* • *San Benito Islands*		• *Coronado and Todos Santos Islands*	• *Coronado and Todos Santos Islands*

Table 6-2
Comparison of Restoration Alternatives

Potential Restoration Actions	Alternative 1 (No Action)	Alternative 2 (Preferred)*	Alternative 3*
• *Asunción and San Roque Islands* • *Natividad Island*			
Create/enhance/protect California brown pelican roost habitat			
Implement an entanglement reduction and outreach program to protect seabird populations			
Restore ashy storm-petrels to Anacapa Island			

*The budgets shown in this table reflect the total amount of funding allocated for each resource category, including the funds already expended for fish contamination and angler surveys, bald eagle work on Santa Catalina Island and the Northern Channel Islands, and a peregrine falcon survey, as described in more detail in Section 4.2.1 and Appendices A, B, and C.

6.3 UNCERTAINTIES

Several uncertainties are inherent in the restoration actions described in this Restoration Plan. As stated in Section 4, the Trustees' strategy is to approach restoration planning as an iterative, adaptive process, and this Restoration Plan will be updated in the future as restoration progress is assessed and new information becomes available. Some of the uncertainties that the Trustees have identified are:

- All of the actions are subject to obtaining the required permits and authorizations (if necessary) before proceeding.
- The budgets assembled for each action in Appendices A–D are estimates and do not include contingencies. These estimates will be refined once the actions approach the stage of implementation and potential funding partners are identified.
- Although all of the actions selected as part of Alternative 2 (preferred) are considered feasible for implementation, unforeseen issues could potentially arise that might prevent implementation. Because all 17 actions evaluated in Tier 2 meet the restoration criteria, in the event that certain actions in Alternative 2 cannot go forward or cost savings are realized that leave funding available, the Trustees would consider pursuing one or more of the remaining Tier 2 actions. The Trustees would document such changes and provide opportunity for public review and comment.
- The outcomes of the ongoing fish contamination and bald eagle data gap studies are not known at the time that this Restoration Plan is being prepared. It is possible that these studies might provide unanticipated new information and cause the Trustees to reconsider the actions of the restoration program.
- Funding beyond that on which this Restoration Plan is based may be made available in the future, depending on the EPA's upcoming determination on the potential in situ response action (see Section 4.3).

7.1 INTRODUCTION TO EVALUATION OF ENVIRONMENTAL CONSEQUENCES

This section describes and compares the potential environmental consequences of the proposed action (restoration of the natural resources injured by the DDTs and PCBs discharged to coastal waters of Southern California) by analyzing the individual projects and the three alternatives described in this Restoration Plan. This plan has been prepared as a programmatic Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) for the purposes of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The potential environmental consequences are considered within the following context:

- The fundamental purpose of the proposed action is to restore injured natural resources and the services they provide (i.e., to improve the natural and human environment).
- The DDTs and PCBs of the Montrose case are expected to persist in the marine environment of the Southern California Bight for many years.
- The alternatives presented in this Restoration Plan include actions for which this programmatic EIS/EIR fulfills NEPA/CEQA requirements as well as actions that will require further NEPA and/or CEQA analysis at a subsequent stage, after the details of the action are developed.
- The Natural Resource Trustees for the Montrose case (Trustees) anticipate updating the Restoration Plan as implementation progresses and new information becomes available. The actions evaluated constitute the actions the Trustees reasonably foresee implementing over the initial phase (Phase 1) of the program, which will run approximately through 2010.

Subsequent planning and environmental impact analysis will be tiered off of this programmatic EIS/EIR. In the terminology of NEPA, "tiering" refers to the coverage of general matters in a broad EIS with subsequent narrower environmental analysis that incorporates by reference the general discussions and concentrates solely on the issues specific to the analysis subsequently prepared. Tiering is appropriate when impact analysis progresses from a program, plan, or policy EIS to an analysis of lesser scope or to a site-specific analysis. Tiering is appropriate when it helps focus analysis on the issues that are ripe for decision and excludes from consideration issues already decided or unresolved (U.S. Council for Environmental Quality regulations for implementing NEPA, Title 40 Code of Federal Regulations [CFR] Section 1508.28).

In addition to addressing the overall Montrose Settlements Restoration Program (MSRP) effort at a programmatic level, this Restoration Plan and Programmatic EIS/EIR fulfills the impact analysis requirements for ten individual actions (see Table 6-1).[1] Analyses of the direct and indirect environmental effects and proposed mitigation are provided in Section 7.2 for these ten

[1] As a matter of practice, the lead federal agency for this programmatic EIS/EIR, the National Oceanic and Atmospheric Administration (NOAA), undertakes a NEPA analysis for all of its major actions with potential for significant effects on the environment, including those occurring outside the United States and its territories. The analysis of potential restoration actions on Baja California Pacific Islands is being provided to ensure that the public is fully informed about important environmental issues. The production of this NEPA document is in no way intended to affect or influence other United States government policies regarding the applicability of NEPA to actions taken outside the United States. Subsequent site-specific detail development for potential restoration actions in Baja California Pacific Islands may be subject to the environmental review requirements of the Mexican government.

actions and, to the extent possible at this stage, for the remaining seven actions that will require further analysis at a later point when more details are available. Expanded discussions of the actions are provided in Appendices A–D.

NEPA and CEQA also require the analysis of cumulative impacts (Section 7.3) and other mandated discussions (Section 7.4), including: irreversible and irretrievable environmental changes and commitments of resources, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term environmental productivity, growth-inducing effects, and identification of any significant and unavoidable adverse impacts.

The environmental impact analysis in this Restoration Plan and Programmatic EIS/EIR focuses on the following categories considered to have potential relevance to the anticipated actions:

- Biological resources (fish, birds and other wildlife)
- Physical resources (earth resources, including sediments, water resources, and oceanographic and coastal processes)
- Human use (recreation, socioeconomics, and aesthetics)

Effects in the following categories are considered insignificant or not relevant to the anticipated actions:

- Air quality: Air quality impacts from any individual project will either be non-existent or minor (i.e., involve limited production of fugitive dust and emissions from construction vehicles). The impacts will be insignificant contributions, both individually and combined, when compared to impacts from other construction projects and from motor vehicle emissions on highways and streets in the areas where restoration actions take place, and will not represent a significant contribution to regional air quality.
- Agriculture: None of the project sites or anticipated sites are suitable for agricultural use.
- Noise: Restoration activities will not take place at sites near existing human habitation. Construction will involve equipment that produces noise similar to or below the levels already allowed by local ordinances governing normal construction activities. Social attraction as a method for restoring seabirds to islands involves production of recorded sounds in these remote areas, but these activities have been successfully employed in the past and it is unlikely to result in adverse consequences to other biological organisms.
- Population and housing: The sites where actions will take place are not populated and are not considered viable areas for housing development.
- Soils, geology, and geologic hazards: Restoration activities do not involve any modification of the geology at any sites, and no geologic hazards will be increased by MSRP activities.
- Land use planning: The implementation of the MSRP Restoration Plan will not involve significant changes in land use or be inconsistent with existing local and regional plans and policies on land use.

The potential effects in the following categories are not anticipated to be significant at this point, but detail is not yet sufficient for final analysis in this EIS/EIR because the actions that could affect these categories are still conceptual:

- Hydrology: The restoration of full tidal exchange wetlands may have hydrological impacts, depending on the nature of the actions and their scale. The potential for such impacts, if any, will be addressed once potential site(s) are identified and project details are more fully developed. None of the other actions evaluated in this Restoration Plan involve physical changes that have the potential for hydrological impacts.
- Navigation and navigation safety: The construction and final placement of material for artificial reefs as envisioned in this Restoration Plan will either have no impacts or insignificant impacts to navigation and navigation safety. During the site selection and design of artificial reefs, the Trustees and other project proponents will consider potential effects on navigation and address these issues in site-specific environmental analyses. Numerous artificial reefs have been constructed in Southern California coastal waters in recent decades (Appendix A1, Figure A1-1), and potential impacts to navigation are avoided through consideration of the locations and depths of material placement. For example, in a Mitigated Negative Declaration that the Port of Los Angeles prepared for the proposed San Pedro artificial reef project (Los Angeles Harbor Department 2003), the Port proposed a minimum reef crest depth and proposed avoiding placement of reef material within shipping lanes or within a 200-yard radius around a navigational marker buoy to accommodate U.S. Coast Guard maintenance of the buoy.
- Transportation, traffic, and roadway safety: Existing transportation, traffic, and roadway systems will remain unaltered by any projects undertaken under the MSRP. A small amount of temporary traffic may result from moving equipment in and out of certain sites. The potential traffic impacts of transporting rock or concrete to potential reef or roost sites may need to be addressed in a subsequent environmental analysis once greater details about site-specific activities are known; however, it is likely that the minimal number of truck trips to move material from source sites to barge-loading areas will simply replace truck trips of alternative uses of the materials (e.g., to crushers and landfills).
- Cultural resources: No significant impacts to cultural resources have been identified for any of the restoration actions. For projects that will involve construction and for which specific sites have not yet been identified (e.g., construction of reefs or modification to fishing facilities), a review of potential cultural resource impacts will need to be conducted once specific sites are identified.

7.2 DIRECT AND INDIRECT IMPACTS OF THE ALTERNATIVES

This section evaluates the direct and indirect environmental effects of the proposed action through analysis of each of the three alternatives: Alternative 1 (No Action), Alternative 2 (Preferred) and Alternative 3. This section also presents mitigation measures to reduce or avoid potential adverse impacts. Expanded descriptions and detailed analysis of the individual projects against the evaluation criteria, including their beneficial and adverse impacts, are provided in Appendices A–D.

7.2.1 Alternative 1 (No Action)

Under the No Action Alternative, the MSRP would not implement any restoration activities except monitoring. Consequently, there would be no environmental impacts when compared to the baseline, or current conditions. Beneficial effects of natural resource restoration actions would not be realized. The purpose and need for the MSRP (i.e., utilizing the funds from the Montrose settlements to restore injured resources and lost services) would not be met. Without active restoration projects, there would be no biological, physical, or human use benefits or adverse impacts. However, natural resource injuries and lost services resulting from the DDTs and PCBs of the Montrose case would persist in the Southern California Bight for the foreseeable future. Also, no compensation for interim lost natural resource services from the date of the enactment of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (1980) until injuries cease would be realized.

7.2.2 Alternatives 2 and 3

Each of these two alternatives consists of a different combination of the 17 restoration actions described in Section 6 and evaluated in detail in Appendices A–D. Several of these individual actions are common to both alternatives, some are only in one alternative, and some are not included in either. The direct and indirect environmental effects of each of the 17 actions are presented here individually (in the same order as the actions are listed in Appendices A–D); the headings indicate which of the alternatives each action is a part of.

These two comprehensive alternatives have been compiled to evaluate different mixes of restoration actions that the Trustees believe they can accomplish within the $25 million funding level set for Phase 1 of implementation. Although some of the actions are not specifically included under either Alternative 2 or 3, all actions are evaluated at this point. As a result, the Trustees would be able to proceed with any of the other actions should additional funding become available, or should any of the proposed actions prove infeasible.

A1. Construct Artificial Reefs and Fishing Access Improvements

Alternative 2 [✓] Alternative 3 [✓] Neither [ ]

This action will require subsequent environmental analysis when the project details are more fully developed.

Biological Effects

Direct Effects. This action will convert soft-bottom aquatic habitat to reef habitat. The reduction of soft-bottom habitat on the limited scale feasible under this restoration action, when compared to the predominant extent of such habitat throughout the region, will not significantly affect the total available soft-bottom habitat to those species that rely on it. Unless care is exercised in siting artificial reefs, their construction can potentially impact the availability of other limited inshore habitat or resources, such as eelgrass beds, spawning areas for market squid (*Loligo opalescens*), or important nursery areas for certain fish species such as California halibut.

The displacement of the sandy- or muddy-bottom habitat with hard-bottom substrate will increase the diversity and may increase the number of the animal and plant biota in the area. The fish productivity of rocky reef habitat has been estimated to be between 9 and 23 times that of sandy-bottom habitat (MEC Analytical Systems 1991).

At a conceptual level, reef construction projects are not likely to adversely affect threatened or endangered species or essential fish habitat. Nonetheless, detailed analysis will be performed at a site-specific level once specific sites for reefs are identified.

Indirect Effects. To the extent that reefs constructed under the MSRP program function as production sites for rockfishes or other species that are currently depleted, the reefs may benefit the management and recovery of these depleted species of fish.

Reef-associated fish typically contain lower concentrations of DDTs and PCBs than soft-bottom species, so constructed reefs benefit the biological organisms that prey on fish in the vicinity of the constructed reefs, as these organisms are likely to be exposed to reduced levels of these contaminants.

It is possible that fishing pressure and thus fish mortality may increase in the vicinity of newly constructed reefs. Such an effect might also occur should improvements to fishing access and amenities be constructed under this restoration action and lead to increases in fishing trips to a particular site.

Mitigation Measures. The specific location of each constructed reef will be studied and selected such that the MSRP reefs avoid impacts to eelgrass beds or other nearshore soft-bottom areas that are currently important and contain limited habitat types. State and federal fisheries agencies will be consulted to ensure appropriate reef design, size, and placement, and to ensure that long-term management will accommodate anticipated increases in fishing and other uses of the reef site.

Physical Effects

Direct Effects. The placement of concrete or rock materials into marine waters will cause short-term suspension of sediments at the reef construction site that will result in short-term water quality impacts. The principal effect will be increased turbidity; however, depending on local conditions, the sediments at the reef site might contain elevated contaminant levels.

Indirect Effects. To the extent that the material used to construct a reef is from the demolition of concrete structures, the beneficial reuse of this material will divert it from land disposal and conserve a corresponding increment of landfill space. There may be other trade-offs related to transportation and disposal of materials (such as reduced air quality impacts relative to land disposal), but whether these trade-offs will have net positive or net negative consequences cannot be determined until the site-specific implementation factors are determined.

Placement of reefs in nearshore areas has the potential to disrupt the normal transport of sediment and affect the topography of adjacent subtidal and beach areas. Also, depending on the nature of the soft substrate in a given area, the depth to bedrock, and the slope, the hard substrate dropped to the marine bottom could potentially not perform as intended.

Mitigation Measures. Adjustments to the methods and timing for reef material placement may be developed in consultation with regulatory agencies (i.e., the California Regional Water Quality Control Board, the U.S. Army Corps of Engineers, and the U.S. Environmental Protection Agency [EPA]) to address local conditions and reduce the potential short-term water quality impacts of the construction.

Once planning progresses to the stage in which site-specific studies are undertaken, the potential short-term physical impacts from placing rock or rubble in a given area will undergo engineering and water quality analysis, and additional evaluation will be performed to identify measures to minimize adverse effects.

Human Use Effects

Direct Effects. Artificial reef construction in areas where fish species contaminated by DDTs and PCBs will be displaced by less-contaminated species associated with hard-bottom and water-column habitats will have a direct benefit to anglers whose fishing has been impacted by fish consumption advisories.

Improvements to fishing access (e.g., the addition of various fishing site amenities, including pier extensions, fish-cleaning stations, benches, parking improvements, or other such actions) are not possible to evaluate at this stage as they are highly dependent on the specific details and local site characteristics. However, construction activities at fishing sites (e.g., construction improvements to piers, amenities such as fish-cleaning stations, parking, etc.) may cause short-term disruption to users of a site during the construction period.

Indirect Effects. Artificial reefs provide human use benefits beyond fishing, as they are also popular areas for scuba and free diving for purposes of recreation, hunting, and underwater photography. As with the biological benefits, the human use benefits will be sustained for a period of decades or perhaps longer with minimal operational or maintenance costs.

Depending on their location, design, and depth, artificial reefs could have adverse impacts on various other types of human uses. Uses that could potentially be impacted by shallow reefs include body surfing or wind surfing and, possibly, navigation. Also, constructed reefs will displace soft-bottom species, and the anglers who favor catching these species at the site of a constructed reef will find it harder to catch these fish. Potential impacts to recreational and navigational uses will be a significant consideration in the selection of candidate sites. Findings on these issues will be included in subsequent site-specific environmental documentation and provided to the public for review.

Mitigation Measures. The Trustees undertook a survey of recreational and subsistence anglers in 2002 and 2003, in part for the purpose of determining fishing preferences at fishing sites along the Los Angeles County and Orange County coastline. The data generated by this field intercept survey and follow-up public involvement activities will be used to select sites that minimize negative impacts to anglers who may be targeting soft-bottom fishes exclusively. The Trustees are also gathering chemistry data on fish contamination. Up-to-date fish contamination data provide a means for optimizing the placement of constructed reefs with respect to prevailing contamination. Thus, if the fish caught after reef construction are lower in contamination, then fishing and fish consumption benefits will be realized from these projects.

Steps will be taken to minimize the impacts resulting from the construction of fishing access improvements. These impacts will be addressed at the stage when site-specific plans are being considered.

When initiating a design for site-specific reef development, the MSRP will consider the potential adverse human use impacts identified above by avoiding placement of reef material where it would cause such adverse impacts. Also, fishing reefs will not typically be constructed in areas shallow enough to affect surfing because swells and waves would deter development of the types of fish communities that are the intent of the reefs.

A2. Provide Public Information to Restore Lost Fishing Services
Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

Biological Effects

Direct Effects. This action will not have any direct biological effects.

Indirect Effects. Should the public information program lead to changes in fishing practices in the region, it is possible that fishing exploitation of certain contaminated species of fish will decrease and fishing for cleaner species of fish will increase. It is also possible that the public information program could lead to increased fishing exploitation of fish populations in the locations that the program identifies as having fish lower in contamination.

Mitigation Measures. The Trustees will consider both contamination levels and vulnerability to over-fishing as factors when providing fishing advice to anglers. Thus, the program will not advise anglers to target any species that is currently over-fished or at risk of future over-fishing due to population status or specific life-history characteristics that might make that species more vulnerable to over-fishing. The Trustees will work closely with state and federal fisheries managers and provide them opportunities to review materials prior to initiating public information and outreach on fishing to ensure that any MSRP recommendations on specific fishing sites and species do not conflict with pertinent fishing regulations (e.g., catch restrictions).

Physical Effects

This program will not have any direct or indirect effects on the physical environment.

Human Use Effects

Direct Effects. Because this project focuses on providing information that enables fishing rather than restricting fishing, no significant direct effects on human uses are anticipated.

Indirect Effects. Development of better data on fish contamination and improved dissemination of information on fish contamination (including the locations and species of fish that are safer for catching and consuming) should provide recreational benefits for anglers and could potentially lead to increased human uses of ocean fish resources. Minor impacts to aesthetics could occur if informational signs or kiosks are erected, depending on the design, size, and placement of the signs.

Mitigation Measures. The designs for the informational signs will be adopted from the previous designs developed and employed by the State of California and the county health departments in the study area. The signs will be placed in consultation with appropriate local authorities in such a way as to minimize any impacts to the aesthetics of the surrounding area.

A3. Restore Full Tidal Exchange Wetlands
Alternative 2 [✓] *Alternative 3 [ ]* *Neither [ ]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Biological Effects

Direct and Indirect Effects. The biological consequences of restoration projects for Southern California coastal wetlands are largely beneficial given the historical losses of such habitats, their relative scarcity today, and their valuable ecological functions. Wetlands restoration requires careful planning, analysis, and consideration of the trade-offs between different and sometimes competing biological resources and uses. MSRP funding will be specifically earmarked for actions that benefit wetlands-dependent marine fish species, which might conceivably alter the relative balance of habitat types targeted for restoration within an overall plan. However, this possibility cannot be fully analyzed until site-specific details are developed.

Mitigation Measures. Appropriate mitigation measures will be identified once potential site(s) are identified and project details are more fully developed.

Physical Effects

Direct Effects. Depending on their location and design, wetlands may provide benefits to water quality (USEPA 2001). Restoration of full tidal exchange may also increase contributions of sediment from terrestrial watersheds into coastal areas.

Indirect Effects. Wetlands restoration could have several indirect physical effects, including hydrological consequences, the need to identify disposal requirements for dredged material, and impacts on roads and utilities.

Mitigation Measures. Appropriate mitigation measures will be identified once potential site(s) are identified and project details are more fully developed.

Human Use Effects

Direct and Indirect Effects. Wetlands provide numerous active and passive recreational use values, including birding, boating, fishing, and other uses. Wetlands restoration may also impact current recreational and other human uses of sites slated for restoration. Environmental effects on human uses will need to be analyzed at a later stage, when more site-specific information is available.

Mitigation Measures. None are identified at this time.

A4. Augment Funds for Implementing Marine Protected Areas in California

Alternative 2 [✓]   Alternative 3 [   ]   Neither [   ]

This action will not establish new Marine Protected Areas (MPAs) or modify the boundaries or human use restrictions of the MPAs already established for the Channel Islands. Rather, this action will enhance implementation of these MPAs so that they will be managed and monitored in ways closer to those originally envisioned. Thus, this analysis evaluates impacts relative to the No Action Alternative (i.e., the current MPA management activities), not the MPA management plan as originally developed.

Biological Effects

Direct Effects. MPAs are established for the purpose of restoring and/or preserving marine biological communities, so increased funding to improve management and monitoring efforts for the Channel Island MPAs will increase the beneficial biological effects for which the MPAs were established.

Indirect Effects. It is possible that the increased public awareness and enforcement of restrictions on the taking of biological organisms from within the boundaries of the Channel Island MPAs that might result from this action could redirect fishing efforts to other marine areas to a greater extent than do the current MPAs. However, the original selection of MPA locations and boundaries was in large part driven by a conscious effort by resource managers to shift such fishing to areas capable of supporting it and away from areas where such practices have led to depletions of critical marine resources. Also, an important component of MPA monitoring is an examination of the degree to which MPAs may result in spillover benefits to fish stocks outside of their boundaries, thus increasing the capacity of surrounding areas to support greater fishing pressure.

Mitigation Measures. Before providing funding to augment implementation of the Channel Islands MPAs, the Trustees will ensure that overall MPA monitoring efforts include adequate provisions for reviewing the effects of the MPAs on surrounding areas.

Physical Effects

This action will have no known direct or indirect effects on the physical environment.

Human Use Effects

Direct and Indirect Effects. Several potential benefits to human uses could result from improved effectiveness of the implementation of the Channel Island MPAs. Restoration of depleted resources within the boundaries of the reserves could provide recreational opportunities outside of the reserve. Although the MPAs generally prohibit the taking of biota within the MPA boundaries, effectively managed MPAs have the potential to lead to spillover of fish to adjacent areas and thus improve fishing use outside their boundaries.

It is possible that augmenting MPA implementation and enforcement (i.e., to levels closer to those originally envisioned) may have increased consequences on some human uses (e.g., fishing within their boundaries) above what might exist in the absence of MSRP support. By their nature, MPAs restrict several types of human uses within their boundaries. This impact was addressed in the environmental documentation that supported the original establishment of the Channel Island MPAs (CDFG 2002). The most seriously debated impact of the Channel Island MPAs related to the question of their contribution to commercial and recreational catches. The opponents of these MPAs suggested that even though MPAs may increase the abundance of fish within their boundaries, they exclude fishermen from productive fishing areas, concentrating them in the less productive areas and resulting in an overall reduction of catch. This concern was addressed during the development of the Channel Island MPAs through extensive collaboration with the fishing community to avoid restrictions to fishing in already established, favored fishing locations. In addition, the Channel Island MPA evaluation plan included extensive socio-economic impact studies designed to address the potential negative impacts of MPAs on human uses (CDFG 2004a).

Mitigation Measures. Before providing funding to augment implementation of the Channel Island MPAs, the Trustees will ensure that the Channel Island MPA Monitoring Plan provisions for socioeconomic impact studies are being implemented as planned.

B. Complete the NCI Bald Eagle Feasibility Study Before Deciding on Further Restoration Actions
Alternative 2 [✓] Alternative 3 [ ] Neither [ ]

This is an interim action that will require subsequent environmental analysis.

Biological Effects

Direct Effects. Individual bald eagles will be impacted by the restoration efforts. Eight of the 34 bald eagles released on Santa Cruz Island as part of the Northern Channel Island (NCI) Bald Eagle Feasibility Study have died from various causes. Overall, the survival rate of eagles released on the Northern Channel Islands appears to be within the normal range of both eagle survival in the wild and a reintroduction program. The loss of several individuals is not considered significant in light of the overall recovery of the bald eagle in the United States and the efforts to restore this species to the Channel Islands.

This course of action proposes to suspend funding of the Santa Catalina Island Bald Eagle Program after 2005 during the interim period until subsequent restoration decisions are made, in or around 2008. One potential outcome of stopping human intervention and allowing bald eagle nests to fail is that eagle pair bonds may break down and the birds may abandon the island. However, it is highly likely that bald eagles will remain on the island for several years despite their inability to hatch offspring naturally. Bald eagles in the wild typically live for 25 to 30 years, and Santa Catalina Island currently supports 15 to 20 birds of a wide range of ages. Currently, five bald eagle nesting territories are active on the island, and the Institute for Wildlife Studies reports that two birds are currently establishing a new territory near Avalon. Even assuming that the Santa Catalina Island bald eagles fail to hatch new chicks in the coming years, bald eagle experts do not expect that they will immediately break their pair bonds and abandon their Santa Catalina Island territories. Rather, it is likely that bald eagles will remain on the island, with their numbers diminishing gradually over a period of 10 years or longer as some of the birds die and are not replaced by others and as certain bald eagle pairs break their pair bonds and leave the island after several years of failing to produce chicks.

Indirect Effects. Bald eagles historically played an important role in the ecology of the Channel Islands by serving as both a top carnivore and a scavenger. Bald eagles prey primarily on fish taken live from the ocean; however, they also feed on seabirds and the carcasses of animals that wash up on shore. Restoration of bald eagles to the Channel Islands provides broad benefits to the island ecosystems.

The presence of bald eagles in the Northern Channel Islands may provide benefits to the endangered island foxes on San Miguel, Santa Rosa, and Santa Cruz Islands. Predation by golden eagles on island foxes has resulted in precipitous declines in island fox populations on these islands (Coonan et al. 1998, USFWS 2004). The presence of territorial bald eagles on the Northern Channel Islands will complement other efforts in the recovery of the island fox if they deter golden eagles from inhabiting the islands.

As explained above, suspension of funding for the Santa Catalina Island Bald Eagle Program until the completion of the NCI Bald Eagle Feasibility Study is highly unlikely to result in the disappearance of bald eagles from Santa Catalina Island. Nevertheless, the Trustees have analyzed the potential indirect effects of a disappearance of bald eagles from Santa Catalina

Island and have concluded that such a disappearance is not likely to adversely affect the endangered island fox.

Unlike the Northern Channel Islands, island fox numbers diminished on Santa Catalina Island as a result of canine distemper rather than predation by golden eagles. An absence of bald eagles on Santa Catalina Island is unlikely to result in the future establishment of golden eagles on the island, as the island likely does not have a sufficient terrestrial vertebrate prey base to attract and sustain golden eagles. Also, unlike on the Northern Channel Islands, there is no nearby mainland source for golden eagles. Given the ongoing efforts to remove golden eagles and eradicate their non-native prey base from the Northern Channel Islands, it is unlikely that these islands would serve as a source of golden eagles to Santa Catalina Island.

The Trustees have informally consulted with the endangered species office of the U.S. Fish and Wildlife Service (USFWS) on this issue, and this office has concurred with this analysis. The Letter of Concurrence is available as part of the MSRP Administrative Record.

The restoration of bald eagles on the Northern Channel Islands is not expected to result in significant impacts to seabird populations. Seabirds are not a principal component of bald eagle diets on Santa Catalina Island, and the same situation is expected to apply on the Northern Channel Islands. This potential impact was discussed in detail in the Feasibility Study for Reestablishment of Bald Eagles on the Northern Channel Islands (MSRP 2002).

Mitigation Measures. The methods for hacking and monitoring bald eagles are well established and designed such that potential impacts to birds are minimized. Measures such as supplementing prey for the juvenile eagles once they are released are part of the NCI Bald Eagle Feasibility Study and will be incorporated into future restoration efforts.

Physical Effects

This action would have no known direct or indirect effects on the physical environment.

Human Use Effects

Direct and Indirect Effects. The presence of the bald eagle on the Channel Islands provides benefits to humans on many levels. The presence of bald eagles provides both aesthetic and recreational benefits to visitors. Also, the bald eagles inhabiting the Channel Islands, which are readily identified by their tags, range freely over great distances and have been sighted on the U.S. mainland, notably along the Southern California coast.

The bald eagle also plays an important role in the cultural history of the Channel Islands. The presence of bald eagles on the island therefore fills an important cultural as well as an ecological niche.

The suspension of funding for the Santa Catalina Island Bald Eagle Program may lead to a diminishing number of bald eagles on Santa Catalina Island during the applicable time period. Fewer bald eagles could result in a reduction in the human use benefits they provide, as there may be fewer occasions for viewing the eagles.

Mitigation Measures. The Trustees' placement of approximately 12 young birds per year on Santa Cruz Island since 2002 may offset the potential reduction in opportunities for viewing bald eagles should their numbers diminish on Santa Catalina Island during the intervening years before a decision is reached on further bald eagle restoration.

B. Complete the NCI Bald Eagle Feasibility Study; Regardless of its Outcome, Continue Funding Santa Catalina Island Bald Eagle Program
Alternative 2 [ ] *Alternative 3 [✓]* *Neither [ ]*

Biological Effects

Direct Effects. This course of action will seek to continue maintaining bald eagles on Santa Catalina Island through human intervention (e.g., egg manipulation, incubation, and chick fostering) for as long as funds remain available. Historically, the Channel Islands were a stronghold for this species. Should it ultimately be found that bald eagles are unable to reproduce on their own on other Channel Islands, maintaining a bald eagle presence on Santa Catalina Island will at least represent a partial or temporary restoration of this important resource.

Individual bald eagles will continue to experience reproductive injuries if intervention efforts continue to maintain them on Santa Catalina Island. These birds are exposed to sufficiently high levels of DDTs and PCBs that they experience reproductive failure. Also, at least one bald eagle death on Santa Catalina Island has been attributed to DDT poisoning. However, the loss of several individuals is not considered significant in light of the overall recovery of the bald eagle in the United States and the efforts to restore this species to the Channel Islands.

Indirect Effects. Bald eagles historically played an integral role in the ecology of the Channel Islands by serving as both a carnivore and a scavenger. Bald eagles prey primarily on fish taken live from the ocean; however, they also feed on seabirds and the carcasses of animals that wash up on shore. Thus, the restoration of bald eagles to the Channel Islands will provide benefits to the island ecosystem.

The continued presence of bald eagles on Santa Catalina Island is not expected to result in significant impacts to seabird populations. Seabirds are not a principal component of the diets of the bald eagles on Santa Catalina Island.

Mitigation Measures. Humans have actively maintained bald eagles on Santa Catalina Island for over 15 years. Therefore, the methods for manipulating nests and monitoring bald eagles on Santa Catalina Island are well established and have been designed such that potential impacts to birds are minimized. Monitoring would continue to be performed to examine trends in contamination levels and to guide the ongoing restoration efforts.

Physical Effects

This action would have no known direct or indirect effects on the physical environment.

Human Use Effects

Direct and Indirect Effects. The presence of the bald eagle on Santa Catalina Island provides important benefits to humans on many levels. Santa Catalina Island is a popular tourist destination, and the presence of bald eagles provides both aesthetic and recreational benefits to visitors on the island. Also, the bald eagles inhabiting the Channel Islands, which are readily identified by their tags, range freely over great distances and have been sighted on the U.S. mainland, notably along the Southern California coast.

The bald eagle also plays an important role in the cultural history of the Channel Islands. The presence of bald eagles on the island therefore fills an important cultural as well as an ecological niche.

C1. Restore Peregrine Falcons to the Channel Islands
Alternative 2 [ ] *Alternative 3 [ ]* *Neither [✓]*

This potential action will require subsequent environmental analysis when the project details are more fully developed.

Biological Effects

Direct Effects. The active restoration of peregrine falcons would speed the recovery of this species into its historically occupied habitat on both the Channel Islands and the U.S. mainland. Based on the results of earlier release programs, this effort would likely result in the establishment of additional peregrine falcon territories on the Channel Islands (Walton 1997). This program would result in an influx of birds around the Southern Channel Islands, thus encouraging recolonization on these islands. Although peregrine falcons are recolonizing the Southern Channel Islands, as demonstrated by the recent breeding on Santa Barbara and Santa Catalina Islands, recolonization has not yet occurred on San Clemente and San Nicolas Islands. In addition, peregrine falcons that fledge from the Channel Islands frequently disperse to the mainland (Walton 1999). Therefore, unoccupied territories on the mainland are also likely to benefit from a release program.

Indirect Effects. Raptors, such as the peregrine falcon, are an essential part of healthy, functioning ecosystems. The peregrine falcon is an apex predator that fills a particular ecological niche in the Channel Islands ecosystem. Although peregrine falcons are once again a top predator on the majority of the Channel Islands, complete recovery has not yet been achieved. Additional active restoration would further encourage recovery on the Channel Islands and help to fully restore a missing component of the island ecosystem.

The peregrine falcon is a highly specialized feeder, concentrating almost entirely on birds. The recovery of the peregrine falcon on the Channel Islands may have a negative impact on bird populations, particularly for those species that are in decline or have limited populations. The Channel Islands are critical breeding areas for seabirds and support important colonies of special status or declining species, such as the state-threatened Xantus’s murrelet, rare ashy storm-petrel, and federally threatened western snowy plover. Peregrine falcons are known predators of the Xantus’s murrelet and western snowy plover (Hunt 1994, USFWS 2001). Peregrine falcons have also been documented preying on petrels (Walton 1997, White et al. 2002); therefore, ashy storm-petrels could be impacted as well. Because many seabirds are under constant threat (e.g., from oil spills, human disturbance, and El Niño events), they may not be able to withstand peregrine falcon predation (Paine et al. 1990). In particular, depressed populations of seabirds may not be able to effectively absorb the additional predation pressure from increased numbers of peregrine falcons on these islands.

Recolonization of peregrine falcons to the Southern Channel Islands may also impact the federally endangered San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*). This bird subspecies is endemic to the U.S. Navy–owned San Clemente Island, and the U.S. Fish and Wildlife Service listed it as endangered in 1977 due to its localized range, critically low population numbers, consistently low productivity, and intense predation pressure. Significant effort has been made to decrease the threat of extinction to the wild population. Although this population has been increasing recently, the subspecies remains highly endangered and vulnerable to predation pressure.

Peregrine falcons do not prey on California brown pelicans (Walton 1997); therefore, release of additional birds is not expected to adversely impact this species.

Mitigation Measures. The methods for hacking and monitoring peregrine falcons are well established and designed such that potential impacts to the birds are minimized. Seabird populations would continue to be monitored to determine whether they are being significantly impacted by increased predation pressure from the restoration of peregrine falcons to the Channel Islands.

Physical Effects

This action would have no known direct or indirect effects to the physical environment.

Human Use Effects

Direct and Indirect Effects. The recovery of the peregrine falcon to the Channel Islands provides both aesthetic and recreational benefits to visitors to the islands. Peregrine falcons are known for their spectacular flights, with an average speed of 40–55 kilometers/hour (25–34 miles/hour) and speeds reaching 112 kilometers/hour (70 miles/hour) (Cade 1982).

C2. Monitor the Recovery of Peregrine Falcons on the Channel Islands

Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

Biological Effects

Direct Effects, Due to the lack of focused surveys for peregrine falcons on the Channel Islands, important information regarding this species is unknown. A monitoring program would provide information on territory occupancy, nest success, and productivity. These measures are all indicators of population health and are important in understanding the long-term recovery of this species on the Channel Islands. The monitoring data would inform natural resource managers of potential threats to peregrine falcon recovery, thereby enabling improved management of this species on the Channel Islands.

A monitoring program would not result in significant impacts to the biological environment. Peregrine falcon pairs may be temporarily disturbed during certain monitoring activities (e.g., entering the nest to collect eggshell fragments or band young); however, the majority of the observations would be from a distance and would not disturb peregrine falcons. The monitoring plan would also consider the presence of seabird nesting colonies and avoid and minimize any impacts to nesting areas during the monitoring efforts.

Indirect Effects. As top predators of their food chain, peregrine falcons are an excellent indicator species of the overall health of the ecosystem in which they live. The monitoring of this species would provide valuable information on the overall levels of contamination in the environment.

Mitigation Measures. Impacts from monitoring activities would be minimized through established survey techniques for peregrine falcons and avoidance of biologically sensitive areas, such as seabird colonies.

Physical Effects

This action would have no known direct or indirect effects on the physical environment.

Human Use Effects

This action would have no known direct or indirect effects on human uses.

C3. Restore Peregrine Falcons to the Baja California Pacific Islands
Alternative 2 [ ] *Alternative 3 [ ]* *Neither [✓]*

Biological Effects

Direct Effects. Actions taken to reduce human disturbance would likely result in recolonization of unoccupied habitat and increased reproductive success. The recolonization of peregrine falcons into historically occupied habitat on these islands would provide direct long-term benefits to this species, as peregrine falcon territories generally remain occupied indefinitely, with new adults recruiting from the floating population over time.

The presence of the peregrine falcon may have a negative impact on bird populations, particularly on those species that are in decline or have limited populations. The Baja California Pacific islands are critical breeding areas for seabirds and support important colonies of special status or declining species, such as the state-threatened Xantus's murrelet and the rare ashy storm-petrel. Because many seabirds are under constant threat (e.g., from oil spills, human disturbance, and El Niño events), they may not be able to withstand peregrine falcon predation (Paine et al. 1990). In particular, depressed populations of seabirds may not be able to effectively absorb the additional predation pressure from increased numbers of peregrine falcons on these islands.

Peregrine falcons do not prey on California brown pelicans; therefore, an increase in the number of peregrine falcon pairs is not expected to adversely impact California brown pelicans.

Indirect Effects. Raptors, such as the peregrine falcon, are an essential part of healthy, functioning ecosystems. The peregrine falcon is an apex predator that fills a particular ecological niche on island ecosystems. Significant efforts are under way to restore the ecosystems of the Baja California Pacific islands, such as the removal of non-native species and habitat restoration. Recovery of this species on the Baja California Pacific islands would complement ongoing efforts to restore the island ecosystems of the region.

In addition, peregrine falcons typically disperse 16 to 241 kilometers (10 to 150 miles) to adjacent unoccupied territories. An increase in the number of peregrine falcons on the Baja California Pacific islands may lead to further recovery of peregrine falcons on the Channel Islands due to their proximity.

Mitigation Measures. Impacts from monitoring activities would be minimized through established survey techniques for peregrine falcons and avoidance of biologically sensitive areas, such as seabird colonies.

Physical Effects

This action would have no known direct or indirect effects on the physical environment.

Human Use Effects

Direct and Indirect Effects. The recovery of the peregrine falcon to the Baja California Pacific islands would provide both aesthetic and recreational benefits to visitors and residents of the islands.

This project proposes to limit human disturbance in the vicinity of peregrine falcon nesting areas. This action may impact residents on the islands during the breeding season for this species. However, this impact is not anticipated to be significant due to the minimal number of people that inhabit the islands.

Mitigation Measures. No mitigation is currently proposed.

D1. Restore Seabirds to San Miguel Island

Alternative 2 [✓] *Alternative 3 [ ]* *Neither [ ]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Biological Effects

Direct and Indirect Effects. The eradication of rats on San Miguel Island has a wide range of potential direct and indirect beneficial and adverse biological impacts; these impacts are more extensively described in Appendix D1. The potential benefits of rat eradication on San Miguel Island include (1) increases in small crevice-nesting seabird populations (such as alcids and storm-petrels), (2) decreased predation on ground-nesting seabirds, such as western gulls, (3) protection of the important seabird colonies on Prince Island and Castle Rock from rat invasion, (4) a decrease in predation of some terrestrial and marine intertidal invertebrates, and (5) broad ecological benefits to the San Miguel Island ecosystem.

However, to eliminate rats from San Miguel Island, a highly efficacious rodenticide must be used to ensure complete eradication. Because there are no rat-specific toxicants, the use of a rodenticide to eradicate rats will pose a primary and secondary risk of poisoning to non-target species on San Miguel Island. Of particular concern are the potential impacts to non-target species, such as the endemic deer mouse and the endangered island fox. Studies will be initiated to evaluate the potential risk of poisoning to non-target species and to develop appropriate mitigation measures.

Mitigation Measures. The removal of the rats will be timed according to a set of biological conditions that maximize the probability of eradicating rats and minimize the potential impact to the San Miguel Island environment. This project will be designed and implemented in a manner that avoids, minimizes, and mitigates impacts to the natural environment on San Miguel Island. Comprehensive measures to avoid and mitigate any impacts from the project will be developed during the planning phase and addressed in subsequent environmental analysis. Particular emphasis will be given to the development of a comprehensive mitigation strategy for the island fox and deer mouse. The successful mitigation program used during rat removal on Anacapa Island will be considered during the development of a mitigation program for San Miguel Island. Potential mitigation measures are outlined in Appendix D1.

This project will proceed only if the risks to non-target species, in particular the endangered island fox and endemic deer mouse, can be minimized to an acceptable level.

Physical Effects

Direct and Indirect Effects. Generally, this action will have no known direct or indirect effects on the physical environment. Unintended temporary water quality impacts could result should some of the bait enter the marine environment.

Mitigation Measures. Specific measures will be developed and implemented to prevent bait from entering the marine environment or to minimize and carefully monitor the amount entering the marine environment.

Human Use Effects

Direct and Indirect Effects. Because rats pose health and safety hazards (e.g., Pratt et al. 1977) and can cause destruction to supplies and equipment, the eradication of rats will benefit visitors and National Park Service (NPS) personnel on San Miguel Island. Although no known rodent-vector diseases have been transmitted to island staff or residents in the recent past, any rodent population has the potential to transmit disease to humans. This action will improve health and safety standards at NPS facilities on the island and will eliminate a potential source of disease. The removal of black rats from San Miguel Island is expected to have long-term health, safety, aesthetic, and recreational benefits and will remove a destructive nuisance to human habitation and use of the island. However, the removal of rats from the island may reduce the human use and non-use benefits to any members of the public who value the presence of this species on the island.

With the possible exception that project workers might experience skin irritation as a result of contact with bait, no negative impacts are expected on humans. Although rodenticides are toxic to humans, significant health effects are not expected unless standard safety precautions are ignored and very large doses are consumed.

Mitigation Measures. To minimize the potential exposure of visitors, San Miguel Island will be closed for several days when the rodenticides are applied. Recreational activities such as camping and hiking will not be permitted during this time. However, due to the distance of San Miguel Island from the U.S. mainland and the annual visitation rate of less than 200 campers each year, the closure of the island will not have a significant impact on recreational and visitor activities.

Project workers will be educated to follow proper safety procedures and avoid contact with the bait. Monitoring will be used to ensure that the project workers follow the safety procedures.

D2. Restore Alcids to Santa Barbara Island

Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

Biological Effects

Direct Effects. Restoring native vegetation and placing nest boxes in appropriate locations on Santa Barbara Island will provide a favorable environment for both Cassin's auklets and Xantus's murrelets. In Northern California, nest boxes have enhanced the population growth rate of several cavity-nesting alcid species at various sites by increasing recruitment of breeding-age birds, improving productivity, and decreasing mortality (Sydeman et al. 2000). The use of playback systems will further facilitate the recolonization of the Cassin's auklet on the island. These techniques should increase the number of breeding pairs of Cassin's auklets and Xantus's murrelets on the island, thereby increasing the number of offspring produced successfully.

This project is expected to have minimal short-term adverse biological impacts. Additional human activity will occur on Santa Barbara Island as a result of this project that could result in temporary displacement of native wildlife or the trampling of native plants.

Indirect Effects. The removal of exotic vegetation may include the use of herbicides, which could have short-term adverse impacts on non-target plants. Subsequent monitoring may temporarily disturb target species.

Mitigation Measures. The removal of exotic vegetation and the planting of native plants will be done during the non-breeding season to avoid impacts to nesting birds. Any herbicides will be applied in a way that avoids or minimizes adverse impacts and is in compliance with NPS policies and other applicable laws and regulations. Potential short-term adverse environmental impacts that might occur during the removal of exotic vegetation will be addressed as part of the environmental compliance for this project.

The use of nest boxes will minimize adverse impacts to nesting alcids due to any disturbance during monitoring.

Physical Effects

There may be minimal short-term adverse impacts due to trampling and increased soil erosion.

Human Use Effects

This action will have no known impacts to human uses. Cultural resources will be avoided on the island during project implementation. It is expected that the nest boxes will be largely screened by vegetation and will not be visible to the public.

D3. Restore Seabirds to San Nicolas Island
Alternative 2 [✓] *Alternative 3 [ ]* *Neither [ ]*

This potential action will require subsequent environmental analysis when the project details are more fully developed.

Biological Effects

Direct Effects. This action will result in the eradication of feral cats from San Nicolas Island. Eradication of these introduced cats will provide long-term conservation benefits for Brandt's cormorants and western gulls by removing a non-native predator from the island ecosystem. The Trustees anticipate that this project will result in increased reproductive success for these species and therefore an expansion of these colonies. Both of these species are endemic to the west coast of North America and have limited ranges. The colonies on San Nicolas Island are located within the center of their range and have historically supported large numbers of birds. This project will contribute to the protection of these colonies, though they will still be subject to predation by the native island fox. However, it is anticipated that larger, more robust colonies will more effectively resist ongoing predation pressure from the island fox.

This action could potentially affect the island fox due to its similarity in size to a feral cat and their similar diets. Although some short-term impacts might occur to individual foxes, the fox population will likely benefit overall from the eradication of feral cats, as they are competitors for food resources and habitat. The eradication methodologies and potential impacts will be addressed fully in subsequent environmental documentation for the project.

Indirect Effects. In addition to benefiting seabirds, this project will also have collateral benefits to the island ecosystem. Sensitive species such as the island fox, the endemic deer mouse, the threatened island night lizard, and the threatened snowy plover will likely benefit from reduced predation and competition. The removal of feral cats will also likely benefit both resident and migratory landbirds on San Nicolas Island. The U.S. Navy has identified the control/eradication of cats as a recommended management action to protect the island's biological resources.

Mitigation Measures. Before initiating this action, techniques that will vary according to the eradication methodologies selected will be investigated and employed in a manner that avoids and minimizes the potential for impacts to the non-target island fox.

Physical Effects

This action will have no known direct or indirect effects to the physical environment.

Human Use Effects

Direct Effects. The removal of non-native species is a critical step in the restoration of island ecosystems. The eradication of feral cats will help restore populations of native species on San Nicolas Island. Such restoration will provide aesthetic and recreational benefits to U.S. Navy personnel. Because the island has restricted access, this project will not likely provide aesthetic or recreational benefits to the general public.

During the eradication program, certain areas may be closed or their use restricted for safety reasons. Such restrictions may limit recreational opportunities for U.S. Navy personnel. However, feral cat control was initiated in the 1980s, and U.S. Navy personnel have accommodated to this activity. Although the action is designed to be an intensive effort over approximately 3 years, it will be compatible with the military use of the island.

Indirect Effects. This action will have no known indirect effects.

Mitigation Measures. Feral cat eradication efforts will be closely coordinated with the U.S. Navy, and the project will be developed in a manner that minimizes impacts on military and recreational activities on the island.

D4. Restore Seabirds to Scorpion and Orizaba Rocks

Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

Biological Effects

Direct Effects. Elimination of invasive plants and restoration of native plants will benefit burrow-nesting species by providing increased nesting habitat and stabilization of the rapidly eroding soil horizon on Scorpion Rock. By providing additional high-quality breeding habitat, this action seeks to increase the number of breeding seabirds on the rock, in particular Cassin's auklets, Xantus's murrelets, and ashy storm-petrels. The use of nest boxes will enhance suitable habitat for seabirds on both Scorpion and Orizaba Rocks, thereby increasing the number of offspring produced and decreasing mortality.

Seabirds such as the California brown pelican are particularly sensitive to human disturbance. Reducing human disturbance will have a positive influence on the survival of brown pelicans by reducing the energy expenditure associated with flushing and relocating due to human disturbance. In addition, reducing disturbance will protect nesting auklets and murrelets from harassment by trespassers.

This project is expected to have minimal short-term adverse effects. Some temporary disturbance to roosting seabirds may occur during the revegetation effort. Exotic vegetation will be removed using mechanical methods, thereby eliminating the need for herbicides. Mechanical removal may result in minimal short-term adverse impacts to surrounding native vegetation and soil.

Indirect Effects. Subsequent monitoring may result in temporary disturbance to seabirds.

Mitigation Measures. The removal of exotic vegetation and the planting of native plants will be done during the non-breeding season to avoid impacts to nesting birds. The National Park Service will consult with the U.S. Fish and Wildlife Service regarding project implementation to ensure that California brown pelicans will not be adversely affected. The use of matting will help minimize potential erosion and stabilize the soil. The use of nest boxes will greatly minimize impacts to nesting alcids.

Physical Effects

Mechanical removal of invasive plants may result in minimal short-term adverse impacts to surrounding soil.

Human Use Effects

This action will have no known effects on cultural resources, recreation, aesthetics, or transportation. Cultural resources will be avoided on the island during project implementation.

D5. Restore Seabirds to Baja California Pacific Islands

Alternative 2 [✓]   Alternative 3 [✓]   Neither [ ]

Multiple seabird restoration projects are under consideration for the Baja California Pacific islands. Recent efforts to remove introduced species on many of these islands have resulted in opportunities to restore seabird populations. In general, restoration actions will include using social attraction techniques (including decoys and vocalizations), improving nesting opportunities with artificial nests, restoring habitat, reducing human disturbance, shielding lights, and eradicating non-native species. The effects of individual projects are described in Appendix D5 and are summarized collectively below.

Biological Effects

Direct Effects. The restoration activities proposed for the Baja California Pacific islands will result in direct benefits to a suite of seabirds, including the Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, ashy storm-petrel, and Xantus's murrelet.

Social attraction efforts will facilitate the recolonization of seabirds on these islands after the removal of introduced species. These types of efforts will encourage seabirds to use suitable and historically occupied habitats. Once attracted to the island, seabirds will be further encouraged to nest in suitable habitat by the presence of nest boxes. The use of nest boxes will also allow biologists to monitor the success of the restoration efforts and minimize disturbance to nesting seabirds. Although social attraction may only be used for a limited time, the recolonization and recovery of historically occupied colonies will provide long-term benefits to seabird populations in the Southern California Bight, as the re-established presence of a colony of birds will likely serve as an ongoing natural attractant in perpetuity.

A reduction in human disturbance around the colonies will significantly benefit roosting and breeding seabirds. Nesting seabirds that are sensitive to disturbance, such as California brown pelicans and cormorants, will in particular benefit from a reduction in human disturbance. At least six species of marine birds had experienced severe population declines due to human disturbance, and subsequent protection has resulted in almost complete recovery of all of these populations (Anderson and Keith 1980).

The proposed activities have the potential to result in limited short-term impacts, including soil disturbance in the areas where nest boxes are used or short-term disturbance to seabirds during monitoring efforts. However, the proposed activities will not result in significant impacts to biological resources.

Indirect Effects. The increase in seabird populations that could result from this action will also likely benefit resident peregrine falcon pairs that prey on seabirds such as petrels and auklets. Because peregrine falcon pairs prey on a number of seabirds (Kiff 1980), increases in seabird populations may help buffer the impacts of increased predation by peregrine falcons.

Mitigation Measures. The removal of exotic vegetation and the planting of native plants will be done during the non-breeding season to avoid impacts to nesting birds. The use of matting will help minimize potential erosion and stabilize the soil. The use of nest boxes will minimize the impacts of monitoring activities on breeding seabirds.

Physical Effects

This action will have no direct or indirect effects on the physical environment.

Human Use Effects

Direct and Indirect Effects. The waters around the Baja California Pacific islands offer many recreational and economic opportunities. Healthy and complete ecosystems support fishing communities around these islands (Anderson and Keith 1980). Seabird colonies are a valuable part of island ecosystems and provide economic benefits in the form of tourism.

This action proposes to limit human disturbance in the vicinity of seabird colonies. This action will likely impact people that either inhabit or illegally camp on the islands. However, this impact is not anticipated to be significant due to the small number of people that inhabit the islands.

Mitigation Measures. When this action involves limiting human activity around seabird colonies, alternate routes will be provided to accommodate human activities on the islands.

D6. Create/Enhance/Protect California Brown Pelican Roost Habitat

Alternative 2 [ ] *Alternative 3 [ ]* *Neither [✓]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Biological Effects

Direct Effects. Improvements in the existing network of communal roosts along the coast would have a positive influence on the energy budgets of pelicans by reducing the energy costs associated with (1) commuting between prey locations and roosts, (2) flushing and relocating due to human disturbance, and (3) using suboptimal microclimates within roosts. The costs of migration would also be reduced by the increased availability, quality, and capacity of stopover sites. Cumulative energy reductions should result in improved body condition for individual birds. The expected population-level effects from improving the condition of individual birds are increased juvenile and adult survival and increased reproductive success for pelicans in California.

The environmental consequences of increased use of lagoons and other roosting areas by pelicans may include impacts on water quality if guano accumulation exceeds the circulation ability of the lagoon. However, in some locations brown pelican guano in the vicinity of roosts could provide a desirable source of nutrient enrichment and might enhance local food webs.

The negative aspects of pelican use of harbors for roosting include the increased risk of contact with environmental contaminants (such as oil), the increased likelihood of injury due to scavenging (e.g., entanglement in fishing line or puncture from fishing hooks), and the development of nuisance issues. However, the project is not expected to result in major increases in pelican use of harbors. Rather, the goal would be to improve the quality of resting time within harbors.

Indirect Effects. Other bird species that occur in association with roosting pelicans are likely to benefit from the proposed roost projects. Bird groups that would benefit from increased availability of island habitat and reduced human disturbance in coastal environments would include gulls, terns, cormorants, shorebirds, herons, egrets, and ducks. The suite of species receiving benefits would vary with the type of roost treatment and project site. The restoration projects would inform and enrich the public through associated interpretation displays and would help foster an awareness and stewardship ethic that should result in reduced disturbance to roosting California brown pelicans and other coastal waterbirds at other locations.

Mitigation Measures. Specific mitigation measures would be developed and incorporated into project design as specific sites are selected and potential impacts are identified.

Physical Effects

Given the relatively small scale of physical construction envisioned under this conceptual action, and given that pelican roost site enhancements would be constructed on existing physical features or structures, no direct or indirect physical effects are anticipated. Further environmental analysis would be required should this action be selected for implementation.

Human Use Effects

Direct Effects. Public enjoyment of pelicans would be increased by projects that allow the public to view communal roosting groups without causing disturbance.

Pelican roost site creation projects, if not carefully designed, could lead to interference with human activities or potential liability situations. Some projects would likely require ongoing inspection and/or management oversight. This issue would be addressed in subsequent planning and environmental documentation.

Indirect Effects. Vegetation on any earthen islands that are created may need to be periodically controlled or removed.

Mitigation Measures. Pelican restoration projects would be designed to minimize impacts to recreational activities such as fishing, boating, and kayaking. Because pelicans are very susceptible to human disturbance, projects would be sited in areas that are compatible with human uses. Potential impacts to navigation would be evaluated for each site-specific project. Careful site selection, project design, selection of raw materials, and adequately funded maintenance programs would offset potential liability concerns.

D7. Implement an Entanglement Reduction and Outreach Program to Protect Seabird Populations

Alternative 2 [ ] *Alternative 3 [ ]* *Neither [✓]*

Biological Effects

Direct Effects. The use of signs and brochures would help promote public awareness of entanglement issues and thus reduce bird injuries and deaths. Seabirds that would benefit from this project include California brown pelicans, cormorants, and gulls. A successful outreach program would aid in the ongoing recovery of the endangered California brown pelican by reducing a source of injury and death to the species.

Indirect Effects. This program would provide information on the proper disposal of fishing line. A reduction in fishing line debris would provide benefits to other marine organisms currently impacted by waste fishing line.

Mitigation Measures. This action is not anticipated to have any adverse effects.

Physical Effects

A reduction in fishing line debris would improve the general quality of the marine environment.

Human Use Effects

Direct Effects. The proper handling and disposal of fishing line would result in improved health and safety, as discarded hooks can injure humans as well as wildlife. Humans are also at risk of injury when attempting to disentangle a hook or line from a seabird. A reduction in seabird/angler interactions would result in improved recreation because hooking a seabird is a frustrating and unwelcome experience. The proper disposal of fishing line would also enhance the aesthetics of the fishing structure and its vicinity.

This action focuses on education rather than restrictions on fishing, so no negative impacts on human uses would result.

Indirect Effects. The design, size, and placement of program signs could have minor impacts to aesthetics.

Mitigation Measures. The design of program signs would likely be adopted from the design developed and employed by a recent restoration effort performed by the American Trader Trustee Council. The signs would be placed in consultation with appropriate local authorities in such a way as to minimize any impacts to the aesthetics of the surrounding area.

D8. Restore Ashy Storm-Petrels to Anacapa Island

Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

Biological Effects

Direct Effects. The Channel Islands are critical nesting habitat for the ashy storm-petrel. With the recent removal of rats from Anacapa Island, high-quality breeding habitat is again available to crevice-nesting seabirds such as the ashy storm-petrel. The combination of social attraction and nest boxes will provide a favorable environment for the establishment of an ashy storm-petrel colony. Although social attraction may only be used for a short amount of time, the colonization of Anacapa Island will provide long-term benefits to the ashy storm-petrel in the

Southern California Bight, as the established presence of a colony of birds will likely serve as an ongoing natural attractant over the long term.

This project seeks to aid in the recovery of this rare and declining species. Given the limited range and overall small population size of the ashy storm-petrel, the establishment of additional secure breeding sites will be a significant benefit. Additional breeding sites buffer the potential catastrophic effects of oil spills and the negative impacts of non-native species on this species.

This action will have minimal short-term adverse biological impacts. The playback of tape-recorded vocalizations causes little disturbance or trauma to birds if the duration of the playback is kept within reasonable bounds.

Indirect Effects. Human activity in the vicinity of the target locations may disturb other species of seabirds that may be nesting nearby.

Mitigation Measures. Researcher activity in the vicinity of nesting areas will be minimized to avoid destruction of the local habitat and disturbance (Johnson et al. 1981, Baptista and Gaunt 1997). Storm-petrels are sensitive to disturbance, including that generated by researchers, especially during the incubation period (Ainley et al. 1974). The project will be implemented in a manner that avoids impacts to nesting seabirds on Anacapa Island.

Physical Effects

This action will have no known direct or indirect effects on the physical environment.

Human Use Effects

A slight increase in human uses on Anacapa Island will occur during the implementation of the action, and this use may impact visitors' experience on the island. However, this use is expected to have minimal short-term adverse impacts.

7.3 CUMULATIVE IMPACTS

Cumulative impacts are impacts that result from an action and other past, present, and reasonably foreseeable near-term future actions taken together. Significant cumulative impacts can result from a combination of actions that do not have significant impacts individually. Taken collectively, the effects of several actions may be additive, countervailing, or synergistic. Impacts are considered regardless of the agencies or parties involved. Thus, in considering cumulative impacts, this analysis is not limited to the actions of the MSRP but also considers current operations, resource management programs, land use plans, and development projects in the region of interest.

Overall, the Montrose Settlements Restoration Program actions will result in a long-term net improvement in fish and wildlife habitat, the restoration of ecological balance in areas where contamination and other human-caused disturbances have led to adverse impacts on sensitive native species, and improvement in the human use and non-use services provided by fish and wildlife in the region. Cumulative impact analysis is nonetheless required to evaluate whether specific components of the MSRP actions, when considered in combination with other past, present, and future actions in the affected area, will have potentially significant adverse effects.

The cumulative effects analysis in this Restoration Plan and programmatic EIS/EIR focuses on the same environmental issues as those in the direct/indirect effects analyses in Section 7.2:

- Biological resources (fish, birds, and other wildlife)
- Physical resources (earth resources, including sediments, water resources, and oceanographic and coastal processes)
- Human uses (recreational, socioeconomic, and aesthetics)

The MSRP study area (see Figure 3.0-1) is located within the Southern California Bight (SCB), extending from Point Dume to Dana Point along the Southern California mainland coast. The study area includes the California Channel Islands and those Baja California Pacific Islands that lie within the SCB. Other actions considered as part of the cumulative impacts analysis for this programmatic EIS/EIR were identified by researching the activities within this study area that are affecting or will affect the same or similar resources. These other actions were identified through consultations within each of the six agencies that constitute the Trustees, consultations with the planning departments of local governments and authorities and other state and federal agencies, and searches of the database of the State of California Office of Planning and Research.

Several of the actions in this programmatic EIS/EIR are still only conceptual and will require subsequent environmental analysis. Some actions do not have specific project locations identified yet. The assessment of cumulative impacts herein focuses on those MSRP actions, locations, and resources for which sufficient detail is currently available. To the extent it is included, the cumulative effects analysis for the actions that are still conceptual is not as detailed. More specific analysis of these actions will be performed in subsequent environmental analyses. When there is uncertainty about cumulative impacts, the Council on Environmental Quality recommends that the uncertainty be addressed through subsequent project monitoring and adaptive management (Council on Environmental Quality 1997).

The study area encompasses a large geographic region in which many types of other actions affect the environment. In keeping with Council on Environmental Quality recommendations, the Trustees have narrowed the focus of the cumulative effects analysis to those actions that have relevance to the effects of the MSRP actions and to important issues of national, regional, or local interest (Council on Environmental Quality 1997).

The following discussion identifies the plans or categories of actions that may affect the same or similar resources as the MSRP actions. The MSRP actions and the affected resources that are relevant to each of these other actions are also listed. These other actions are considered in the cumulative impacts analysis that follows.

- **Channel Islands National Park 2001–2005 Strategic Plan:** This plan addresses the management of natural resources and research and the recreational uses of these resources for the Channel Islands National Park. The plan also develops long-term policy recommendations to enhance the management of the areas in the Channel Islands under the park’s jurisdiction. Cumulative additive beneficial effects are expected from the combination of NPS management activities and MSRP actions.

  MSRP actions affecting the same or similar resources: the bald eagle, peregrine falcon, and seabird restoration actions on the Channel Islands will occur within the park’s boundaries.

- **Channel Islands National Marine Sanctuary 1983 Management Plan:** This plan addresses the management of marine resources under the sanctuary’s jurisdiction. The management plan has been under review since 1999, and a revision is currently being prepared; it is anticipated that the draft revised management plan will be released for public review and comment during 2005. Expansion of the boundaries of the Channel Islands National Marine Sanctuary is under consideration as part of the draft revised plan. Cumulative additive beneficial effects are expected from the combination of Channel Islands National Marine Sanctuary management activities and MSRP actions.

MSRP actions affecting the same or similar resources: “augment funds for implementing Marine Protected Areas in California,” and bald eagle, peregrine falcon, and seabird restoration projects on the Channel Islands within the boundaries of the Channel Islands National Marine Sanctuary.

- **Southern California Wetlands Recovery Project 2001 Regional Strategy and Implementation Plan:** This plan articulates long-term goals and specific implementation strategies to guide the efforts of the multi-party project and its partners to accelerate the restoration of coastal wetlands. Cumulative additive beneficial effects are expected from the combination of Southern California Wetlands Recovery Project activities and MSRP efforts to restore coastal wetlands.

  MSRP action affecting the same or similar resources: “restore full tidal exchange wetlands.”

- **Other Seabird Restoration Projects:** In addition to the seabird restoration actions proposed by the MSRP, several other recently completed, ongoing, and proposed projects target the same seabird species and their habitats. These projects stem from natural resource damage (NRD) settlements from other cases and from the independent efforts of various environmental organizations that focus on seabird restoration. Other recently settled NRD cases that have resulted in seabird restoration actions in the region include the American Trader, Command, and Cape Mohican cases. Other NRD case settlements are likely to occur in the future, leading to additional seabird restoration projects. The seabird restoration projects conducted or planned for target species and/or within the study area include the Anacapa Island Restoration Project, the Brown Pelican Roost Enhancement Project in the San Diego Bay Salt Ponds, the Brown Pelican Entanglement Outreach and Education Program for Southern California, the Common Murre Restoration Project, the Western and Clark's Grebe Restoration Project, and the Seabird Colony Protection Program. These and other projects are further described in the restoration plans associated with these NRD cases. Cumulative additive beneficial effects are expected from the combination of these projects and the MSRP seabird restoration actions. The other seabird restoration projects, when considered together with the MSRP bald eagle and peregrine falcon restoration actions, will have minor additive beneficial effects on bald eagles (which prey to a limited extent on seabirds) and will have somewhat greater additive beneficial effects on peregrine falcons (which prey on seabirds to a greater extent than bald eagles).

  MSRP actions affecting the same or similar resources: bald eagle, peregrine falcon, and seabird restoration actions.

- **Ports of Los Angeles and Long Beach:** The Ports of Los Angeles and Long Beach are the largest ports on the west coast of the United States. Numerous construction and environmental mitigation projects are at various stages of planning, design, and implementation. Some of these projects include marine harbor and pier terminal redevelopments projects, construction of the Rainbow Harbor master plan, reconfiguration of wharves and expansion of backlands, channel deepening projects, construction of a crude oil receiving facility at Port of Los Angeles Pier 400, expansion of Cabrillo Marine Aquarium, and construction of a fishing reef off of Point Fermin, near the San Pedro breakwater. The potential for cumulative impacts from MSRP actions and port projects cannot be adequately assessed until further details are developed on the MSRP fishing and fish habitat actions. The Trustees will consider the potential for cumulative impacts as the planning and design of these actions progress.

MSRP actions affecting the same or similar resources: “construct artificial reefs and fishing access improvements.”

- **Cooling Water Intake Entrainment and Impingement – New Requirements:** Coastal electric power generation stations and other large industrial facilities draw in millions of gallons per day from nearshore waters for cooling purposes. Marine life can be either entrained or impinged on the intake structures. Entrained organisms are those that are not strong enough to swim against the current of the intake system. Impinged organisms are those that are collected on traveling screens designed to remove large debris from the intake water. Cooling water intakes kill billions of fish larvae and hundreds of thousands of juveniles and adults each year (USEPA 2004a). In addition to fish losses, larval forms of invertebrates and adult zooplankton are lost to the ecosystem. Fourteen coastal power plants in Southern California use large quantities of cooling water. In July 2004, the EPA issued new regulations under Section 316(b) of the federal Clean Water Act that set requirements for large power plants (those utilizing over 50 million gallons of water per day) to reduce the impacts of cooling water intake on marine organisms. MSRP restoration actions will have beneficial counteracting effects to the ongoing adverse effects from the operation of major cooling water intake structures in the Southern California Bight. MSRP restoration actions will have beneficial additive effects to the beneficial effects from the reductions in entrainment and impingement that are expected as a result of the implementation of the new EPA regulatory requirements for cooling water intakes.

  MSRP actions that affect the same or similar resources: fishing and fish habitat actions.

- **Desalination Facilities:** Currently, several seawater desalination facilities exist in the study area and about a dozen facilities are being considered. The existing coastal desalination facilities are relatively small, but the total output of all of the proposed coastal facilities, including some that would be among the largest in the country, could be far greater. Coastal desalination facilities may have adverse impacts on marine organisms due to the effects of the seawater intake and discharge on nearby marine life. The largest proposed desalination facilities would be located at coastal power plants that use ocean water for cooling, and these facilities would propose to use hundreds of millions of gallons of seawater per day. The existing desalination facilities in Southern California are located on Santa Catalina Island, San Nicolas Island, and various offshore oil and gas platforms. These facilities have a combined maximum capacity of about 200 acre-feet per year. New facilities in various stages of planning, design, and approval for construction include facilities in Long Beach, Los Angeles, Huntington Beach, San Onofre, Carlsbad, and San Diego. The potential combined maximum capacity of these new facilities is over 200,000 acre-feet per year.

  MSRP actions that affect the same or similar resources: fishing and fish habitat restoration actions.

- **California Marine Life Protection Act (MLPA) Initiative:** The 1999 MLPA directed the state to design and manage a network of marine protected areas to, among other things, protect marine life and habitats, marine ecosystems, and marine natural heritage, as well as improve the recreational, educational, and study opportunities provided by marine ecosystems. The California Resources Agency and the California Department of Fish and Game are partnering with the Resources Legacy Fund Foundation, NOAA, and the MPA Science Institute of the National Marine Protected Areas Center in a new initiative to achieve the MLPA goals. This public-private partnership is being guided by the advice of scientists, resource managers, experts, stakeholders, and members of the public. The MLPA Initiative, which is governed by a blue-ribbon task force, will oversee the preparation of a statewide guide for developing a Marine Protected Area master plan, create a pilot project in an area along the central coast to identify potential networks of Marine Protected Areas, develop a strategy for long-term funding, and make recommendations for improved coordination of Marine Protected Areas with key federal agencies.

  MSRP actions that affect the same or similar resources: "augment funding for MPAs in California."

- **Liquefied Natural Gas Deepwater Port Import Terminals and Associated Facilities and Operations:** Several proposals have been made to construct and operate liquefied natural gas (LNG) import, storage, and transport facilities within the study area of this plan. Specific projects include three along the Southern California coast (a Port of Long Beach LNG terminal and the Cabrillo Port and Crystal Clearwater Port projects, which are proposed for 11 to 12 miles offshore of Ventura County) and three along the Pacific coast of Baja California (Energia Costa Azul, which is 14 miles north of Ensenada, GNL Mar Adentro [Chevron], which is near South Coronado Island, and the Moss Maritime facility, which is 5 miles offshore of Rosarito). Sempra Energy has commenced construction of the Energia Costa Azul facility, which is expected to be operational by 2008; the other facilities are in various stages of planning, design, and environmental review and legal dispute. These projects have several common components, including LNG carrier berths, storage facilities, regasification units, and pipelines. The Cabrillo Port and Crystal Clearwater Port projects are approximately 20 miles away from the nearest Channel Island, Anacapa, and for this analysis it is assumed that they are far enough away that normal operations would not be expected to seriously disrupt seabird colonies in the Channel Islands. In contrast, the potential GNL Mar Adentro facility, which is proposed for a location near South Coronado Island, would be located approximately 1 mile from that island, and thus disruption to seabirds would be expected to occur if this facility were built.

  MSRP actions that affect the same or similar resources: seabird restoration projects near South Coronado Island.

- **SOCAL Range Complex and Point Mugu Sea Range Operations:** The U.S. Navy owns two of the Channel Islands, San Nicolas and San Clemente, and conducts military training and testing operations on them. The SOCAL Range Complex includes the following military training ranges: San Clemente Island, the Southern California Anti-Submarine Warfare Range, a live-fire exercise range, an aircraft emergency jettison area, the shallow water training range, and the shore bombardment range. Missile and aircraft overflights associated with ongoing operations on San Nicolas Island occur about eight times per year along the shore of the island. The Navy is also working with other partners to restore the endemic and federally endangered San Clemente loggerhead shrike. Restoration of peregrine falcons to the Southern Channel Islands could have counteractive effects on efforts to increase the numbers of San Clemente loggerhead shrikes, as the peregrine falcons might prey on the shrikes.

MSRP actions that affect the same or similar resources: “restore seabirds to San Nicolas Island” and peregrine falcon restoration.

7.3.1 Alternative 1 (No Action)

7.3.2 Alternatives 2 and 3

As described in Section 7.2.1, under the No Action Alternative no cumulative impacts would occur. The beneficial effects of natural resource restoration actions would not be realized. The purpose and need for the Montrose Settlements Restoration Program (i.e., utilizing the funds from the Montrose settlements to restore injured resources and lost services) would not be met. Without active restoration projects, there would be no biological, physical, or human use beneficial or adverse impacts. However, natural resource injuries and lost services resulting from the DDTs and PCBs of the Montrose case would persist in the Southern California Bight for the foreseeable future. Also, no compensation for interim lost natural resource services from the date of the enactment of CERCLA until the time that the injuries cease would be realized.

This section presents an assessment of cumulative effects for the two action alternatives, Alternatives 2 and 3. Each of these two alternatives consists of a different combination of the 17 restoration actions described in Section 6 and evaluated in detail in Appendices A–D. Several of these individual actions are common to both alternatives, some are only in one alternative, and some are not included in either. The cumulative impacts of each of the 17 actions are presented here one by one (in the same order as the actions are listed in Appendices A–D); the headings indicate which of the alternatives each action is a part of.

A1. Construct Artificial Reefs and Fishing Access Improvements

Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Cumulative Biological Effects

The soft-bottom marine habitats covered by artificial reefs under this action are the spatially predominant benthic habitat type in the coastal regions of the Southern California Bight. For example, in a U.S. Geological Survey (USGS) study of the seafloor of Short Bank in central Santa Monica Bay (Dartnell and Gardner 2004), less than 11 percent of the seafloor was classified as rock. Thus, on a regional scale the percentage of soft-bottom marine benthic habitat that may be covered by reefs constructed by the MSRP, even when considered along with other jurisdictions that have constructed or may construct artificial reefs (e.g., Port of Los Angeles or the San Onofre Nuclear Generating Station) would be insignificant.

The construction of new artificial reefs may increase fish production, though the amount of increase would depend on their design and location (see Appendix A1). When considered in association with the adverse effects on marine life from current and proposed desalination and cooling water intake structures in the study area, the construction of artificial reefs may have countervailing (i.e., beneficial or mitigating) biological effects. Cumulative beneficial biological effects may also be realized by the combination of MSRP artificial reef construction with other similar fisheries enhancement actions in the study area (construction of the Point Fermin and other artificial reefs, reduction of entrainment and impingement brought about by the implementation of new EPA regulations on cooling water intakes, and increased productivity from the establishment of Marine Protected Areas).

Cumulative Physical Effects

At the regional level, when considering the cumulative size of the proposed MSRP and other artificial reef projects reasonably foreseeable for the Southern California Bight, the potential cumulative impacts of artificial reef construction on sediments, water resources, and oceanographic and coastal processes are not considered to be significant. Potential concerns over short-term water quality impacts from reef material placement and concerns about potential effects on sediment transport or other processes will be addressed in subsequent site-specific analysis as potential reef sites are identified. Individual reef construction projects will be spatially and temporally spread apart; thus, the physical impacts from MSRP reef construction are not expected to have additive cumulative impacts. The potential for additive impacts due to non-MSRP construction activities will be addressed in subsequent site-specific environmental analysis.

Cumulative Human Use Effects

Considered cumulatively, the effects of MSRP- and other-constructed reefs on recreation would be largely beneficial. The restoration of lost fishing services, one of the objectives of the MSRP, would entail actions to improve the ability of recreational and subsistence anglers to fish for fish that are not the subject of state consumption advisories. Unless care is taken during planning to consider the potential cumulative impacts associated with the locations and construction of multiple new reefs, these reefs have the potential to adversely affect other aquatic human uses such as surfing and boating. The locations and designs of reefs will be determined so as to avoid or minimize potential conflicts with other human uses and to consider the cumulative impacts associated with the combination of MSRP-sponsored work and other actions.

A2. Provide Public Information to Restore Lost Fishing Services

Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

Cumulative Biological and Physical Effects

This action would have no known direct or indirect effects on the biological or physical environment.

Cumulative Effects on Human Uses

The public information on fishing and fish contamination that is made available by the MSRP and others may potentially redistribute or increase or decrease the number of fishing trips that occur at different fishing sites along the Southern California coast. These effects will improve recreational enjoyment by making better information available on where and how to fish for cleaner fish. Several other regional and national public campaigns are aimed at educating the public and changing public fishing and fish consumption practices. for example, the EPA has created the local Fish Contamination Education Collaborative, and the EPA and the Food and

Drug Administration have implemented national campaigns on reducing exposures to mercury in certain fish species. In combination, these public information actions have beneficial additive cumulative effects on human uses.

A3. Restore Full Tidal Exchange Wetlands
Alternative 2 [✓]   Alternative 3 [ ]   Neither [ ]

This action will require subsequent environmental analysis when the project details are more fully developed.

Cumulative Biological, Physical, and Human Use Effects

Coastal wetland habitat is scarce along the Southern California coast, and the large-scale projects that create or improve existing habitat of this type that the MSRP may contribute funding to are the subject of a major regional planning effort (Southern California Wetlands Recovery Project 2004). Although restorers of coastal wetlands in Southern California seek outcomes having highly beneficial cumulative effects on the environment, such projects involve numerous biological, physical, and human use trade-offs. The cumulative effects of coastal wetlands restoration in Southern California has been analyzed recently in several relevant environmental impact reports and statements (e.g., the 2001 Final EIS/EIR for the Bolsa Chica lowlands restoration project [USFWS 2001a]). Until more specific decisions are made, this MSRP action, which contributes toward wetlands restoration, is not yet specific enough for cumulative impacts analysis; these effects will be addressed in subsequent NEPA/CEQA analysis for the specific wetlands restoration project(s) to which the MSRP contributes a portion of funding. Alternatively, should the Trustees contribute toward a wetlands project for which NEPA/CEQA documentation has already been completed, the Trustees will evaluate and adopt that existing documentation.

A4. Augment Funds for Implementing Marine Protected Areas in California
Alternative 2 [✓]   Alternative 3 [ ]   Neither [ ]

Cumulative Effects on the Biological Environment

To the extent that MSRP funding improves the implementation of the Channel Islands MPAs, it may increase the biological productivity within the MPA boundaries. This increase may have beneficial (countervailing) cumulative effects on marine life in the study area when considered in combination with the potentially adverse impacts to marine life if new desalination plants are constructed in the region. This action may also have beneficial additive cumulative effects when considered in combination with the reductions in entrainment and impingement from coastal cooling water intakes as new EPA regulations are implemented.

Cumulative Effects on the Physical Environment

This action would have no known direct or indirect effects on the physical environment.

Cumulative Effects on Human Uses

Given the long-term goals of the California Marine Life Protection Act (see Appendix A4), it is possible that the MSRP enhancement to implementation and monitoring of the Channel Island MPAs may contribute information to the efforts at implementing the California Marine Life Protection Act, and this information will factor into subsequent decisions on whether to create additional MPAs elsewhere along the California coast. The information from this action may potentially lead to both beneficial and adverse effects on fishing and other types of human uses of the ocean environment in and around the MPAs; however, insufficient information is available at this point to consider how such future actions will play out.

B. Complete the NCI Bald Eagle Feasibility Study Before Deciding on Further Restoration Actions
Alternative 2 [✓] *Alternative 3 [ ]* *Neither [ ]*

This is an interim action that will require subsequent environmental analysis.

Cumulative Biological Effects

This is an interim action in that it defers longer range decisions on bald eagle restoration until the NCI Bald Eagle Feasibility Study is concluded. Other actions affecting the same or similar resources are the Channel Islands National Park and Channel Islands National Marine Sanctuary management plans and the Catalina Island Conservancy annual operational plan. Because some, if not most, of the bald eagles currently on Santa Catalina Island are expected to remain during the interim period even if the suspension of MSRP funding leads to a discontinuation of that program, no cumulative adverse biological effects are expected from this bald eagle action. There is a potential that the separate past, present, and future bald eagle restoration actions on Santa Catalina Island, Santa Cruz Island, and on the California mainland will have additive or synergistic beneficial effects on bald eagles throughout the region. Further analysis of the potential cumulative effects will be a part of subsequent decision-making on bald eagle restoration in or around 2008.

Bald eagle restoration actions alone are not expected to result in significant impacts to seabirds, as seabirds are not a principal component of bald eagle diets in the Channel Islands. This potential impact was discussed in detail in the Feasibility Study for Reestablishment of Bald Eagles on the Northern Channel Islands (MSRP 2002). When bald eagle actions are considered cumulatively with the restoration of peregrine falcons, which prey almost exclusively on other birds, there is a greater potential for impacts on sensitive seabird and terrestrial bird species in the Channel Islands. Further discussion of this point is presented in the following section on peregrine falcon restoration.

Cumulative Physical Effects

This action would have no known direct or indirect effects on the physical environment.

Cumulative Effects on Human Uses

Cumulative effects on human uses are not expected from this action given the interim nature of this action and the likelihood that bald eagles will remain on Santa Catalina Island and continue to be sighted by residents and visitors.

B. Complete the NCI Bald Eagle Feasibility Study; Regardless of its Outcome, Continue Funding Santa Catalina Island Bald Eagle Program
Alternative 2 [ ] *Alternative 3 [✓]* *Neither [ ]*

Cumulative Effects on the Biological Environment

This action, along with implementation of other Channel Island management plans identified above, is expected to have additive beneficial effects on bald eagles and further the collective aims of these plans to restore the natural ecological attributes of these island environments. Bald eagle restoration actions alone are not expected to result in significant impacts to seabirds, as seabirds are not a principal component of bald eagle diets in the Channel Islands. This potential impact was discussed in detail in the Feasibility Study for the Reestablishment of Bald Eagles on the Northern Channel Islands (MSRP 2002). When bald eagle actions are considered cumulatively with the restoration of peregrine falcons, which prey almost exclusively on other birds, there is a greater potential for impacts on sensitive seabird and terrestrial bird species in the Channel Islands. Further discussion of this point is presented in the following section on peregrine falcon restoration.

Cumulative Effects on the Physical Environment

This action would have no known cumulative effects on the physical environment.

Cumulative Effects on Human Uses

This action would have no known cumulative effects on human uses.

C1. Restore Peregrine Falcons to the Channel Islands
Alternative 2 [ ] Alternative 3 [ ] Neither [✓]

C2. Monitor the Recovery of Peregrine Falcons on the Channel Islands
Alternative 2 [✓] Alternative 3 [✓] Neither [ ]

C3. Restore Peregrine Falcons to the Baja California Pacific Islands
Alternative 2 [ ] Alternative 3 [ ] Neither [✓]

These three peregrine falcon restoration actions are analyzed collectively.

Cumulative Biological Effects

The Trustees have evaluated whether peregrine falcon restoration to the Channel Islands, together with other actions that could adversely affect sensitive seabird and terrestrial bird species in the Channel Islands, may have additive cumulative impacts. Increasing the overall numbers of predatory birds (bald eagles and peregrine falcons) inhabiting the Channel Islands may have countervailing impacts when considering other actions aimed at restoring rare, threatened, or endangered seabirds and terrestrial birds. Birds constitute only a small fraction of the diet of bald eagles; however, peregrine falcons prey almost exclusively on other birds. Given that other actions (by the MSRP and other entities) to restore other bird populations are proceeding at the same time and given that bald eagles and peregrine falcons have had a long historical presence on the Channel Islands prior to their extirpation and presumably coexisted with other bird populations there, the restoration of bald eagles and peregrine falcons at a carefully monitored, measured pace is not expected to have a significant adverse cumulative impact on recovery efforts for other bird populations (MSRP 2002).

In addition to the potential countervailing effects of the restoration of bald eagles and peregrine falcons on the restoration and recovery of seabirds and terrestrial birds, the potentially adverse impacts of the LNG facility to be constructed and operated near South Coronado Island should be considered. The incremental degree of increase in losses of sensitive seabird species such as petrels and auklets to predation due to a rise in the numbers of peregrine falcons foraging in the Coronado Islands and the LNG development is uncertain. This uncertainty will be addressed through subsequent project monitoring and adaptive management.

The potential for interactive effects from MSRP bird restoration projects is one of the factors contributing to the Trustees' preference for Alternative 2, which provides a more balanced mix of funding for predatory bird and seabird restoration. In the absence of seabird restoration, predatory bird restoration has a greater potential to adversely affect sensitive seabird populations. Similarly, increases in seabird numbers likely benefit peregrine falcons and other predatory birds. Thus, the potential for cumulative adverse effects on other birds from peregrine falcon and bald eagle restoration are offset when seabird restoration proceeds at the same time.

Cumulative Physical Effects

This action would have no known cumulative effects to the physical environment.

Cumulative Human Use Effects

This action would have no known cumulative effects on human uses.

D1. Restore Seabirds to San Miguel Island
Alternative 2 [✓]   Alternative 3 [   ]   Neither [   ]

This action will require subsequent environmental analysis when the project details are more fully developed.

Cumulative Biological Effects

As described in Section 7.2.2, efforts to restore seabirds through the eradication of rats from San Miguel Island has the potential to adversely affect non-target species, particularly the native deer mouse, and to indirectly affect the ongoing recovery efforts for the endangered island fox. This action will proceed only if the risks to non-target species can be minimized to an acceptable level, which will be the subject of subsequent planning efforts.

Potential cumulative adverse effects to rats targeted for removal or eradication from San Miguel Island under this action are considered insignificant given the wide distribution and numbers in which such rats occur elsewhere, particularly on the U.S. mainland. Numerous efforts to remove non-native species (rabbits, cats, feral sheep, cattle, burros, and feral pigs) from the island environments along the California coast have occurred in the recent past, including the projects undertaken by the natural resource trustee councils for the Cape Mohican, M/T Command, and American Trader oil spill cases (NOAA 2005a) as well as the resource management projects undertaken by the Channel Islands National Park (NPS 2005). Together, these projects have resulted in substantial recoveries of endemic plants and animals on the islands (MSRP 2002) without adversely affecting the species targeted for eradication where they occur elsewhere.

Cumulative Physical Effects

This action would have no known cumulative effects to the physical environment.

Cumulative Human Use Effects

This action would have no known cumulative effects on human uses.

D2. Restore Alcids to Santa Barbara Island
Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Cumulative Biological Effects

This action would have no known cumulative effects on biological resources.

Cumulative Physical Effects

This action would have no known cumulative effects on the physical environment.

Cumulative Human Use Effects

This action would have no known cumulative impacts to human uses. Cultural resources would be avoided on the island during project implementation.

D3. Restore Seabirds to San Nicolas Island
Alternative 2 [✓] *Alternative 3 [ ]* *Neither [ ]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Cumulative Biological Effects

This action would complement the conservation actions that the U.S. Navy is taking on San Nicolas Island. The MSRP-funded feral cat eradication effort would expand ongoing control efforts with the goal of eradicating cats from the island over a 3-year time frame. Eradication of feral cats would benefit not only seabird populations but also island foxes and other endemic species on San Nicolas Island.

Potential cumulative adverse effects to non-native feral cats targeted for removal or eradication from San Nicolas Island under this action are considered insignificant given the wide distribution and numbers in which such cats occur elsewhere, particularly on the U.S. mainland. Numerous efforts to remove non-native species (rabbits, cats, feral sheep, cattle, burros, feral pigs, and invasive plants) from the island environments along the California coast have occurred in the recent past, including projects undertaken by natural resource trustee councils for the Cape Mohican, M/T Command, and American Trader oil spill cases (NOAA 2005a) as well as the resource management projects undertaken by the Channel Islands National Park (NPS 2005). These projects have resulted in substantial recoveries of endemic plants and animals on the islands (MSRP 2002) without adversely affecting the species targeted for eradication where they occur elsewhere.

Cumulative Physical Effects

This action would have no known cumulative effects on the physical environment.

Cumulative Human Use Effects

This action would have no known cumulative effects on human uses.

D4. Restore Seabirds to Scorpion and Orizaba Rocks

Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Cumulative Biological, Physical, and Human Use Effects

This action would have no known cumulative effects on the biological or physical environment or on human uses.

D5. Restore Seabirds to Baja California Pacific Islands

Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

Cumulative Biological Effects

As described above in the analysis of cumulative effects for the peregrine falcon restoration actions, seabird restoration on the Coronados Islands and future LNG-related construction and operation near these islands may have countervailing effects. Specifically, the benefits of the MSRP actions aimed at restoring seabird populations around the Coronado Islands may be counteracted should the proposed GNL Mar Adentro (Chevron) LNG facility be constructed. The nature and degree of countervailing effects is unknown at this time. This uncertainty will be addressed through subsequent project monitoring and adaptive management.

Cumulative Physical Effects

These actions would have no known direct or indirect effects on the physical environment.

Cumulative Human Use Effects

These actions would have no known direct or indirect effects on human uses.

D6. Create/Enhance/Protect California Brown Pelican Roost Habitat

Alternative 2 [ ] *Alternative 3 [ ]* *Neither [✓]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Cumulative Biological, Physical, and Human Use Effects

Because no specific sites have been selected for this action, the nature and degree of cumulative effects are unknown at this time. This uncertainty will be addressed through subsequent environmental analysis.

D7. Implement an Entanglement Reduction and Outreach Program to Protect Seabird Populations

Alternative 2 [ ] *Alternative 3 [ ]* *Neither [✓]*

Cumulative Biological Effects

This action would have no known cumulative effects on the biological environment.

Cumulative Physical Effects

This action would have no known cumulative effects on the physical environment.

Cumulative Human Use Effects

Although numerous other small- and larger-scale public outreach and education efforts aim at reducing adverse impacts to non-targeted resources from fishing and other coastal recreational activities, the cumulative effects on human uses of this and other such actions are not considered significant.

D8. Restore Ashy Storm-Petrels to Anacapa Island
Alternative 2 [✓] *Alternative 3 [✓]* *Neither [ ]*

This action will require subsequent environmental analysis when the project details are more fully developed.

Cumulative Biological Effects

This action will capitalize on the recently completed rat eradication efforts on Anacapa Island. The recent removal of the rat population provides an excellent opportunity for colonization on the island by ashy storm-petrels, as the amount of suitable nesting habitat for seabirds has increased substantially.

Cumulative Physical Effects

This action would have no known cumulative effects on the physical environment.

Cumulative Human Use Effects

This action would have no known cumulative effects on human uses.

7.4 OTHER NEPA- AND CEQA-MANDATED DISCUSSIONS

7.4.1 Irreversible and Irretrievable Commitment of Resources and Environmental Changes

The MSRP will require a relatively small but irretrievable commitment of energy and material resources to construct and monitor the preferred alternative. CEQA regulations require that an EIR consider significant irreversible environmental changes. Construction of artificial reefs will involve physical placement of material on the seafloor that will be for all practical purposes an irreversible action. Most of the MSRP actions, however, such as those aimed at restoring birds through removal of non-native fauna and flora from islands, the use of social attraction techniques, and the hacking of bald eagles and peregrine falcons, could theoretically be reversed at some point in the future. Depending on other future developments, the suspension of the Trustees' funding support for the bald eagle program on Santa Catalina Island could eventually lead to the disappearance of bald eagles from that island. This result could happen if no other funding sources are found to continue the intervention needed because the bald eagles cannot reproduce on their own and if the Trustees decide not to pursue further bald eagle restoration work on Santa Catalina Island after the NCI Bald Eagle Feasibility Study is complete. Such consequences could be reversed at some point in the future by hacking new bald eagles onto the island.

7.4.2 Relationship between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The short-term uses of the environment that will occur in conjunction with the proposed actions are expected to lead to substantially greater long-term productivity.

7.4.3 Growth-Inducing Impacts

CEQA regulations require that an EIR address the potential growth-inducing impacts of a proposed project. Implementation of the MSRP actions will not foster economic or population growth or the construction of additional housing, and therefore will not have a growth-inducing impact.

7.4.4 Significant and Unavoidable Adverse Impacts

To the extent known at this stage in the planning, no adverse impacts identified in this programmatic EIS/EIR are expected to be significant. Several individual projects require subsequent site-specific detail development and environmental analysis. Should any significant and unavoidable adverse environmental impacts be identified at a later stage in planning, they will be addressed in subsequent environmental documentation. The Trustees do not intend to pursue natural resource restoration projects that, on subsequent analysis, have significant and unavoidable adverse environmental impacts.

8.1 OVERVIEW

The three major laws guiding the restoration of the injured resources and services for the Montrose Settlements Restoration Program (MSRP) are the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Environmental Policy Act (NEPA), and the California Environmental Quality Act (CEQA). These statutes set forth a specific process of impact analysis and public review. The Natural Resource Trustees for the Montrose case (Trustees) must also comply with other applicable laws, regulations, and policies at the federal, state, and local levels.

The potentially relevant laws, regulations, and policies are set forth below. In addition to laws and regulations, the Trustees must consider relevant environmental or economic programs or plans that are ongoing or planned in or near the study area. The Trustees must ensure that their restoration activities neither impede nor duplicate such programs or plans. By coordinating restoration with other relevant programs and plans, the Trustees can enhance the overall effort to improve the environment affected by the contaminant releases at issue in the Montrose case.

8.2 KEY STATUTES, REGULATIONS, AND POLICIES

8.2.1 Federal Statutes and Executive Orders

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. 9601 et seq.)

CERCLA, otherwise known as the Superfund law, provides the basic legal framework for the cleanup and restoration of the nation’s hazardous substances sites. Under CERCLA, responsible parties are liable for damages, including reasonable assessment costs, for injuries to, or the loss of, natural resources. The term “natural resources” is broadly defined by CERCLA to mean “land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, … any state or local government, any foreign government, or any Indian tribe….” The state provides that parties responsible for contamination of sites and the current owners or operators of contaminated sites are liable for the cost of cleanup and for damages to natural resources. Compensation is used to restore, replace, rehabilitate, or acquire the equivalent of natural resources and services. The MSRP will operate in accordance with the requirements of CERCLA.

Federal and state agencies and Indian tribes may act as Trustees on behalf of the public to assess the injuries, scale restoration to compensate for those injuries, and implement restoration. This Restoration Plan/Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) has been prepared jointly by the six trustee agencies that form the Montrose Trustee Council: the National Oceanic and Atmospheric Administration (NOAA) (lead agency for the federal government), the U.S. Fish and Wildlife Service (USFWS), the National Park Service (NPS), the California Department of Fish and Game (CDFG) (lead agency for the State of California), the California Department of Parks and Recreation (CDPR), and the California State Lands Commission (CSLC). CERCLA and its implementing regulations for natural resource damage assessment and restoration (Title 43 Code of Federal Regulations [CFR] Part 11) mandate that the designated Trustees shall develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent of the injured natural resources and lost services.

National Environmental Policy Act, 42 U.S.C. 4321, et seq.; 40 C.F.R. Parts 1500–1508

NEPA sets forth a specific process of impact analysis and public review. NEPA is the basic national charter for the protection of the environment. Its purpose is to “encourage productive and enjoyable harmony between man and the environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; and to enrich the understanding of the ecological systems and natural resources important to the Nation.” The law requires the government to consider the consequences of major federal actions on human and natural aspects of the environment to minimize, where possible, adverse impacts. Equally important, NEPA established a process of environmental review and public notification for federal planning and decision making.

Generally, when it is uncertain whether an action will have a significant effect, federal agencies will begin the NEPA planning process by preparing an Environmental Assessment (EA). Alternatively, the federal agencies may proceed directly to the preparation of an EIS. The Trustees have chosen to bypass the EA step and proceed directly to the preparation of a programmatic EIS, due to the broad-reaching nature of the actions being proposed under the MSRP and the fact that some of the specific restoration actions and locations have yet to be determined at this time.

The Trustees have integrated CERCLA restoration planning with the NEPA process to comply, in part, with those requirements. This integrated approach allows the Trustees to meet the public involvement requirement of CERCLA and NEPA concurrently.

The Clean Water Act, 33 U.S.C. 1251, et seq.

The Clean Water Act (CWA) is the principal statute governing water quality. The goal of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation’s waters. The CWA regulates both the direct and indirect discharge of pollutants into the nation’s waters. Section 301 of the CWA prohibits the discharge into navigable waters of any pollutant by any person from a point source unless it is in compliance with a National Pollution Discharge Elimination System permit.

Section 311 of the CWA regulates the discharge of oil and other hazardous substances into navigable waters and waters of the contiguous zone, as well as onto adjoining shorelines, that may be harmful to the public or to natural resources. The CWA allows the federal government to remove the substance and assess the removal costs against the responsible party. Under the CWA, removal costs include those associated with the restoration or replacement of the natural resources damaged or destroyed as a result of a discharge of oil or a hazardous substance.

Section 404 of the act authorizes the U.S. Army Corps of Engineers to issue permits, after notice and opportunity for public hearings, for the disposal of dredged and fill material into navigable waters. Generally, projects that discharge dredged or fill material into waters including wetlands require Section 404 permits. Section 401 of the CWA provides that projects that involve discharge or fill to wetlands or navigable waters must obtain certification of compliance with state water quality standards. The Trustees anticipate that artificial reef construction, fishing access improvements, wetlands restoration actions, and potentially other actions such as seabird roost creation or enhancement will require permits under the CWA; the implementing agency for each project will apply for these permits as appropriate after sufficient site-specific information is developed.

The Clean Air Act, 42 U.S.C. 7401, et seq.

The Clean Air Act (CAA) is the principal statute governing air quality. The primary goal of the CAA is to protect and enhance the quality of the nation's air resources so as to promote the public health and welfare and the productive capacity of its population. The CAA regulates both the direct and indirect discharge of airborne pollutants. Section 7471 of the CAA states that applicable implementation plans shall contain emission limitations and such other measures as may be necessary, as determined under regulations promulgated under this part, to prevent significant deterioration of air quality.

The Trustees anticipate that artificial reef construction, fishing access improvements, wetlands restoration actions, and potentially other actions such as seabird roost creation or enhancement will require discussion of general conformity requirements; the implementing agency for each project will address these requirements after sufficient site-specific information is developed.

Coastal Zone Management Act, 16 U.S.C. 1451, et seq.

The goal of the Coastal Zone Management Act (CZMA) is to encourage states to preserve, protect, develop, and, where possible, restore and enhance valuable natural coastal resources. Participation by states is voluntary. The State of California has enacted the federally approved California Coastal Act.

Section 1456 of the CZMA requires that any federal action inside or outside of the coastal zone that affects any land or water use or natural resources of the coastal zone shall be consistent, to the maximum extent practicable, with the enforceable policies of approved state management programs. It states that no federal license or permit may be granted without giving the state the opportunity to concur that the project is consistent with the state's coastal policies. The regulations outline the consistency procedures.

The Trustees do not believe that the MSRP will adversely affect the State of California's coastal zone. However, to comply with the CZMA, the Trustees intend to seek the concurrence of the State of California that the preferred restoration projects are consistent to the maximum extent practicable with the enforceable policies of the state coastal program.

Endangered Species Act, 16 U.S.C. 1531, et seq.

The purpose of the Endangered Species Act (ESA) is to conserve endangered and threatened species and the ecosystems on which they depend. The ESA directs all federal agencies to use their authorities to further these purposes. Pursuant to Section 7 of the ESA, each federal agency shall, in consultation with the secretary, ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

Under the ESA, NOAA and the USFWS publish lists of endangered and threatened species. Before initiating an action, the federal action agency, or its non-federal permit applicant, must ask the USFWS and/or NOAA to provide a list of threatened, endangered, proposed, and candidate species and designated critical habitats that may be present in the project area. If no species or critical habitats are present, the federal action agency has no further ESA obligation under Section 7. If a listed species is present and the federal action agency determines that the project may affect a listed species, consultation is required. The first phase of consultation is informal. For major construction activities, a biological assessment is required to assist in the determination of whether the proposed action is likely to adversely affect listed species and critical habitats. For actions that are not major construction activities, the federal action agency must provide the USFWS and/or NOAA with an account of the basis for evaluating the likely effects of the action.

If the federal action agency concludes that the project will not adversely affect listed species or critical habitats, the agency submits a "not likely to adversely affect" determination to the USFWS and/or NOAA for its concurrence. If the USFWS and/or NOAA concurs with the federal action agency that the project is not likely to adversely affect any listed species, then the consultation (informal to this point) is concluded and the decision is put in writing. Although not required, the federal action agency may request written concurrence from the UFWS and/or NOAA that the proposed action will have no effect on listed species or critical habitats.

If the federal action agency determines that a project may adversely affect a listed species or a designated critical habitat, formal consultation is required. There is a designated period of time in which to consult (90 days), and beyond that, another set period of time for the USFWS and/or NOAA to prepare a biological opinion (45 days). The determination of whether or not the proposed action would be likely to jeopardize the species or adversely modify its critical habitat is contained in the biological opinion. If a jeopardy or adverse modification determination is made, the biological opinion must identify any reasonable and prudent alternatives that could allow the project to move forward.

Multiple threatened and endangered species occur in the study area for this Restoration Plan (see Tables 3.4-4 and 3.4-5). Several of the preferred projects target restoration of federally listed species, including the endangered California brown pelican and the threatened bald eagle. Other listed species, such as the endangered island fox, may be affected by proposed projects. For each project that is selected as preferred in the final Restoration Plan, the Trustees will evaluate the potential effects of the project on listed species and critical habitat. Based on this analysis, the Trustees will perform the appropriate level of consultation with the USFWS and/or NOAA Fisheries pursuant to Section 7 of the ESA.

Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801, et seq.

The federal Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as amended and reauthorized by the Sustainable Fisheries Act (Public Law 104-297) establishes a program to promote the protection of essential fish habitat (EFH) in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. After an EFH has been described and identified in fishery management plans by the regional fishery management councils, federal agencies are obligated to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH.

None of the projects for which this programmatic EIS/EIR represents final environmental review have the potential to affect an EFH. For other projects requiring subsequent analysis and having the potential to affect EFH, the Trustees will consult with appropriate NOAA officials after sufficient site-specific information is developed.

Fish and Wildlife Coordination Act, 16 U.S.C. 661, et seq.

The federal Fish and Wildlife Coordination Act requires that federal agencies consult with the USFWS, NOAA Fisheries, and state wildlife agencies for activities that affect, control, or modify waters of any stream or bodies of water in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat. This consultation is generally incorporated into the process of complying with Section 404 of the CWA, NEPA, or other federal permit, license, or review requirements.

The Trustees will consult with the appropriate agencies as they pursue permitting for specific actions that may trigger such consultation.

Marine Mammal Protection Act, 16 U.S.C. 3371, et seq.

Under the Marine Mammal Protection Act (MMPA), the Secretary of Commerce is responsible for the conservation and management of pinnipeds (other than walruses) and cetaceans. The Secretary of the Interior is responsible for walruses, sea otters, polar bears, manatees, and dugongs. The Secretary of Commerce delegated MMPA authority to NOAA Fisheries. Title II of the act established an independent Marine Mammal Commission and its Committee of Scientific Advisors to oversee and recommend actions necessary to meet the intents and provisions of the act. The act provides that the Secretary shall allow the incidental, but not intentional, taking, by U.S. citizens engaged in activities other than commercial fishing of small numbers of depleted as well as non-depleted marine mammals if, after notice and opportunity for public comment, the secretary finds that the total of such taking will have a negligible impact on the affected species or stock, and prescribes regulations setting forth permissible methods of taking, and requirements for monitoring and reporting such taking.” However, the 1994 amendments provide that this regulation requirement may be waived provided that the proposed activity results in only harassment, and no serious injury or mortality is anticipated.

None of the projects for which this programmatic EIS/EIR represents final environmental review have the potential to affect marine mammals. For other projects requiring subsequent analysis and having the potential to affect marine mammals, the Trustees will consult with appropriate NOAA or USFWS officials after sufficient site-specific information is developed.

Migratory Bird Treaty Act of 1918, 16 U.S.C. 703, et seq.

The Migratory Bird Treaty Act (MBTA) implements four international treaties involving protection of migratory birds, including all marine birds, and is one of the earliest statutes (amended several times) to provide for avian protection by the federal government. Among its other provisions, it broadly prohibits actions to “pursue, hunt, take, capture, kill, attempt to take, kill, possess, offer for sale, sell, offer to purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird...or any part, nest, or egg of such bird." Exceptions to these prohibitions are only allowed under regulations or permits issued by USFWS. Hunting of game birds, including waterfowl and certain shore birds, is annually regulated through a process in which the USFWS sets "framework regulations" based on the best current population data available, and states pass regulations that conform to those federal regulations. All other prohibited actions are only allowed under specific permits issued by the USFWS. Criminal violations of this act are enforced by USFWS, and it is also the primary statute under which USFWS and U.S. Department of Interior have responsibility to manage all migratory birds wherever they occur, including marine birds.

The MBTA is also the basis for USFWS oversight and permitting of collection and preservation or rehabilitation of birds oiled during spill response, which usually provides the primary data for determining extent of injury to marine birds and the need for restoration.

Projects identified in this Restoration Plan and programmatic EIS/EIR will be conducted in full compliance with the MBTA.

National Marine Sanctuaries Act, 16 U.S.C. 1431, et seq.

The National Marine Sanctuaries Act (NMSA) prohibits the destruction, loss of, or injury to any sanctuary resource and any violation of the act, any regulations, or permits issued pursuant to the NMSA. The Secretary of Commerce (Secretary) is required to conduct such enforcement activities as are necessary and reasonable to carry out the NMSA. The Secretary may issue special use permits that authorize specific activities in a sanctuary to establish conditions of access to and use of any sanctuary resource, or to promote public use and understanding of a sanctuary resource.

The NMSA also establishes liability for response costs and natural resource damages for injury to sanctuary natural resources. Under the NMSA, the Secretary may undertake or authorize all necessary actions to prevent or minimize the destruction or loss of, or injury to, sanctuary resources, or to minimize the imminent risk of such destruction, loss, or injury. Furthermore, the Secretary shall assess damage to sanctuary resources. The act defines natural resource damages to include (1) the cost of replacing, restoring, or acquiring the equivalent of a sanctuary resource, (2) the value of the lost use of the resource pending its restoration, (3) the cost of damage assessments, and (4) reasonable monitoring costs. The Secretary is required to use recovered response costs and damages to finance response actions and damage assessments to restore, replace, or acquire the equivalent of the injured sanctuary resource, and to manage and improve national marine sanctuaries.

The Channel Islands National Marine Sanctuary is located within the study area of the Restoration Plan. None of the projects for which this programmatic EIS/EIR represents final environmental review have the potential to affect this sanctuary. For other projects requiring subsequent analysis and having the potential to affect resources within the sanctuary, the Trustees will consult with and as appropriate apply for a permit from the Channel Islands National Marine Sanctuary office after sufficient site-specific information is developed.

Park System Resource Protection Act, 16 U.S.C. 19jj

Public Law 101-337, the Park System Resource Protections Act (PSRPA) (16 United States Code [U.S.C.] 19jj), requires the Secretary of the Interior (Secretary) to assess and monitor injuries to NPS resources. A “park system resource” is defined by the PSRPA as “any living or nonliving resource that is located within the boundaries of a unit of the National Park System….” The act specifically allows the Secretary to recover response costs and damages from the responsible party causing the destruction, loss of, or injury to park system resources. “Response costs” are defined by the act to include the costs of actions taken by the Secretary to prevent, abate, or minimize the destruction, loss, or injury or imminent risk of such destruction, loss, or injury. Response costs also include monitoring ongoing effects of incidents causing such destruction, loss, or injury.

The Channel Islands National Park is located within the study area of the Restoration Plan, and several projects will occur on NPS lands. However, none of the projects for which this programmatic EIS/EIR represents final environmental review have the potential to negatively affect NPS resources. For other projects requiring subsequent analysis and having the potential to affect NPS resources, the Trustees will consult with and, as appropriate, apply for a permit from the Channel Islands National Park office after sufficient site-specific information is developed.

Rivers and Harbors Act, 33 U.S.C. 401, et seq.

The federal Rivers and Harbors Act regulates development and use of the nation’s navigable waterways. Section 10 of the act prohibits unauthorized obstruction or alteration of navigable waters and vests the U.S. Army Corps of Engineers with authority to regulate discharges of fill and other materials into such waters. Restoration actions that require Section 404 CWA permits are likely also to require permits under Section 10 of the Rivers and Harbors Act. However, a single permit usually serves for both. Therefore, the Trustees can ensure compliance with the Rivers and Harbors Act through the same mechanism.

The Trustees do not believe that any of the projects for which this programmatic EIS/EIR represents final environmental review have the potential to negatively affect navigable waters. For other projects requiring subsequent analysis and having the potential to affect navigable waterways (e.g. artificial reefs), the Trustees will consult with appropriate U.S. Army Corps of Engineers officials after sufficient site-specific information is developed.

Executive Order 11988: Construction in Flood Plains

This 1977 executive order (EO) directs federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of development in floodplains wherever there is a practicable alternative. Each agency is responsible for evaluating the potential effects of any action it may take in a floodplain. Before taking an action, the federal agency should determine whether the proposed action would occur in a floodplain. For any major federal action significantly affecting the quality of the human environment, the evaluation would be included in the agency’s NEPA compliance document(s). The agency should consider alternatives to avoid adverse effects and incompatible development in floodplains. If the only practicable alternative requires siting in a floodplain, the agency should: (1) design or modify the action to minimize potential harm and (2) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain.

None of the projects for which this programmatic EIS/EIR represents final environmental review will occur in a floodplain. For other projects requiring subsequent analysis and having the potential to occur in a floodplain (e.g., wetland restoration), the Trustees will consult with appropriate officials after sufficient site-specific information is developed.

Executive Order 13112: Invasive Species

EO 13112 applies to all federal agencies whose actions may affect the status of invasive species and requires agencies to identify such actions and to the extent practicable and permitted by law (1) take actions specified in the order to address the problem consistent with their authorities and budgetary resources; and (2) not authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, "pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions."

The Trustees do not believe that any of the projects for which this programmatic EIS/EIR represents final environmental review have the potential to cause or promote the introduction or spread of invasive species. For other projects requiring subsequent analysis and having the potential to affect the status of invasive species, the Trustees will consult with appropriate officials after sufficient site-specific information is developed.

Executive Order 13186: Protection of Migratory Birds

EO 13186, titled the Responsibilities of Federal Agencies to Protect Migratory Birds, requires federal agencies to avoid or minimize the effects of their actions on migratory birds, and, in some cases, to evaluate the effects of actions and plans on migratory birds during environmental analyses. The EO further directs federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within two years, a Memorandum of Understanding with the USFWS that shall promote the conservation of migratory bird populations.

None of the projects for which this programmatic EIS/EIR represents final environmental review have the potential to affect migratory birds. For other projects requiring subsequent analysis and having the potential to affect migratory species, the Trustees will consult with appropriate USFWS officials after sufficient site-specific information is developed.

Executive Order 12898: Environmental Justice

On February 11, 1994, President Clinton issued EO 12898, titled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This EO requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The U.S. Environmental Protection Agency (EPA) and the Council on Environmental Quality have emphasized the importance of incorporating environmental justice review in the analyses conducted by federal agencies under NEPA and of developing mitigation measures that avoid disproportionate environmental effects on minority and low-income populations. The Trustees have concluded that there are no low-income or ethnic minority communities that would be adversely affected by the MSRP. Rather, MSRP actions that would restore fishing services would benefit subsistence fishers and in concert with the EPA's institutional controls program, would reduce exposures to contaminated fish that may currently be disproportionately affecting minority and low-income populations.

Environmental Justice further requires federal agencies to provide opportunities for community input in the NEPA process. The Trustees will make every effort to involve the affected community by providing notice to members of the public and access to related documents.

Information Quality Law, Public Law 106-554, Section 515

Information disseminated by federal agencies to the public after October 1, 2002, is subject to information quality guidelines developed by each agency pursuant to Section 515 of Public Law 106-554. These guidelines are intended to ensure and maximize the quality of the objectivity, utility, and integrity of such information. This Restoration Plan/EIS/EIR is an information product covered by the information quality guidelines established by NOAA and the Department of the Interior for this purpose. The quality of the information contained herein is consistent with these guidelines, as applicable.

8.2.2 State Statutes

California Environmental Quality Act, Pub. Res. Code 21000–21178.1

CEQA was adopted in 1970, and its basic purposes are to inform California governmental agencies and the public about the potentially significant effects of proposed activities, identify ways that environmental damage can be avoided or significantly reduced, prevent significant avoidable damage to the environment through adoption of feasible alternatives or mitigation measures, and to disclose the reasons for agency approval of a project resulting in significant environmental effects.

The CEQA process begins with a preliminary review as to whether CEQA applies to the project in question. Generally, a project is subject to CEQA if it involves a discretionary action that is carried out, funded or authorized by an agency, and that has the potential to impact the environment. Once the agency determines that the project is subject to CEQA, the lead agency must then determine whether the action is exempt under either a statutory or categorical exemption.

If the lead agency determines that the project is not exempt, then an Initial Study is generally prepared to determine whether the project may have a potentially significant effect on the environment. Based on the results of the Initial Study, the lead agency determines whether to prepare a Negative Declaration (i.e., the project will not result in significant adverse effects to the environment) or an EIR. Alternatively, the agency may proceed directly to the preparation of an EIR. Although the restoration program is not likely to have significant adverse environmental impacts, the Trustees have chosen to prepare an EIR because the program covers a broad range in types and locations of actions, some of which are still conceptual and which will need subsequent environmental analysis. Thus, the Trustees have prepared a programmatic EIR that covers several specific actions (Table 6-1) and the MSRP effort as a whole that may later be incorporated by reference in subsequent CEQA analysis. The Trustees have integrated both NEPA and CEQA requirements into this Restoration Plan and programmatic EIS/EIR.

The list of agencies expected to use the EIR in their decision-making include, but are not necessarily limited to, the CSLC, the California Coastal Commission, the CDPR, the CDFG, the State Water Resources Control Board, the Department of Water Resources, the U.S. Army Corps of Engineers, the USFWS, NOAA, the NPS, the EPA, and local planning departments, boards, or commissions.

California Coastal Act, California Public Resources Code Sections 30000, et seq.

The California Coastal Act was enacted by the California State Legislature in 1976 to provide long-term protection of California's 1,100-mile coastline for the benefit of current and future generations. The Coastal Act created a partnership between the state (acting through the California Coastal Commission [Commission]) and local government (15 coastal counties and 58 cities) to manage the conservation and development of coastal resources through a comprehensive planning and regulatory program. New development in the Coastal Zone may require a permit from the Commission or the appropriate local government agency. The Commission also reviews and approves Local Coastal Programs, which are the basic planning tools used by local governments to guide development in the Coastal Zone.

For all of the California coast, except San Francisco Bay, the Commission implements the federal Coastal Zone Management Act of 1972 (in the San Francisco Bay area, the implementing agency is the San Francisco Bay Conservation and Development Commission). The Commission is responsible for reviewing proposed federal and federally authorized activities to assess their consistency with the approved state coastal management program. The Commission developed the California Coastal Management Program pursuant to the requirements of the federal Coastal Zone Management Act of 1972. After NOAA approved the California Coastal Management Program in 1977, all federal activities affecting Coastal Zone resources became subject to the Commission's regulatory jurisdiction. A federal agency must conduct its activities (including federal development projects, permits and licenses, and assistance to state and local governments) in a manner consistent with the California Coastal Management Program. The process established to implement this requirement is called a consistency determination for federal activities and development projects and a consistency certification for federal permits and licenses and federal support to state and local agencies.

The Trustees do not believe that the projects implemented by the MSRP will adversely affect California's Coastal Zone resources. However, the Trustees intend to seek the Commission's concurrence that their preferred alternative is consistent with California's federally approved Coastal Management Program.

California Endangered Species Act, Fish and Game Code 2050 et seq.

Pursuant to the California Endangered Species Act (CESA) (California Fish and Game Code Sections 2050 et seq.), it is the policy of the State of California that state agencies should not approve projects as proposed that would jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species if there are reasonable and prudent alternatives available. However, if reasonable alternatives are infeasible, individual projects may be approved if appropriate mitigation and enhancement measures are provided.

Pursuant to the CESA, the Fish and Game Commission has established a list of threatened and endangered species based on criteria recommended by the California Department of Fish and Game. Section 2080 of the California Fish and Game Code prohibits "take" of any species that the Commission determines to be an endangered species or a threatened species. Take is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." The CESA allows for take incidental to otherwise lawful development projects. The CESA emphasizes early consultation to avoid potential impacts to rare, endangered, or threatened species and to develop appropriate mitigation planning to offset project-caused losses of populations of listed species and their essential habitats.

Multiple threatened and endangered species occur in the study area for this Restoration Plan (see Tables 3.4-4 and 3.4-5). Several of the preferred projects target restoration of state-listed species, including the endangered bald eagle, peregrine falcon, California brown pelican, and marbled murrelet as well as the threatened Xantus's murrelet. Other listed species may be affected by proposed projects, such as the state-threatened island fox. For each project that is selected as preferred in the final Restoration Plan, the Trustees will evaluate the potential effects of the project on listed species and critical habitats. Based on this analysis, the Trustees will perform the appropriate level of consultation with the California Department of Fish and Game.

Marine Life Protection Act

In 1999, the California State Legislature found that the marine habitat and biological diversity in the state's ocean waters were threatened by coastal development, water pollution, and other human activities, and passed the Marine Life Protection Act (MLPA). The MLPA mandates that the state design and manage an improved network of marine protected areas to, among other things, protect marine life and habitats, marine ecosystems, and marine natural heritage.

Under the MLPA, the state is required to develop a master plan for the integrated management of existing and new reserves for the entire state. The development of the MLPA master plan was placed on hold by the State of California in January of 2004 due to lack of funding, but the program was revitalized later in 2004 through a combination of public and private funding. At a future date should the MLPA master plan propose creation of new Marine Protected Areas (MPAs) within the MSRP study area, the Trustees would seek to participate in planning efforts to ensure coordination with MSRP restoration projects and to optimize the potential benefits to injured resources and lost services.

Public Resources Code, Division 6, Sections 6001, et seq.

The Public Resources Code, Division 6, gives the CSLC jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable rivers, sloughs, lakes, etc. The CSLC has certain residual and review authority for tide and submerged lands legislatively granted in trust to local jurisdictions (Public Resources Code §6301 and §6306). All tide and submerged lands, granted or ungranted, as well as navigable rivers, sloughs, etc., are impressed with the common law public trust. A lease may be required from the CSLC if a restoration project is located on such lands.

8.2.3 Other Potentially Applicable Statutes and Regulations

Additional statues may be applicable to Natural Resource Damage Assessment (NRDA) restoration planning activities. The statutes listed below, or their implementing regulations, may require permits from federal or state permitting authorities.

- National Park Act of August 19, 1916 (Organic Act), 16 U.S.C. 1, et seq.
- Archaeological Resources Protection Act, 16 U.S.C. 460, et seq.
- National Historic Preservation Act of 1966 as amended (16 U.S.C. 470-470t, 110)
- Executive Order 11514 – Protection and Enhancement of Environmental Quality
- Executive Order 11990 – Protection of Wetlands
- Executive Order 11991 – Relating to the Protection and Enhancement of Environmental Quality
- Porter-Cologne Water Quality Control Act (Porter-Cologne)

8.2.4 List of Potential Permits or Other Approvals

Many of the restoration actions described in this Restoration Plan require further development and will be subject to further regulatory requirements prior to implementation. Table 8-1 summarizes the further permitting and/or other environmental consultation or review requirements that the Trustees currently anticipate may be required for implementation of the various restoration actions.

Table 8-1
List of Permits, Consultations, or Other Approvals That May Be Required for MSRP Restoration Actions

Restoration Actions	Additional NEPA or CEQA Review	Section 404 and/or Section 10 of CWA	CAA	CZMA	ESA	CESA	EFH	MMPA	MBTA	State Lands Commission Lease	Channel Islands Nat. Park Permit	National Marine Sanctuary Permit	Other: Local	Other: Navy	Extraterritorial Env. Requirements*
Fishing and Fish Habitat															
Construct artificial reefs and fishing access improvements	X	X	X	X	X	X	X			X			X		
Provide public information to restore lost fishing services													X		
Restore full tidal exchange wetlands	X	X	X	X	X	X				X					
Augment funds for implementing Marine Protected Areas in California															

Table 8-1
List of Permits, Consultations, or Other Approvals That May Be Required for MSRP Restoration Actions

Restoration Actions	Additional NEPA or CEQA Review	Section 404 and/or Section 10 of CWA	CAA	CZMA	ESA	CESA	EFH	MMPA	MBTA	State Lands Commission Lease	Channel Islands Nat. Park Permit	National Marine Sanctuary Permit	Other: Local	Other: Navy	Extraterritorial Env. Requirements*
Bald Eagles															
Complete the NCI Bald Eagle Feasibility Study before deciding on further restoration actions					X	X					X				
Complete the NCI Bald Eagle Feasibility Study; regardless of its outcome, continue funding Santa Catalina Island Bald Eagle Program					X	X									
Peregrine Falcons															
Restore peregrine falcons to the Channel Islands	X				X								X		
Monitor the recovery of peregrine falcons on the Channel Islands															
Restore peregrine falcons to the Baja California Pacific Islands															X
Seabirds															
Restore seabirds to San Miguel Island	X			X	X	X	X	X	X		X	X			
Restore alcids to Santa Barbara Island	X				X	X					X				
Restore seabirds to San Nicolas Island	X				X	X								X	
Restore seabirds to Scorpion and Orizaba Rocks	X				X	X					X				
Restore seabirds to Baja California Pacific Islands															X
Create/enhance/protect California brown pelican roost habitat	X	X	X	X	X	X							X		

Table 8-1
List of Permits, Consultations, or Other Approvals That May Be Required for MSRP Restoration Actions

Restoration Actions	Additional NEPA or CEQA Review	Section 404 and/or Section 10 of CWA	CAA	CZMA	ESA	CESA	EFH	MMPA	MBTA	State Lands Commission Lease	Channel Islands Nat. Park Permit	National Marine Sanctuary Permit	Other: Local	Other: Navy	Extraterritorial Env. Requirements*
Implement an entanglement reduction and outreach program to protect seabird populations													X		
Restore ashy storm-petrels to Anacapa Island	X				X	X					X				

*These projects would be implemented outside of the United States of America under the jurisdiction of another sovereign state (Mexico) and as such may be subject to applicable Mexican environmental requirements.

CAA = Clean Air Act

CEQA = California Environmental Policy Act

CESA = California Endangered Species Act

CWA = Clean Water Act

CZMA = Coastal Zone Management Act

EFH = essential fish habitat

ESA = Endangered Species Act

MBTA = Migratory Bird Treaty Act

MMPA = Marine Mammal Protection Act

NEPA = National Environmental Policy Act

This section of the Montrose Settlements Restoration Program (MSRP) Final Restoration Plan and Programmatic Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) provides a record of the public comments received on the draft Restoration Plan and programmatic EIS/EIR and the responses to these comments prepared by the Natural Resource Trustees for the Montrose case (Trustees). The draft document underwent a 45-day public comment period extending from Friday, April 8, to Monday, May 23, 2005. During this time, the Trustees received many written comments, and accepted additional input at various public meetings held throughout the affected area.

The Trustees received many comments that spanned all aspects of the draft Restoration Plan and programmatic EIS/EIR. These public comments served to enhance the final version of the plan. A full copy of the written comments as well as the transcripts of the public meetings and the transcripts of telephone comments have been included in the MSRP Administrative Record and are available online at www.montroserestoration.gov.

The Trustees' responses to public comments have been organized according to common themes, beginning with responses to general comments about restoration planning and the document itself and followed by the responses to the comments regarding the specific natural resource categories. The responses are presented below.

9.1 GENERAL COMMENTS

9.1.1 Identity of the Montrose Settlements Restoration Program

Comment: Many reviewers mistook the Montrose Settlements Restoration Program for the Montrose Chemical Corporation.
Source(s): Multiple public reviewers

The Montrose Settlements Restoration Program is managed by a Natural Resource Trustee Council that consists of three federal and three state agencies (the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, the National Park Service, the California Department of Fish and Game, the California State Lands Commission, and the California State Department of Parks and Recreation). These government agencies are responsible for using the funds recovered from Montrose Chemical Corporation (Montrose) and other liable parties in judicial settlements to restore the natural resources injured by the DDTs and PCBs released to the Southern California Bight by Montrose and the other defendants. The Trustee Council (referred to as the Trustees throughout this document) created the MSRP as a temporary inter-agency unit to develop a plan for the restoration of the injured resources and to administer the settlement funds for that purpose.

The MSRP acts under the direction of the Trustees. The six government agencies that constitute the Trustees are not in any way affiliated with the Montrose Chemical Corporation or any of the other defendants in the litigation. Neither the Trustees nor the MSRP are responsible for the releases of the contaminants into the ocean or for the impacts to natural resources that resulted from those releases.

9.1.2 Noise Impacts

Comment: *Abalone Cove Beach Park, the Portuguese Bend Co-op Preschool, and the Long Point Resort Hotel (under construction) should be listed as sensitive receptors in Coastal Reach 3.*
Source(s): *City of Rancho Palos Verdes*

The Trustees have added these locations to the list of sensitive noise receptors included in Table 3.9-1.

9.1.3 Use of Restoration Funds for Site Cleanup

Comment: *Restoration funds should be used to address the DDTs and PCBs that remain in the sediments off the coast of California. Several ideas on specific methods for cleaning up sediments were proposed.*
Source(s): *Multiple public reviewers*

In general, the law (i.e., the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]) assigns the responsibility for cleaning up hazardous substances to the U.S. Environmental Protection Agency (EPA) and state cleanup agencies. The settlements for the Montrose case specifically provide funds to the EPA and under certain circumstances to the California Department of Toxic Substances Control (DTSC) for this purpose. Thus, the EPA will conduct the cleanup actions (if any) to address the continued DDT and PCB contamination of sediments and will do so using funds that the settlements provide for this purpose.

The $140.2 million recovered in settlements from the defendants in the Montrose case was divided in the following manner:

- $66.25 million was awarded to EPA for response (cleanup) actions, which may include reducing human health risks via public education and outreach ("institutional controls") and addressing the contaminated sediments offshore ("in-situ response") (see Section 4.2.2 for a more detailed description of these programs). An additional $10 million ("swing money") was set aside in a special account that EPA may use to conduct any in situ response actions. These monies may become available to the Trustees in certain limited circumstances (described in Section 9.1.6).
- $63.95 million was awarded to the Trustees to reimburse past costs and to restore injured natural resources and lost services.

Comment: *Restoration funds should be used to address onshore contaminated areas, such as the Consolidated Slip*
Source(s): *J. Marquez*

Although large amounts of DDTs and PCBs made their way into the marine environment through the wastewater outfalls at White Point, off the Palos Verdes Shelf, contaminants also entered the environment through runoff from the Montrose plant itself. That runoff flowed through storm drains into the Dominguez Channel and down to the area known as the Consolidated Slip. However, the legal settlements reached in 2001 covered only the offshore areas of contamination and prohibit the use of settlement funds for response actions in the onshore areas such as the Consolidated Slip.

9.1.4 Restoration Timing/Coordination with EPA

Comment: *The Trustees should wait to implement many of the restoration actions until the completion of EPA's site remediation work.*
Source(s): *Coastal Resources Associates, Inc.; T. Coops; J. Morton*

Although any successful site remediation by the EPA is likely to enhance the benefits provided by the Trustees' restoration actions, none of the restoration ideas that passed the Tier 1 and Tier 2 evaluations are dependent on the results of the EPA's site remediation work. Given the time it is likely to take to complete the complex and difficult remediation work, the Trustees believe it is important not to delay implementation of those restoration actions that, if taken sooner, can restore injured resources and/or provide the benefits of those resources to the public.

9.1.5 Overall Allocation of Restoration Funds

Comment: *Several reviewers questioned the proposed distribution of funding across the different restoration categories and actions. Some expressed the opinion that insufficient funds were allocated for specific injured resources such as bald eagles or fish habitat. Others stated that too much funding was provided for categories such as seabirds and fishing. Still others stated the opinion that the distribution of funding should take into account the geographic distribution of the contamination.*
Source(s): *Multiple public reviewers*

The consent decrees for the Montrose case provided funding for restoration, but did not specify how the restoration funds should be allocated among the different resource categories. After considering the ongoing uncertainties identified in Section 4, the Trustees proposed a phased approach to implementation that provides for adaptive management (i.e., adjusting management actions as new information is gained through the planning and implementing of the actions).

Several other considerations also went into the Trustees' decision to allocate the first phase of restoration funding approximately equally between fishing and fish habitat restoration actions and seabird restoration actions. These considerations included (1) the estimated costs for the actions that are relatively specific in scope at this stage; (2) the scalability of other actions that are still conceptual (e.g., actions such as reef construction and wetlands restoration for which the size, number, and locations may be tailored to available budgets); and (3) the practical limitations on managing implementation of multiple restoration actions simultaneously in the same region. In light of these considerations, the Trustees concluded that the proposed mix of actions reflected in the alternatives represents a reasonable distribution of restoration funds for a first phase of implementation and that the phasing provides for future adjustment and adaptation as more information is gained.

The injuries from DDTs and PCBs were not limited to the localized sediment deposits. Contaminants were distributed throughout the Southern California Bight by fish and marine mammals carrying them in their bodies. Therefore, when considering geographic distribution, the

Trustees did not factor in proximity of restoration actions to the contaminated sediments, but rather gave consideration to the locations where natural resource injuries and lost services occurred, and the proximity of the different restoration actions to those sites of injuries and lost services (among other factors). See also Section 9.1.11.

9.1.6 Swing Money

Comment: *Certain statements in the draft Restoration Plan have incorrectly characterized the way that the final consent decree provides for $10 million in contingent funding, or "swing money," to be disbursed depending on the EPA's decision on in situ remediation of sediments.*

Source(s): *EPA*

Paragraph 11.C of the final Montrose Consent Decree provides as follows:

> In the event EPA makes a response action selection determination to not select any "in-situ" response action... then all funds retained in the Court Registry Account… shall be paid from the Court Registry Account to the Trustees.

The Trustees have reworded those sections of the text to reflect the above-quoted text of the final consent decree.

9.1.7 Past Natural Resource Damage Assessment and Litigation Costs

Comment: *The Trustees should provide a description of how the $35 million in past damage assessment costs were spent, and to what purpose. The Trustees should not use settlement funds for reimbursement of past damage assessment costs.*

Source(s): *Heal the Bay; Santa Monica Baykeeper; Pacific Seabird Group*

The final consent decree states that settlement funds are to be used to "(1) reimburse past and future damage assessment costs, and (2) restore, replace, or acquire the equivalent of the injured natural resources and/or the services provided by such resources."

The Trustees' natural resource damage assessment included numerous studies to:

- Determine injuries across a wide range of resources
- Quantify those injuries
- Establish a pathway from the Montrose facility to those resources and injuries
- Determine the value of natural resource injuries and services lost
- Characterize the affected area
- Evaluate potential response actions to address the remaining contamination (before the EPA joined the case in the mid 1990s)

Table 9-1 provides a summary of the approximate costs that the Trustees have incurred throughout the Montrose damage assessment and litigation, including the costs of specific studies and general management.

Table 9-1
Summary of Damage Assessment Costs for the Montrose Case

Study or Action	Description	Approximate Cost
Sediment	To determine if the sea floor sediments were contaminated at a level that causes injury to biological resources.	$750,000
Fish Reproduction	To determine if a significant difference in reproductive success can be measured between control fish and fish from the Southern California Bight.	$2,100,000
Birds	To determine whether injuries to bird species in the Southern California Bight had been caused by and were continuing because of exposure to DDTs and/or PCBs.	$2,000,000
Marine Mammals	To determine if exposure to DDTs and PCBS was causing injury to marine mammals in the Southern California Bight.	$1,750,000
Pathways	To determine the pathway between the contaminant releases and the injured resources to evaluate whether the releases actually caused the natural resource injuries found.	$750,000
Direct Use Value Studies	To collect general information about the way people use the natural resources of the Southern California Bight and specific data on the uses of the resources that were available.	$500,000
Contingent Valuation Study	To determine the interim lost value associated with the injured resources.	$7,600,000
Palos Verdes Shelf Characterization	To collect comprehensive information about the distribution of the effluent-affected sediment layer.	$3,500,000
Palos Verdes Shelf Natural Recovery Estimation	To estimate the time needed for natural recovery of the Palos Verdes Shelf if no restoration or associated activities were undertaken.	$3,500,000
Physical Remediation	To evaluate the technical feasibility for a range of sediment restoration approaches to accelerate the biological recovery of the system by removing or isolating the DDT- and/or PCB-laden sediments.	$900,000
Biological Restoration	To develop key components of a Restoration and Compensation Determination Plan for use in natural resource restoration planning	$300,000
General Case Management	General management and coordination functions associated with the damage assessment	$2,100,000
Peer Review	To conduct independent peer review for each part of the damage assessment	$600,000
Quality Assurance	To ensure that Principal Investigators specified and achieved the quality of data needed to conduct damage assessment studies.	$1,200,000
Other agency costs	Costs necessary for planning, management, and implementation of damage assessment and litigation.	$8,000,000
Approximate Total		**$35,000,000**

Generally, the costs for conducting many damage assessments do not come from Congressional appropriations. Given the magnitude, geographic extent, and persistence of the contaminants of this case and the duration and contentiousness of the legal case itself, the $35 million expended for the damage assessment and litigation in the Montrose case was deemed reasonably necessary. This amount falls within the range of the costs incurred for other large and complex damage assessments, including the Cantara Loop train derailment ($15–17 million) and the *EXXON Valdez* oil spill ($108.3 million). The Trustees decided to cap reimbursement of their past costs at $35 million, even though documented costs came to approximately $36.3 million.

9.1.8 Outreach and Education

Comment: Outreach and education should be evaluated as a separate resource category for funding consideration and as a component of specific restoration actions.
Source(s): Palos Verdes Peninsula Land Conservancy; multiple public reviewers

Planning and implementing natural resource restoration in accordance with applicable federal and state laws requires public participation; therefore, it is appropriate that a portion of funding be applied to public outreach and education activities aimed at fulfilling this requirement. However, the Trustees did not believe that restoration ideas eliciting funds for general outreach and education should be included with specific proposals to fund “on-the-ground” restoration work, such as seabird social attraction or the construction of artificial reefs. The one exception was a targeted campaign aimed at providing greater information to anglers about fish contamination (“provide public information to restore lost fishing services”; see Appendix A2). The outreach and education project described in Appendix A2 is a means of restoring lost fishing opportunities (a per se injury under CERCLA) to anglers and thus is, in effect, on-the-ground restoration.

Other outreach and education ideas submitted outlined general programs to promote environmental stewardship across various audiences. The Trustees recognize the importance of outreach and education as a means of engaging the public in restoration in general and in the Montrose case in particular. After reviewing the outreach and education proposals from Tier 1, the Trustees have chosen to incorporate some aspects of those ideas into the “provide public information to restore lost fishing services” action (see Appendix A2 for details).

Most of the restoration actions that MSRP will undertake will include an outreach and education element within the scope of implementation. An MSRP outreach and education coordinator will oversee these aspects of the actions as well as general outreach and education on the Montrose case as a whole.

Comment: Money should be spent to educate the public about the human health consequences of DDTs and PCBs.
Source(s): T. Laura; M. Padian

Alternative 2 (preferred) in the Restoration Plan includes a component for providing public information regarding DDT and PCB contamination in fish caught in the affected area. The Trustees will continue to work closely with the EPA’s institutional controls program, including the Fish Contamination and Education Collaborative (FCEC), whose goal is to provide information to help educate the public about the health risks of consuming fish contaminated with DDTs and PCBs. Together with FCEC, MSRP designs and produces outreach materials, which FCEC then disseminates to a host of community-based organizations and health educators in the Southern California region. In addition, several county, state, and federal public health and environmental agencies have broader responsibilities to protect and inform the public on environmental health issues, including the general risks of exposures to DDTs and PCBs.

9.1.9 Research and Monitoring

Comment: *Some reviewers submitted proposals for additional research and/or indicated that further monitoring was needed before implementing certain restoration actions, and requested that their suggested research/monitoring components be included in the Restoration Plan.*
Source(s): *Multiple public reviewers*

The Trustees' goal is to maximize the amount of actual natural resource restoration that can be achieved through the Montrose settlements. In pursuing this goal, the Trustees recognize that a certain amount of additional study and project monitoring is required to ensure that the actions being taken are appropriate and effective. As is the case for general outreach and education proposals, the ideas for additional study and monitoring that were submitted to the Trustees were not evaluated alongside actual restoration actions, but have been retained for further consideration as restoration proceeds and potential needs for further information arise. Most of the specific research proposals that have been suggested are addressed in the responses to seabird restoration comments (see Section 9.5).

Regarding project monitoring, each restoration action that the Trustees implement will include a monitoring component, which will serve to enhance adaptive management of those actions (i.e., will identify successes/failures and adapt techniques accordingly) and measure the effectiveness of the restoration efforts.

9.1.10 Methodology for Analyzing Alternatives

Comment: *The U.S. Department of the Interior's Title 43 Code of Federal Regulations (CFR) Part 11.82(d) "factors to consider when selecting the [restoration] alternative to pursue" should be more fully integrated into the project analysis methodology or more information should be provided on how the criteria used in the Restoration Plan were selected.*
Source(s): *EPA*

The ten selection factors that the EPA identifies and how they are integrated into the six evaluation criteria of the Restoration Plan are described in Section 5.1.1. To address the EPA's comment, the Trustees have added language in the Restoration Plan to further clarify how the Title 43 CFR Part 11.82(d) "factors to consider" were integrated and adapted into the MSRP evaluation criteria (see Section 5.1.1). These evaluation criteria were developed with public input at workshops held in 2002 and 2003. All relevant considerations were incorporated into the evaluation criteria that the Trustees used for the Montrose case. In some cases the Part 11.82(d) factors were combined or reorganized into the six criteria to facilitate and improve the clarity of analysis. For instance, the Trustees incorporated two factors listed separately in Part 11.82(d), "relationship of the expected costs to the expected benefits" and "cost-effectiveness," into three evaluation criteria: "Resource Benefits," "Ecosystem Benefits," and "Cost."

Comment: The key assumptions of the Restoration Plan, such as the preference to use restoration funds for actions that are sustainable in nature, should be identified.
Source(s): EPA

The preference to use restoration funds for actions that are sustainable in nature is an outgrowth of two of the MSRP evaluation criteria. The "Resource Benefits" criterion includes consideration of the duration of the benefits and gives preference to actions having greater duration. The "Feasibility" criterion includes consideration of the degree of ongoing operation and maintenance needed to ensure that the action continues to produce the intended results and gives preference to actions requiring less or no long-term operation and maintenance.

Comment: The Restoration Plan should include an explanation as to why the potential for additional injury was not deemed significant for inclusion in the evaluation criteria.
Source(s): EPA

The potential for additional injury is a relevant consideration for the Restoration Plan. This factor is more fully described in Section 11.82(d) as, "Potential for additional injury resulting from the proposed action, including long-term and indirect impacts to the injured resources or other resources." This factor was incorporated into the Trustees' fifth criterion, "Environmental Acceptability," in which consideration was given to the potential beneficial and adverse environmental effects of the restoration actions.

Table 9-2 illustrates how this and other Section 11.82(d) factors were incorporated into the MSRP evaluation criteria.

Table 9-2
Relationship between MSRP Evaluation Criteria and the Evaluation Factors Listed in the Federal Natural Resource Damage Assessment Regulations (43 CFR Part 11.82[d])

MSRP Evaluation Criteria	Factors Listed under 43 CFR Part 11.82(d) Incorporated into Corresponding MSRP Criteria
Nexus • Nature of action • Location	Not listed
Feasibility • Technical feasibility • Potential institutional or administrative barriers to an action's implementation • Degree of ongoing operation and maintenance needed to ensure intended results	• Technical feasibility • Consistency with relevant state, federal or tribal policies and laws
Resource Benefits • Degree to which injured natural resource values and services are improved by the action • Degree to which benefits are measurable • Duration of benefits • Conservation status of resource(s)	• Relationship of the expected costs of the proposed actions to the expected benefits from the restoration • Results of any planned or actual response actions • Natural recovery period • Ability of the resources to recover with or without

Table 9-2
Relationship between MSRP Evaluation Criteria and the Evaluation Factors Listed in the Federal Natural Resource Damage Assessment Regulations (43 CFR Part 11.82[d])

MSRP Evaluation Criteria	Factors Listed under 43 CFR Part 11.82(d) Incorporated into Corresponding MSRP Criteria
	alternative actions
Ecosystem Benefits • Degree to which action leads to sustainable improvements in broader ecological functions	• Relationship of the expected costs of the proposed actions to the expected benefits from the restoration • Results of any planned or actual response actions • Natural recovery period • Ability of the resources to recover with or without alternative actions
Environmental Acceptability • Potential beneficial and adverse environmental effects	• Potential human health and safety effects • Potential for additional injury resulting from the proposed action, including long-term and indirect impacts
Cost • Includes possible partnerships	• Relationship of the expected costs of the proposed actions to the expected benefits from the restoration • Cost-effectiveness

9.1.11 Tier 1 and Tier 2 Action Criteria: Nexus (Physical Proximity)

Comment: *It is unclear how proximity to the site of impact was employed as a criterion for evaluating actions. A higher priority for funding should go to actions nearest the contaminated sediment.*

Source(s): *Palos Verdes Peninsula Land Conservancy; Catalina Island Conservancy; multiple public reviewers*

In reviewing action ideas in the Tier 1 and Tier 2 evaluations, the Trustees considered the location of potential actions in relation to the location of injuries and lost services. Actions providing benefits in locations where resource injuries and service losses have occurred or are occurring were given the highest consideration. Although the contaminants at issue in this case entered the marine environment at the outfalls near White Point, impacts to injured natural resources and losses to the services those resources provide were documented across the Southern California Bight (see relevant responses for specific resource injuries in Sections 9.2 through 9.5, particularly Section 9.2.3).

Under the MSRP criteria, the preferred locations for restoration actions do not always equate to the geographic locations where the greatest sediment contamination still exists or locations where injuries to natural resources are ongoing, because the continuing contaminant exposures may prevent attainment of the intended restoration objectives. However, after considering the limitations resulting from ongoing contamination, the Trustees placed greater value on actions that are as close as feasible to the sites of the original injury and lost services.

Comment: Certain reviewers were concerned that a sediment "plume" of DDT extends southward near Catalina Island and questioned why no sediment samples were taken past the continental drop-off as well as why fish were not sampled around Catalina Island.

Source(s): Catalina Island Conservancy; J. Barelli

Sediments containing high loads of DDTs and PCBs do not extend to Santa Catalina Island. Sediments and fish have been sampled off of Santa Catalina Island (see the short summary of fish sampling in Section 9.2.3). Although it may be tempting to conclude that Santa Catalina Island is directly in the impact zone of effluent from the Los Angeles County Sanitation Districts (LACSD) outfall pipes, several factors prevented the majority of the contaminants from reaching the island. The DDT- and PCB-contaminated effluent that passed through the wastewater outfalls located on the Palos Verdes Shelf was released into the water column and was attached to particles that were transported by the prevailing currents until they were either consumed by fish or other pelagic biota or settled to the bottom and became part of the sediments.

The concentrations of DDTs and PCBs in the wastewater effluent and, correspondingly, in the ocean water column had dropped to near zero by the 1980s (see Figure 2-2). The distribution of contamination occurring in sediments today is to a large extent a function of the direction and distance that the contaminants were transported while they were in the water column in the 1940s to the 1970s. The U.S. Geological Survey (USGS) summary of sediment data, which was based on the data collected by LACSD, shows that the concentrations of DDTs and PCBs decline rapidly in the offshore southeast direction (i.e., toward Santa Catalina Island), whereas they decline much more slowly toward the northwest, into Santa Monica Bay. The USGS data summary suggests that the major trajectory of contaminant transport was to the northwest, away from the island (Lee et al. 2002). The USGS data summary also shows that surface contamination levels were nearly at background levels only 3 to 4 miles offshore of White Point. It is therefore unlikely that significant levels of contaminants occur in the sediments adjacent to Santa Catalina Island, 17 miles away from the most contaminated sediments.

Comment: Restoration funds are most appropriately used on and around Catalina Island, the area "hardest hit" by the contaminants of the Montrose case.

Source(s): Catalina Island Conservancy; multiple public reviewers

Although the Trustees found that the bald eagles and peregrine falcons on Santa Catalina Island have been injured by the contaminants of the Montrose case, the Trustees also found injuries and losses of services caused by the Montrose contamination throughout the Southern California Bight. Bald eagles and peregrines falcons historically nested not only on Santa Catalina Island but throughout the Channel Islands and had been extirpated throughout the Channel Islands by the 1960s. Because injuries from the contaminants of the Montrose case were seen throughout the Southern California Bight, the Trustees have concluded that Santa Catalina Island is not the hardest hit location.

Although Santa Catalina Island is closer than the other Channel Islands to the primary source of the DDTs and PCBs from Montrose, studies of the fate and transport of the contamination issuing from the LACSD ocean outfalls, including studies of bottom currents and sediment transport, demonstrate a prevalent direction of physical transport of the contaminants to the north and west rather than to the south, in the direction of Santa Catalina Island (see also Section 2.2).

The biological injuries from the Montrose contaminants are largely a result of uptake, biomagnification, and transport of the chemicals throughout the food web of the Southern California Bight. Thus, many of the injuries stemming from the DDTs and PCBs of this case occurred and continue to occur over a wide geographic range.

The consent decrees for the Montrose case did not specify that settlement monies were to be targeted at any specific location. Rather, the final consent decree stated that,

> The Trustees will use the damages for restoration of injured natural resources, including bald eagles, peregrine falcons and other marine birds, fish and the habitats upon which they depend, as well as providing for implementation of restoration projects intended to compensate the public for lost use of natural resources.

To the extent that the Trustees have selected specific sites for restoration, the Trustees have selected the sites that they consider will have the greatest benefit to the injured natural resources and lost services. For example, in the case of lost fishing services, the Trustees will give priority to those mainland coastal locations that continue to be affected by fishing advisories caused by the contaminants of the Montrose case. The Trustees seek to restore bald eagles to their historical territories throughout the Channel Islands and believe that the best prospect for attaining this goal at present rests in establishing breeding bald eagles on the Northern Channel Islands (with the awareness of uncertainties that may require reconsideration of all bald eagle restoration options when the current Northern Channel Island bald eagle studies are concluded).

Comment: *The Trustees gave preference to actions in the Northern Channel Islands (most of which are under National Park Service jurisdiction) because of ownership and/or jurisdictional considerations rather than on the basis of explicit evaluation criteria.*
Source(s): *Catalina Island Conservancy; multiple public reviewers*

The overall evaluation of potential restoration actions considered feasibility, including any potential regulatory requirements or other institutional barriers to implementation. However, these factors did not ultimately determine which actions would or would not be implemented; the Trustees also considered biological reasons for pursuing restoration actions on the Northern Channel Islands. The National Park Service (NPS) is only one of the six Trustee agencies for the Montrose case; decisions regarding which actions will or will not be implemented are made unanimously by all of the Trustee agencies.

The bald eagle restoration work as outlined in this plan will focus on the Northern Channel Islands, at least until the results of the Northern Channel Island (NCI) Bald Eagle Feasibility Study are known. The Trustees believe, based on the data evaluated to date, that bald eagle reintroduction in the Northern Channel Islands has a higher likelihood of success for both technical and biological reasons. The ownership of the Northern Channel Islands is incidental to this conclusion. However, even though most of the Northern Channel Islands are under the jurisdiction of the NPS, the majority (76 percent) of Santa Cruz Island (where the NCI Bald Eagle Feasibility Study is actually being conducted) is managed by The Nature Conservancy. Further discussion of the bald eagle restoration evaluation is found in Section 9.3.

Also, many of the other fish and fish habitat, peregrine falcon, and seabird restoration actions will be implemented in areas other than the Northern Channel Islands. Reef construction, the provision of public information to restore lost fishing services, the restoration of full tidal exchange wetlands, and two seabird actions that may be implemented in Phase 2 (depending on funding availability) will be implemented on Southern California mainland areas not managed by the NPS. In addition, peregrine falcon monitoring will address all of the Channel Islands.

9.1.12 Tier 1 and Tier 2 Action Criteria: Benefits (to the Public)

Comment: *Certain reviewers felt that the Trustees should give greater weight to human use benefits as a component of the evaluation, and cited the greater degree of human use benefits from bald eagles on Catalina Island, which is more heavily visited than other Channel Islands. Other reviewers expressed concerns that the benefits of some of the actions included in the Trustees' preferred alternative would not be realized in areas that could be appreciated by Californians.*

Source(s): *Catalina Island Conservancy; multiple public reviewers*

The human use services provided by natural resources, such as the viewing of bald eagles and the recreational and other public uses provided by fish, are important aspects to consider in evaluating the resource benefits of a restoration action. Non-use services are likewise a consideration in evaluating the benefits of actions. One example of non-use services is the value the public places on the awareness that natural resources such as bald eagles are thriving and being protected in places where they had been injured in the past, even if people do not view or otherwise use the resources. Although the "Resource Benefits" criterion in the Restoration Plan does not distinguish between public use and non-use benefits, the Trustees considered these benefits (in addition to biological and other benefits) in their evaluation of actions during the restoration planning process.

The public comments received on the draft Restoration Plan indicated that there is substantial public interest in and exceptional human use and non-use value ascribed to bald eagle restoration. The Trustees have modified the bald eagle restoration provisions in Alternative 2 (the preferred alternative) in response to these comments, reserving funds exclusively for bald eagle restoration and providing for future consideration of additional bald eagle restoration on Santa Catalina Island after the results of ongoing studies are known, as described in more detail in Section 9.3.

9.1.13 Tier 1 and Tier 2 Action Criteria: Environmental Acceptability (Cumulative Impacts)

Comment: *The cumulative impacts analysis should be expanded to include any known projects or other actions within the Southern California Bight and associated area that may adversely impact injured resources.*

Source(s): *EPA*

The cumulative impacts analysis in Section 7 has been revised and expanded to address this comment.

9.1.14 Impact Analyses, Including Impacts to Threatened and Endangered Species

Comment: *The Restoration Plan should include information regarding the direct and indirect impacts of the project alternatives on key endangered species, as well as an expanded impact analysis of the projects and alternatives to make more explicit the cause-and-effect relationships among affected species.*
Source(s): *EPA*

The analyses of the actions in Appendices A–D and the actions and alternatives in Sections 6 and 7 have been revised to more clearly describe the potential beneficial and adverse effects of the evaluated restoration actions in general and their effects on threatened and endangered species in particular. More detail has also been provided to explain how the MSRP evaluation criteria led to the selection of the preferred alternative.

9.1.15 Potential Impacts to the Ventura River Watershed

Comment: *The project site lies in the Ventura River watershed. Please provide information on how it will change the loading of pollutants into the watershed.*
Source(s): *California Regional Water Quality Control Board, Los Angeles Region*

None of the actions planned for the MSRP will occur in the Ventura River Watershed.

9.1.16 Implementation of Actions Not Passed to the Tier 2 Evaluation

Comment: *The current preparation of a Natural Communities Conservation Plan and the concurrent acquisition of open space may indirectly implement two ideas from Tier 1.*
Source(s): *City of Rancho Palos Verdes; Palos Verdes Peninsula Land Conservancy*

The two actions that may be indirectly implemented are (1) restore overgrazed seashore in Abalone Cove and (2) acquire and enhance peregrine falcon habitat on the Palos Verdes Peninsula. The first idea did not pass to Tier 2 evaluation in this Restoration Plan due to Trustee concerns about technical and regulatory feasibility of the idea. The second idea did not pass to Tier 2 mainly due to the successful recovery of peregrine falcons on the mainland. Although these two ideas will not be implemented as a part of this Restoration Plan, the Trustees support the implementation of these actions by other groups.

9.1.17 General Comments on Restoration Alternatives

Comment: *The three alternatives presented in the Restoration Plan do not seem to be representative of all of the restoration options available.*
Source(s): *FCEC*

Under the National Environmental Policy Act (NEPA), the California Environmental Quality Act (CEQA), and the federal Natural Resource Damage Assessment (NRDA) regulations, the Trustees must consider a range of possible courses of action to undertake restoration, but are not required to consider every possible option. In this Restoration Plan, the Trustees presented a No Action Alternative (a required natural recovery alternative with minimum management actions) and two comprehensive restoration alternatives, one of which represented the Trustees' preferred course of action.

In the preparation of the draft Restoration Plan, the Trustees noted that the last two alternatives presented in the plan were structured to facilitate review of the plan and had been assembled to illustrate the trade-offs involved in emphasizing different restoration priorities. The alternatives were in no way meant to be inclusive of all of the restoration options available. The draft Restoration Plan explained that comments could be submitted either on the alternatives as assembled in the plan, on individual actions, on the allocation of funding, or on any other aspect of the plan. The public comment period provided an opportunity for the public to react to the alternatives as presented, give feedback on whether they support the Trustees' preferred alternative as presented, suggest modifications, support a different alternative, recommend an entirely new alternative, etc.

In response to the numerous and wide range of comments received from individuals and organizations, the Trustees have retained the basic framework presented in Alternatives 2 and 3, but have modified the preferred alternative (Alternative 2) (see the Executive Summary and Section 7).

Comment: The restoration alternatives would be better characterized as "two comprehensive restoration plan alternatives and a no action alternative," rather than the stated "three comprehensive restoration alternatives."
Source(s): EPA

The Trustees agree and have incorporated this characterization throughout the document.

9.1.18 Comments on Applicable Laws and Regulations

Comment: Section 8 should be amended to include information regarding the requirements of the Federal Clean Air act and obligations for general conformity determination, as well as details on Mexican laws and regulations, including applicable environmental review requirements.
Source(s): EPA

Section 8.2.1 has been modified to include the requested information regarding the federal Clean Air Act. Details on Mexican laws and regulations have not been included.

9.2 FISHING AND FISH HABITAT COMMENTS

9.2.1 Flexibility of Funding Within the Fishing and Fish Habitat Category

Comment: It is difficult to evaluate how funds should be allocated within the overall fishing and fish habitat category across different actions; the Trustees should keep funding flexible within this category.
Source(s): R. Ambrose

The Trustees intend to incorporate some flexibility in how funds are allocated among fishing and fish habitat actions. Further, the Trustees have specifically adopted a phased approach to the restoration program to allow for adaptive management and to give the public a chance to revisit the work as implementation progresses.

9.2.2 Reconsideration of Tier 1 Idea

Comment: The Trustees should reconsider the White Croaker Commercial Market Certification Program idea previously submitted but which did not pass the Tier 1 evaluation.
Source(s): Heal the Bay; Santa Monica Baykeeper

The Trustees previously evaluated the idea of creating a white croaker certification program to allow certified uncontaminated white croaker to be marketed, but the idea did not pass the Tier 1 evaluation. The objective of this proposed idea was to restore commercial fishing operations impacted by loss of demand for this species due in part to public presumptions that this species is contaminated. The primary reasons that this idea was not further evaluated were the significant start-up and long-term commitments required, such as the extensive monitoring of white croaker contamination levels, and the question of which agencies could certify “clean” white croaker and under what authority. The full Tier 1 evaluation of this idea can be found in the Record of Initial Restoration Ideas and Tier 1 Evaluation, which is available as part of the MSRP Administrative Record.

The current MSRP/EPA fish contamination survey extended the geographic range of sampling for white croaker up to Ventura, where a previously existing white croaker commercial fishery has been shut down due to loss of demand. Part of the justification for expanding sampling was to determine if Ventura-caught white croaker were in fact “clean.” The Trustees will further explore the feasibility of certifying seafood as “clean” as part of the next phase of restoration if the results from the fish contamination survey indicate that there may be some promise in this idea.

9.2.3 New Fishing and Fish Habitat Restoration Ideas

Comment: Catalina Island, the island hardest hit by contaminants and most visited, should be funded for its fisheries and ecosystems consistent with similar activities on islands farther away.
Source(s): Catalina Island Conservancy; USC Wrigley Institute for Environmental Studies; multiple public reviewers

The Trustees have carefully examined evidence of DDT/PCB impacts on Santa Catalina Island’s fish and fishing resources and have concluded that these impacts are not only substantially lower on that island than in ocean waters near the Southern California mainland, but also not appreciably greater than the impacts in the waters surrounding the other Channel Islands. This conclusion is supported by several lines of evidence, including data from several surveys of a variety of components of the food web. The data are summarized below.

Mussels collected off of Santa Catalina Island and other Channel Islands are orders of magnitude lower in contamination than those collected off of Palos Verdes Shelf, Santa Monica Bay, and San Pedro Bay. Also, there is no difference in contamination levels between the north and the south sides of Santa Catalina Island and between Santa Catalina Island and locations in the

Northern Channel Islands (Figure 9-1). The Channel Island area with the most highly contaminated shellfish was San Miguel Island, which is part of the Northern Channel Islands.

Human heath is not at risk for those fishing near Santa Catalina Island or any of the other Channel Islands. No fish consumption advisories exist for any species of fish on any of the Channel Islands, including Santa Catalina Island. Multiple fish contaminant surveys included Santa Catalina Island and targeted a variety of fishes, and none of these surveys resulted in evidence supporting the need for fish consumption advisories. Samples from kelp bass collected off of the coast of Santa Catalina Island in the late 1980s showed DDT concentrations that ranged from 2–14 parts per billion (ppb), and PCBs were not detected in these fish. The concentrations of PCBs and DDTs found in these fish were well below the state trigger level of 100 ppb and also well below the levels that the LACSD found in the kelp bass it collected in 1983 from the Northern Channel Islands. These samples contained DDT concentrations of 17–60 ppb (average of 34.2 ppb) and PCB concentration of 3–63 ppb (average of 15.9 ppb). To provide perspective, kelp bass collected off Palos Verdes in 2004 contained DDT concentrations ranging from 20–1,020 ppb (average of 203 ppb) and PCB concentrations ranging from 20–240 ppb (average of 88 ppb), still much higher than the concentrations found in fish collected 20 years earlier off the Channel Islands.

Further, a 1998 survey throughout the Southern California Bight (referred to as the Bight ’98 data) (Southern California Coastal Water Research Project 2004) collected soft-bottom-dwelling flatfishes from all around Santa Monica Bay, Palos Verdes, San Pedro Bay, and Santa Catalina Island (Figure 9-2). This survey found that the contaminant concentrations in the fish collected from the shore-based areas were orders of magnitude higher than in the fish collected off the island. If direct transport of DDTs and PCBs had occurred from the LACSD outfalls at White Point toward Santa Catalina Island, the north side of the island would be characterized by more contaminated fish than the south side. However, the Bight ‘98 data do not support this conclusion; on the contrary, low levels of contamination exist in fish taken from both sides of Santa Catalina Island. When considered together, these data suggest that (1) Santa Catalina Island was much less impacted than mainland areas similarly distant from the outfall pipes (e.g., central Santa Monica Bay) and (2) Santa Catalina Island was impacted by DDTs and PCBs to the same degree as the Northern Channel Islands.

In addition to the LACSD outfalls, which were the principal source of DDT and PCB contamination in the Southern California marine region, barrels of acid sludge containing DDTs were dumped into the San Pedro Basin, which is closer to Santa Catalina Island than the LACSD outfalls, up until 1961 (see page 2-3 and Figure 2-3). The dumping occurred in much deeper water (a depth of approximately 2,500 feet) than the depth of the LACSD outfalls (about 200 feet). Despite this other potential source of DDT contamination, concentrations of DDTs in fish and mussels from samples taken in the 1980s and 1990s (see Figures 9-1 and 9-2) indicate that these receptors are still significantly less contaminated than those sampled along the Southern California mainland coast.

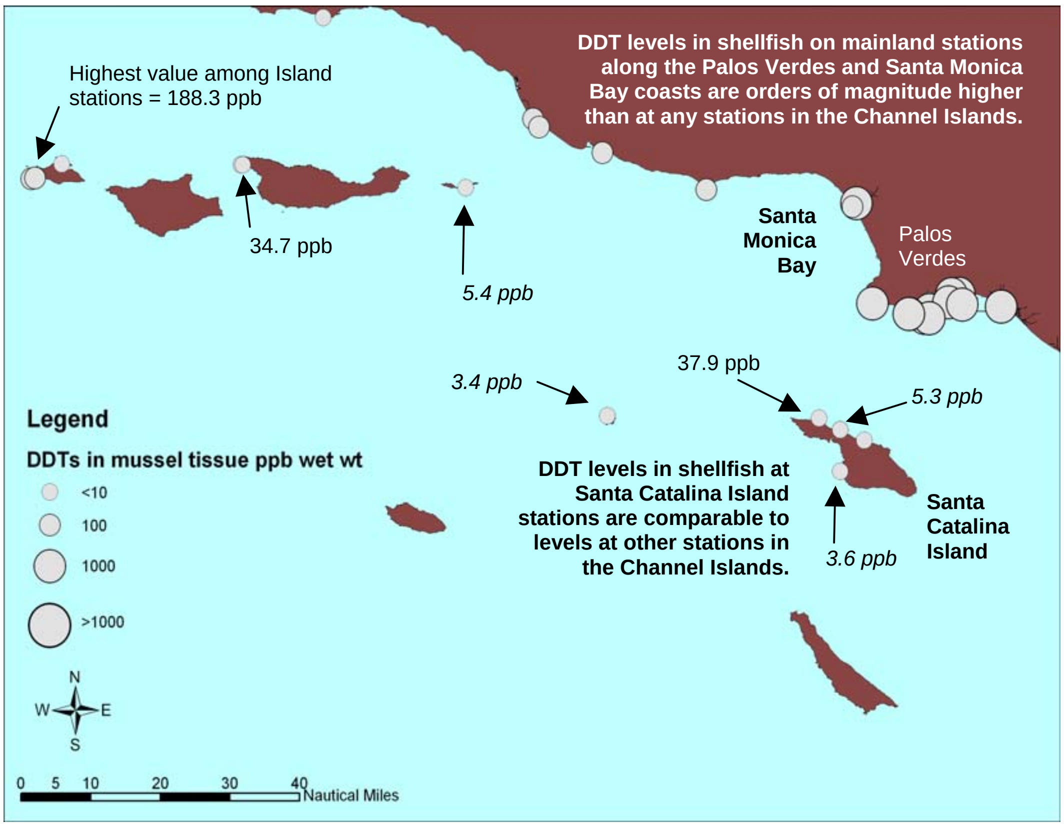
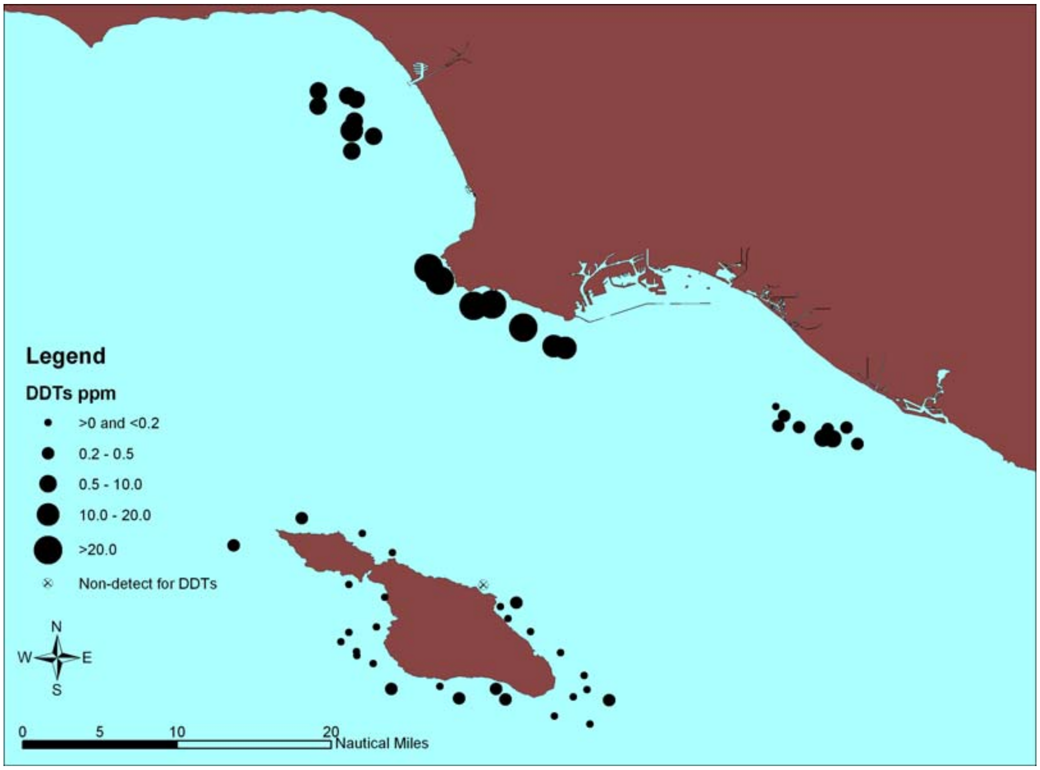
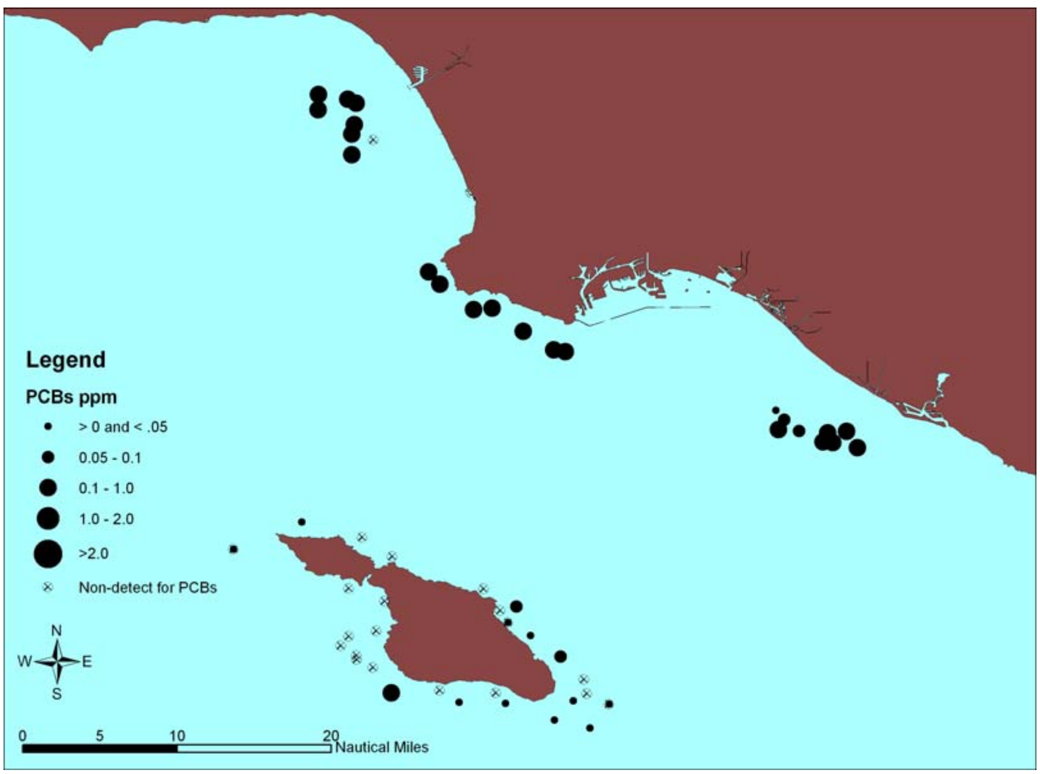


Figure 9-1. Results from the 1981 state mussel watch survey and the 1988 federal mussel watch survey, both of which examined relative contamination levels in shellfish in various locations along the Southern California coast and throughout the Channel Islands.





Source: SCCWRP 1998.

Figure 9-2. Concentrations of DDTs (top panel) and PCBs (bottom panel) in benthic soft-bottom fishes collected in Santa Monica Bay, Palos Verdes Shelf, San Pedro Bay, and Catalina Island.

Despite the fact that fish surrounding Santa Catalina Island are not highly contaminated, bald eagles on the island continue to experience reproductive impairment. In addition to eating fish, bald eagles also consume other birds and scavenge from the marine mammal carcasses that wash ashore. Observations and modeling of the dietary composition of the Santa Catalina Island bald eagles have shown that the vast majority of their exposure to DDTs and PCBs comes from the marine mammal carcasses and seabird component of their diet; the marine mammals and seabirds forage over a much broader marine region and accumulate high amounts of DDTs and PCBs in their tissues not from consumption of fish near the island, but from other more highly contaminated areas.

Comment: The Trustees should implement projects to reduce entrainment of fish in power plant cooling systems, either by relocating intakes from sensitive areas or by alternative cooling technologies that don't require once-through cooling.
Source(s): Heal the Bay; Santa Monica Baykeeper

This idea was not among those evaluated in the original evaluation process. Evaluating this idea would require an investigation of how local power plants and other major cooling water users intend to respond to the Clean Water Act Section 316(b) requirements recently released by the EPA. Any response would occur as permits come up for renewal, many of which are scheduled in the next 5 to 10 years. This idea will therefore be investigated during the first phase of restoration and considered for the second phase.

Power plants will be required to drastically reduce both entrainment and impingement to comply with the new Section 316(b) permit requirements. The Trustees would not fund projects that simply bring industrial facilities into compliance with the new Section 316(b) standards, as this is the responsibility of each permittee. However, the Trustees may examine opportunities for funding projects that significantly decrease impingement or entrainment beyond the level required by permit. This evaluation would only examine funding the portion of an action that is in excess of the cost of compliance.

Comment: The Trustees should create a Marine Protected Area on the Palos Verdes Shelf where fish contamination levels are high, perhaps in combination with one of the reef projects. Such an MPA would have greater nexus to the case than the Channel Islands MPAs. It makes little sense to leave onshore areas near the site of contamination open to fishing when "1) there are fish consumption advisories due to cancer risks, 2) the area is closed to commercial fishing for white croaker, and 3) artificial reefs are being created to restore lost fishing services."
Source(s): Heal the Bay; Santa Monica Baykeeper

Although creating a marine reserve on the Palos Verdes Shelf within the zone of highest fish contamination may be a method for protecting human health, it unfortunately does not serve the objective of restoring lost fishing services. Although a commercial catch ban is in effect for white croaker for the Palos Verdes Shelf, there is no indication that the contamination levels in other fish species warrant expanding the commercial catch ban or prohibiting fishing altogether. Many migratory, reef, and pelagic species are currently not limited by advisories even in the area of highest contamination.

Separate from the objective of restoring lost fishing services, the restoration of fish and the habitats on which they depend is another of the uses for settlement funds identified in the final consent decree. The Trustees have evaluated ways of increasing fish production in the Southern California Bight, but with a focus on increasing production in areas that are not contaminated, thereby increasing the proportion of "clean" fish in the bight. Marine Protected Areas (MPAs) have been shown to be an effective mechanism for increasing fish production within their boundaries and are a potential means for achieving the Trustees' fish habitat restoration objective. However, a carefully planned network of MPAs is more likely to be effective at increasing the sustainability of fishing than an individual, isolated MPAs developed separately and for varying purposes. As a result, the Trustees have opted to contribute to the implementation of such a network of MPAs rather than proposing to establish independent MPAs that are not designed to complement the broader effort.

The California State Marine Life Protection Act is in the process of developing a unified and interconnected network of MPAs that will ultimately extend throughout the California coastline. Information obtained from each phase of implementation will be used to refine the design of and the justification for the MPAs established in subsequent phases. If successful, this network of MPAs will contribute to fish production in the Southern California Bight. However, the critical element for determining the location, shape, and size of an MPA, as well as justifying its implementation to the public, is sound evidence resulting from the monitoring of existing MPAs. The Trustees consider contributing critical funding to the evaluation and enforcement of the Channel Island MPAs to be both fish habitat restoration in the Channel Islands as well as a contribution to the evaluation of the effectiveness of MPAs throughout California.

Comment: The Trustees should establish a saltwater fishery to reintroduce fresh, clean saltwater fish back into the ocean near the proposed artificial reefs.
Source(s): J. Marquez

Several similar ideas for stock enhancement were put forward during the scoping process and evaluated during the Tier 1 Evaluation. These included ideas to supplement nearshore fisheries in contaminated areas with clean, hatchery-raised fish and ideas for spotted sand bass, giant sea bass, and white abalone hatchery programs. Such ideas, however, would offer limited sustainability due to their high and long-term operational and maintenance costs. Also, the effectiveness of actions using captivity-reared fish to increase the availability of popular sport fishes typically lower in contamination is uncertain for marine species. For these reasons, stock enhancement ideas were not carried forward to the Tier 2 evaluation.

9.2.4 Comments on "Construct Artificial Reefs and Fishing Access Improvements"

Comment: There is a lack of specificity pertaining to the number, size, material, design and location of proposed artificial reefs.
Source(s): Heal the Bay; Santa Monica Baykeeper

The Restoration Plan contains information pertaining to the number, material, and design of reefs proposed in the reef restoration action. The document specifically states the intent to construct two to three reefs during the first phase of restoration and that the materials used would comply with the standards established by the California Department of Fish and Game Artificial Reef

Program. Numerous details are also provided regarding the design elements that would be considered when implementing specific reef projects (see Appendix A1).

Appendix A1 indicates that the sizes and locations of reef projects will be determined through an iterative process that will begin with the results of the current MSRP/EPA fish contamination survey. However, specific reef sites will likely require follow-up environmental sampling prior to implementation. Each of these reef projects will include site-specific environmental review and public comment. For purposes of this Restoration Plan, the Trustees have provided a detailed overview of the reef approach to restoration. It would not be possible to evaluate specific locations fully, even if the current sampling data were available.

Comment: *The Trustees should not finalize fishing and fish habitat restoration actions until the results of the MSRP/EPA fish contamination survey are known; if fish monitoring data find that reef fish are as contaminated as soft-bottom fish, the reef restoration measure would not be effective. The Trustees should incorporate the final fish contamination data into the Restoration Plan.*
Source(s): *EPA*

The fish contamination data currently being generated are extremely unlikely to find that reef fish are as contaminated as soft-bottom fish. The Trustees have thoroughly reviewed the Palos Verdes shelf fish contamination monitoring data from the past decade. These data include both soft-bottom and reef species; the data have consistently shown reef species to be orders of magnitude lower in DDTs and PCBs than soft-bottom species. The value of the current monitoring data is not to confirm that the reef restoration action will be effective, but rather to refine the areas where it will be most effective. Thus, for purposes of describing the reef restoration concept, it is unnecessary to delay other restoration activities while the fish contaminant survey data are finalized, validated, and reviewed by the California Office of Environmental Health Hazard Assessment (OEHHA) to generate updated fish consumption advisories.

Comment: *Constructed reefs would be an effective means of attracting less contaminated fish, although one reviewer felt that the amount of funding allotted is inadequate.*
Source(s): *Office of Environmental Health Hazard Assessment; R. Ambrose*

The Trustees recognize that the current allocation of funds to reef restoration projects is limited. However, the Trustees believe that sufficient funds have been allocated to achieve the Phase 1 restoration goal of initiating two to three reef projects. Further allocations to reef restoration projects will be considered for the next phase of the restoration. Reef construction will be adaptive (i.e., the monitoring of the results of early work will help guide subsequent work). The degree of additional funding will depend on the observed effectiveness of the projects in Phase 1.

Comment: *Placing reefs in contaminated areas would only expand the dispersal of the DDTs to new animal and plant species, and more fishermen and fish eaters.*
Source(s): *M. Padian*

The goal of constructing artificial reefs and fishing access improvements is to restore lost fishing services by changing the species composition of fish in selected fishing areas. The premise of this restoration action is that the fish, particularly white croaker, that are associated with soft-bottom habitats feed on benthic organisms from the contaminated sediments and are consequently the most highly contaminated species. In contrast, fish associated with hard-bottom or pelagic habitats feed on organisms that are either living in the water column or attached to hard substrate and are consequently less contaminated.

The construction of a reef is likely to change the types of fish in the area because soft-bottom species do not typically inhabit reef habitats (Allen 1999). The primary benefit of this action will be to displace these highly contaminated, soft-bottom fishes with water-column-feeding and hard-bottom species, which tend to be lower in contamination. Building reefs will also provide ecosystem benefits by increasing the production of fish whose tissues contain lower concentrations of contaminants (Dixon and Schroeter 1998).

Comment: *Any future nearshore artificial reef or fishing access projects proposed along the base of the Palos Verdes coastal bluffs should be carefully designed to address the potential to trigger or exacerbate landslide movement.*
Source(s): *City of Rancho Palos Verdes*

The Trustees intend to evaluate all potential adverse impacts of reef construction as development progresses. This evaluation will be applied on a site-specific basis and will be covered by separate environmental impact documents for each reef project that will be subject to public review and comment. The Trustees will include local authorities and the public in all aspects of reef location, design, and construction.

Comment: *Any reef projects proposed near the Palos Verdes Shelf should address the potential of LA County Sanitation Department's current and proposed drainage pipes, which are still distributing DDTs and PCBs.*
Source(s): *J. Marquez*

Monitoring of the current wastewater discharge from the LACSD White Point outfalls indicates that the levels of these contaminants are now almost undetectable. The Trustees will, however, coordinate all reef-building activities with LACSD to prevent any conflicts that may exist between proposed reef projects and the impact or function of existing or planned outfalls.

Comment: *Fishing access improvements do not qualify as restoration for injuries to natural resources. Although pier improvements would enhance the public's fishing experience, they would not provide any restoration to the marine environment.*
Source(s): *Heal the Bay; Santa Monica Baykeeper*

Fishing access improvements address the loss of natural resource services resulting from fish consumption advisories, which impact the public's use and enjoyment of the resource. In addition, fish consumption advisories in the target area are most limiting on species of fish commonly caught from piers, due to the predominance of soft-bottom habitats adjacent to the piers. Thus, pier anglers are disproportionately affected by fish consumption advisories as compared to boat-mode anglers.

Reef construction would restore lost fishing services (and, more broadly, restore fish and the habitat on which they depend) by displacing the more highly contaminated soft-bottom species of fish away from the piers and replacing them with less-contaminated reef species. Providing for improvements to fishing amenities at fishing sites along with fish habitat manipulation in proximity to these fishing sites offers additional compensatory restoration for past losses of fishing services. We have modified the text in the detailed description of this action (Appendix A1) to include this clarification.

Comment: *Support the concept of providing fishing access improvements.*
Source(s): *Office of Environmental Health Hazard Assessment (OEHHA)*

Comment noted.

9.2.5 Comments on "Provide Public Information to Restore Lost Fishing Services"

Comment: *Although public outreach is important, it is more appropriately addressed through the existing institutional controls program administered by EPA and its partners, and implementation of such a program by MSRP would lead to a redundancy in efforts. Another reviewer felt that the funds set aside for such outreach should instead be combined with the $500,000 to implement MPAs.*
Source(s): *Heal the Bay; Santa Monica Baykeeper; C. Broussard*

The Trustees agree that public outreach is a critical component of the Montrose settlements; however, these comments reflect a misunderstanding of the nature of the injury that MSRP outreach would be designed to restore (i.e., lost fishing opportunities/enjoyment). The institutional controls program administered by the EPA through the FCEC has brought together a network of community-based organizations (CBOs) and other partners. This network creates a forum for distributing a common message regarding contaminants in fish to those that are likely to be exposed to high body burdens of DDTs and PCBs as a result of consuming locally caught fish (e.g., local subsistence anglers).

The outreach objectives of the Trustees are different. The EPA has been an effective leader in bringing partners together and generating a common message that clearly identifies how anglers can avoid exposures to PCBs and DDTs in fish, but the emphasis has been on avoidance rather than on restoration of lost fishing services. To provide anglers with alternatives to lost fishing opportunities, MSRP must have knowledge of contaminant levels in fishes that are not included in fish consumption advisories, including knowledge of other contaminants (principally mercury) that are likely to limit consumption. (The EPA has determined that it cannot fund mercury analyses for this case.) MSRP must also consider the ecological and life-history differences between species of fish and how these differences influence contaminant levels in the fish. These ecological and life-history differences go beyond the general, and at times inaccurate, presumption that higher trophic levels and larger fish are more contaminated and include factors such as home range, migratory behavior, foraging mode, and habitat preferences. Because these considerations stem from the fact that fish are a living marine resource, messages related to the restoration of lost fish services are most appropriately generated by resource management agencies having such expertise.

The Trustees will work closely with the EPA and other FCEC partners to develop a cohesive set of outreach and education messages. Indeed, the Trustees have been active partners with the FCEC and have contributed expertise and support for the program from its beginning. The Trustees produced several pilot outreach projects to evaluate the viability of outreach as a restoration action. These pilot-level projects include an educational comic book that provides a history of the Montrose case and information on reducing health risks while enjoying the benefits of fishing, a fish identification card, and contributions to other FCEC materials. MSRP receives constant requests for a revised and larger-scale comic book printing and more fish ID cards from FCEC partners (including Heal the Bay). In fact, it was the overwhelmingly positive response to these pilot projects that confirmed the value of the Trustees' role in developing a complete set of messages regarding "smart" fishing in the areas impacted by the Montrose contaminants.

The Trustees have edited Appendix A2 to clarify the distinctions between the EPA and the MSRP contributions to the overall messages presented to anglers and to clarify the Trustees' intent to implement a fishing outreach and education effort in collaboration with FCEC partners to integrate the critical components of the outreach messages that are not provided by the EPA.

Comment: *Support is given to the MSRP for its new and continuing efforts to provide information to the public concerning fishing options and resource contamination.*
Source(s): *Office of Environmental Health Hazard Assessment*

Comment noted.

9.2.6 Comments on "Restore Full Tidal Exchange Wetlands"

Comment: *Wetlands restoration is the only "true mitigation" proposed in the Restoration Plan, and more funding should be allocated to such restoration. The wetland restoration should be focused on a specific area between Point Dume and Bolsa Chica.*
Source(s): *Heal the Bay; Santa Monica Baykeeper*

The Trustees disagree that wetland restoration is the only "true" mitigation proposed in the Restoration Plan and believe that other restoration actions have many ecologically restorative aspects. The Trustees' preferred alternative, Alternative 2, proposes a broader set of fishing and fish habitat restoration actions than the non-preferred Alternative 3.

All other factors being the same, the Trustees would give preference to actions that are in closer proximity to the sites of the injuries associated with the Montrose case. However, the Trustees do not consider it advisable to restrict the boundaries for where wetlands restoration would be considered to such a narrow geographic range (Point Dume to Bolsa Chica). The impacts of DDTs and PCBs have been demonstrated to occur far beyond these boundaries, so conducting wetlands restoration beyond these boundaries to restore these impacts is justified. However, the Trustees will evaluate the proximity of potential sites to the Palos Verdes Shelf region, among other criteria, when evaluating wetlands restoration projects.

Comment: *Wetlands can occasionally be sites of increased mercury methylation.*
Source(s): *Office of Environmental Health Hazards Assessment*

The Trustees will investigate the issue of potential mercury methylation in considering the potential fisheries effects of wetlands restoration.

Comment: The concept of wetlands restoration is supported.
Source(s): Office of Environmental Health Hazards Assessment; Los Angeles Regional Water Quality Control Board

Comments noted.

Comment: The Trustees should contribute funding to implement the recommendations of the Southern California Wetlands Recovery Project (SCWRP) as those are formulated and released.
Source(s): Los Angeles Regional Water Quality Control Board

The Trustees' preferred alternative includes the restoration of full tidal exchange wetlands as one of the actions to restore fishing and fish habitat. The Trustees will work closely with SCWRP to identify the most appropriate wetlands restoration project(s) to meet the MSRP restoration objectives.

9.2.7 Comments on "Augment Funds for Implementing Marine Protected Areas in California"

Comment: The MPA concept is supported.
Source(s): Office of Environmental Health Hazard Assessment; Los Angeles Regional Water Quality Control Board

Comments noted.

9.3 BALD EAGLE RESTORATION COMMENTS

9.3.1 General Bald Eagle Comments

Comment: Man is responsible for DDT and should compensate the eagles and help them recover.
Source(s): Multiple public reviewers

Bald eagles are one of the priority resources for the MSRP. The Trustees are committed to pursuing the restoration of bald eagles on the Channel Islands and have allocated a total of $6.2 million in Phase 1 to help them recover. The Trustees were formed to work on behalf of the public to restore those resources injured by the DDT contamination at issue in the Montrose case, and bald eagles are among the injured resources. The funding of the NCI Bald Eagle Feasibility Study as well as previous funding of the Santa Catalina Island Bald Eagle Program are both examples of efforts that the Trustees have funded to help bald eagles recover on the Channel Islands.

Comment: The bald eagle is a yardstick to measure DDT contamination in Southern California's coastal waters.
Source(s): R. Roe

The Trustees agree that bald eagles are an excellent indicator of the levels of DDTs and PCBs in the Southern California Bight, due to their position as a top predator in the food chain. However, this fact is not a sufficient reason to maintain eagles on Santa Catalina Island. The levels of DDTs and PCBs can be measured in a variety of sources (such as sediments, fish, and marine mammals) that provide a picture of current contaminant levels in the marine environment and indicate whether levels are decreasing.

9.3.2 Funding Allocation for Bald Eagle Restoration

Comment: Funds should be spent on restoring bald eagles to Catalina, rather than on efforts to eradicate non-native species on islands which are more distant from the principal source of contamination than Catalina.
Source(s): Catalina Island Conservancy; multiple public reviewers

As stated previously, the Montrose consent decrees contain provisions that identify the appropriate uses of settlement funds. Funds paid to the Trustees are to be used to address injuries and lost services for a suite of natural resources and natural resource services. These resources and services include fishing and fish habitat, bald eagles, peregrine falcons, and seabirds. The Trustees' preferred alternative attempts to restore the diversity of natural resources injured and the natural resource services lost as a result of the contaminants of the Montrose case.

The utilization of restoration funds to restore seabirds on other Channel Islands and on Baja California Pacific Islands is entirely within the scope of the Montrose consent decrees. The contaminants of the Montrose case impacted seabirds in many areas of the Southern California Bight. Because many seabird species either migrate or range across a broad expanse of the marine environment, the most effective restoration may not necessarily correspond to the location where contamination is heaviest. The specific methodologies for restoring seabirds include habitat restoration, non-native animal eradication, and social attraction. These methods have been used in other natural resource damage cases where direct restoration has not always been possible.

The Trustees have modified the text to address the concern that greater funding be devoted to bald eagle restoration. Previously, the Trustees' preferred alternative provided for the potential use of a portion of the bald eagle restoration funds for additional seabird restoration. Now, the Trustees propose to devote the entire $6.2 million allocated to bald eagles in Phase 1 of the restoration effort to bald eagle restoration.

Comment: Priority should be given to the reduction and elimination of non-native invasive animals and plants from island environments rather than the Catalina bald eagle egg manipulation and chick fostering program.
Source(s): Multiple public reviewers

The Trustees have included several actions in their preferred alternative that involve the elimination of exotic organisms from several islands as a means of aiding the restoration of seabirds. These actions include "restore seabirds to San Miguel Island" and "restore seabirds to San Nicolas Island" (see Appendices D1 and D3).

Comment: Support of the Santa Catalina Island bald eagle program is a small portion of the overall budget, and funding Catalina's recovery efforts is an investment in a comprehensive eagle recovery effort.
Source(s): Catalina Island Conservancy; multiple public reviewers

Although the annual budget of approximately $250,000 for the Santa Catalina Island Bald Eagle Program may appear insignificant compared to the overall settlement amount of $30 million for restoration, the Trustees must address a range of natural resources and services that were injured by the DDT contamination. In addition to bald eagles on Santa Catalina Island, the Restoration Plan addresses injuries to bald eagles elsewhere in the Channel Islands as well as injuries to fishing and fish habitat, peregrine falcons, and seabirds. To adequately address the diversity of injuries associated with the Montrose case, the Trustees had to decide how to best spend the limited restoration funds. In the case of bald eagle restoration on the Channel Islands, the Trustees have decided to suspend funding of the Santa Catalina Island Bald Eagle Program until the results of the NCI Bald Eagle Feasibility Study are known in order to conserve and wisely use limited restoration dollars.

Comment: Continuing human intervention at every stage of breeding would be a squandering of precious restoration dollars. Funding should be moved to places that more effectively benefit the environment and are more self-sustaining than the Santa Catalina Island program.
Source(s): Pacific Seabird Group; multiple public reviewers

A diverse set of opinions were expressed in public comments on the bald eagle restoration options, including some which supported the current focus on restoring self-sustaining bald eagles on the Northern Channel Islands. The preferred alternative consists of many actions that address a wide range of injured natural resources and locations.

9.3.3 Suggested Funding Scenarios for Bald Eagle Restoration

Comment: Funding of the Santa Catalina Island Bald Eagle Program should continue regardless of whether or not human intervention is always required.
Source(s): Multiple public reviewers

With the persistence of DDT in the food web, the successful reproduction of bald eagles on Santa Catalina Island will require continued human intervention for a long time. Although some recovery efforts require long-term human assistance, the Trustees must decide which actions are most cost-effective and provide the greatest long-term benefit within the scope of the limited restoration funds available for this case. Given the range of natural resources that the Trustees are addressing, they believe that the large proportion of settlement funds that would be necessary to continue the current Santa Catalina Island Bald Eagle Program as long as required for bald eagles to be able to reproduce on their own can be better spent to benefit other injured resources and services, including bald eagles on the Northern Channel Islands.

Comment: Funding should be set aside for future restoration work on Santa Catalina Island until such time that contamination levels decline.
Source(s): UCLA Environmental Science and Engineering Program; Island Conservation Northwest; Island Conservation; Multiple public reviewers

The Trustees consider this comment a logical approach to future bald eagle restoration efforts on Santa Catalina Island. This approach will be evaluated when deciding on the subsequent bald eagle restoration actions once the results of the NCI Bald Eagle Feasibility Study are known. However, if bald eagles can reproduce successfully on the Northern Channel Islands, it is likely that the Trustees will focus restoration funds on those islands, with the expectation that eagles will eventually disperse and successfully breed on all the Channel Islands (including Santa Catalina Island) once contamination levels subside.

Comment: Funding of the Santa Catalina Island Bald Eagle Program should continue at least until the results of the NCI Bald Eagle Feasibility Study are known.
Source(s): Avalon City Council; J. Morton

The Trustees have seriously considered multiple funding scenarios with respect to the Santa Catalina Island Bald Eagle Program, including continued funding until the results of the NCI Bald Eagle Feasibility Study are known. However, the Trustees have concluded that it is highly likely that eagles will still be present on Santa Catalina Island when the results of the study are known in or around 2008 (see the responses for Section 9.3.7) even without an egg manipulation and fostering program in the interim. Consequently, the Trustees have decided to conserve limited restoration dollars until the results or the study are known.

Comment: The Environmental Protection Agency should solve the contamination problem first before the Trustees bring eagles back to Santa Catalina Island.
Source(s): mymak@juno.com

Given the scope of the contamination at issue in the Montrose case and the limited money to remediate the site, it is unlikely that the EPA will be able to fully solve the contamination problem through active remediation. Thus, reductions to background contamination levels will likely be achieved over time through natural processes. The Trustees will consider the option of setting aside funds for future bald eagle restoration work on Santa Catalina Island once the results of the NCI Bald Eagle Feasibility Study are known.

Comment: Funding for the Santa Catalina Island Bald Eagle Program should be discontinued and the money used on projects that will benefit many species and island ecosystems as a whole.
Source(s): Multiple public reviewers

The Trustees will defer making longer-term decisions on bald eagle restoration until the results of the NCI Bald Eagle Feasibility Study are known, in or around 2008. However, until then, the Trustees will discontinue funding for the Santa Catalina Island Bald Eagle Program. When the results of the NCI Bald Eagle Feasibility Study are known the Trustees will re-evaluate all potential options for bald eagle restoration, including measures that may be taken even if bald eagles are not able to reproduce on their own anywhere in the Channel Islands. The remaining bald eagle restoration funds could then be used on any of the Channel Islands. This action conserves limited restoration funds until sufficient information is known about the ability of the different Channel Island environments to support bald eagles.

Comment: *Some reviewers suggested additional ideas for fundraising to support bald eagle work on Santa Catalina Island.*
Source(s): *T. Marsh; D. MacKenzie*

The Trustees have forwarded all ideas for fundraising to support bald eagle work on Santa Catalina Island to the Institute for Wildlife Studies.

9.3.4 Reproductive Status of Bald Eagles on Santa Catalina Island

Comment: *It is too soon to abandon restoration efforts on Santa Catalina Island. DDT levels are decreasing in the eggs of at least one pair of nesting eagles; this indicates that Santa Catalina Island bald eagles may soon be able to reproduce on their own.*
Source(s): *Catalina Island Conservancy; multiple public reviewers*

The Trustees performed a comprehensive analysis of the levels of DDT in the Santa Catalina Island bald eagle eggs and did not find any statistically significant trends indicating a reduction of DDT levels (see Appendix B). Three of the five bald eagle territories on the island (Pinnacle Rock, West End, and Two Harbors) produce eggs that continue to greatly exceed the contaminant thresholds associated with reproductive success. Although the two remaining territories (Seal Rocks and Twin Rocks) produce less-contaminated eggs, these eggs continue to exhibit concentrations above the threshold required for reproductive success. The Trustees did not find statistically significant trends for any of the five territories indicating that contaminant levels are declining to the point where eagles could be self-sustaining in the foreseeable future.

Several reviewers believe that the Santa Catalina Island Bald Eagle Program simply needs more time. The Trustees understand the challenges associated with restoring bald eagles in the presence of ongoing contamination and agree that there is no quick fix to the problem. However, the Trustees have limited restoration funds and must decide on how best to allocate that funding among actions whose benefits can be realized over the long term. In light of the continued high levels of contamination in bald eagles and the fact that the contamination will remain available in the food web for some time, continued funding of the Santa Catalina Island program in the short-term is unlikely to achieve the overall goal of restoring bald eagles to the Channel Islands. The Trustees have chosen to focus their current restoration efforts on the Northern Channel Islands, with the goal of establishing a self-sustaining population there. The results of the NCI Bald Eagle Feasibility Study are expected to be known in or around 2008. The Trustees anticipate that if eagles can successfully reproduce on the Northern Channel Islands, then eagles will eventually repopulate the rest of the Channel Islands, including Santa Catalina Island.

9.3.5 Public Access to Bald Eagles

Comment: It is necessary to maintain high-profile conservation efforts such as the Santa Catalina Island Bald Eagle Program.
Source: Humboldt State University Department of Wildlife; J. Miller

The Trustees recognize that the Santa Catalina Island Bald Eagle Program presents a useful educational and public outreach opportunity. Although education and public outreach are important benefits of the program, the Trustees' overall goal is to restore bald eagles to all of the Channel Islands, not just Santa Catalina Island. The Trustees' bald eagle efforts on the Northern Channel Islands have also received significant interest from the public and the press. The Trustees consider their overall effort to restore bald eagles to the Channel Islands a high-profile restoration effort, and public outreach will continue to be an important component of the program.

Comment: Santa Catalina Island provides a significant number of people with the opportunity to enjoy bald eagles in a natural setting, and consequently should be a priority for restoration efforts.
Source(s): Catalina Island Conservancy; multiple public reviewers

The Trustees recognize that the Santa Catalina Island Bald Eagle Program provides a great opportunity for the public to experience and learn about bald eagles. Although public access to restoration actions is a consideration in evaluating these actions, it is one of multiple factors that the Trustees must address. At this time, the Trustees have chosen to focus on the restoration of bald eagles on the Northern Channel Islands. In addition, bald eagle experts indicate that the eagles will likely remain on Santa Catalina Island, at least until the NCI Bald Eagle Feasibility Study is expected to be completed. Although the Northern Channel Islands do not receive as many visitors as Santa Catalina Island, the public does have access to the islands, and visitation is encouraged by the National Park Service. The Trustees have modified the bald eagle restoration provisions in the Restoration Plan in response to this and other issues raised in public comments and will revisit bald eagle restoration options, including options on Santa Catalina Island, once the results of the NCI Bald Eagle Feasibility Study are known.

It should also be noted that Santa Catalina Island is not the only place where the public can observe wild bald eagles in Southern California. Every year, bald eagles migrate to Southern California for the winter. Among other places, wintering bald eagles can be enjoyed by the public at Big Bear Lake, Silverwood Lake, Lake Arrowhead, Lake Hemet, and Cachuma Lake.

Comment: Funding of the Santa Catalina Island Bald Eagle Program should be continued as an education tool for the benefit of our children and grandchildren.
Source(s): Multiple public reviewers

The Trustees appreciate the fact that people, both young and old, cherish the opportunity to view bald eagles in the wild. The Trustees have placed a high priority on those actions that will have long-term benefits to both the injured natural resource (i.e., the bald eagle) and the public. In the present circumstances, given finite funds, the Santa Catalina Island Bald Eagle Program will not result in long-term benefits to bald eagles or the public unless bald eagles are able to reproduce successfully on their own. The Trustees are hopeful that the restoration of eagles to the Northern Channel Islands will be self-sustaining and will not require the same human intervention that characterizes the Santa Catalina Island Bald Eagle Program. Only the establishment of self-sustaining bald eagle pairs on the Channel Islands will truly provide long-term benefits for generations to come.

Comment: You have to decide whether the money that you are going to be saving by not having that bald eagle reintroduction program is going to be worth the public relations problem you are going to have.
Source(s): S. Pillman

The Trustees recognize that the public places a high value on the presence of bald eagles on the Channel Islands, whether or not the eagles are reproducing on their own. The Trustees have modified the bald eagle restoration provisions in the Restoration Plan in response to this and other issues raised in public comments and will revisit the bald eagle restoration options, including options on Santa Catalina Island, once the results of the NCI Bald Eagle Feasibility Study are known. The Trustees will then release a subsequent NEPA/CEQA document for public review and input; that document will outline the next steps for bald eagle restoration on the Channel Islands.

9.3.6 Potential Benefits of Funding the Santa Catalina Island Bald Eagle Program

Comment: The Santa Catalina Island Bald Eagle Program may be able to provide important strategies for long-term chemical impacts and recovery efforts.
Source(s): M. Gaede

The fact that bald eagles on Santa Catalina Island continue to experience reproductive problems illustrates the persistence of chemicals (specifically, DDTs and PCBs) in the marine environment. The methods used to maintain bald eagles on Santa Catalina Island (artificial incubation of eggs and hacking of additional birds) are well established and have been successfully used in several recovery efforts. However, the Santa Catalina Island program is unique in that the contaminant levels in the bald eagle eggs are substantially higher than the levels seen elsewhere. Therefore, the challenges of artificial incubation of bald eagle eggs on Santa Catalina Island are much greater than for most incubation efforts. Although the use of novel techniques in the incubation of bald eagle eggs on Santa Catalina Island might advance the science of such recovery efforts in other species, it is unlikely that other bird eggs will demonstrate similar contaminant levels in their eggs.

Comment: The bald eagles produced on Santa Catalina Island are a potential source population for the recovery of bald eagles on the Northern Channel Islands and the adjacent mainland.
Source(s): Catalina Island Conservancy; multiple public reviewers

The Trustees are aware that eagles from Santa Catalina Island have dispersed to the mainland and that several individuals have recently been observed on the Northern Channel Islands. However, because the Santa Catalina Island eagles continue to lay highly contaminated eggs, the majority of the chicks that have been fostered on Santa Catalina Island have come from a captive breeding program at the San Francisco Zoo, not from the Santa Catalina Island birds themselves. Even with human intervention, the hatching success of Santa Catalina Island eggs remains low. The Trustees believe that hacking birds directly onto Santa Cruz Island is a more effective strategy for restoring eagles to the Channel Islands than continuing the fostering program on Santa Catalina Island.

The California mainland population of bald eagles has steadily increased to approximately 200 nesting pairs in recent years (Jurek, pers. comm., 2005). The mainland eagle population trend is the result of natural population growth with no captive breeding or augmentation of wild nests. Although the mainland population is being slightly augmented by the released birds from Santa Catalina Island, the recovery of the bald eagle on the mainland is occurring regardless of this contribution.

9.3.7 Potential Impacts of Not Funding the Santa Catalina Island Bald Eagle Program

Comment: *It cannot be assumed that Santa Catalina Island's current population of eagles would stay on the island if they couldn't reproduce over the next few years. The reallocation of funds could mean the disappearance once again of bald eagles from Santa Catalina Island.*
Source: *Catalina Island Conservancy; multiple public reviewers*

Even without continued Trustee funding of the current Santa Catalina Island Bald Eagle Program, it is highly likely that bald eagles will remain on Santa Catalina Island for several years despite their inability to hatch offspring naturally. Bald eagles in the wild typically live for 25 to 30 years, and Santa Catalina Island currently supports 15 to 20 birds of a wide range of ages. Currently, five active bald eagle nesting territories are present on the island, and the Institute for Wildlife Studies reports that two birds are currently establishing a new territory near Avalon. Even if the Santa Catalina Island bald eagles fail to hatch new chicks in the coming years, bald eagle experts do not expect that they will immediately break their pair bonds and abandon their Santa Catalina Island territories. Rather, it is likely that bald eagles will remain on the island, with their numbers diminishing gradually over a period of as many as 10 years or longer as some of the birds die and are not replaced by others and as certain bald eagle pairs break their pair bonds and leave after several years of failing to produce chicks.

Thus, the Trustees anticipate that bald eagles will still be present on several of the Channel Islands, including Santa Catalina Island, when the results of the NCI Bald Eagle Feasibility Study are known in or around 2008. In response to comments from the public, the Trustees have modified provisions for bald eagle restoration in the revised Restoration Plan. As a result, the Trustees will re-evaluate all bald eagle restoration options when the results of the NCI Bald Eagle Feasibility Study are known. If the results indicate that bald eagles throughout the Channel Islands still experience reproductive impairment due to the persistence of DDTs and PCBs in their diets, the Trustees would explore various options for further bald eagle restoration in the Channel Islands, including Santa Catalina Island. Some options may not be as costly as the current egg manipulation and chick fostering work on Santa Catalina Island. For instance, the Trustees might devote funds at a later date to monitor bald eagle numbers and periodically place young bald eagles on the Channel Islands (a process known as "hacking"). This option would continue a non-breeding bald eagle presence on the Channel Islands, providing human use and ecological services, until such time that contaminant levels diminish to a level that would support naturally reproducing eagles or so long as funding remains.

Comment: Stopping the Santa Catalina Island Bald Eagle Program could negatively impact the endangered Catalina Island fox.
Source(s): Catalina Island Conservancy; several public reviewers

The Trustees have carefully considered this issue and determined that, based on several factors, it is unlikely that golden eagles will establish residency on Santa Catalina Island even though they are resident on the Northern Channel Islands. An important factor in this determination is that Santa Catalina Island likely does not have a sufficient terrestrial vertebrate prey base adequate to sustain golden eagles and to support golden eagle breeding on the island. The presence of feral pigs is one the primary reasons golden eagles were able to establish themselves on Santa Cruz Island. Efforts initiated in the 1990s eliminated several introduced terrestrial mammals (i.e., goats and pigs) from Santa Catalina Island that could have served as prey for golden eagles. Without a similar prey base, it is unlikely that Santa Catalina Island could support resident golden eagles.

A second factor making it unlikely that golden eagles would establish themselves on Santa Catalina Island is that, unlike on the Northern Channel Islands, there is no nearby mainland source for golden eagles. Golden eagles are considered an occasional visitor to Santa Catalina Island and have never been documented to breed on the island (Collins, pers. comm. 2005). This was true even when bald eagles were absent from the island (and feral pigs were present). Given the extensive development of Los Angeles County, it is unlikely that golden eagles will disperse out to Santa Catalina Island from the nearby mainland. A more likely scenario would be that golden eagles would disperse to Santa Catalina Island from the Northern Channel Islands. However, an extensive program has been in place since 1999 on the Northern Channel Islands to remove golden eagles. Through this effort, a total of 41 golden eagles have been relocated and approximately 5 to 7 golden eagles are estimated to remain on the islands (Sharpe, pers. comm., 2005). Efforts are ongoing to relocate the remaining golden eagles. With the substantial reduction in golden eagles, it is unlikely that the Northern Channel Islands would serve as a source of golden eagles to Santa Catalina Island.

The National Park Service is also currently eradicating feral pigs on Santa Cruz Island. Although this effort may take several years to complete, this non-native prey source will no longer be available to golden eagles. Without an adequate food base, golden eagles will likely resume their historical status on the Channel Islands as an occasional visitor.

The Trustees do not anticipate that bald eagles will disappear from Santa Catalina Island before the completion of the NCI Bald Eagle Feasibility Study. At that time, the Trustees will consider any new information regarding the status of golden eagles and bald eagles on the Channel Islands and will re-examine any potential impacts to the Santa Catalina Island fox. However, for the purposes of this interim decision to suspend funding of the Santa Catalina Island Bald Eagle Program until the results of the NCI Bald Eagle Feasibility Study are known, the Trustees have determined that this action will not likely adversely affect the Santa Catalina Island fox. This determination has been reviewed by the U.S. Fish and Wildlife Service and has received its concurrence (see Appendix B).

9.3.8 Humane Treatment of Bald Eagles

Comment: *Abandoning eagles on Santa Catalina Island is inhumane.*
Source: *K. McKay*

Comment: *Keeping eagles on Santa Catalina Island, where they continue to be injured, is wrong.*
Source(s): *M. Padian; J. Steinberg*

These two contrasting comments address the challenges of restoring bald eagles in an environment where they continue to be exposed to contamination. Over the past 25 years, the parties working to restore bald eagles, including the Trustees, have found that the long-term restoration of bald eagles on the Channel Islands requires different measures. Some of these measures may entail risks that the birds continue to be exposed to contamination and its adverse effects.

Adult bald eagles that accumulate high levels of DDTs and PCBs into their system can experience a range of neurological problems that can sometimes lead to death. In fact, a 12-year old female adult bald eagle died from suspected DDT poisoning on Santa Catalina Island in the 1990s. Because of the ongoing contamination of birds and their subsequent reproductive problems on Santa Catalina Island, the Trustees initiated the NCI Bald Eagle Feasibility Study in the hopes that birds on these islands would be less exposed to contaminants than those on Santa Catalina Island.

9.3.9 Bald Eagles and the Santa Catalina Island Economy

Comment: *If bald eagles disappear from Santa Catalina Island, the island's economy may be affected.*
Source: *S. Dewey*

The Trustees do not anticipate that suspending the funding of the Santa Catalina Island Bald Eagle Program will result in the disappearance of the bald eagles in the near future (see Section 9.3.7). The high likelihood that eagle pairs will remain on the island over the next several years (even without human intervention) provides the opportunity for private or other public fundraising to continue the current Santa Catalina Island Bald Eagle Program. The Trustees are only making an interim decision at this point; the completion of the NCI Bald Eagle Feasibility Study and the Trustees' release of an additional NEPA/CEQA document will provide a further opportunity for public input on bald eagle restoration.

9.3.10 New Bald Eagle Restoration Ideas

Comment: *Was there any discussion about providing some funding to monitor what is going on over a period of years, what will happen to that population on Santa Catalina Island if funding for the egg replacement ceases after 2005?*
Source(s): *Catalina Island Conservancy*

During the interim period until the NCI Bald Eagle Feasibility Study is completed, the Trustees have chosen to focus their restoration efforts on the Northern Channel Islands, which continue to hold the potential for the long-term restoration of bald eagles, and suspend funding of the Santa Catalina Island Bald Eagle Program. The Trustees considered but decided against funding to monitor Santa Catalina Island during this time to conserve limited restoration funds for future bald eagle restoration actions. However, the Trustees will revisit all aspects of bald eagle restoration once the results of the NCI Bald Eagle Feasibility Study are known, likely in 2008.

Even without continued Trustee funding of the current Santa Catalina Island Bald Eagle Program, it is highly likely that bald eagles will remain on Santa Catalina Island for several years despite their inability to hatch offspring naturally. Bald eagles in the wild typically live for 25 to 30 years, and Santa Catalina Island currently supports 15 to 20 birds of a wide range of ages. Currently, five active bald eagle nesting territories are present on the island, and the Institute for Wildlife Studies reports that two birds are currently establishing a new territory near Avalon. Even assuming that the Santa Catalina Island bald eagles fail to hatch new chicks in the coming years, bald eagle experts do not expect that they will immediately break their pair bonds and abandon their Santa Catalina Island territories. Rather, it is likely that bald eagles will remain on Santa Catalina Island, with their numbers diminishing gradually over a period of as many as 10 years or longer as some of the birds die and are not replaced by others and as certain bald eagle pairs break their pair bonds and leave after several years of failing to produce chicks.

Thus, the Trustees anticipate that bald eagles will still be on several of the Channel Islands, including Santa Catalina Island, when the results of the NCI Bald Eagle Feasibility Study are known (in or around 2008). If the results of the NCI Bald Eagle Feasibility Study indicate that bald eagles throughout the Channel Islands are still experiencing reproductive impairment due to the persistence of DDTs and PCBs in their diets, the Trustees would explore various options for further bald eagle restoration on one or more of the Channel Islands, including Santa Catalina Island.

Comment: ***Certain reviewers suggested that the Trustees relocate Santa Catalina Island bald eagle eggs to non-contaminated areas far from the Palos Verdes Shelf. Another suggested that the Santa Catalina Island birds be moved to the Northern Channel Islands until the DDTs and PCBs near the outfall are naturally capped.***

Source(s): *J. Martin; S. Zelman; D. Weisman*

Relocating Santa Catalina Island bald eagle eggs away from the Palos Verdes Shelf raises several technical issues and would not address the MSRP goal of restoring bald eagles to the Southern California Bight. If the Santa Catalina Island bald eagles were to be relocated to the Northern Channel Islands, there would be no guarantee that the birds would remain there; they might return to their original Santa Catalina island territories.

Comment: ***The Trustees should consider commercially farming fish off of Santa Catalina Island for bald eagles and sport fishermen.***

Source(s): *T. Marsh*

Although fish constitute a large percentage of the diet of bald eagles on Santa Catalina Island, bald eagles are exposed to DDTs and PCBs mostly through their consumption of contaminated marine mammal carcasses and seabirds. Compared to marine mammals and seabirds, fish around Santa Catalina Island are relatively clean and are not contributing significantly to bald eagle exposure. Therefore, a program for the commercial farming of fish off of the island would not be an effective way to reduce the exposure of bald eagles to contaminants.

Comment: Bald eagle eggs and adults should be tested for methyl mercury due to the biological damage it causes.
Source(s): J. Lara

Mercury has been linked to reproductive problems in several species of birds. Currently, bald eagle eggs on Santa Catalina Island are analyzed for DDTs and PCBs. The Trustees are analyzing mercury as part of the fish sampling program along the coast of Ventura, Los Angeles, and Orange Counties to provide important information to fish consumers. The Trustees may consider analyzing the mercury concentrations in bald eagle eggs in the future.

9.3.11 NEPA Documentation

Comment: The Trustees should consider preparing subsequent NEPA documentation to allow for more meaningful public involvement once the ramifications of decisions regarding the fate of the bald eagle are clearer.
Source(s): EPA

Based on public comments, the Trustees now plan to prepare a subsequent NEPA/CEQA document once the outcome of the NCI Bald Eagle Feasibility Study is known. This document will discuss the Trustees' preferred next steps for bald eagle restoration on the Channel Islands. The public will have an opportunity to review and provide formal comment on this document.

9.3.12 Ecosystem-Level Restoration

Comment: Restoration is not limited to establishing self-sustaining populations, rather it means restoring functioning ecosystems.
Source(s): D.H. Van Vuren

All other evaluation criteria being equal, the Trustees gave preference to actions with greater potential for long-term and/or permanent benefits and without intensive ongoing human intervention and attendant costs. Thus, the Trustees preferred actions likely to produce results that extend beyond the time during which funding is available. Whether or not this objective is achievable for bald eagles in light of the ongoing contamination remains to be seen.

The Trustees acknowledge the important role that bald eagles play in the ecosystem of the Channel Islands. Due to their ecological role and in response to the public support for the eagles, the Trustees will now allocate the entire $6.2 million for bald eagle restoration on the Channel Islands and will consider actions that are not self-sustaining if eagles on the Northern Channel Islands cannot reproduce on their own.

9.4 PEREGRINE FALCON RESTORATION COMMENTS

9.4.1 Use of the Term "Natural Recovery" for Peregrine Falcons

Comment: *Referring to the recovery of peregrine falcons on the Channel Islands as "natural" is incorrect due to past and continuing active release efforts conducted by the Santa Cruz Predatory Bird Research Group and funded by donations and other non-Montrose support.*

Source(s): *Santa Cruz Predatory Bird Research Group*

In the Restoration Plan, the Trustees discuss that the recovery of the peregrine falcon was largely due to an active release program. Peregrine falcon recovery on the Channel Islands has clearly benefited from the ongoing release program conducted by the Santa Cruz Predatory Bird Research Group on the proximate mainland. However, it is known that peregrine falcon pairs on the Northern Channel Islands are reproducing successfully and that natural recruitment is occurring. Therefore, it is likely that the continued recovery of the peregrine falcon on the Channel Islands is due to a combination of natural recovery and the active release program on the mainland. The Trustees agree that the use of the term "natural recovery" does not portray the overall situation on the Channel Islands and have consequently modified the text of the Restoration Plan.

9.4.2 Allocation of Funds to Peregrine Falcon Restoration

Comment: *No additional funds should be allocated towards the peregrine falcon due to their current status on the Channel Islands. One commenter questioned why monitoring would occur if the Trustees were not going to implement active restoration.*

Source(s): *J. Adams; R. Ambrose*

Peregrine falcons are one of the MSRP priority bird species due to the DDT-related eggshell thinning injuries that this species has suffered. Although these birds are once again breeding successfully on the Northern Channel Islands, the extent of their recovery throughout the Channel Islands is not clearly known. Also unknown is whether pairs are still experiencing reduced productivity due to the ongoing effects of DDT contamination. It is important to monitor the current status of and the potential ongoing threats to this species before considering future active restoration efforts (such as releasing additional birds on the islands). Several peregrine falcon surveys will occur within Phase 1 of restoration implementation. After considering the results of these surveys, the Trustees may decide to proceed with active restoration efforts in Phase 2 of the restoration program.

9.4.3 Active Restoration of Peregrine Falcons on Santa Catalina Island

Comment: *The Trustees should pursue active restoration of peregrine falcons on Santa Catalina Island. One commenter urged the Trustees to consider the need for active restoration on the Channel Islands after the survey results are known.*
Source(s): *Catalina Island Conservancy; USC Wrigley Institute for Environmental Studies; multiple public reviewers*

The Trustees evaluated active restoration of peregrine falcons on the Channel Islands (see Appendix C1). As part of this action, the Trustees evaluated releasing additional peregrine falcons on Santa Catalina Island to facilitate the recovery of this species to the Southern Channel Islands. However, the Trustees concluded that active restoration was not necessary at this time on the Channel Islands (including Santa Catalina Island) for the following reasons: (1) the current status of peregrine falcons on the Channel Islands, (2) the results of the 2004 Santa Catalina Island peregrine falcon survey funded by the Trustees, and (3) the potential impacts to sensitive bird species. These factors are described and evaluated in greater detail in Appendix C1. Over the next 5 years, the Trustees will fund several peregrine falcon surveys on the Channel Islands that will provide updated information on the status of these birds. Based on the results of these surveys, the Trustees may decide to proceed with active restoration activities on the Channel Islands in Phase 2 of the restoration program. A subsequent NEPA/CEQA document will be released to the public to address future restoration actions in Phase 2.

9.4.4 Budget and Time Frame for Peregrine Falcon Restoration

Comment: *The draft restoration plan departs from the spirit of the outcome of the court case when it comes to addressing the actual damages for which Montrose is accountable. The Judge in that case calculated the damages done to the resources and came up with a figure of $7 million for peregrine falcon restoration.*
Source(s): *Santa Cruz Predatory Bird Research Group*

Contrary to this comment, the court did not determine a distinct dollar value for the peregrine falcon injuries or for any of the injured resources in this case. The Trustees provided estimates to the court during litigation concerning the potential costs of restoration. The final consent decree does not specify how funding should be allocated among the different injured resources and lost services. See Section 9.4.3 for a discussion of the Trustees’ decisions regarding active peregrine falcon restoration.

Comment: *The proposed monitoring budget is not adequate to address recruitment, dispersal, and foraging behavior of peregrine falcons on the Channel Islands. Monitoring should also be expanded to include the coastal mainland and the Baja California Pacific Islands.*
Source(s): *Santa Cruz Predatory Bird Research Group*

The Restoration Plan outlines a number of parameters (such as productivity, recruitment, dispersal) that would be considered in the peregrine falcon monitoring program. The importance and scope of these parameters will be prioritized during the development of the monitoring plan.

The scope and extent of the monitoring program will determine the ultimate budget for this action. At this point, the proposed budget is an estimate based on consultation with several peregrine falcon experts. The budget may be adjusted once the objectives and scope of the monitoring program are more clearly defined.

The Trustees considered implementing a monitoring program in the Baja California Pacific Islands, as discussed in Appendix C3. The Trustees also previously considered several mainland peregrine falcon actions during the Tier 1 analysis. However, based on the injury information for the case and the increasing number of peregrine falcons on the mainland, the Trustees decided that restoration and/or monitoring activities on the Channel Islands would receive priority over monitoring at other locations.

9.4.5 Threat of Peregrine Falcon Restoration to Seabird Populations

Comment: Restoration activities for peregrine falcons may pose significant threats towards depleted and rare seabirds.
Source(s): J. Adams

In Appendix C1, the Trustees addressed the potential impacts to depleted and rare birds (including seabirds) from active peregrine falcon restoration activities on the Channel Islands. These potential impacts were one of the reasons for not selecting active restoration of peregrine falcons at this time. Rather, the Trustees have chosen to monitor the status of peregrine falcons on the Channel Islands during Phase 1 of restoration implementation. These monitoring activities will be undertaken in such manner as to avoid impacts to seabird colonies. Should surveys indicate that active restoration of peregrine falcons is warranted on the Channel Islands, the Trustees will fully evaluate the potential impacts to rare seabirds in the Phase 2 NEPA/CEQA document.

9.5 SEABIRD RESTORATION COMMENTS

The Trustees received many letters in support of Alternative 2 with respect to seabird restoration actions. Those in support felt that Alternative 2 provides a more appropriate level of funding to restore seabird populations impacted by Montrose DDT releases. Supporters of Alternative 2 stated that the proposed seabird actions will promote long-term significant benefits to seabird populations. Specific comments received on the seabird actions are addressed below.

9.5.1 Seabird Nexus

Comment: Several reviewers objected to the level of funding for seabird restoration actions, questioning the nexus of seabird injuries to the Montrose case.
Source(s): UCLA Environmental Science and Engineering Program; Heal the Bay; Santa Monica Baykeeper; multiple public reviewers

The final consent decree for the Montrose case included seabirds as a target for restoration funds due to the injuries associated with DDT-related eggshell thinning. The Trustees closely evaluated the nexus for seabirds and targeted restoration actions for those seabirds that demonstrated severe or significant eggshell thinning and/or for which DDT egg residues were significantly elevated in the colonies of the Southern California Bight. A complete description of the seabird nexus can be found in Section 5.1. Although seabirds may not be experiencing continued injury that is similar to that of the bald eagles on Santa Catalina Island, their populations were clearly impacted by DDT contamination in the Southern California Bight.

Seabirds are also consumed by both bald eagles and peregrine falcons, two high-priority bird species for this restoration program. Actions that increase seabird populations in the Southern California Bight will also provide indirect benefits to the recovery of bald eagles and peregrine falcons on the Channel Islands. For these reasons, it is appropriate to allocate substantial funding to the seabird category.

Comment: *Other reviewers supported the use of funds for seabird restoration as part of the preferred alternative (Alternative 2).*
Source(s): *Pacific Seabird Group; multiple public reviewers*

Comment noted.

9.5.2 Seabird Restoration on Baja California, Mexico

Comment: *Funds should not be spent on seabird restoration in Baja California because it is far from the contamination source and not related to the Montrose case.*
Source(s): *Heal the Bay; Santa Monica Baykeeper; Catalina Island Conservancy; USC Wrigley Institute for Environmental Studies; multiple public reviewers*

As discussed in Appendix D5, many of the seabird species that breed on the Baja California Pacific Islands also breed on the Channel Islands. Several of the Baja California Pacific Islands are oceanographically part of the Southern California Bight and most of the seabird colonies in Mexico and California form part of a larger metapopulation of seabirds that breed, forage, and disperse into the Southern California Bight. The Trustees are targeting seabird restoration actions on both the Baja California Pacific Islands and the Channel Islands because seabird populations in both locations demonstrated injury from eggshell thinning as a result of DDT contamination. For example, the California brown pelican sustained almost complete reproductive failure due to DDT-related eggshell thinning in the late 1960s and early 1970s on both the Coronado Islands in Mexico and Anacapa Island in the Channel Islands. Restoration actions in both of these areas will directly benefit seabird populations that were impacted by the contamination addressed in the Montrose case.

9.5.3 Additional Seabird Data Gap Studies

Comment: *Additional studies should be conducted to determine the extent of the seabird injuries due to DDT contamination. Specifically, the Trustees should monitor the levels of DDT and PCB contamination in sooty shearwater, black-vented and pink-footed shearwaters in addition to the other nesting birds of the SCB*
Source(s): *J. Adams; H. Nevins*

During the damage assessment for the Montrose case, the Trustees funded several data gap studies for seabirds to determine potential injuries from DDT contamination. At that time, the Trustees focused on injuries to nesting seabirds in the Southern California Bight. Although additional data gap studies could have been conducted to determine potential injuries to migratory species, the Trustees decided to focus on breeding seabirds of the Southern California Bight for the case. Even with this more narrow focus, there are still more seabird restoration actions for these species than available funding. Because of the limited funding for seabird restoration, the Trustees prefer to spend funds on actual on-the-ground restoration activities rather than conduct further data gap studies to determine additional seabird injuries. The Trustees believe that the proposed seabird restoration actions will provide long-term benefits to a suite of seabirds that nest within the Southern California Bight.

9.5.4 Additional Long-Term Seabird Monitoring in the Southern California Bight

Comment: *The Trustees should fund long-term seabird monitoring to better understand the biology of seabirds in the Southern California Bight, as well as long-term monitoring efforts to assess seabird species and their prey fishes within the Channel Islands Marine Protected Area. One reviewer specifically mentioned that the Trustees should also monitor seabirds on Anacapa following the recent black rat removal.*

Source(s): *J. Adams; multiple public reviewers*

The Trustees have allocated a total of $6.5 million to fund five seabird restoration actions in their preferred alternative. These actions include habitat restoration, eradication of exotics, and social attraction. The decision to fund habitat-based restoration rather than monitoring efforts for seabirds reflects the Trustees' desire to fund direct restoration actions for seabirds. These types of restoration actions have proven to provide significant benefits to seabird populations throughout the world. Although important, monitoring programs for seabirds do not achieve the Trustees' goal of restoring seabirds within the Southern California Bight. The Trustees are also aware of other efforts to implement monitoring programs for seabirds, such as the Seabird Conservation Plan recently developed by the U.S. Fish and Wildlife Service. The Trustees' preferred alternative also calls for augmenting funds to support implementation, including monitoring, of the Channel Islands MPAs.

9.5.5 Restoration of Additional Seabird Species and Locations

Comment: *The Restoration Plan only targets a few seabird species and ignores the vast majority of marine birds that forage in the Southern California Bight but breed elsewhere.*

Source(s): *H. Nevins; J. Adams*

The Trustees recognize that migratory seabird species were likely exposed to DDT and PCB contamination while foraging in the Southern California Bight. However, based on the injury information collected for the case and the limited funds available for seabird restoration, the Trustees prioritized nine breeding seabird species of the Southern California Bight for restoration.

In general, the Trustees support trans-boundary restoration efforts, as demonstrated by their support for seabird actions in Mexico. Actions in New Zealand and Chile were not included in the preferred alternative because of their weaker nexus to the case. Also, the Trustee Council for the Command oil spill case is already pursuing seabird restoration in New Zealand. Given the limited restoration funds available, the Montrose Trustees have chosen to prioritize their seabird restoration efforts in the Southern California Bight and Baja California, Mexico.

9.5.6 Impacts to Humans Who Consume Seabirds

Comment: *The Restoration Plan fails to recognize the human reliance on migratory species likely affected by DDTs. The Trustees should further investigate the extent of contaminant exposure affecting cultural harvest and human consumptions of sooty shearwaters in New Zealand.*
Source(s): *H. Nevins*

Based on the limited restoration funds available for seabird actions, the Trustees have chosen to focus on on-the-ground restoration actions rather than further explore the potential injuries of the case. The potential effect to humans in New Zealand was not addressed at the time of the damage assessment, and the Trustees consider these potential impacts to be outside the scope of the restoration program.

9.5.7 Impacts to Seabirds from Other Restoration Actions

Comment: *Restoring bald eagles would likely undermine several of the seabird restoration actions because eagles will eat or harass seabirds.*
Source(s): *Pacific Seabird Group*

The potential impact of bald eagles on seabirds is addressed in both the Restoration Plan (Appendix B) and the Environmental Assessment for the Feasibility Study for the Reestablishment of Bald Eagles on the Channel Islands (MSRP 2002). Please refer to these two sources for more information. Although the Trustees acknowledge that bald eagles consume seabirds, they are a small percentage of an eagle's diet compared to fish. The Trustees do not believe that the presence of bald eagles will compromise the success of the proposed seabird restoration actions, though they anticipate that eagles will occasionally prey on seabirds. The success of the seabird restoration actions should increase seabird numbers on the Channel Islands, and as a result, sensitive species would be better able to withstand any predation pressure from bald eagles.

9.5.8 Comments on "Restore Alcids to Santa Barbara Island"

Comment: *The Trustees should investigate the ecological linkages between introduced grasslands, mouse populations and barn owls [which could impact alcid populations] before investing in this action.*
Source(s): *J. Adams*

The Trustees recognize the importance of understanding the ecological links between introduced grasslands, mouse populations, and barn owls. The National Park Service is currently conducting studies on the mouse population and its potential impacts on seabirds. Studies on the barn owl population are also under consideration. The Trustees will evaluate the impacts of deer mice on the success of this action during the monitoring phase of the action. In addition, it is likely that Cassin's auklets are not as vulnerable to mouse depredation as Xantus's murrelets, since egg neglect is negligible in Cassin's auklets. Auklets begin incubating their eggs immediately after laying, unlike murrelets, which leave their first egg unattended before laying their second, a practice that makes murrelet eggs more susceptible to predation.

Comment: The capacity for auklets to breed successfully at Santa Barbara Island will depend on the distribution and availability of suitable prey resources in the area. The Trustees should also assess the prey resources off Santa Barbara Island before pursuing this action to ensure that adequate prey resources are available to support auklets.
Source(s): J. Adams

The Trustees believe that the presence of nesting birds on the other nearby Channel Islands indicate that adequate prey is available to support auklets on Santa Barbara Island. Cassin's auklets are currently nesting successfully on Prince Island, San Miguel Island, Scorpion Rock, and Santa Cruz Island. In addition, Santa Barbara Island historically supported a population of over 5,000 pairs of auklets. Conducting a food availability study prior to implementing this action would be too costly given limited restoration funds as well as the Trustees' preference to spend funds on actual on-the-ground restoration activities rather than additional research. The Trustees believe that the proposed seabird restoration actions will provide long-term benefits to Cassin's auklets and Xantus's murrelets in the Southern California Bight.

Comment: Social Attraction of birds to artificial nest sites does not imply restoration. For auklets, the Trustees are urged to pursue and evaluate additional criteria for interpreting/demonstrating restoration success including, comparisons of reproductive parameters and chick growth with auklets nesting at Scorpion Rock and Prince Island, adult survival rates, and nest site fidelity. It is also recommended that this action include an evaluation of the potential for this action to increase (or in the event of poor reproductive success due to food limitation or predation, decrease) the overall abundance of auklets. How do anticipated restoration actions and outcomes to the populations compare with "baseline conditions" had dumping not occurred?
Source(s): J. Adams

The Trustees do not agree with the contention that this action does not constitute restoration. Compensatory restoration in the form of reestablishing a population that was originally extirpated from its historical habitat is a method commonly used in other CERCLA and oil spill cases where direct restoration is not always possible. The specifics of the monitoring plan for this action will be determined during project development and will include the parameters mentioned above. Accurate baseline population information does not exist for auklets on Santa Barbara Island; however, reproductive success and parameters from the restored colony on Santa Barbara Island will be compared with the results documented on other colonies within the Southern California Bight.

Comment: Xantus's Murrelets are not presently limited by the availability of suitable nest sites. Xantus's Murrelets are currently recolonizing Anacapa Island following the removal of rats. The number of active nest sites, however, has shown a *long-term decline. Whereas there is available natural nest habitat, having murrelets occupy artificial nest sites does not constitute restoration.*

Source(s): J. Adams

The Trustees do not agree with the contention that this action does not constitute restoration. One possible theory concerning the cause of the recent decline in active nests is that the drought in the late 1980s and early 1990s affected nest site availability for Xantus's murrelets in the bush site sub-colonies. This action will restore bush nest sites on the upper bluffs of the islands and will maintain a portion of these sites during low-rain years in order to continue to provide healthy vegetative cover. The hope is that this action will provide suitable habitat in a new area, and thus draw birds away from lower-quality habitat (e.g., under plywood boards and across ladders). Higher-quality nest sites should result in increased productivity. Also, these nest sites will provide safer access to the nests by researchers, which in turn will result in more consistent and higher-quality monitoring for a larger percentage of birds. The Trustees believe that an increase in the number of murrelets nesting on Santa Barbara Island as well as their productivity does constitute restoration and will provide long-term benefits to Xantus's murrelets in the Southern California Bight.

Comment: Plan should outline quantitative measures that can be used to demonstrate successful vegetation restoration.

Source(s): J. Adams

The monitoring plan for this action will outline measures to document successful vegetation restoration. The evaluation of the action (Appendix D2) has been modified to reflect this.

Comment: It is not clear what the benefits to the two species will be after the estimated five year action. Trustees should outline whether the artificial nest sites will be maintained or phased out after the project is determined successful.

Source(s): J. Adams

This action will have an adaptive management plan. The status of the action and the artificial nest sites will be decided after reviewing the results and the status of the population on the island.

9.5.9 Comments on "Restore Seabirds to Scorpion Rock"

Comment: An important first step for the project is to reduce human disturbance at colony through signage and effective educational outreach actions.

Source(s): J. Adams

Disturbance reduction and educational outreach are major components of this action.

Comment: Erosion problems on island need to be stabilized.

Source(s): J. Adams

Erosion control is a major component of this action.

Comment: It should be recognized that at present Scorpion Rock is a somewhat ephemeral nesting colony for auklets. Auklets nested there during the cool *and productive years of 1999-2003. Reproductive success is likely to be lower and more variable that at principal colonies off San Miguel Island. None of the sites on the rock were occupied in 2004 and anomalous conditions may prevent auklets from nesting there this season. The trustees need to establish a restoration criterion that evaluates the success of this colony in the context of oceanographic conditions and availability of suitable prey resources.*

Source(s): *J. Adams*

Cassin's auklets were nesting on Scorpion Rock when the first nest boxes were established and have made some effort every year following that. Cassin's auklets suffered poor reproductive success in 2004, not just on Scorpion Rock but throughout the Southern California Bight. As a result, the Trustees do not feel that the Scorpion Rock colony is ephemeral, but do agree that the restoration success criteria (which will be identified when the monitoring plan is developed) should take into consideration the potential impacts oceanographic conditions and prey availability.

Comment: *Plan should outline quantitative measures that can be used to demonstrate successful vegetation restoration and erosion control.*

Source(s): *J. Adams*

The monitoring plan for this action will outline measures to document successful vegetation restoration and erosion control. The evaluation of the action (Appendix D4) has been modified to reflect this.

Comment: *Adding additional nest sites and then determining that the sites are used by seabirds does not necessarily constitute restoration.*

Source(s): *J. Adams*

The Trustees do not agree with the contention that this action does not constitute restoration. Increasing the number of birds nesting on the rock and their productivity will have significant impacts on the population.

Comment: *The Trustees should consider supporting longer term monitoring (> 5-yrs) of auklets at Scorpion Rock and Prince Island within the context of oceanographic assessments, to better understand and interpret restoration success.*

Source(s): *J. Adams*

The specifics of the monitoring plan will be determined during the development of the action-specific plan. The Trustees will take into consideration the potential impacts of oceanographic conditions. Auklet monitoring on Prince Island will be considered as part of the action "restore seabirds to San Miguel Island" (see Appendix D1).

9.5.10 Comments on "Restore Seabirds to Baja California Pacific Islands"

Comment: Projects on Guadalupe Island should be funded regardless of the outcome of the NCI Feasibility Study.

Source(s): J. Adams

All of the seabird restoration actions on the Baja California Pacific islands have a strong nexus to the Montrose case and would benefit seabirds injured by the contaminants of the case. However, because the Trustees have chosen to modify the preferred alternative to reserve $6.2 million exclusively for bald eagle restoration, the balance of that money will no longer be available for seabird restoration, pending the results of the NCI Bald Eagle Feasibility Study. For this reason, two seabird actions, "restore seabirds to Baja California Pacific islands" (Guadalupe Island) and "restore ashy storm-petrels to Anacapa Island," may not be funded during this phase of restoration. However, the Trustees believe that the possibility of cost-sharing and the eventual allocation of a second round of funds in Phase 2 of restoration may result in the eventual implementation of these actions.

9.5.11 Comments on "Restore Ashy Strom-Petrels to Anacapa Island"

Comment: The Trustees should reconsider the project to eradicate the introduced House Mouse from the Farallon Islands to effectively restore this species injured by chemical pollution in the SCB.

Source(s): J. Adams

This idea did not rate as high as other seabird ideas primarily due to its location outside of the Southern California Bight. Other projects targeting ashy storm-petrels received higher ratings in respect to nexus. Also, Luckenbach Trustee Council is considering the Farallon Islands project for funding.

Comment: The Plan in its current form suggests that social attraction has been used successfully on this species; it is important to point out that this technique has only been used successfully to capture birds, but social attraction to nest sites has never been demonstrated. Social attraction with this species has never been demonstrated. Efforts to attract petrels to nest sites on the Farallon Islands have failed. Researchers have also found that only boxes that were installed within pre-existing nest sites were used by breeding individuals. Boxes installed in suitable nesting habitat failed. The Trustees are urged to consider support for ongoing petrel studies throughout the Channel Islands that are designed to evaluate efficacy and limitations at vocalization broadcasts, catch-per-unit effort, inter-island exchange, adult survival and population size.

Source(s): J. Adams

The Trustees did not mean to indicate that social attraction has been used successfully to establish a nesting colony of ashy storm-petrels, but instead that playbacks have been used successfully to capture ashy storm-petrels in mist nets. The appendix has been modified to make this point clearer. However, social attraction has been used successfully to establish nesting colonies of other species of petrels on islands in the Galapagos and off the coast of Maine. The Trustees will take the information learned from the Farallon Islands project into consideration when implementing the Anacapa Island action. Details of the monitoring plan for this action will be developed prior to implementation.

Comment: The Trustees should examine disturbance issues impacting reproductive success of petrels in sea caves that are open to public.
Source(s): J. Adams

The dry caves on Anacapa Island where petrels nest are already closed to public access. Disturbance issues in the caves of the Channel Islands National Park are the responsibility of the National Park Service.

Comment: At present suitable nesting habitat for this species does not appear to be limiting. Furthermore, from a demographic perspective, increasing reproductive output for such a long-lived, late-maturing seabird with low lifetime reproductive output is not likely to enhance the population. More information is required to assess what limits sub-adult and adult survival (i.e., predation, attraction to artificial light, pollution, plastic ingestion, etc.).
Source(s): J. Adams

Now that the introduced black rat has been removed from Anacapa Island, there is a great opportunity for the ashy storm-petrel population to increase and expand into parts of the island that the species did not previously use due to the presence of rats. The birds may be reluctant to do so without the social cues provided by social attraction. Spreading the population to more than one or two islands greatly reduces the risk of catastrophic events (such as an oil spill or the unintended reintroduction of rats to the island) eliminating this rare and endemic population.

Appendix A

Tier 2 Evaluation of Fishing and Fish Habitat Restoration Actions

Appendix A1

Construct Artificial Reefs and Fishing Access Improvements

A1.1 GOALS AND NEXUS TO INJURY

As a result of the historical releases of DDTs and PCBs by the Montrose defendants, several species of fish, particularly those associated with soft sediments, in certain coastal areas continue to accumulate levels of contamination that make it advisable for people to avoid or limit their consumption. The goal of constructing artificial reefs and fishing access improvements is to restore lost fishing services by changing the species composition of fish in selected fishing areas. In this appendix, we categorize fish species based on the habitats with which they are most commonly associated. The term “bottom” is commonly used to describe the substratum. Thus, soft-bottom fishes are those that are commonly associated with sand or mud substrata, and hard-bottom fishes are those that are commonly associated with reef or rocky substrata. An additional category of fish, water-column-feeding fish, refers to pelagic fishes that feed on prey that is suspended in the water column (e.g., pelagic zooplankton).

The premise of this restoration action is that fish, particularly white croaker, that are associated with soft-bottom habitats feed on benthic organisms from the contaminated sediments and are consequently the most highly contaminated species. In contrast, fish associated with hard-bottom or pelagic habitats feed on organisms that are either living in the water column or attached to hard substrate and are consequently less contaminated. This premise is supported both by (1) data collected by the Los Angeles County Sanitation Districts, which demonstrate a repeated pattern of lower contamination levels in kelp bass and black surfperch relative to white croaker, and (2) the current fish consumption advisories, which are broader and more restrictive for white croaker than for hard-bottom species.

The construction of a reef is likely to change the types of fish in an area because soft-bottom species do not typically inhabit reef habitats (Allen 1999). The primary benefit of these projects will be to displace these highly contaminated, soft-bottom fishes with water-column-feeding and hard-bottom species, which tend to be lower in contamination. Building reefs will also provide ecosystem benefits by increasing the production of fish whose tissues contain lower concentrations of contaminants (Dixon and Schroeter 1998). Reef construction may be complemented at some sites by improvements to fishing access (e.g., piers or other amenities) to promote the use of the enhanced fishing sites, to heighten awareness of how habitat affects the concentration of contaminants in different species of fish, and to provide compensatory restoration for past losses in fishing opportunities due to limitations imposed by fish consumption advisories.

Both elements of this restoration action (using artificial reefs to replace contaminated soft-bottom fishes with hard-bottom species and constructing improved public access to such sites) have a strong relationship to the lost fishing services of the Montrose case and act as both primary and compensatory restoration of lost fishing opportunities. The reef element also addresses the objective of restoring fish and the habitats on which they depend.

A1.2 BACKGROUND

Artificial reefs have been employed extensively throughout the world, including California coastal waters, as a means to improve fishing, diversify fish communities, and increase productivity. Artificial reefs may be broadly classified according to their fundamental purposes:

fishing reefs and fish production reefs. A fishing reef (sometimes referred to as a Fish Aggregation Device [FAD]) typically provides little or no fish production value itself, functioning instead to aggregate certain species for the purpose of recreational or commercial catch. A production reef is constructed to promote settlement, growth, and survival of resident reef species over a long time frame for the purpose of increasing fish production. It is also possible to design projects that incorporate both elements, for instance by placing fishing reefs in proximity to production reefs or by restricting fishing to a limited portion of a reef that is sufficiently large to allow the remaining areas to function undisturbed as production sites and to sustain the fishing portion. Natural reef habitats act both to aggregate and to produce fish.

The California Department of Fish and Game (CDFG) administers the California Artificial Reef Program (California Fish and Game Code Sections 6420–6425), which has a long history of designing and constructing artificial reefs for purposes of increasing local production and abundance of fishes that are targeted by recreational anglers. To date, approximately 30 artificial reefs have been constructed involving over 100 modules and a broad range of designs and goals (Figure A1-1). Although some reefs in California have been called "fishing or fishing opportunity reefs," the California definition of artificial reef requires that fishing reefs be designed and constructed to function as habitat that supports a productive and sustainable marine community typical of natural reef habitats rather than simply functioning as a FAD. This approach has generated a large amount of information regarding species composition, community succession, and productivity for artificial reefs (Ambrose 2000, Dixon and Schroeter 1998).

The CDFG program has developed a specific definition of artificial reefs that includes the contingency that they simulate natural reef habitats:

> "Artificial reef" means manmade or natural objects intentionally placed in selected areas of the marine environment to duplicate those conditions that induce production of fish and invertebrates on natural reefs and rough bottoms, and that stimulate the growth of kelp or other mid-water plant life which creates natural habitat for those species. (California Fish and Game Code Section 6421a)

Additional information on reef productivity and community structure has been generated in the past two decades by construction of a series of "developmental" reefs specifically designed to evaluate and compare how various design elements affect biological productivity and community structure. Developmental reefs have been built at Pendleton, Pitas Point, Santa Monica Bay, Marina Del Rey #2, Oceanside #2, Pacific Beach, Carlsbad, and Topanga. These developmental reefs generally consist of a series of rock modules with different rock sizes, relief profiles, and depths in paired replicates. The California Fish and Game Code states that "production" reefs would ultimately be built based on the information gained from the study of these "developmental" reefs (California Fish and Game Code Section 6420). However, due to cuts in funding for the CDFG artificial reef program, the intended studies of the existing developmental reef sites have not occurred (Parker, pers. comm., 2004).

A1.2.1 Relevant Models for Reefs That Would Meet MSRP Restoration Objectives

Increasingly, artificial reefs have been constructed to replace or mitigate for aquatic resources impacted by human activities (Ambrose 1994). Mitigation reefs have been constructed in recent years at several sites within the Southern California Bight, including Bolsa Chica, Long Beach Harbor, near the Angels Gate entrance to Los Angeles Harbor, in San Diego Bay, and offshore of Camp Pendleton. To mitigate for impacts to a kelp forest caused by releases of warm water by the San Onofre Nuclear Generating Station (SONGS), the utilities that operate SONGS are currently developing near San Clemente what may eventually be the largest mitigation reef in the United States (SCE 2004).

The study design and findings of the SONGS[1] reef pilot program are particularly relevant to the development of a reef construction program for the Montrose Settlements Restoration Program (MSRP). Although the primary goal of the SONGS reef program is to replace lost kelp forest

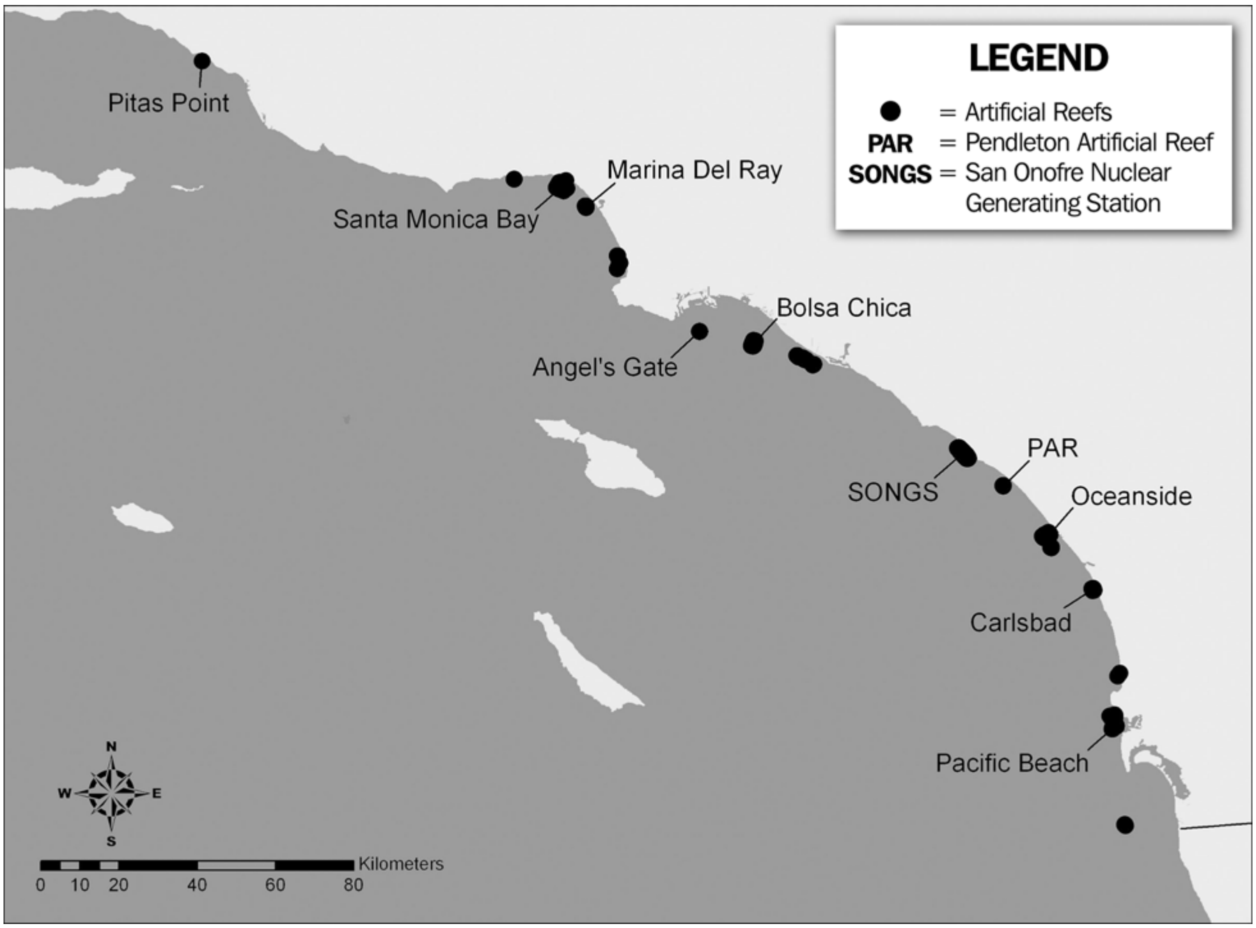


Figure A1-1. Artificial reefs in the Southern California Bight.

[1] Much of the information regarding the SONGS reef program is based on a phone interview with Dr. Steven Schroeter, who has been a principal investigator on the project since its inception.

habitat, the changes in fish community structure that occur would be relevant to the MSRP goal of providing cleaner fish for anglers. The utilities operating SONGS have developed a series of standards that the constructed reef must meet to achieve the desired level of mitigation and a 5-year pilot program to study how different reef designs perform in achieving these standards.

After reviewing the findings of previous studies, the SONGS parties designed and constructed an experimental modular reef system to investigate the importance of substrate (quarry rock versus concrete) and reef material coverage density (40 percent, 60 percent, and 80 percent) on kelp recruitment and growth as well as a more general analysis of community structure. Other issues evaluated in the SONGS pilot study will include the differences between high-relief and low-relief reefs (i.e., the variations in the sizes of the materials making up the reef), kelp out-planting versus natural recruitment, and several other considerations.

The SONGS 5-year evaluation study is scheduled to end in 2005. The Trustees will use the information generated by this and other developmental reefs to optimize the design of new artificial reefs to create a sustainable means for providing cleaner fish in the areas impacted by the contamination associated with the Montrose case.

A1.2.2 Designing for Sustainability

Artificial and natural reefs both attract fish and contribute to fish production under the right conditions (Ambrose 1994, Dixon and Schroeter 1998). Reef-based production can be estimated using several models, but most production estimates are based on estimating the standing stock on the reef at one or more points in time (Dixon and Schroeter 1998). Such estimates of changes in the overall biomass of fish do not differentiate between new fish production (i.e., gonadal production) and recruitment of fish from other areas (e.g., MEC Analytical Systems 1991).

For a constructed reef to add more fish to a total population, the fish population must be limited by the availability of reef habitat (Dixon and Schroeter 1998). Although it is uncertain whether fish populations are limited by the availability of reef habitat in Southern California, it is clear that reef habitat is rare relative to soft-bottom habitat (Cross and Allen 1993). Relative scarcity does not prove habitat limitation, but it is possible that building reefs will increase the number of potential settlement sites for juvenile reef fishes. Given the growing awareness that the settlement and early juvenile period is a significant mortality bottleneck for many marine fishes (e.g., Bailey and Houde 1989), particularly for reef-dwelling species (Victor 1986), an increase in potential settlement sites may increase survival through the early juvenile period.

The question of the relative importance of recruitment versus production remains unanswered for most marine reef fishes and for both natural and artificial reefs, but it is likely that both processes play a role (Dixon and Schroeter 1998). For example, certain artificial reef habitats in Southern California have supported self-sustaining populations of fish over more than a decade (Pondella et al. 2002) and have acted as a source of larval production that contributes significantly to the larval supply in the Southern California Bight (Stephens and Pondella 2002) However, the ability to confirm recruitment versus production is typically complicated by the high level of inter-annual variability in recruitment that occurs for most marine fish, the multiple recruitment bottlenecks that are likely to exist during early life history (e.g., first-feeding and settlement), and the difficulty in measuring the abundance of early-stage juveniles.

Because the focus of an MSRP reef program is to provide cleaner fish to anglers, the critical element is the degree to which the composition of fish species at a fishing site changes in favor of those that are less contaminated, rather than whether the reef increases the overall biomass of fish available. Nevertheless, the question of how reefs affect fish production is still relevant to this restoration effort, as the construction of new reefs may lead to increased local fishing pressure on fishing sites. This pressure could be addressed in a number of ways. A sufficiently large reef could be constructed to be sustainable despite the anticipated increase in fishing pressure. Alternatively, a reef could be placed in proximity to existing reefs where fishing is restricted or to Marine Protected Areas , thus incorporating into the reef design a source of fish to replace those caught at the fishing reef by anglers.

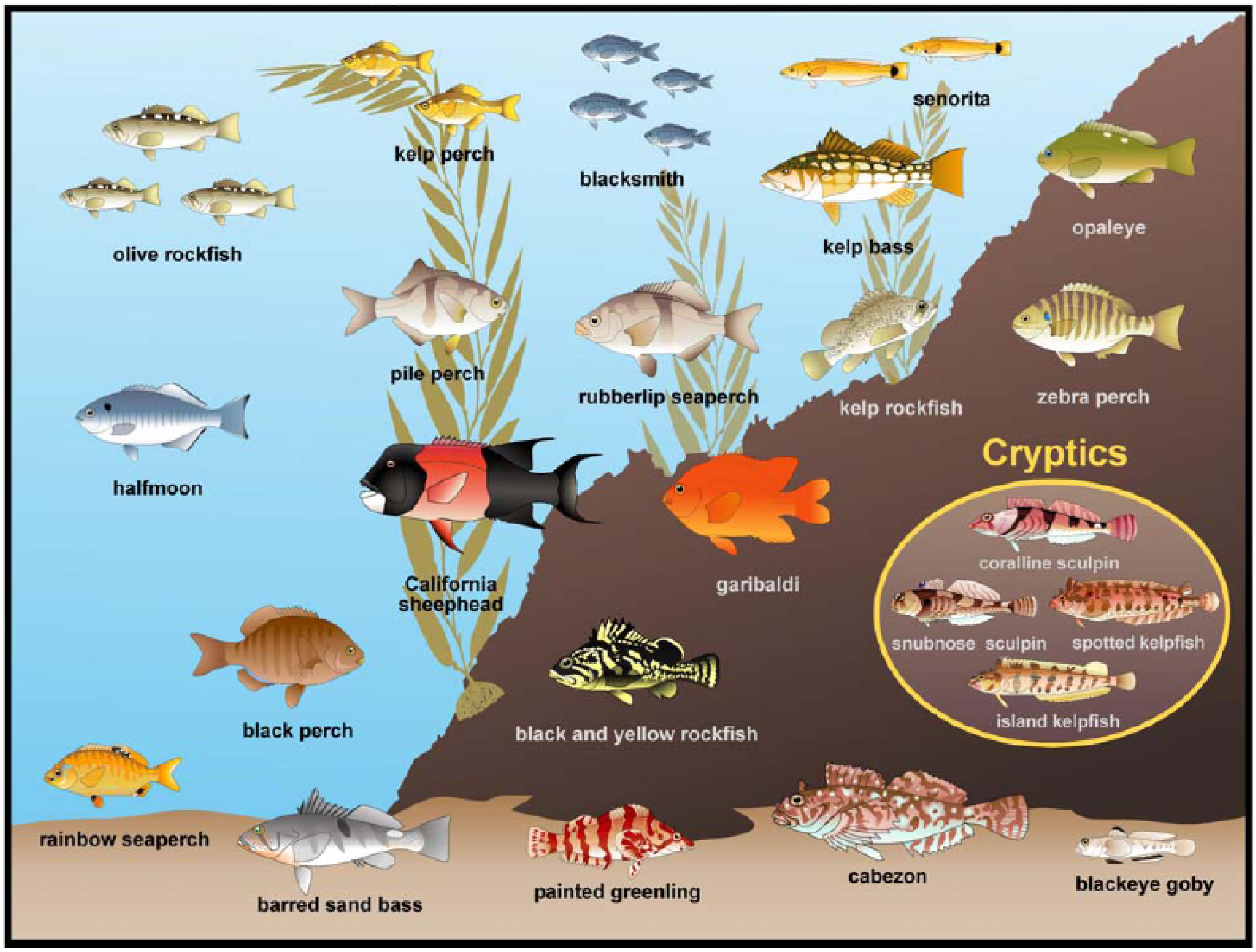
A fishing site enhancement program in Washington state provides one way of increasing the sustainability of fishing on artificial reefs. In 1974, the Washington Department of Fisheries began a marine fish enhancement program that involved building shore-based fishing structures (i.e., piers) and construction of “habitat enhancement” (reefs) around the structures to increase production/density of fish around them (Buckley 1982). These projects found that fishing structures that included habitat enhancement were much more productive and sustainable than those that did not. Also, the design of the enhancement was such that approximately 20 percent of the enhanced habitat was available to anglers using the fishing structure. The remaining 80 percent of the enhanced habitat was established as “production” zones and was protected against fishing from boats. This design resulted in sustainable fishing over a 50- to 10-year evaluation period.

The Washington study described a successional pattern in community structure where the reef community shifted from juveniles who appeared to be seeding unoccupied habitats to adults that appeared to be more resident. The conclusions of this study also suggested that the continuing availability of fish for fishing from pier structures was maximized via three mechanisms: (1) enhancement of the habitat surrounding structure to increase aggregation/production of fish; (2) episodic aggregation events producing periods of high catches; and (3) the presence of local resident fish that maintained catches during periods of low levels of aggregation. The third mechanism was promoted and sustained largely because significant components of the resident fish populations were protected from fishing.

Reefs can have substantial impacts on the local availability of fish that are lower in contamination. Although species that occur on a constructed reef are not the same as those that occur on soft-bottom habitats, constructed reefs support a diverse and productive community, and the species that occur on reefs perform many of the same ecological roles as those that occupy soft-bottom habitats (Ambrose 1994). Also, in a review of the literature pertaining to white croaker, Allen (1999) found that this species is never associated with any hard-bottom substrate, including natural or constructed reefs. Figure A1-2 is a schematic showing the fish assemblage associated with the rocky habitats adjacent to the Los Angeles breakwater (from Froeschke et al. 2005).

A1.3 PROJECT DESCRIPTION AND METHODS

The construction of artificial reefs and fishing access improvements is evaluated in this appendix at a non-site-specific, conceptual level for the MSRP Restoration Plan and programmatic Environmental Impact Statement/ Environmental Impact Report. The Trustees will further develop and design the details of the program as described below during the implementation phase of restoration and will prepare additional environmental documentation pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) prior to final site selection and construction for each reef project.



(Source: Froeschke et al. 2005)

Figure A1-2. Fish assemblage adjacent to the Los Angeles breakwater.

The MSRP reef program will entail two types of activities. The first activity will be the construction of reefs to increase the availability of fish species that are lower in DDTs and PCBs. The second activity will be to implement improvements to fishing access and amenities to promote the use of the newly enhanced fishing sites, heighten awareness of the reasons why reefs were built in the vicinity of the fishing locations, and to act as compensatory restoration for past lost fishing opportunities.

A1.3.1 Reef Development

The development of the reef-building component will follow a five-step sequence: (1) contaminant and angler use evaluation; (2) site selection; (3) reef design; (4) reef construction; and (5) monitoring. This sequence is likely to be iterative, with some or all steps being applied to each constructed reef.

Step 1: Contaminant and Angler Use Evaluation

This step involves developing a detailed understanding of the spatial and species-specific patterns of contamination in the fishes commonly targeted by anglers in the Southern California Bight, and combining this information with information on fishing practices and preferences at different locations as obtained from surveys of anglers. This analysis will be guided by sediment contamination levels, as these levels will be the determiners of local resuspension of contaminants during reef construction and local bioaccumulation levels in the residents of the constructed reef.

The results of the fish contamination survey and the angler survey will be entered into a geographical information system (GIS) database to facilitate analysis and to generate a first-level evaluation of potential sites for reef construction. The fish contamination data will come primarily from the contaminant survey that MSRP is currently conducting in collaboration with the EPA; results are expected late in 2005. These results, coupled with those from the angler surveys that the State of California is conducting as part of the Marine Recreational Fishing Statistical Survey (MRFSS)[2] as well as those conducted by the Trustees and EPA in 2002 and 2003, will identify areas where high levels of angler activity are coupled with a large disparity between contamination levels in soft-bottom versus hard-bottom fishes.

Although detailed data identifying differences in contamination levels among species and locations are not yet available to conduct this analysis, evaluations of previous contaminant data (Figure A1-3) have been used to provide initial indications of likely regions for deployment of artificial reefs (Figure A1-4). Figure A1-3 displays historical data showing levels of contamination in three species of fish commonly collected in the Southern California Bight. At the time of these surveys, white croaker were contaminated above the State of California trigger levels (screening but non-regulatory concentrations of potential concern are indicated by the reference line in Figure A1-3) over a much broader geographic range than the other two species. These earlier data suggest reefs constructed in areas adjacent to the Palos Verdes Shelf may achieve MSRP restoration objectives (Figure A1-4). The updated and more detailed data will be

[2] The MRFSS in California is now an expanded program called the California Recreational Fishing Survey.

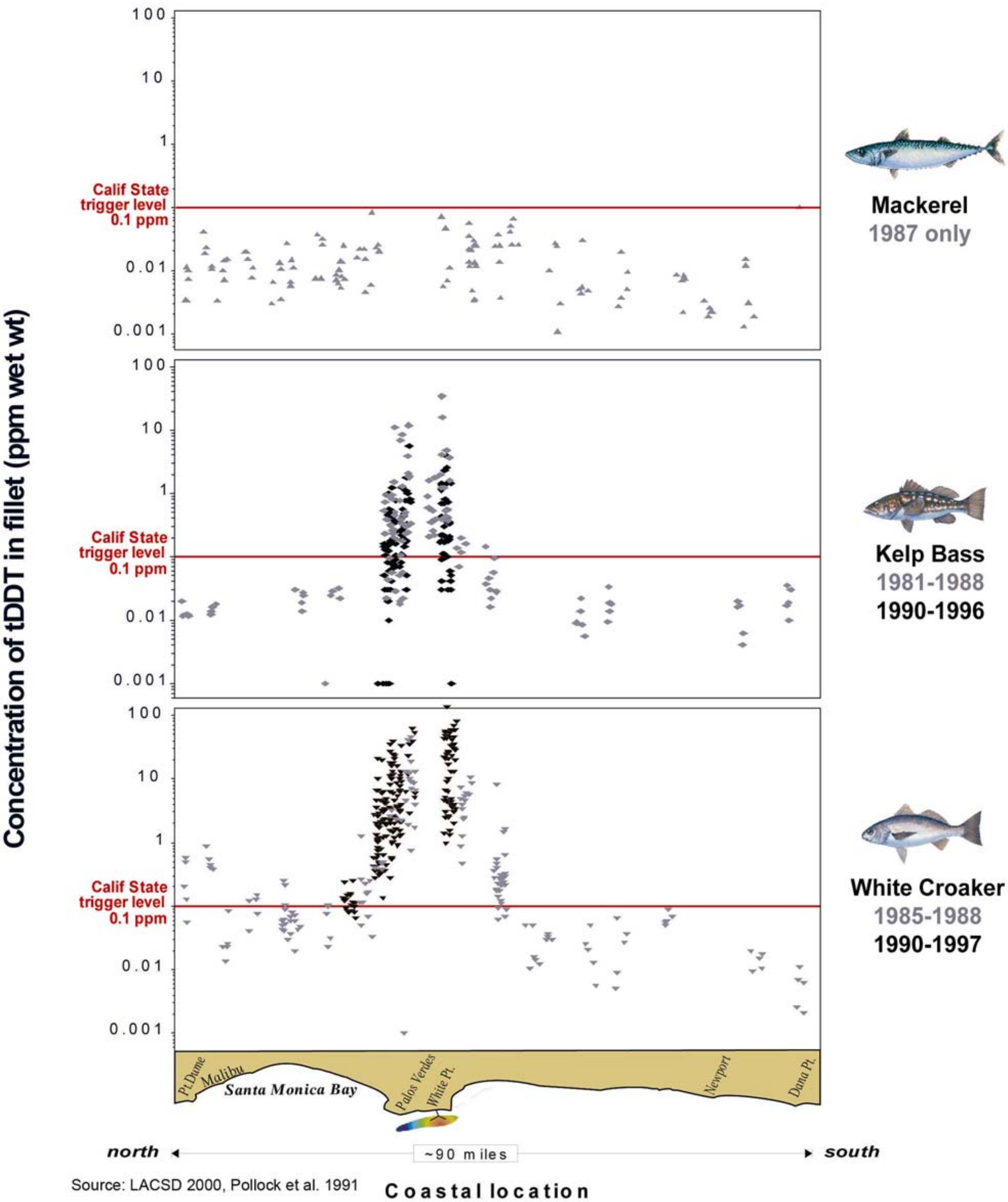


Figure A1-3. DDT in fish fillet between Malibu and Dana Point.

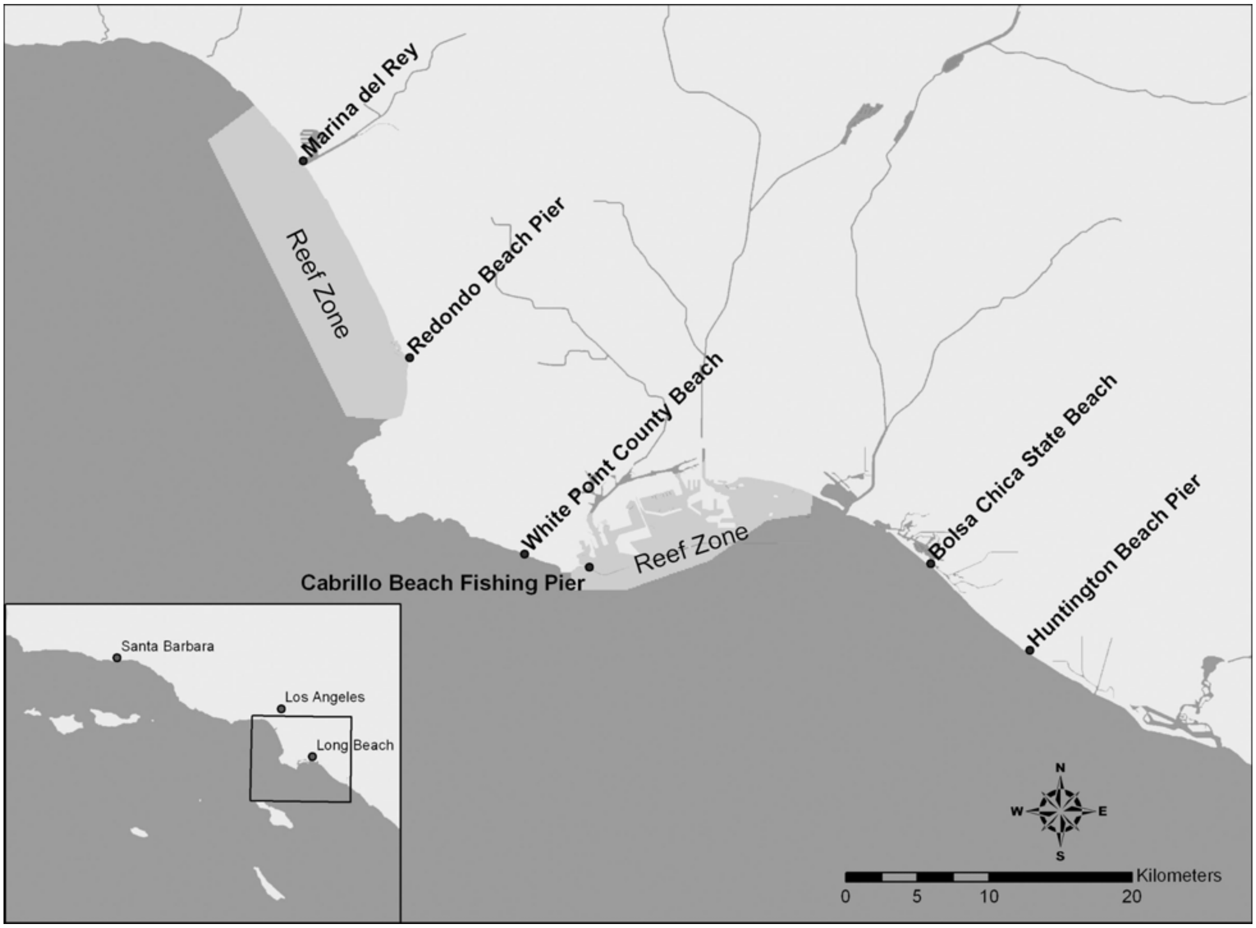


Figure A1-4. Potential zones for deployment of artificial reefs (indicated by gray-shaded areas).

used both to confirm the viability of these regions for restoration reef construction and to provide the detailed information necessary to determine specific project locations within the regions.

Step 2: Site Selection

In Step 2, the Trustees will refine and prioritize site and design considerations for individual reef projects, building on the broader site evaluation performed in Step 1. The Trustees will evaluate a comprehensive set of considerations, including:

- The potential effects of reef placement on sediment transport
- The suitability of the existing bottom substrate for placement of reef material
- The potential effects on navigation and recreational uses
- The presence of historically important sites
- The potential effects on essential fish habitat and species of concern
- The levels of local public support or opposition

- The proximity to other existing reef habitat or kelp beds
- The proximity to point-sources of pollutants (e.g., wastewater outfalls or storm drains)
- The potential for funding partnerships
- Current land management plans for the location.

The site identification step will involve an iterative proposal and review process; an initial list of a small number of candidate sites might be developed, publicly reviewed, and further refined. This step will include consultation with local jurisdictions and publicized workshops for interested parties to participate and comment on potential reef sites.

Placing new reefs adjacent to or sufficiently near existing similar habitat to allow for migration of fish from existing to new reefs will receive priority consideration. If new reefs are placed near existing reefs or kelp beds or are used to bridge gaps between existing isolated reefs, then the new reefs may generate benefits beyond those that would accrue from isolated reef construction. Such bridge or extension reefs could be designed to promote additional functions, such as the creation of nursery areas or the development of diverse reef habitats containing both high- and low-relief features, a range of depths, and structural complexity. Proximity to kelp forest habitats would increase the likelihood of natural recruitment of kelp to the constructed reef.

Shore-based fishing sites will receive highest priority, but offshore sites may be considered for fish production benefits. The justification for placing a higher priority on shore-based fishing sites is that anglers fishing from the shore or from piers generally have fewer choices regarding the habitats over which they fish than do boat anglers. The outcome of Step 2 will be a limited number of sites (e.g., two or three) to carry forward into subsequent steps.

Step 3: Reef Design

Step 3 will determine the final form of the constructed reefs. This step will incorporate results from past and ongoing artificial reef evaluation projects (e.g., the Pendleton Artificial Reef and SONGS), the input of experts in the field, and the limitations associated with the specific reef site identified in Step 2. Considerations to address include material type, the nature of existing sediments in the area, amount of relief, patchy versus even coverage, kelp outplanting versus reliance on natural recruitment of kelp, the fraction of the reef that would be available to anglers for fishing versus the fraction that would be less available or specifically protected for production, and the connections with existing artificial or natural reef habitats. Step 3 will also design the pre- and post-construction monitoring that will take place to determine the effectiveness of the restoration effort. The final result of this step will be supplemental NEPA and CEQA documentation for one or more individual reef construction projects; this documentation will be released for public comment. After public comments are incorporated, permit applications will be submitted.

Step 4: Reef Construction

Step 4 will be initiated after the acquisition of appropriate permits and final design work, including identification of specific construction methods and sources of materials, determination of the contracting and construction management approaches, and establishment of funding partnerships. For planning purposes the Trustees anticipate constructing reefs at two to three locations over a 5-year period.

Step 5: Monitoring and Long-Term Oversight

The purpose of monitoring a constructed restoration reef is to document the abundance, species composition, size frequency, and contamination levels of the fishes that occupy the reef as the community develops. The following discussion provides a template for the fish contaminant component of the monitoring that can be applied to any MSRP reef project. The monitoring of species composition, abundance, and size structure will follow the protocols established as part of the long-term shallow subtidal fish monitoring programs in other parts of California (e.g., the Partnership for Interdisciplinary Studies of Coastal Oceans and the National Parks Service kelp forest monitoring survey).

The Trustees have two fundamental incentives for collecting fish contaminant data from a restoration reef. The first incentive stems from the likelihood that MSRP will be building reefs sequentially rather than simultaneously. Thus, the information on fish species abundance, species composition, and contamination levels gained from one reef project could be applied to the design and location of future reef projects. In this way, the MSRP reef program will be implemented using an adaptive management strategy to maximize the positive impacts of each constructed reef.

The second incentive for monitoring fish contamination levels is that the Trustees will provide empirical confirmation that the reef has improved fishing by increasing opportunities to catch less-contaminated fish. There is good reason to believe that the fish that occupy the constructed reef habitat immediately after construction may differ in contamination levels from those that occupy the reef later because of the successional nature of community development on created reefs. The early inhabitants of a constructed reef are almost entirely transient individuals that move in from other areas and that may reflect bioaccumulation rates in areas adjacent to the reef site. The proportion of resident individuals that reflect bioaccumulation rates more local to the site typically increases as time passes. The monitoring of restoration reefs should reflect the need to estimate contamination levels in fish in both the short term and the longer term.

Contaminant monitoring will cover a suite of species that represents the diversity of eco-types targeted by local anglers. Southern California is home to a diverse assemblage of fishes, and anglers target many of these fish. For example, in 2003 anglers in Southern California reportedly landed over 120 species of fish (RecFin 2005). This taxonomic diversity encompasses a diversity of foraging modes, home ranges, and habitat associations, even within the subset of fish species that frequent reef and hard-bottom habitats. The proposed contaminant monitoring scheme will encompass this diversity by sampling representative species that forage at different trophic levels and are associated with different microhabitat types.

The Trustees plan to adopt a strategy of partnering with other agencies and organizations to obtain pilot-level information on reef designs and placement. This strategy will result in the greatest benefit in terms of achieving MSRP restoration goals. For example, a partnership opportunity exists in a reef project that the Port of Los Angeles (POLA) has proposed off of Point Fermin. The application of the reef-fish contaminant monitoring program to the proposed POLA reef would benefit the MSRP reef planning efforts in at least two ways. First, the POLA reef deployment is likely to occur before any MSRP reef construction. Thus, the fish contamination data from the POLA reef would be available to assist in the siting and design of the MSRP reefs. These data would provide indications of contaminant levels in the fish that in succession occupy such a reef and might be useful in obtaining public acceptance and permitting for MSRP reefs sited in similar areas with transitional levels of sediment contamination.

Second, reef monitoring for the POLA project will also document whether and how fishing practices have been affected by the project. Thus, surveys of anglers will be conducted to determine the effects of the project on fishing practices and preferences. These surveys will identify the fish being caught by anglers and retained for consumption before and after reef construction. This information will aid the Trustees in their efforts to design and construct reefs that have positive fishing benefits.

In the long term, it is anticipated that MSRP-constructed reefs will become part of the existing California artificial reef program, which is administered by the California Department of Fish and Game (California Fish and Game Code Sections 6420–6425).

A1.3.2 Fishing Access Improvements

During the reef development steps outlined above, the Trustees will also consider whether the improvements to fishing access and amenities at the sites under consideration for reefs would complement the restoration of lost fishing services. Several types of improvement will be considered, including parking improvements, construction or extension of piers to ensure optimal fishing access to constructed reefs, and increases in the number of or improvements in fish cleaning stations, lighting, benches, railings, restroom facilities, etc. Interpretive signs, displays, kiosks, or other materials may also be provided to explain to the public the need for and the function of the fishing restoration actions. Consideration and evaluation of improvements to access and amenities at these locations will be conducted in parallel with reef site design and development and will entail close consultation with local and state jurisdictions and interested users.

The Trustees have conducted preliminary analysis of the cost of pier construction and the construction of associated amenities. The unit cost of pier construction appears to be on the order of $200 per square foot or more; thus, the cost of constructing a pier of 50,000 square foot would likely exceed $10 million. Because MSRP restoration funding is limited and the primary objective of this restoration approach is reef construction, the Trustees would likely place a cap on the proportion of funding devoted to access improvements to ensure that sufficient funds are available for reef construction.

A1.4 ENVIRONMENTAL BENEFITS AND IMPACTS

This analysis addresses the environmental consequences of constructing artificial reefs and fishing access improvements at a broad conceptual level, as no specific sites have been proposed or evaluated. Additional NEPA and CEQA documentation will be required to address site-specific environmental considerations.

A1.4.1 Biological

Benefits

Reefs provide habitat for a multitude of marine fishes, invertebrates, and plants. The displacement of the sandy or muddy bottom habitat with a hard-bottom substrate would increase the diversity and may increase the number of the animal and plant biota in the area. Reefs act as nursery and spawning habitat for a variety of species native to the Southern California Bight. Reefs also act as a substrate for the recruitment and growth of giant kelp, which are also an important component of critical nursery habitat for many fish and invertebrate species. In addition, the fish productivity of rocky reef habitat has been estimated to be between 9 and 23 times that of sandy bottom habitat (MEC Analytical Systems 1991).

Recent declines in certain species of groundfish on the west coast, including rockfish complexes, have led to increased restrictions on fishing for these species. To the extent that reefs constructed under the MSRP program function as production sites for these or similar species (e.g., should reef design include a fish production/nursery component that increases the abundances of rockfishes), reefs may benefit the management and recovery of these depleted species of fish.

Because reef-associated fish typically contain lower concentrations of DDTs and PCBs than soft-bottom species, constructed reefs would benefit the biological organisms that prey on fish in the vicinity of the constructed reefs, as the organisms preying on fish would be exposed to reduced levels of these contaminants.

Once constructed, an artificial reef would provide benefits for many decades with minimal operational and maintenance costs.

Impacts

In general, hard-bottom or reef habitat is one of the most important but least abundant habitats in the Southern California coastal marine environment (Cross and Allen 1993). Soft-bottom substrates (i.e., sand and mud) predominate in an overwhelming percentage of the marine area along the coast from Point Dume to Dana Point (Ambrose 1994). Thus, conversion of habitat from soft-bottom to reef on the scale feasible under this restoration program would not significantly reduce the total available soft-bottom habitat to those species that rely on it. It is possible that constructing reefs may impact the availability of some other limited inshore habitat or resource, such as eelgrass beds. Also, soft-bottom habitat in nearshore waters of California are spawning areas for market squid (*Loligo opalescens*), which is an important commercial species in California. In addition, sheltered, shallow soft-bottom areas in certain locations (e.g., inside the Los Angeles and Long Beach Harbor breakwaters) provide important nursery areas for several fish species, including California halibut. The specific locations of each constructed reef will be studied and selected such that limited natural habitats are not covered or compromised.

Artificial reefs are known to be aggregators of marine life; such sites are popular fishing and diving locations because of the large numbers of fish and invertebrates attracted to the structures for habitat and food. Because of the popularity of these sites for anglers, fish mortality could increase in the vicinity of newly constructed reefs. Such an effect might also occur as a result of improvements to fishing access and amenities that increase the number of fishing trips to a site. Thus, before a reef is constructed at a given site, appropriate steps will be taken to ensure that reef design, size, placement, and long-term management will accommodate the anticipated increases in fishing and other uses of the reef site.

At a conceptual level, reef construction projects are not likely to adversely affect threatened or endangered species or essential fish habitat. However, detailed analysis will be performed at a site-specific level before a reef is constructed.

A1.4.2 Physical

Benefits

The benefits of artificial reefs to the physical environment would be nominal. To the extent that the material used to construct a reef is taken from the demolition of concrete structures, the beneficial reuse of this material would divert it from land disposal and conserve a corresponding increment of landfill space. Other trade-offs related to the transportation and disposal of materials (such as reduced air quality impacts relative to land disposal) would occur, but whether they would have net positive or net negative consequences cannot be determined until site-specific implementation factors are determined.

Impacts

The placement of reefs in nearshore areas has the potential to alter the transport of sediment and affect the topography of adjacent subtidal and beach areas. Also, depending on the nature of the soft substrate in a given area, the depth to bedrock, and the slope, hard substrate dropped to the marine bottom may not perform as intended. The potential physical impacts from placing rock or rubble in a given area will be submitted to engineering analysis and supplemental review and evaluation performed.

The placement of concrete or rock materials into marine waters would cause short-term suspension of sediments at the site and result in short-term water quality impacts. The principal effect would be increased turbidity; however, depending on local conditions, the sediments at the reef site might contain elevated contaminant levels. The methods and timing for reef material placement may be adjusted in consultation with regulatory agencies to address such local conditions and reduce the short-term water quality impacts of the construction.

A1.4.3 Human Use

Benefits

Artificial reef construction in areas will displace highly contaminated soft-bottom species and replace them with less-contaminated hard-bottom and water-column species. This result will provide direct benefits to anglers whose fishing opportunities have been impacted by fish consumption advisories. Artificial reefs provide human use benefits beyond fishing, as they are also popular areas for scuba and free diving for purposes of recreation, hunting, and underwater photography. As with the biological benefits, the human use benefits will be sustained for a period of decades or longer with minimal operational or maintenance costs.

Improvements to fishing access may include the addition of various fishing site amenities, including fish-cleaning stations, benches, pier extensions, or parking improvements. Informational panels or kiosks might also be included at reef sites to inform and educate the public on the benefits of the project. Such improvements will be undertaken with the specific intent of improving human use at the fishing site, thereby compensating for past and ongoing lost fishing opportunities, and efforts will be made to ensure functional and aesthetic benefits.

Impacts

Depending on its location and design, an artificial reef can impact various human uses in an area. Potentially impacted uses include recreation (e.g., board, body, or wind surfing) and navigation. Constructed reefs displace soft-bottom species, so the anglers specifically targeting these species at the site would find it harder to catch these fish. The potential impacts to recreational and navigational uses will be a significant consideration as candidate sites are evaluated. One of the purposes of the survey of recreational and subsistence anglers that the Trustees undertook in 2002 and 2003 was to determine fishing preferences at fishing sites along the Los Angeles and Orange County coast. The data generated by this field intercept survey and the follow-up public involvement activities will be used to select sites that minimize negative impacts to anglers who may be exclusively targeting soft-bottom fishes. The survey findings will be included in subsequent site-specific environmental documentation that will be developed by the Trustees. It is unlikely that a reef will be constructed in an area used by surfers (e.g., in high-energy surf areas) because of the tendency of swells and waves to damage or destroy artificial reefs.

Construction activities at fishing sites (e.g., construction improvements to piers and the provision of amenities such as fish cleaning stations, parking, etc.) may cause short-term disruption to users of a site during the period of construction. Steps will be taken to minimize the impacts of construction; these steps will be addressed at the stage when site-specific plans are being considered.

A1.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

Artificial reefs have been constructed in many areas along the coast of California and elsewhere to enhance fisheries and fish production and to replace lost habitat. Studies of previously constructed reefs (including the 5-year pilot reef project near San Clemente) have resulted in a substantial body of knowledge on the likely outcomes associated with different design attributes and implementation approaches. Although the principal purpose for an MSRP reef (i.e., displacing highly contaminated fish and attracting/producing less contaminated fish) may be novel, the likelihood is high that constructing reefs in suitable areas will achieve this purpose. Sufficient data are available to develop reasonable predictions about species abundance and composition in a constructed reef. The degree to which the changes in species composition will lower the contamination levels in the fish caught by anglers at a site can be predicted from measurements of contaminants in similar fish caught near the potential reef sites. Thus, it is feasible to design and place a reef to achieve this purpose; it is also feasible to scale the reef such that it will provide sustainable fishing services.

Appropriately placed artificial reefs increase the diversity of the local marine ecosystem and often attract increased recreational use. Where complemented with above-water enhancements (e.g., improvements to fishing access and associated recreational amenities), reefs are well suited for the goals of both restoring and compensating for lost fishing services.

Several potential reef sites exist within the regions indicated in Figure A1-4. The Trustees have not proposed specific reef sites at this stage. Rather, the Trustees will allocate funds for artificial reef construction and associated fishing access improvements. Selection and design of specific projects will be decided through further analysis, planning, and public review of site-specific proposals. In this context, the Trustees will seek to enter into partnerships with other parties willing to co-fund such work to leverage the use of natural resource restoration funds to obtain as many acres of new reef habitat as possible within the limits of available funding.

Regulatory approval and public acceptance of reef construction projects have been achieved in the past. However, recent efforts by POLA to obtain approval to construct a new artificial reef offshore of Point Fermin have been delayed pending resolution of concerns about the proximity of the site to contaminated sediments on the Palos Verdes Shelf. This case suggests that any proposal to construct a reef for the MSRP objective of displacing contaminated fish will require careful planning and coordination with interested parties. Nevertheless, there is general support for reef construction. Fishing organizations such as the United Anglers have expressed a desire for more artificial reef construction, and regulatory agencies have approved reef construction as a means for mitigating environmental impacts.

A1.6 PERFORMANCE CRITERIA AND MONITORING

Several performance criteria will be used to evaluate the effectiveness of a constructed artificial reef in meeting the Trustees' restoration goals: fish abundance, species composition, fish size distribution, and the fish contamination levels. Abundance and size distribution are important because an increase in fishing services requires sufficient abundances of legal-size fish to replace the displaced soft-bottom fish that occupied the fishing area prior to reef construction. The contamination levels in the fish that occupy the reef are clearly important because the goal is to increase the local abundance of cleaner fish. Each of these parameters may undergo a successional sequence after reef construction, so it will be necessary to implement a monitoring program that includes high temporal resolution (e.g., annual or biannual) monitoring initially followed by more infrequent monitoring later to determine the sustainability and stability of the reef community.

A1.7 EVALUATION

The Trustees have evaluated this restoration action against the screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. This action will address the loss of natural resource services provided by fish, which was one of the natural resource injuries brought forward by the Trustees in the Montrose case. Species composition and the contamination levels of the fish occupying the reef site can be measured prior to and after reef construction and the net change in the availability of cleaner fish can be estimated by combining species distribution with species-specific contamination levels. Artificial reef construction has been shown to have pronounced local effects on species composition through the combined effects of production and attraction, so a reef is highly likely to produce local changes in species composition. Thus, larger-scale (i.e., regional) increases in population levels will not be required to have the desired restoration effect.

This action will require supplemental environmental documentation that will be prepared after development of site-specific proposals pursuant to NEPA and CEQA.

A1.8 BUDGET

The Trustees have previously developed estimates of the cost and amount of artificial reef needed to replace the contaminated biomass of fish caused by the Montrose contamination (Ambrose 2000). These estimates ranged from $60,000/acre to $318,000/acre based on the construction of 1 to 9 acres of reef. This analysis revealed that the smallest reefs (1 to 2 acres) had by far the greatest per-acre construction costs ($318,000 and $250,000 per acre for the smallest and second smallest reefs, respectively). This estimate is subject to substantial variability due to several unknowns, such as the purchase cost of materials for reef construction. Furthermore, the density of reef material contributes substantially to the costs associated with reef construction. The SONGS reef project experienced a 20 percent decrease in construction costs between its high-density and its low-density reef treatments. The results of the SONGS analysis may help to identify the most cost-effective design for MSRP reefs.

This restoration program will proceed incrementally, with a goal of constructing two to three reefs in the 5-year period during the first phase of restoration. The costs of such a program may be broadly estimated as follows:

- Reef design, permitting, construction, and monitoring: Ambrose (2000) estimated an average cost of $170,000 per acre. Assuming 10 to 12 acres of coverage for each reef, each reef project would cost $1 million to $2 million. The 22.4-acre artificial SONGS reef cost $2.7 million to construct, suggesting construction costs of approximately $120,000 per acre.
- Construction of fishing access improvements: The cost of this construction has been estimated based on several potential actions that could be implemented at a number of fishing sites (MSRP Administrative Record). The estimated costs associated with building a new pier are approximately $200/ft^2, so the total cost of building a new pier that is similar in size to other piers in Southern California (e.g., the Redondo Pier, which is 70,000 ft^2) would be approximately $14 million. Thus, matching funds would be critical for undertaking such a project. The cost of installing access improvements to existing piers has been estimated to range from $92,000 to $368,240 depending on location and the needed improvements.

The two estimates cited above suggest a potential range of costs for each reef and access project of $2 million to $4 million.

Appendix A2

Provide Public Information to Restore Lost Fishing Services

A2.1 GOALS AND NEXUS TO INJURY

The goal of this action is to build on the public outreach and education work initiated by the U.S. Environmental Protection Agency (EPA) through the establishment of the Fish Contamination Education Collaborative (FCEC). FCEC is a federal, state, and local partnership project aimed at addressing public exposure to contaminated fish in the Southern California coastal area. The FCEC focuses on educating the public about the human health hazards associated with DDT and PCB contamination in fish. Thus, the FCEC program provides information to help people reduce their exposure to DDTs and PCBs from the fish they eat.

The Natural Resource Trustees for the Montrose case (Trustees) will expand this ongoing effort to increase fishing services by providing information to anglers that allows them to make sound decisions about where and for which species to fish. The Trustees will also provide outreach materials that establish the link between the ecology and life history of a particular species and its tendency to bioaccumulate contaminants. This information would enable people to make knowledgeable choices about where, when, and for which species to fish to minimize their exposure to contaminants. This action has a strong nexus to the ongoing loss of natural resource services caused by the contaminants of the case (which have led to the imposition of state fishing advisories and other limitations on the human use values of fish).

A2.2 BACKGROUND

For several decades, high levels of DDTs and PCBs have been found in several species of fish commonly caught by anglers along the Southern California coast. White croaker, surfperches, kelp bass, and other species of fish collected from several sites along the Los Angeles County and Orange County coasts carry concentrations of DDTs and PCBs in edible tissues that exceed the guidelines and standards set by federal and state agencies for safe consumption (OEHHA 2003). This situation represents a loss of natural resource value to the public and constitutes a per se injury under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations for damage assessment (Title 43 Code of Federal Regulations [CFR] Part 11.62).

The current state fish consumption advisories were established in 1991 for Southern California coastal locations between Point Dume and Dana Point. These advisories identify eight species and species groups of fish in eleven locations; anglers are advised to either not consume these fish or limit their consumption of these fish (OEHHA 2003). In addition to these fish consumption advisories released by the State of California, the EPA and the U.S. Food and Drug Administration (FDA) have released general fish consumption advisories for locally caught fish (USEPA 2004b) that are based largely on mercury contamination.

The federal advisories suggest that in the absence of site- and/or species-specific advisories generated by local governments, anglers should consume no more than one meal per week of locally caught fish. Thus, consumption of fish should be limited to a maximum of one meal per week where data are absent or do not include mercury concentrations. If data from the Montrose Settlements Restoration Program (MSRP)/EPA-funded fish contamination survey identify species and/or locations where contaminant levels are low enough that the consumption recommendations may be increased to more than one meal per week (i.e., above the EPA/FDA recommendations), this result would constitute a clear increase in fishing opportunities for those species and locations.

Because contamination levels are not uniform but vary by location and species of fish, and because existing data on fish contamination are out of date and incomplete, it is difficult for anglers to make informed choices about fishing and fish consumption. In some instances, this lack of current information may result in anglers and those to whom they supply some of their catch being exposed to DDTs and PCBs through unknowing consumption of contaminated fish. The EPA's current outreach program specifically addresses such incidences. However, in other cases, the lack of current and complete information may lead potential anglers to alter their fishing habits or avoid fishing altogether out of concern about fish contamination and the uncertainties surrounding it. This issue is the one on which the Trustees will focus their attention.

A2.2.1 EPA Institutional Controls

The EPA established a program of institutional controls (ICs) in 2001 as a set of initial actions to address the immediate human health risks associated with the consumption of fish contaminated with DDTs and PCBs from the Palos Verdes Shelf. Public outreach is one component of the ICs program.

The objectives of the public outreach program established by the EPA are to reduce the health risks associated with eating fish contaminated with DDTs and PCBs by increasing awareness and understanding of fish consumption advisories and building local capacity to address fish contamination issues. To implement this work, the EPA convened a Seafood Contamination Task Force, which is now known as the FCEC. The FCEC is a consortium of federal, state, and local government agencies, local institutions, and community-based organizations that provides a means of coordinating the development and implementation of a public outreach program with direct stakeholder involvement at all levels. The FCEC also serves as a decision-making body for the public outreach and education component of the ICs program and serves in an advisory role to the EPA on other Palos Verdes Shelf IC activities.

The EPA started the full implementation of the public outreach and education program in January 2003. The MSRP Trustees have been an active partner in the FCEC from its beginning and have consistently provided technical support and materials for the program. The materials provided by the Trustees were used as part of an outreach pilot project that was designed to evaluate the viability of outreach as a restoration action. The response to these materials has been overwhelmingly positive, with numerous requests for additional and updated materials.

A2.2.2 The Role of MSRP

With adequate fish contamination data, it is possible to identify and promote optimal fishing opportunities and thus increase public use and enjoyment of fish services. Furthermore, by expanding the information available to encompass other contaminants that are of general concern with regard to fish consumption (e.g., mercury) and including analyses of fish that are less likely to be contaminated, more complete advice regarding the risks and benefits of eating fish can be provided to the public.

This action complements and expands on the current outreach efforts spearheaded by the EPA, which focus on warning citizens about where they should avoid fishing or which fish they should avoid catching and eating based solely on DDT and PCB concentrations. The EPA is not able to include analyses of and therefore outreach regarding mercury due to limitations imposed on them by Superfund laws. Although the information generated by the EPA's outreach efforts is a critical component of addressing the human health risks associated with consuming fish, this information provides limited guidance regarding what is safe to eat, largely because the basis of the information is limited to DDTs and PCBs and species that are particularly highly contaminated by DDTs and PCBs.

A2.3 PROJECT DESCRIPTION AND METHODS

Public outreach and education is a key strategy of the MSRP on a number of levels. The MSRP already employs outreach and education activities as a means of involving the public in restoration planning and plans to use these activities to keep the public informed and involved as restoration implementation proceeds (see Section 5.4.1 of the Restoration Plan). Under the category of fishing and fish habitat restoration, public outreach and education is proposed as a specific action for restoring lost natural resource services by providing information to people that allows them to make knowledgeable choices about where to fish, and what to fish for. This information differs from, and will complement, the critical information generated by the EPA regarding fish species and locations to avoid.

The program to provide public information to restore lost fishing services would be designed in close coordination with the existing FCEC organization, with the goal of integrating contributions from both MSRP and the EPA into a common and complete message. MSRP would continue to work in close partnership with FCEC and take advantage of many of the existing programs, points of contact, outreach materials, and other aspects of the FCEC. This approach would reduce public confusion, reduce the potential for these agencies to send out mixed messages, and potentially result in substantial cost sharing.

As natural resource agencies, the agencies that serve as the Trustees will also develop outreach materials that provide a link between fish as living marine resources and the risks and benefits they provide to their consumers. Contaminant bioaccumulation rates largely depend on the specific ecological and life-history strategies of a fish. Factors such as habitat use, migratory behavior, age, size, foraging mode, and preferred prey all play a critical role in the level of health risk that a fish imposes on its consumer. Thus, if anglers learn about the ecology and life history of the fish that they typically encounter, they can enable themselves to make more informed decisions about what to eat and what to throw back.

Gathering updated and accurate information on the levels of contamination in the fishes inhabiting the coastal waters of the Southern California Bight is essential if the Trustees are to provide public information on the species that are safe to target for fishing. This gathering process includes continuing to identify and investigate the species that may not impose significant human health risks. Updated information will enable the Trustees to distribute better information to anglers about the species and the locations for fishing that offer minimal contaminant-related threats. Also, if contamination levels have changed since the data for the current advisories were gathered (1987), some advisories my need to be revised or eliminated.

In collaboration with the EPA, the Trustees have already implemented a survey of fish contamination levels for 23 species or species groups in the area from Point Dume to Dana Point.

This data set, once analyzed, will provide a context for the development of restoration projects and highlight the areas that need additional sampling to better understand where restoration activities may be implemented or where the contamination levels are particularly dynamic (e.g., at the edges of the highly contaminated areas).

The specific activities and products of the public information program on fishing will be developed in a work plan once this Restoration Plan has been approved. Although the Trustees will not provide funds to construct specific facilities or support specific staff positions, the budget for the project mentioned above will include a portion to fund the design and production of outreach materials, including stationery or traveling graphic exhibits for learning centers and associated literature for dissemination, signage, advertising spots, public service announcements, pier outreach, or other such activities to dispense information to the public. The Trustees hope to cooperate with the following groups in this endeavor:

- Palos Verdes Peninsula Land Conservancy (PVPLC): PVPLC submitted a proposal requesting supplemental funding to construct an interpretive center at the White Point Nature Preserve. Although MSRP will not fund the construction of specific facilities, the Trustees agree that because this center will be located near the wastewater outfalls where the contaminants of the Montrose case originally entered the marine environment, this center would be a prime location for an educational exhibit. Another reason why the center would be a prime location for an exhibit is the potentially large number of people affected by the Montrose contaminants that the center would be able to reach.
- Marine Mammal Care Center (MMCC)/Center for Marine Studies (CMS) at Ft. MacArthur: MMCC and CMS submitted several proposals for funding for educators and for transportation to expand their current outreach and education programs. Although MSRP will not fund specific staff positions or transportation, the Trustees feel that the location and missions of the MMCC and CMS make Ft. MacArthur another well-suited place for educational exhibits.
- Other groups: The following list shows groups the Trustees currently work with and other groups that the Trustees hope to work with in the future to develop and disseminate additional outreach materials:
    - FCEC
    - Cabrillo Marine Aquarium
    - Long Beach Aquarium of the Pacific
    - EALab
    - Channel Islands National Park
    - Channel Islands Marine Sanctuary

This list is by no means exhaustive and will grow to include other groups as outreach opportunities are identified and expanded.

A2.4 ENVIRONMENTAL BENEFITS AND IMPACTS

A2.4.1 Biological

Benefits

Because this action involves public outreach and education rather than directly affecting biological habitat or organisms, the Trustees do not anticipate any direct benefits to biological resources. However, as part of their message, the Trustees intend to encourage conservation-minded fishing (including the careful handling and release of fish that are not retained by anglers for consumption), which may provide benefits to fish populations.

Impacts

Because this action involves public outreach and education, the Trustees do not anticipate any direct adverse impacts to biological resources. Should the public information lead to changes in fishing practices in the region, it is possible that fishing exploitation of certain cleaner species of fish would increase. It is also possible that the public information that the action provides may lead to increased exploitation of fish populations in locations identified as having fish lower in contamination. The degree to which this public information program would result in increased fishing mortality of certain species and/or at certain locations is not expected to be significant. However, the Trustees will consider both contamination levels and vulnerability to over-fishing as factors when they provide fishing advice to anglers. The Trustees will not advise anglers to focus fishing activity on any species that is currently over-fished or at risk of future over-fishing due to population status or specific life-history characteristics that might make that species more vulnerable to over-fishing. Also, the Trustees will encourage anglers to comply with all state fishing size and bag limits that are established to ensure sustainable fishing.

A2.4.2 Physical

Benefits

This action will not have benefits with regard to geology/earth resources, water resources, oceanographic and coastal processes, air quality, or noise.

Impacts

This action will not have negative impacts on geology/earth resources, water resources, oceanographic and coastal processes, air quality, or noise.

A2.4.3 Human Use

Benefits

The development and dissemination of better data on fish contamination (including information on the locations and species of fish that offer reduced contaminant-related risk) will lead to improved recreational benefits for anglers and could potentially lead to improved human use of ocean fish resources. By clarifying the current state of contamination in fish and providing advice to anglers about locations and species that do not trigger health advisories, this action directly addresses the loss of natural resource services caused by elevated levels of contamination that have led to the issuance of directives to limit or ban consumption of several species of marine fish.

Impacts

Because this action focuses on providing information that will tend to promote fishing rather than restrict fishing, the action will not have negative impacts on human use. The action may have minor impacts to aesthetics depending on the design, size, and placement of signs. The designs of the program signage would be adopted from the previous designs developed and employed by the State of California and the county health departments in the study area. The signs would be placed in consultation with appropriate local authorities and in coordination with groups conducting outreach activities (such as the FCEC) in such a way as to minimize any impacts to the aesthetics of the surrounding area and avoid duplication of signage and/or message.

A2.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

Education and awareness programs, through their display signs and brochures, nearly always attract public attention. Successful public educational programs instill knowledge and appreciation of the subject considered. This approach has a high probability of increasing human use and enjoyment of fishing resources in the targeted areas.

A2.6 PERFORMANCE CRITERIA AND MONITORING

Public feedback and reaction will be the primary means of monitoring the success of the outreach and educational activities of this action. The action will require the periodic updating and replacement of outreach materials to be effective over time due to the dynamic nature of contamination levels in the fish and changes in state fish consumption advisories.

A2.7 EVALUATION

Lack of public awareness about where fish contamination is a problem along the Southern California coast has significantly contributed to the loss of the natural resource services that fishing provides. Current outreach efforts spearheaded by the EPA provide critical information regarding the risks imposed by DDTs and PCBs, but do little to restore the faith in the resource itself, in general due to the EPA's inability to seek out fish that provide minimal human health risks. The Trustees have evaluated this action against the screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these criteria. The Trustees have determined that this action will provide immediate benefits to human uses of injured natural resources and will be a cost-effective means of restoring the lost fishing services that have resulted from the contamination at issue in the Montrose case.

A2.8 ESTIMATED BUDGET

The Trustees will develop a work plan for public outreach and education efforts on fishing that addresses the specific components of the action and assumes close collaboration with the FCEC. For planning purposes, the Trustees have initially assumed that approximately $1 million would be used to conduct outreach, develop and produce materials, obtain and review additional contamination data, and perform other activities related to this restoration action.

Appendix A3

Restore Full Tidal Exchange Wetlands

A3.1 GOALS AND NEXUS TO INJURY

The objective of this restoration action is to contribute to the restoration of coastal wetland/estuarine habitats that have direct tidal links to the ocean and serve as nursery habitats for fish, especially species that are targeted by ocean anglers. This action has nexus to the restoration objective of improving fish and the habitats on which they depend, as described in Section 4 of this Restoration Plan. The nexus between this action and the restoration objective of improving fishing impacted by state consumption advisories is not as direct or measurable. To the extent that wetlands restoration increases the production of recreationally valuable species that are lower in contamination and that eventually inhabit ocean fishing sites, then the restoration goal of “improving fishing” would also be met.

A3.2 BACKGROUND

A3.2.1 Importance of Wetlands as Nurseries

Coastal wetlands serve as nursery habitat for a diverse assemblage of marine fishes. The importance of wetlands/estuaries as nurseries is generally attributed to their higher productivity and warmer water temperatures (which promote fast growth rates in juvenile fish) as well as to the protection they provide from physical disturbance and larger ocean-resident predators (McHugh 1967, Boesch and Turner 1984). Examples of wetland-nursery- or estuarine-nursery-dependent species come from both the east and west coasts of the United States and from all around the world. In the Southern California Bight (SCB), wetlands are limited in size and many have been eliminated or otherwise filled in by coastal development However, those wetlands that still exist harbor juveniles of a suite of species that depend on wetlands for nursery habitat (Horn and Allen 1981).

The California halibut *(Paralichthys californicus)* uses wetlands as nurseries throughout its range. Wetlands in California have been reduced to a small fraction of what was historically present on the coast, and it has been speculated that this reduction limits the production potential for species like California halibut, and that declines in landings of this species in Southern California are associated with the dredging and filling of bays and wetlands (CDFG 2001). Although it is apparent that California halibut are currently fished at a sustainable level, some speculate that the fishery could sustain much higher levels of fishing mortality if wetland nursery habitat was increased. A study of the early growth, development, and survival of California halibut (Kramer 1991) found that juvenile halibut settled in both bays and the open coast, but juvenile survival was much higher for those that settled in the bays. The author further concludes that those California halibut that settled in the open coast either moved into the bays after settlement or died, suggesting that California halibut are highly dependent on bays for nurseries.

A3.2.2 Importance of Wetland-Dependent Species to Anglers

Some wetland-dependent fish species are highly desired by local sport and subsistence anglers across most fishing modes. For example, in a recent survey of fishing practices and preferences in the SCB conducted by the Natural Resource Trustees for the Montrose case (Trustees) and the U.S. Environmental Protection Agency (EPA), anglers were asked which species of fish they were “trying to catch” (MSRP and USEPA 2004). In the anglers’ replies, California halibut or barred sand bass, two species that use coastal wetland habitats, were consistently included in the top three species desired by anglers for all modes of fishing. White croaker, a species subject to consumption advisories and fishing restrictions in the region, was not included in the top three most-sought-after fish species for any fishing mode. However, when responding to a question on what species they typically catch, anglers collectively identified white croaker as being among the most commonly caught species, and California halibut was not. Furthermore, contaminant analysis of halibut collected in the SCB indicates that California halibut may contain lower concentrations of DDTs, PCBs, and mercury than other fish commonly caught by pier anglers, such as white croaker. Thus, if the Montrose Settlements Restoration Program (MSRP) were to contribute to an existing wetland restoration project that would improve the viability of the restored wetland as a nursery habitat, MSRP could potentially increase the availability of halibut and potentially other species for both shore-based and boat-based anglers in the areas affected by the Montrose contaminants.

A3.3 PROJECT DESCRIPTION AND METHODS

This restoration action is described at a non-site-specific, conceptual level for this Restoration Plan and programmatic Environmental Impact Statement/Environmental Impact Report. The Trustees will further develop the design details of the action as described below. Additional National Environmental Policy Act (NEPA) and/or California Environmental Quality Act (CEQA) documentation will be required prior to any final site selection and construction.

Through this action, the Trustees will use a portion of the Montrose settlements to contribute to one or more coastal wetlands restoration projects in Southern California. Several such projects are at various stages of planning. Given the high costs of sizable wetlands restoration actions in California and the existing multi-agency framework for regional planning, the Trustees do not propose that MSRP fund and implement such a habitat restoration project in its entirety. Providing improved wetland habitat for fish may be more cost-effective and within the range of funding available under MSRP if the action were to cover the incremental costs of incorporating improved fish habitat into existing plans for restoration.

Several potential opportunities exist for MSRP to participate in restoration projects in Southern California without having to bear the total cost of the restoration. The Trustees have preliminarily reviewed a list of projects compiled by the Southern California Wetlands Recovery Project (WRP) (www.coastalconservancy.ca.gov/scwrp). The list of potential projects in the WRP inventory covers a larger geographic area and includes a larger variety of wetland types than would be suitable for MSRP objectives. Nevertheless, this list may be screened to identify the projects that contain open water and salt marshes and are in the study area.

The Trustees consider the following to be the fundamental characteristics required for restored wetlands to function as marine fish nurseries: full tidal exchange over the majority of the year, suitable water depth, substrate, food sources, and cover. The components of wetland restoration projects that apply to the Trustees’ objectives would likely relate to acquiring land, sediment removal or reducing sediment input, opening or protecting channels to the ocean that provide full tidal exchange, creating deeper areas or channels that provide refuge for juveniles during low tides, and establishing eelgrass beds, which have been shown to be an important nursery-habitat characteristic for marine fishes. To accomplish this restoration action, the Trustees will develop a comprehensive set of evaluation criteria, review potential projects with WRP representatives and others, and potentially request the submission of proposals from existing project proponents for MSRP review and selection. As an additional selection criterion, priority will be given to projects whose plan includes an agreement among the participating agencies to allow for the continued protection of the restored wetland in perpetuity. Such an agreement would preferably state the agency that will be responsible for the long-term maintenance of the site, as in the Batequitos Lagoon project description, where the California Department of Fish and Game is designated as being responsible for long-term maintenance (Merkel and Associates 2003).

This restoration action will likely entail MSRP partnering with agencies or groups that are leading the planning, design, and implementation of large wetland restoration efforts that still have incomplete commitments for funding and that offer opportunities to affect the final design and function of the site identified for habitat restoration. Although proximity to the Palos Verdes site will be included as a selection criterion, the Trustees believe that restricting site selection to wetlands local to the Palos Verdes Shelf (i.e., within the boundaries of the Palos Verdes peninsula) may limit opportunities too severely and lead to the elimination of projects that might provide significant fish habitat benefits. Also, because halibut and other coastal species dependent on wetlands are highly mobile, the Trustees believe that the effects of wetland restorations on fish habitat are likely to provide regional benefits. Thus, projects located within the boundaries of the Southern California Bight will be considered to have sufficient geographic nexus to the injured fish habitats on the Palos Verdes Shelf to satisfy this criterion. At present, it is not clear whether greater benefits may be derived from identifying areas for land acquisition for new restoration or from contributing to ongoing restoration in areas that are most likely to result in nursery habitat for the California halibut and other sport fishes.

A3.4 ENVIRONMENTAL BENEFITS AND IMPACTS

The environmental consequences of wetland restoration actions are addressed at a broad conceptual level, as no specific sites have been proposed or evaluated for this action. Subsequent NEPA and/or CEQA documentation will address site-specific environmental considerations.

A3.4.1 Biological

Benefits

The restoration of full tidal exchange wetlands along the Southern California coast will have numerous ecological benefits and, more specifically, will provide increased and/or improved habitat for several species of marine fishes that depend on such habitat for portions or all of their life histories. Wetlands have been studied extensively to document their numerous functions and values (USEPA 2001, Greeson et al 1979). Once wetlands are restored, they have the potential to serve as nursery habitat for multiple fish species for a period that could span decades or more provided the wetlands are protected from development or other forms of impacts.

Primary sport fish species that rely on wetlands as nurseries include spotted sand bass, California halibut, and, to some extent, barred sand bass. Spotted sand bass experience population boom and bust fluctuations that appear to be linked El Niño–driven fluctuations in sea surface temperature (Allen, et. al. 1995). This species is dependent on wetlands for its entire life history, so the quantity and quality of available wetland habitat will directly affect the overall abundance of this species. California halibut utilize wetland habitats (among other coastal habitats) as nurseries during their juvenile period. Although California halibut populations are currently considered to be stable and managed at a sustainable level, their abundances are not considered to be at historical levels. An analysis of the California halibut population suggests that historical fluctuations in abundance occur over an approximate 20-year time scale, but that landings declined during the 1970s and appear now to be maintained at a level far below their historical levels, possibly due to reductions in available wetland habitat. Presumably, as wetland habitats are restored, population abundance and therefore the level of sustainable fishing mortality will increase. Juvenile barred sand bass use subtidal wetlands as nurseries along with other shallow nearshore waters (CDFG 2001)

Fully functioning estuarine wetlands and embayments provide several benefits to the species of fish sought by coastal anglers. These wetlands not only serve as habitat during critical life stages for halibut and other species, but also increase primary production and promote production of forage fish that are prey for other marine species of fish. Specific wetland restoration benefits may be evaluated at two levels that reflect the two fish-related MSRP restoration objectives: (1) restore fish and the habitats on which they depend and (2) restore lost fishing services.

Impacts

The biological consequences of wetlands restoration projects are largely beneficial, but such projects usually involve trade-offs between different and sometimes competing biological resources and uses. Analysis of specific impacts is beyond the scope of this Restoration Plan, as the Trustees have not identified a specific project or projects toward which they would contribute funding. It is anticipated that the lead agencies for the wetlands restoration work to which MSRP funds are contributed will conduct the NEPA/CEQA analysis at a later date.

A3.4.2 Physical

Benefits

Intertidal wetlands have been credited as providing a broad benefit to a variety of resources (USEPA 2001, USEPA 2005a). These benefits include biological diversity, water quality improvement and biogeochemical cycling, atmospheric maintenance, hydrologic cycle roles (including groundwater replenishment), flood control (including storage and flow reduction), shoreline erosion control, and recreation. Specific analysis is beyond the scope of this Restoration Plan, as the Trustees have not identified a specific project or projects toward which they would contribute funding. It is anticipated that the lead agencies for the wetlands restoration work to which MSRP funds are contributed will conduct the NEPA/CEQA analysis at a later date.

Impacts

Wetlands restoration planning and design requires thorough analysis of a number of physical issues, including the hydrological the consequences of modifying landscapes, the identification of the disposal requirements for dredged material, and others. Specific analysis is beyond the scope of this Restoration Plan, as the Trustees have not identified a specific project or projects toward which they would contribute funding. It is anticipated that the lead agencies for the wetlands restoration work to which MSRP funds are contributed will conduct the NEPA/CEQA analysis at a later date.

A3.4.3 Human Use

Benefits

Wetlands provide numerous active and passive recreational use values, including birding, boating, fishing, and other uses. Specific analysis is beyond the scope of this Restoration Plan, as the Trustees have not identified a specific project or projects toward which they would contribute funding. It is anticipated that the lead agencies for the wetlands restoration work to which MSRP funds are contributed will conduct the NEPA/CEQA analysis at a later date.

The measurement of the direct benefits of any single wetland restoration project toward restoring the lost fishing services caused by the contamination at issue in the Montrose case may be difficult (Witting, in prep). The amount of restored halibut nursery habitat required to result in a measurable increases in the availability of California halibut can be roughly estimated using available catch data and the densities of juvenile California halibut in existing wetlands. Tagging studies indicate that adult halibut move long distances both up and down the coast and to offshore islands. This finding suggests that wetland restoration activity would have to result in a population-level increase in California halibut before specific benefits to anglers affected by fish consumption advisories at specific coastal sites could be measured. Given that the adult halibut population size and catch varies from year to year (one standard deviation is about 31 percent of the mean population size), it is likely that small increases in abundance would not be measurable.

Although no single wetland restoration effort would likely result in a measurable increase in the population size of California halibut, the collective beneficial impacts of many coastal wetland restoration projects in California may contribute significantly to increasing halibut abundance, to the extent that the projects involve the creation of wetland habitats that act as juvenile halibut nurseries. Thus, the MSRP contribution to coastal wetland restoration will contribute to this larger effort, but by itself may not increase fishing services for halibut to a degree that is readily measurable.

Impacts

Wetlands restoration may impact current recreational and other human uses of sites slated for restoration. Specific analysis is beyond the scope of this Restoration Plan, as the Trustees have not identified a specific project or projects toward which they would contribute funding. It is anticipated that the lead agencies for the wetlands restoration work to which MSRP funds are contributed will conduct the NEPA/CEQA analysis at a later date.

A3.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

This action is, in concept, highly feasible because it entails contribution to existing wetland restoration efforts and will be incorporated as a portion of a broader design. The methods employed by this project will be standard, well-established methods that have been used for wetland restoration in many areas throughout the country.

Wetland restorations are likely to involve significant initial costs, including those associated with land acquisition, design, and engineering. However, the long-term costs are typically limited to monitoring and perhaps enforcement.

The Trustees will only consider contributing to wetland restoration efforts with plans that either already include or would be modified as a result of MSRP financial support to include the specific habitat components identified in this action. Thus, regulatory and public acceptance is likely to be high.

A3.6 PERFORMANCE CRITERIA AND MONITORING

The Trustees will adopt and contribute to the performance criteria and monitoring approach developed by the lead agency associated with the wetland restoration. The Trustees will limit their performance criteria to evaluating the restored wetlands ability to function as a nursery rather than evaluate the specific project’s ability to change the fishing services in areas affected by fish consumption advisories.

A3.7 EVALUATION

The Trustees have evaluated this action against all the screening and evaluation criteria developed to select restoration projects and have concluded that this action is consistent with these selection factors. The Trustees have determined that this type and scale of action will provide long-term benefits to fish and the habitats on which they depend. This action will also provide broader ecological benefits and could contribute to improvements in coastal fisheries in areas currently affected by consumption advisories.

Further NEPA/CEQA analysis will be performed for this action prior to implementation. The lead agency or agencies for the overall wetlands restoration efforts to which MSRP funds are contributed will conduct the NEPA/CEQA analysis.

A3.8 BUDGET

The current work plan for the WRP identifies over $300 million in funding needs for the restoration of Southern California wetlands. Only a portion of these identified needs entail actions that restore full tidal exchange wetlands; however, the funding needs of this portion greatly exceed available MSRP restoration funds. For Phase 1 of restoration, the Trustees will contribute a portion of the $12 million allocated to restoration of fishing and fish habitat. Specific allocation of these funds between wetlands restoration and other fishing and fish habitat restoration work will depend on the funding partnerships identified and the specific needs of individual projects. The Trustees anticipate that funding for wetlands restoration will not exceed 25 percent of funding allocated to restoration of fishing and fish habitat as a category.

Appendix A4

Augment Funds for Implementing Marine Protected Areas in California

A4.1 GOALS AND NEXUS TO INJURY

The goal of this action is to improve fish habitat function in Southern California by augmenting the funds needed to evaluate and implement Marine Protected Areas as part of an ecosystem-based management approach for fishery resources. The primary focus of this action will be to provide needed funds for the implementation of the recently established Channel Islands network of Marine Protected Areas (MPAs) to ensure that they provide the best possible basis for further implementations of MPA networks throughout California. Although this action provides specific benefits to fish habitats adjacent to the Northern Channel Islands, the action will also provide longer-term benefits for fish habitats and fishing throughout California by helping to generate sound empirical underpinnings for the site and design of future networks of MPAs. The recently established network of MPAs in the Channel Islands are currently the most appropriate area to direct such effort because they were specifically designed to evaluate the utility of using MPAs as a management tool. If mainland coastal MPA networks are established in the future, the Natural Resource Trustees for the Montrose case (Trustees) will consider directing additional funds to their implementation and/or evaluation during the next phase of restoration, particularly if the MPAs are established in Southern California.

There is growing recognition within California and throughout the world that existing fishing management practices should be expanded to include new methods that utilize an ecosystem approach. The Channel Islands network of MPAs was created in 2002 as a first step in implementing a California-wide network of MPAs as required by the California Marine Life Protection Act (MLPA) initiative. Collection of fish and other biota is prohibited in 10 of the 12 MPAs in this network and restricted in the remaining two MPAs. These protected areas enable fish to grow larger and have higher fecundity, leading to higher abundances within the MPA, and potentially to improvements in fish catches outside of the MPA. These “spillover” effects of MPAs are subject to an ongoing debate among scientists, managers, and commercial and recreational fishing interests. As a result, the degree to which commercial and recreational fishing interests are assured that MPAs networks result in a net increase catches will directly impact the level of resistance that the future implementation of these networks will receive.

This restoration action is considered to have a moderate relationship to the lost fishing services of the Montrose case because of the distance of the Channel Islands MPAs from areas with fishing advisories. However, MPAs may be areas of higher fish abundance, which may benefit eagles foraging along the coastlines of the Channel Islands. An evaluation of diet-based sources of DDTs to eagles demonstrated that even though fish constituted approximately 79 percent of the diet of bald eagles, only 8 percent of there total body burden of DDTs came from fish. Marine mammal tissue (principally sea lions) constituted approximately 5.8 percent of their diet, but contributed to approximately 59 percent of the eagles’ body burden of DDTs (Glaser and Connolly 2002). If fish abundances within and around the MPAs are sufficiently high to shift eagle foraging habits such that a larger proportion of their diet consists of fish rather than marine mammal carcasses, the possibility of the eagles producing viable eggs may be improved. Similarly, successfully implemented MPAs in the Channel Islands may also provide less disturbed foraging habitat with higher abundances of prey for seabirds that were impacted by DDTs.

This action has the highest nexus to injured fish habitats. Given that specific fish habitats (Palos Verdes Shelf sediments) are injured in a way that makes direct restoration difficult, this action is considered to be compensatory for the lost habitat function of the Palos Verdes Shelf. Further, if the Channel Islands MPAs are managed effectively and monitoring demonstrates improvements to adjacent fisheries, the use of MPAs as a management tool may be expanded by state and federal regulatory agencies to other areas along the California coast and eventually benefit anglers closer to the area impacted by Montrose-related contaminants.

A4.2 BACKGROUND

MPAs are sections of the ocean set aside to protect and restore habitats and ecosystems, conserve biological diversity, provide a sanctuary for sea life, enhance recreational and educational opportunities, provide a reference point against which scientists can measure changes elsewhere in the environment, and help rebuild depleted fisheries (McArdle 1997). Although MPAs may be established by federal, state, or local agencies, this action focuses on those established by the State of California, primarily because these are specifically designed to act as a stimulant of fish production and thereby create a more sustainable approach to fisheries management. The State of California is the primary agency involved in evaluating the effectiveness of the Channel Islands MPAs in increasing the abundances of fish beyond their borders.

The MPA concept spans a broad range of resource management options, ranging from limited to full protection. The State of California MPA classifications include:

- Marine Reserves: Also called no-take reserves, marine reserves prohibit all take of living, geological, or cultural resources.
- Marine Conservation Areas: Prohibit specific commercial and/or recreational take of resources on a case-by-case basis.
- Marine Parks: Prohibit commercial take but allow recreational fishing, though some restrictions may apply.

The wide variation in levels of protection and effectiveness of enforcement among the current array of MPAs in California creates “an illusion of protection while falling far short of its potential to protect living marine life and its habitat” (California Fish and Game Code, Section 2851). Prior to the establishment of the Channel Islands MPA network, only 14 of the 220,000 square miles of combined federal and state waters of California were set aside as genuine no-take reserves.

The Channel Islands MPA network was approved by the California Fish and Game Commission in 2002 and established by formal legislative rule in April 2003. The network consists of 12 MPAs covering 142 square nautical miles (487 square kilometers) (Figure 4A-1). Ten of the 12 MPAs (132 square nautical miles [453 square kilometers]) are no-take marine reserves, and the remaining two are marine conservation areas, which allow for limited recreational fishing and commercial lobster trapping. Thus, the establishment of the Channel Islands MPA network significantly expanded the total amount of area set aside as no-take marine reserves in California marine waters.

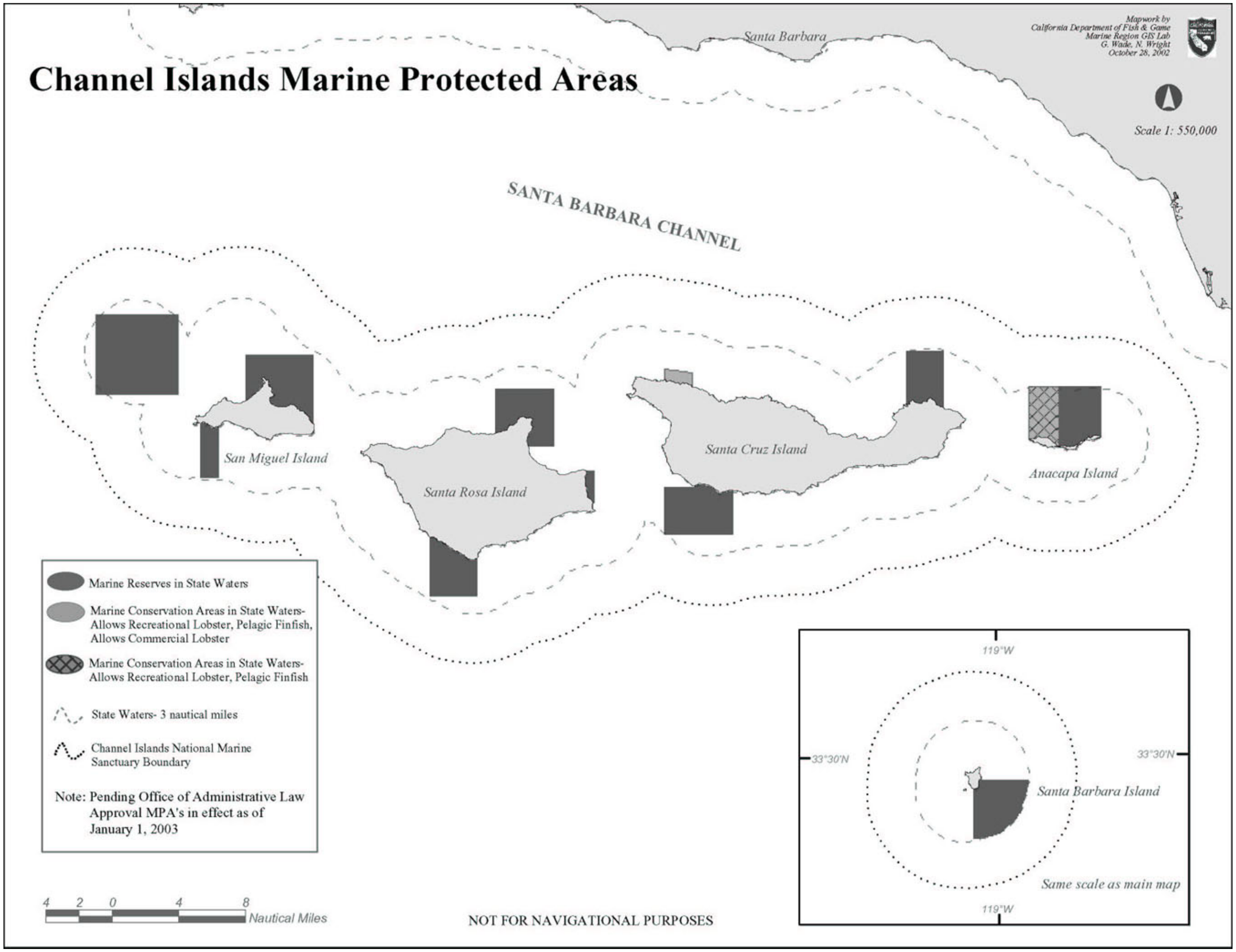


Figure A4-1. The Channel Islands network of Marine Protected Areas.

Several other MPAs exist in the Southern California Bight (a list may be found at www.dfg.ca.gov/mrd/mlpa/mpa.html). None of the other MPAs are as broad or comprehensive in scope as the Channel Islands MPAs, and most are designated as state marine parks rather than no-take reserves. Two marine parks, Abalone Cove State Marine Park and Point Fermin State Marine Park, are located in the Palos Verdes Shelf coastal region, an area associated with the most restrictive fishing advisories related to the Montrose case. The Point Fermin park serves primarily to prohibit the collection of invertebrates and does not restrict fin fishing; the Abalone Cove park imposes only limited restrictions pertaining to mode of fishing and does not regulate the species or quantity of fish caught. Neither of these sites has a management objective of enhancing fisheries outside of its boundaries.

Concurrent with the establishment of the Channel Islands MPAs is an expansion in the efforts to examine and reinvigorate ocean resource management in the United States and throughout the world in response to indicators of concern (e.g., depleted fish populations, lost nursery habitat, polluted coastal zones, or contaminated fish). At the national level, the Pew Oceans Commission published its findings and action recommendations in 2003, declaring that the oceans of the nation are in crisis (Pew Oceans Commission 2003). In September 2004, the U.S. Commission on Ocean Policy released its findings and recommendations for a new, coordinated, and comprehensive national ocean policy (U.S. Commission on Ocean Policy 2004). In 1999, the California State Legislature found that the marine habitat and biological diversity of the state's ocean waters were threatened by coastal development, water pollution, and other human activities and passed the MLPA. The MLPA mandates that the state design and manage an improved network of MPAs to, among other things, protect marine life and habitats, marine ecosystems, and marine natural heritage.

Under the MLPA, the state is required to develop a master plan for the integrated management of existing and new marine reserves for the entire state. The development of the MLPA master plan was placed on hold by the State of California in January 2004 due to lack of funding, but the program was revitalized later in 2004 through a combination of public and private funding. The evaluation of the Channel Islands MPAs has continued via collaboration between the California Department of Fish and Game (CDFG), the National Park Service (NPS), the National Oceanic and Atmospheric Administration (NOAA) National Marine Sanctuaries Program, and various universities. However, many components of the evaluation are currently operating with insufficient levels of funding (Table A4-1).

The success of an MPA, and therefore the degree to which information from it can be used to guide future MPAs, is strongly influenced by the effectiveness of its implementation. Insufficient financial and technical resources, lack of staff, or lack of data for management decisions can reduce the effectiveness of an MPA. Monitoring, public education, and enforcement play critical roles in providing for and demonstrating the long-term positive impacts of MPAs on biodiversity and the human communities that depend on these resources. (NOAA 2005a).

Monitoring programs for the Channel Islands MPAs provide information that is central to understanding the effectiveness of MPAs as a management tool for restoring depleted marine resources and sustainable fishing services. Biological monitoring of these MPAs includes a range of activities, is conducted by several groups and agencies (including NPS, CDFG, the

Partnership for Interdisciplinary Studies of Coastal Oceans [PISCO], University of California, Santa Barbara, and others), and is typically incompletely funded (Table A4-1). CDFG oversees

Table A4-1
Summary of Activities Associated with Monitoring,
Evaluating, and Enforcing the Channel Islands MPAs

Agency	Progam	Annual Cost	Years	Total Cost (2005-2008)	Secured[3]	Funding Needs
CDFG[1]	**SCUBA Surveys**	N/A - $500,000	4	N/A - $2,000,000	$800,000	N/A - $1,200,000
	Groundfish tagging	N/A - $150,000	4	N/A - $600,000	$115,000	N/A - $485,000
	Trap/Fixed Gear Surveys	$100,000 - $300,000	4	$400,000 - $1,200,000	$0	$400,000 - $1,200,000
	Newly Settled Fish Surveys	N/A - $100,000	3	N/A - $300,000	$75,000	N/A - $225,000
	Aerial Monitoring of Kelp Canopy	N/A - $100,000	4	N/A - $400,000	$400,000	N/A - $0
	ROV Surveys	$150,000 - $200,000	4	$600,000 - $800,000	$40,000	$560,000 - $760,000
	Submersible Surveys	$60,000 - $100,000	4	$240,000 - $400,000	$0	$240,000 - $400,000
	Intertidal Monitoring	N/A - $200,000	4	N/A - $800,000	$800,000	N/A - $0
	Social Science Coordinator	$60,000 - $100,000	4	$240,000 - $400,000	$0	$240,000 - $400,000
	Social Science Surveys[4]	$325,000 - $500,000	4	$1,300,000 - $2,000,000	$600,000	$700,000 - $1,400,000
	Sanctuary Aerial Monitoring and Spatial Analysis Program (SAMSAP)	N/A - $100,000	4	N/A - $400,000	$400,000	N/A - $0
	Public Outreach	N/A - $50,000	4	N/A - $200,000	$200,000	N/A - $0
	Enforcement[5]	TBD	4	TBD	TBD	TBD
NPS	**Kelp Forest Monitoring Survey**	N/A - $280,000	4	N/A - $1,120,000	$920,000	N/A $200,000
	MPA evaluation/extention of	N/A - variable[2]	4	N/A - $904,711	$564,711	N/A $340,000
	Enforcement	$526,000	4	$2,104,000	$800,000	$1,304,000
Total[5]				$13,628,711		$7,914,000

[1] CDFG costs are estimates and some programs may vary in costs among years so a range of annual costs for these programs is presented.
[2] National Parks Service MPA project includes higher costs in the first two years due to the increased costs associated with setting up sites. Once sites are set up maintenance/monitoring costs are ~$170,000/year.
[3] Secured funding based on an assumption that current funding levels are maintained.
[4] Social science surveys includes knowledge perceptions and attitudes surveys as well as analysis of DFG commercial and recreational fisheries data.
[5] Total costs are based on maximun cost estimates only and should therefore be viewed as a "worst-case" scenario.
[5] TBD = To Be Determined

the evaluation of the MPAs. The goals of these monitoring programs are as diverse as the programs themselves, but the biological monitoring is primarily focused on evaluating productivity inside and outside the MPAs and the degree to which productivity (primarily in terms of fish biomass, eggs, or larvae) "spills over" into adjacent unprotected areas.

A4.3 PROJECT DESCRIPTION AND METHODS

The management and monitoring of the Channel Islands MPAs is a large effort involving state and federal agencies, academic institutions, and non-governmental organizations. Each component of this multi-faceted approach operates on different levels of funding with different funding sources. In examining the MPA concept as a potential means of restoring fish and their habitats in the Southern California Bight, the Trustees identified four specific actions for which Montrose Settlements Restoration Program (MSRP) funds could contribute to more effective implementation of the Channel Islands MPAs:

1. Subtidal fish monitoring: Much of the work associated with the Channel Islands MPA evaluation is labor intensive field work that requires significant training and knowledge of the biota. Over a 5-year period, MSRP could fund the salary of a technician working

for one of the existing MPA implementation groups (i.e., NPS, PISCO, or CDFG) during the field season to address key funding gaps in specific monitoring programs. This action will, for instance, improve the reliability of data collected to evaluate the spillover benefits of MPAs on adjacent fisheries.

2. NPS/CDFG enforcement: Inadequate enforcement of MPA restrictions on taking biota from the reserves would undermine the validity of the assessment of how well the MPA achieves its objectives. If the MPAs do not in fact function as a refuge from fishing due to lack of enforcement, the results of the MPA evaluation would not represent a protected area and would therefore not be an evaluation of the utility of MPAs as a management tool.

3. Support for CDFG ROV Surveys: Beyond the scuba-based survey work, CDFG also conducts regular remotely operated vehicle (ROV) surveys in the deeper regions of the reserve that are not easily monitored using scuba surveys. The CDFG boat that is available for these surveys is not adequately rigged to conduct these surveys, and other boats must be contracted to do the work (Ugoretz, pers. comm., 2004), leading to logistic constraints and higher operating costs.

4. Expansion of the groundfish tagging project: Through a private contractor, CDFG has been conducting a tagging program that specifically examines the abundance and movements of selected groundfish species inside and outside of MPAs, including, but not limited to, those that have been established in the Northern Channel Islands (Hanan, pers. comm., 2004). This effort has collateral benefits to commercial fishing boats impacted by fishery closures because the program employs these boats and crews for fish collections. The program also promotes the involvement of anglers over a 5-year period in the MPA evaluation process. Funding for this project was only sufficient to focus primarily on one species group: rockfishes. MSRP could fund this work for two additional years, allowing the techniques and infrastructure to be applied to species that are more directly relevant to MSRP restoration goals (e.g., kelp bass and surfperches). The results of this work would not only be relevant to the ongoing evaluation of the Channel Islands MPAs, but would also be relevant to MSRP artificial reef restoration projects by providing additional insights on the relationship between reef size and ability to sustain fishing pressure.

A4.4 ENVIRONMENTAL BENEFITS AND IMPACTS

A4.4.1 Biological

Benefits

The concept of using MPAs as a management tool is grounded in the concept that MPAs would be established in “source” habitats where the local population is protected and produces maximal numbers of eggs, larvae, and adults. This production would “refuel” areas depleted by fishing via spillover of adults and direct recruitment of juveniles, allowing for higher levels of fishing mortality than would be possible without the protected regions.

MPAs have been shown to increase fish abundance outside their boundaries via increased production of eggs by bigger, more abundant fish within the MPA and the spillover of fish from the MPA (e.g., Roberts et al. 2001). This effect is still much debated with no clear consensus in the literature (Willis et al. 2003). It is likely that the potential for spillover effects is system- and species-dependent and largely due to interspecies differences in often poorly understood life history parameters (e.g., larval survivorship, fecundity, home range, mobility, and size and age at reproduction) that affect the impacts of MPAs on abundance of fish outside their borders (Botsford et al. 2003, McClanahan and Mangi 2000). Recent work investigating maternal effects on offspring viability in rockfishes has shown that protecting larger older individuals in a population is an important component of the maintenance of a healthy population (Berkley et al. 2004a, 2004b). This work also suggests that many of the west coast groundfishes that are currently considered to be overfished are particularly sensitive to the loss of large, old individuals. The value of MPAs is that they present a solution to the problem of the loss of larger, older fish that typically occurs under conventional management strategies.

A fish population that consists of a diverse age/size distribution will likely spawn over a broader spawning period, with younger individuals spawning at different times than older individuals (Kjesbu et al. 1996). A broader spawning period can result in an increased potential for larvae to encounter conditions favorable for recruitment. Much of this work, however, is based on life-history-specific examinations, and to date there is a lack of comprehensive studies that examine the population-level impacts of these processes. The evaluation of the Northern Channel Islands MPAs may provide at least regional, if not population-level, data that will test the hypotheses that have been established based on the examination of specific life stages.

Although the impact of MPAs on surrounding fisheries is still a subject of debate, a growing body of literature has demonstrated the positive effects of MPAs on the size and abundance of fish and invertebrates within their boundaries (summarized in Halpern 2003). Although this effect by itself does not provide for additional fishing opportunities, it does provide important opportunities to monitor fish communities in a more pristine state. These opportunities are critical to pre-empt the tendency to allow ecological baselines to slide as marine resources become depleted (Dayton et al. 1998). These opportunities also provide chances for marine ecologists to investigate biological interactions in marine communities that are not impacted by fishing mortality, enabling a more clear separation of natural shifts in ecosystem processes (El Nińo, current regimes, etc.) and the impacts of fishing. Although these benefits do not directly result in increases in fishing opportunities, they relate directly to the process of improving the standards and methods with which fishery resources are managed.

The benefits of a successful evaluation of the utility of the Channel Islands MPAs as a fishery management tool may extend beyond the Northern Channel Islands if they improve the reliability of determinations of MPA effectiveness as a fishery management tool. Conventional resource management strategies are often ineffective for sustaining marine fisheries, and several important species commonly caught off the coast of California exhibit life-history characteristics that make them particularly vulnerable to the weaknesses of conventional management approaches (Berkley et al. 2004a, 2004b). Improved management strategies that incorporate the needs of species with vulnerable life history characteristics may be as vital a restoration activity to marine fisheries resources as the creation or restoration of critical habitat.

The Channel Islands MPA monitoring plan (CDFG 2004a) states that some resources may respond to MPAs quickly, whereas others may take many years to respond. The monitoring plan suggests that a major review be conducted 5 years after implementation (in the spring of 2008). The monitoring plan does not suggest that after 5 years there will be sufficient data to determine the outcome of the evaluation, but simply that 5 years will be sufficient time to determine if mid-course or adaptive corrections in the process need to be made. Given this expected time frame, the Trustees consider that a minimum period of involvement of 5 years is required to substantially improve the evaluation of the Northern Channel Islands MPAs.

Impacts

This action has no known biological impacts.

A4.4.2 Physical

Benefits

This action has no known benefits to the physical environment.

Impacts

This action has no known impacts to the physical environment.

A4.4.3 Human Use

Benefits

Several potential benefits to human use could occur from improved effectiveness of the implementation of the Channel Islands MPAs. Restoration of depleted resources within the boundaries of the reserves may provide recreational opportunities outside of the reserves. Although the MPAs generally prohibit the taking of biota within the MPA boundaries, effectively managed MPAs could potentially lead to the spillover of fish to adjacent areas and thus improve fishing uses outside their boundaries. The specific benefits of this action will relate to the design and location of the future MPAs on which the results of this action would be based. Only through a detailed understanding of the ecological value of currently established MPAs can future MPAs be designed that maximize the potential benefits to human use.

Impacts

By their nature, MPAs restrict several types of human uses within their boundaries. This impact was addressed in the environmental documentation that supported the original establishment of the Channel Islands MPAs (CDFG 2002). The most seriously debated impact of the Channel Islands MPAs related to the question of their contribution to commercial and recreational catches. Opponents of these MPAs suggest that even though MPAs may increase the abundance of fish within their boundaries, they exclude fishermen from the most productive fishing areas, concentrating them in the less productive areas and causing an overall reduction of catch. This issue was addressed during the development of the Channel Islands MPAs through extensive collaboration with the fishing community to avoid restrictions to fishing in already-established, favored fishing locations. In addition, the Channel Islands MPA evaluation plan calls for extensive socioeconomic impact studies designed to address the potential negative impacts of MPAs on human uses (CDFG 2002).

The specific MSRP action proposed here, augmenting funding for existing management and monitoring efforts, does not establish new MPAs and does not modify the boundaries or human use restrictions already established for the Channel Islands MPAs. Thus, potential impacts to human uses are not considered to be significant.

A4.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

The success of this restoration action does not depend on actual monitoring outcomes (e.g., whether these MPAs improve fisheries in adjacent areas), but on whether MSRP contributions improve the validity and reliability of the findings emerging out of MPA implementation and increase the credibility of those findings before the public and affected user groups.

Because this restoration action will entail supplementing current enforcement and monitoring programs already designed and being carried out by CDFG, NPS, and PISCO, the operational feasibility of the action is high. The tagging program has been established and has already developed a working relationship with commercial charter boat captains along the Southern California coast. These agencies have also developed the protocols and initiated outreach to fishermen to increase recapture potential. Thus, the Trustees will not need to fund concept development, only implementation.

It is unlikely that any of the projects described above will encounter significant regulatory hurdles. However, the establishment of MPAs in the Northern Channel Islands has not had universal public support. The objective of this restoration action will be to contribute to enforcement and monitoring efforts that aim to resolve questions about the specific and realized benefits of MPAs.

A4.6 PERFORMANCE CRITERIA AND MONITORING

This action will be nested within the broader scope of the ongoing evaluation of the Northern Channel Islands MPAs being carried out by CDFG, which has developed specific performance criteria (CDFG 2004a). The Trustees will adopt these criteria.

A4.7 EVALUATION

The Trustees have evaluated this restoration action against all screening and evaluation criteria developed to select restoration actions and concluded that this action is consistent with these selection factors. Because the Channel Islands MPAs are distant from the areas affected by the fish consumption advisories related to the Montrose case, this action is not likely to significantly restore the lost human uses (fishing services) related to the case. Also, given the lack of regional data on the spillover of fish to fishing areas adjacent to MPAs, the potential that establishing new

MPAs nearer the Los Angeles coast would restore fishing services is uncertain. Nevertheless, this action will address the MSRP goal of restoring fish and the habitats on which they depend within the Southern California Bight and for this reason has been found to meet the selection factors. Also, the findings that come from improved management and monitoring of the Channel Islands MPAs may ultimately be used to improve fishery resources elsewhere, including the areas more severely impacted by the Montrose contamination.

A4.8 BUDGET

Under this action, MSRP funds will be provided to support MPA implementation in the Northern Channel Islands (Table A4-1). The Trustees propose to provide up to $500,000 toward implementation and evaluation of the Channel Islands MPAs from the $12 million allocated for all fishing and fish habitat restoration actions under the MSRP. The specific projects that will be funded will be determined via a review process that will respond to the dynamic nature of the funding for this program and will therefore seek to avoid duplicating funding for projects and maximize the degree to which funds may be matched with funding from other sources.

Appendix B

Restore Bald Eagles to the Channel Islands

Bald eagle restoration throughout the Channel Islands presents a special situation because bald eagles introduced to and currently nesting on Santa Catalina Island continue to exhibit reproductive injuries caused by ongoing exposures to DDTs and PCBs. Also, bald eagles historically inhabited most of the Channel Islands, and we do not yet know if they would have greater success reproducing on islands other than Santa Catalina Island (none of the Catalina Island bald eagles has dispersed to and established territories on any of the other Channel Islands). Thus, selecting restoration actions requires consideration of interrelated factors and depends ultimately on the outcome of the ongoing Feasibility Study for Reestablishment of Bald Eagles on the Northern Channel Islands (NCI), California (MSRP 2002). (This ongoing study is referred to as the "NCI Bald Eagle Feasibility Study" throughout this appendix.) Sections B.3 and B.4 describe and evaluate the two contrasting options for bald eagle restoration that this plan addresses.

B.1 GOALS AND NEXUS TO INJURY

The bald eagle is a priority resource for restoration that continues to demonstrate injury from the contaminants of the Montrose case. The overall goal for this resource is for the Natural Resource Trustees for the Montrose case (Trustees) to restore self-sustaining bald eagles to the Channel Islands. Bald eagles historically nested throughout the Channel Islands prior to releases of DDTs and PCBs, but by the early 1960s had disappeared from the area (Kiff 1980). In 1980, a multiagency program reintroduced the birds to Santa Catalina Island but their breeding continues to be impaired by these contaminants. Due to the continued presence of DDTs and PCBs in their environment, it is not yet known to what extent the bald eagle restoration goal is attainable in the near term.

B.2 BACKGROUND

Bald eagles were a resident breeding species on all of the California Channel Islands from before the turn of the century until at least the 1930s (Willett 1933, Kiff 1980). Ornithologists and egg collectors reported bald eagles to be common on the Northern Channel Islands between the late 1800s through the 1930s. From the 1800s to 1950, bald eagle nesting areas were reported from a minimum of 35 different locations on the islands, making the Channel Islands a stronghold for this species in Southern California (Kiff 2000). However, due to the lack of systematic surveys, this number is likely an underestimate (Kiff 2000). The last confirmed nesting of an eagle on the Channel Islands was in 1949 on Anacapa Island (Kiff 1980).

Little published information is available regarding the status of bald eagles on the Channel Islands after the 1940s, but a few adult birds continued to be observed on some of the islands into the late 1950s and 1960s. Santa Catalina Island residents remember seeing eagles up until the mid to late 1950s (Kiff 1980, Garcelon 1988). By the early 1960s, bald eagles had disappeared from all of the Channel Islands (Kiff 1980). The timing of the decline of bald eagles on the Channel Islands coincided closely with the extirpation of peregrine falcons and bald eagles from other portions of their North American range as a result of the eggshell thinning effects of DDE (Kiff 2000, Garcelon 1988). The reduction of bald eagle populations in many areas of the country has been correlated with high levels of organochlorine compounds and specifically with DDTs (Stickel et al. 1966, Krantz et al. 1970). Other factors contributing to the decline of bald eagles on the Channel Islands and Southern California included historical persecution by humans (egg collecting and shooting) and limited nesting opportunities on the mainland of Southern California due to development and recreation (Kiff 1980).

Raptor species, such as bald eagles and peregrine falcons, are particularly susceptible to these contaminants because they are high-trophic-level predators. Because DDTs and PCBs are slow to break down and are strongly attracted to fats, they bioaccumulate and become more concentrated in animals at higher levels in the food web. When feeding on food contaminated with DDE (a metabolite of DDT) and PCBs, animals at the top of the food web, like bald eagles and peregrine falcons, can accumulate harmful concentrations of these chemicals. DDE has been demonstrated to cause eggshell thinning and subsequent reproductive failure in many species of birds feeding in the marine ecosystem (Hickey and Anderson 1968, Risebrough et al. 1971, Gress et al. 1973). DDE in the diet of bald eagles has negatively affected the ability of the eagles to produce young (Wiemeyer et al. 1993). The continuing influence of this contaminant also accounted for the inability of bald eagles to recolonize the islands after other sources of mortality had ceased (Kiff 2000).

Bald eagles are currently listed as threatened under the Endangered Species Act, but have been proposed for delisting due to substantial recovery of the species on the mainland. In its Pacific Bald Eagle Recovery Plan, the U.S. Fish and Wildlife Service (USFWS) set recovery goals for bald eagles for specific zones in California. The Recovery Plan indicates that the most suitable habitat in Southern California is on the Channel Islands, especially Santa Cruz and Santa Catalina Islands (Jurek 2000, USFWS 1986). As outlined in the Recovery Plan, the recovery population goal is the minimum nucleus of nesting pairs that, if self-sustaining over the long term, will be capable of maintaining the genetic variability in the breeding population (USFWS 1986). This population goal is 6 nesting pairs for the Channel Islands zone and a minimum of 16 territories needed to provide secure habitat for the recovered population. Although Santa Catalina Island currently has 5 breeding pairs, they continue to suffer reproductive problems and are not considered self-sustaining (see Section B.2.3).

B.2.1 Historical Presence of Bald Eagles on the Channel Islands

In a survey of historical records, Kiff (2000) showed the following maximum numbers of nesting bald eagles reported per island in a single year: Anacapa (3); San Miguel (3); Santa Cruz (5); Santa Rosa (3); Santa Barbara (1); Santa Catalina (4); San Clemente (3); and San Nicolas (1). Between 1875 and 1960, active eagle nests were reported from a minimum of 35 different sites on the Channel Islands.

Santa Cruz Island regularly supported a minimum of at least five pairs of bald eagles, which nested in niches and potholes on the sea cliffs (Kiff 1980). Known nesting areas on Santa Cruz Island included Pelican Bay, San Pedro Point, Blue Banks, Valley Anchorage, Chinese Harbor, Potato Harbor, and Middle Grounds. Anacapa Island had as many as three nesting pairs in some years. However, since collectors or ornithologists did not visit large portions of the Northern Channel Islands very often, if at all, the estimates of nesting pairs are likely an underestimate (Kiff 2000).

Grinnell (1897) visited San Clemente Island in 1897 and stated, “The Bald Eagle was seen rather commonly along the shores of the island.” The lack of ornithologist visits to the island after 1939 makes it impossible to speculate on the date of the bald eagle extirpation from the island. Few ornithologists visited San Nicolas Island historically, so the size of the eagle population is poorly known. However, there is no question that the species was formerly resident there (Kiff 2000). Finally, numerous ornithologists reported bald eagles to be common on Santa Catalina Island and present on Santa Barbara Island starting in the 1870s (Kiff 2000).

B.2.2 Ecological Role of Bald Eagles on the Channel Islands

Bald eagles historically played a role in the ecology of the Channel Islands by serving as both a top carnivore and a scavenger. Bald eagles prey primarily on fish taken live from the ocean; however, they also feed on seabirds and the carcasses of animals that wash up on shore.

No other species plays the same ecological role as the bald eagle. In the absence of bald eagles on the Northern Channel Islands, golden eagles (not native to the Northern Channel Islands) have become established. Nesting adult bald eagles defend territories and would likely have excluded golden eagles from becoming established on the Northern Channel Islands (USFWS 2004). The golden eagle, a terrestrial predator, has had tremendous negative impacts on native island foxes in the Northern Channel Islands, a species that does not have evolutionary adaptations to avoid predation (Coonan 2001, Roemer 1999).

In addition to their role in the balance of natural systems, bald eagles were revered by Native American cultures historically occupying the Channel Islands and are still admired and valued by people for whom the bald eagle is both a striking bird and our American symbol.

B.2.3 Santa Catalina Island Bald Eagle Program

In 1980, the USFWS and the Institute for Wildlife Studies, with the cooperation of the California Department of Fish and Game and the Catalina Island Conservancy, initiated a program to reintroduce bald eagles to Santa Catalina Island. Between 1980 and 1986, 33 eagles from wild nests were raised on three different artificial nest or hacking platforms on Santa Catalina Island (Garcelon 1988). The birds were released once they were able to fly (at around 12 weeks of age). Some of these birds matured and formed breeding pairs on the island. In 1987, the first bald eagle eggs were laid but soon broke. Subsequent contaminant analysis of egg remains revealed DDE levels sufficient to cause complete reproductive failure (Garcelon et al. 1989). From 1991 to 1993, the Institute for Wildlife Studies studied food habits of the released eagles and documented high levels of DDE in the tissues of certain prey items commonly consumed by these eagles (Garcelon 1997, Garcelon et al. 1997a, 1997b).

Since 1989, the reintroduced population has been maintained through manipulations of eggs and chicks at each nest site, and through hacking of additional birds. In the egg manipulation process, structurally deficient eggs laid by the birds affected by DDE are replaced with artificial eggs. The adult eagles continue to incubate the artificial eggs, while the real eggs are removed and artificially incubated at the Avian Conservation Center (ACC) at the San Francisco Zoo. Chicks that hatch from these removed eggs, or those produced by captive adults at the ACC or by wild birds, are then fostered back into the nests. In 2005, the Trustees funded the establishment of an incubation facility on Santa Catalina Island so that eggs and chicks would not need to be transported to and from the ACC at the San Francisco Zoo.

From 1980 to 2004, a total of 80 eggs were removed from nests on Santa Catalina Island, 14 of which hatched (Sharpe et al. 2004). A total of 47 chicks and 3 eggs (of which 2 hatched) were fostered into nests (Sharpe et al. 2004), and adult bald eagles successfully reared 40 of these 49 chicks. During this time, an additional 21 birds were also hacked onto the island (Sharpe et al. 2004). Because of the high DDE concentrations in the eggs, this active program of manipulation and augmentation is necessary to maintain bald eagles on Santa Catalina Island at this time.

Bald Eagle Territories on Santa Catalina Island

Nesting bald eagles have established five territories on Santa Catalina Island since 1984 (see Figure 3.4-3 in Section 3). A brief description of each territory is provided below.

- The West End territory was established in 1991 and is located 0.5 kilometers (km) (0.3 miles) from the northwestern end of the island on a rock pinnacle approximately 75 meters (246 feet) above the water. The territory was initially occupied by a 10-year-old male and a 5-year old female, but a second female has assisted in breeding activities since 1992 (Sharpe et al. 2004). The nest has been used since 1991.
- The Pinnacle Rock territory is located 4.3 km (2.7 miles) southwest of the city of Avalon. It was initially occupied in 1990 and the original pair, a 5-year old female and a 4-year old male, have continuously nested there since 1990 (Sharpe et al. 2004).
- The Twin Rocks territory is located 5 km (3 miles) northwest of Avalon. The territory was first occupied in 1984 and contained active nests in 1985, 1987, and 1989. A new 4-year-old male joined the female of the original pair in 1995. The first eggs of the new pair were laid in 1997, but were abandoned after the egg switch. In 1998, the original female was replaced by a 12-year old female and this pair has nested in the territory every year to the present (Sharpe et al. 2004).
- The Seal Rocks territory is located 4.5 km (2.8 miles) southeast of the city of Avalon. The original pair of this territory first nested in 1988. The female died on May 5, 1993, from DDE contaminant poisoning (Garcelon and Thomas 1997). In 1995, another adult female laid two infertile eggs. A new female and male began occupying the territory in 1997. In 1999, the pair laid one egg, but the nest was destroyed during a storm. The pair did not attempt to nest in 2000, but successfully fledged fostered chicks from 2001 to 2004 (Sharpe et al. 2004).
- The Two Harbors territory is located 2 km (1.2 miles) southwest of the town of Two Harbors. This territory was first active in 2003, and was occupied by a pair of 5-year old birds. The male of this territory is an ACC-produced eagle that was fostered into the West End territory in 1998. The female hatched from an egg laid in the West End territory in 1998 and fostered into the Pinnacle Rock nest (Sharpe 2003).

Summary of Contaminant Data

Organochlorine contaminants, especially DDE, have been related to deleterious effects on bald eagle reproduction (Krantz et. al 1970, Grier 1982, Wiemeyer et al. 1984, 1993). Wiemeyer et al. (1993) reported that less than 3.6 micrograms per gram (µg/g) of DDE (wet weight) was found in eagle eggs where normal reproduction was occurring (mean 5-year production $\geq$1.0 fledgling per nest). When DDE levels in bald eagle eggs exceed 3.6 µg/g (wet weight), declines in productivity are expected (productivity was almost halved), with considerable reduction in productivity expected when eggs exceed 6.3 µg/g (wet weight) (mean 5-year production $\leq$0.27 fledgling per nest) (Wiemeyer et al. 1993).

In addition to DDE, other contaminants have been associated with reduced nest success (Wiemeyer et al. 1993, Nisbet 1989). Of particular concern are PCBs, which co-occur with DDTs in eagle eggs (Wiemeyer et al. 1993) and have adverse effects that translate into reduced number of fledglings produced per nest. The adverse effects associated with PCB exposure include embryo and chick mortality, edema, growth retardation, and deformities (Peakall 1994). Normal reproduction has been associated with eagle eggs containing less than 4.0 µg/g PCBs (Wiemeyer et al. 1984). In the analysis by Wiemeyer et al. (1993) of data on eagle eggs containing both DDTs and PCBs, less than 3.0 µg/g total PCBs (wet weight) was measured in eggs where mean 5-year productivity approached 1.0 fledgling per nest. Productivity was substantially reduced (0.61 fledgling per nest) in nests where eggs had more than 5.6 µg/g total PCBs (wet weight) (Wiemeyer et al. 1993).

Sprunt et al. (1973) reported that a minimum of 0.7 chicks per active nest is considered necessary to prevent a bald eagle population from declining. Kubiak and Best (1991) reported that 1.0 chick per nest is expected from a healthy eagle population. Similarly, the USFWS Pacific Bald Eagle Recovery Plan identifies the goal of 1.0 fledged young per pair with an average success rate per occupied site of not less than 65 percent over a 5-year period (USFWS 1986).

Contaminant Levels in Bald Eagle Eggs

Bald eagle eggs collected from Santa Catalina Island that failed to hatch have been monitored for DDE and PCB levels from 1989–2004 (Figures B-1 and B-2). Eagle eggs collected from the Pinnacle Rock and West End nests continue to show the highest DDE concentrations among the five different territories on the island. Unlike the other territories on the island, these nests have been occupied by the original female of that territory throughout the study period. Because these nests have been occupied by the same female over a period of 13 to14 years, continuous, long-term information on DDE concentrations in the eggs can be used to measure changes in contamination over time.

The concentrations of DDE in eggs from all five territories, and PCBs in eggs from three territories exceed thresholds (<3.6 µg/g and <3 µg/g, respectively) associated with reduced productivity (<1.0 fledgling/nest). In addition, no significant change (e.g., no reduction) in the DDE levels has occurred in these territories over time. For example the DDE concentrations in eggs show no temporal change over the past 4 years (i.e., 2001–2004, regression analysis, $p>0.05$) with most nests showing no trend ($p>0.2$). The concentration of DDE in one nest (Seal Rocks) did show an indication of a trend that could be considered borderline ($p=0.054$). However, regressions on data from two nests monitored since 1989 (Pinnacle Rock and West End) show no significant long-term change in DDE levels as well ($p > 0.4$, $df_{residuals} > 10$) and do not support the inference that changes in DDE concentrations observed in eggs from the Seal Rocks territory reflect a long-term linear change that might be projected into the future.

A change in the female of a territory can affect the contaminant levels in eggs (e.g., the Seal Rocks and Twin Rocks territories, Figures B-1 and B-2). This effect may result from female prey preference, foraging style, and age. Although concentrations in recent eggs from the Seal Rocks territory are significantly lower than in eggs from 1990 and 1992 (when the same nest was occupied by a different pair of eagles), concentrations continue to exceed the adverse effect threshold for DDE (3.6 µg/g). The presence of a new female in the Twin Rocks Territory since 1998 has resulted in egg concentrations that still exceed the effect threshold for DDE. Despite the lower DDE levels in these eggs, the detrimental effects of eggshell thinning continue today, as evidenced by a broken egg found in the Twin Rocks nest in 2003.

The Two Harbors territory was established in 2003 by two 5-year-old birds, but concentrations in the single sample from 2003 already exceeded the threshold concentration for DDE and PCBs necessary for healthy eagle reproduction (Figures B-1 and B-2), and are similar to those found in the eggs of long-term resident eagles (e.g., at West End and Pinnacle Rock).

Given that DDE and PCB levels in eggs are not declining and currently exceed thresholds associated with reduced productivity (<1.0 fledgling/nest), it is unlikely that eagles will be able to be self-sustaining on Santa Catalina Island in the foreseeable future.

Limited Hatching Success Despite Artificial Incubation

The first bald eagle nesting attempts failed on Santa Catalina Island due to eggs breaking in the nest. To remove the risk of adults crushing the eggs during incubation and to reduce the effect of environmental factors such as water loss, bald eagle eggs have been collected since 1989 and placed in an artificial incubation facility. Between 1989 and 2004, 80 eggs have been collected and transported primarily to the San Francisco Zoo. Without such intervention, successful reproduction is highly unlikely, as documented by the continued breaking of eggs that are left in the nests. For example, in 2000 an egg broke in each of the three active nests (Pinnacle Rock, West End, and Twin Rocks), and in 2003 an egg broke in the Twin Rocks territory. Despite the efforts to hatch these eggs in a controlled environment, only 14 of the 80 eggs (18 percent) have hatched to date. Low hatching success may be the result of embryo mortality often attributed to PCBs and/or eggshell thinning generally associated with DDTs. The low hatching rate confirms the continued effect of DDTs and PCBs despite measures to reduce the effects of eggshell thinning by placing the eggs in an optimal, controlled environment.

Conclusion

The available egg data and limited hatching success even with artificial incubation indicate that overall concentrations of DDE and total PCBs in failed-to-hatch eggs from all territories continue to exceed thresholds for adverse effects (reduced nest success). Based on the current levels of DDE and PCBs in eggs and the lack of any significant trends in reduction of DDE levels in eggs, Santa Catalina Island bald eagles are not likely to reach a state of self-sustainability in the foreseeable future.

Costs of the Santa Catalina Bald Eagle Program

From 2002–2005, the average annual cost of supporting the Santa Catalina Island Bald Eagle Program (including monitoring, retrieval of eggs from nests, artificial incubation of eggs, failed-

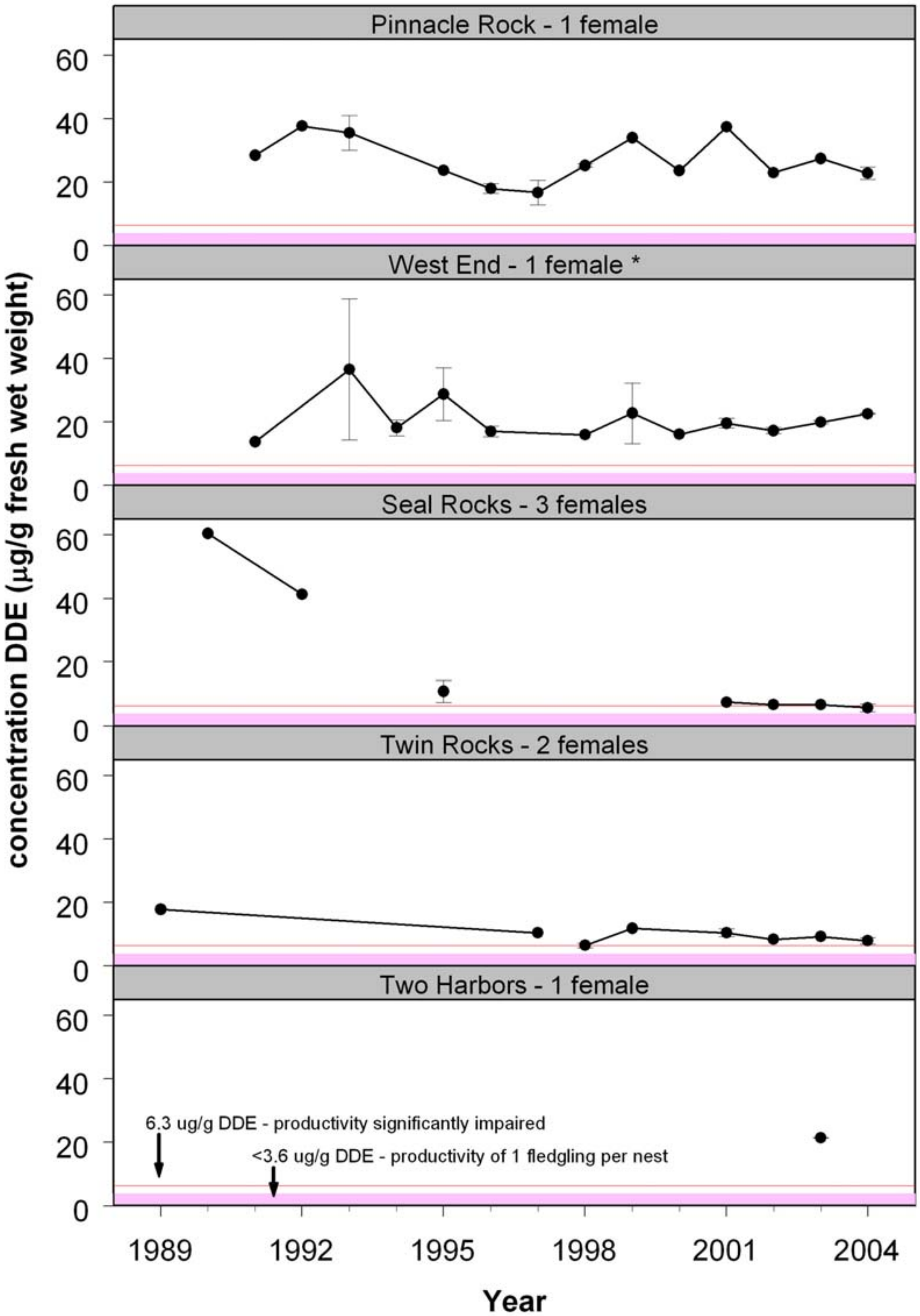


Figure B-1. Levels of DDE in Santa Catalina bald eagle failed-to-hatch eggs from 1989–2004.

Each panel includes data from one of the five bald eagle territories on Santa Catalina Island. Threshold DDE contamination levels are indicated for each panel as labeled in the Two Harbors panel. Line breaks within a panel indicate a change in females within a territory. For the West End Territory(*), a second female joined the original pair in 1992 and has assisted in incubation of eggs, but has not produced any eggs used in this analysis.

Figure B-1 [BACK]

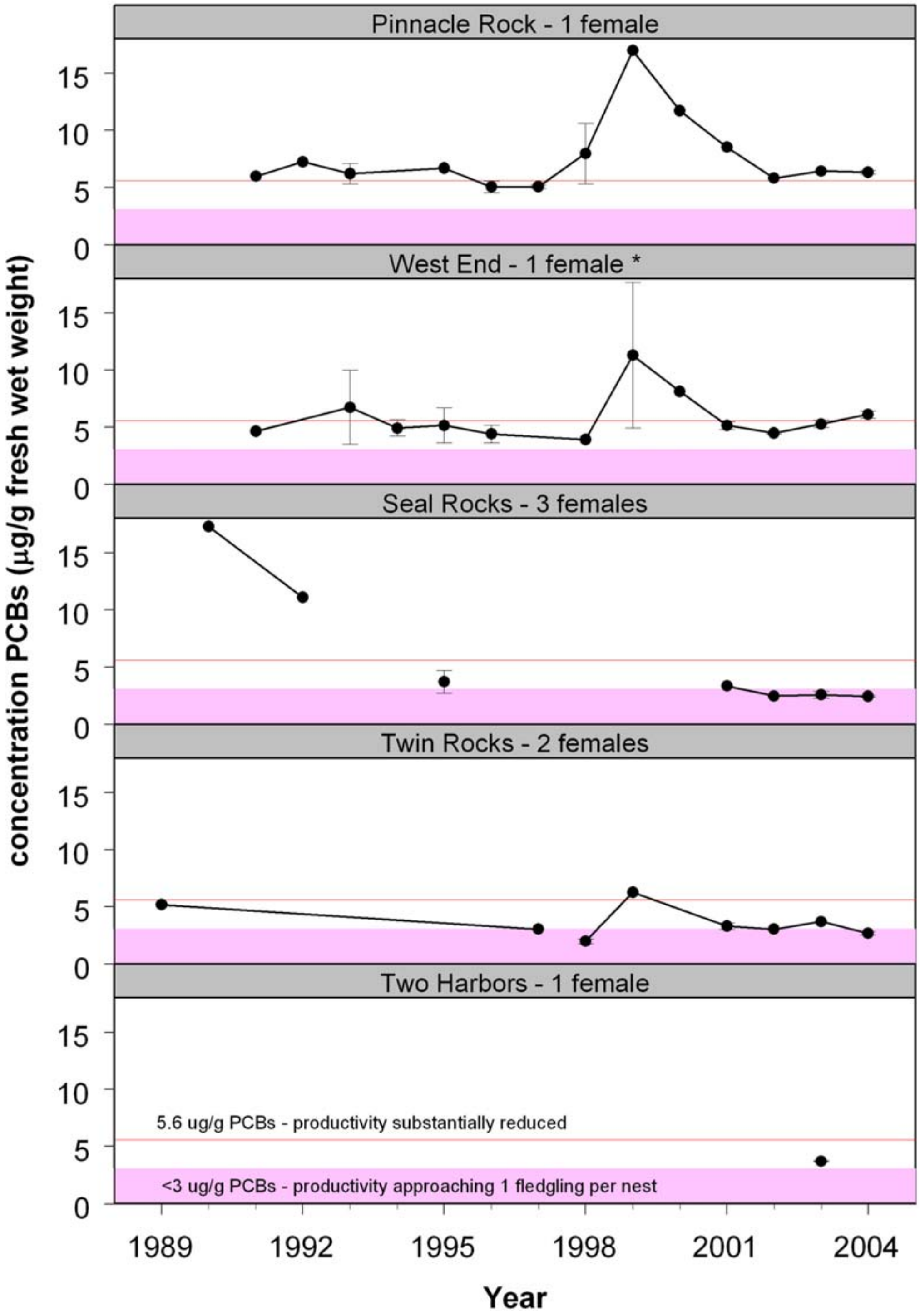


Figure B-2. Levels of PCBs in Santa Catalina bald eagle failed-to-hatch eggs from 1989–2004.

Each panel includes data from one of the five bald eagle territories on Santa Catalina Island. Threshold PCB contamination levels are indicated for each panel as labeled in the Two Harbors panel. Line breaks within a panel indicate a change in females within a territory. For the West End Territory(*), a second female joined the original pair in 1992 and has assisted in incubation of eggs, but has not produced any eggs used in this analysis.

Figure B-2 [BACK]

to-hatch egg contaminant analysis, fostering healthy chicks into nests, and agency support) was approximately $270,000. In recent years, the Trustees have assumed full funding of the Santa Catalina Island Bald Eagle Program to ensure that the option of maintaining a population of bald eagles on Santa Catalina Island could receive consideration within this Restoration Plan.

B.2.4 Northern Channel Islands Bald Eagle Feasibility Study

Since bald eagles have not recolonized other Channel Islands, in 2002 the Trustees initiated the NCI Bald Eagle Feasibility Study to determine whether bald eagles reintroduced to the Northern Channel Islands (and thus farther from the main source of contamination) would have sufficiently low exposures that they can successfully breed and produce young.

From 2002 to 2004, 34 bald eagle juveniles were released on Santa Cruz Island (12 birds in 2002, 10 in 2003, and 12 in 2004). These birds were either hatched from eggs from the captive breeding population at the San Francisco Zoo or were juveniles collected from the wild in Alaska. Of these 34 birds, 19 birds are known to have survived to date and have been observed or recorded recently on the Northern Channel Islands (Dooley, pers. comm., 2005). These birds have been documented moving among Santa Cruz, San Miguel, Santa Rosa, and Anacapa Islands. An additional 7 birds may have survived; however, no recent satellite tracking data (due to transmitters falling off or no longer working) or recent sightings confirm this statement (Dooley, pers. comm., 2005). Of these 7 birds, 3 were last recorded on the mainland and the other 4 were last reported on Anacapa or Santa Rosa Islands. The remaining 8 of the 34 eagles that were released are known or are suspected to have died as follows: five eagles drowned trying to cross the Santa Barbara Channel to the mainland, one was hit by a car in Salt Lake City, Utah, one died after getting stuck in a tree on Santa Rosa Island, and one is assumed dead although the cause of death is unknown (Dooley, pers. comm., 2005).

Since the NCI Feasibility Study began, eagles have crossed to the mainland, ranging as far as Yellowstone National Park in Wyoming. Eagles have also been documented from Oregon, Northern California, and Utah. The presence of the bald eagles on the Northern Channel Islands has attracted bald eagles from nearby Santa Catalina Island. A minimum of two eagles from Santa Catalina Island have been documented spending time on Santa Cruz Island (Dooley, pers. comm., 2005).

In August 2004, biologists recaptured three eagles released in 2003 to collect blood and feather samples, which will be analyzed to determine current contaminant levels in the birds. When the bald eagles on the Northern Channel Islands begin to reproduce, biologists will monitor their nests to determine if the eagles are capable of hatching eggs in the wild. Because it takes as many as five to seven years for bald eagles to reach reproductive age, the Trustees anticipate having initial results of the first breeding attempts available around 2008.

Monitoring is an important component of the NCI Bald Eagle Feasibility Study. Appendix A of the Feasibility Study for Reestablishment of Bald Eagles on the Northern Channel Islands (MSRP 2002) outlined the central components of the monitoring program, including obtaining bald eagle blood samples and prey items for DDT and PCB analysis, tracking movement of the birds with satellite telemetry, and performing stable isotope analysis on prey resources (MSRP 2002). Once the birds begin breeding, biologists will monitor nests to determine reproductive success. Nest monitoring will likely continue for several years after the first breeding attempts to obtain data from multiple pairs over several years and to account for unsuccessful breeding attempts that are typical of first-time breeders. Specific details of the nest monitoring will be developed as part of the overall ongoing monitoring program. This monitoring program is evaluated on a yearly basis in consultation with experts, and is modified as needed.

For the study period from 2002–2005, a total of approximately $2.3 million was budgeted for the NCI Bald Eagle Feasibility Study. This cost covers all aspects, including obtaining, caring for, and releasing bald eagle juveniles, fieldwork, monitoring, contaminant analysis, and agency support. The Trustees anticipate allocating an additional $1 million over the next several years in support of the NCI Bald Eagle Feasibility Study. Costs would likely decrease after 2006 as the released birds mature and emphasis shifts to nest monitoring and contaminant analysis (rather than the release of additional birds). Therefore, the total estimated cost of the NCI Bald Eagle Feasibility Study is $3.3 million.

Two possible courses of action for bald eagle restoration are described and evaluated in the following sections.

B.3 COMPLETE THE NCI BALD EAGLE FEASIBILITY STUDY BEFORE DECIDING ON FURTHER RESTORATION ACTIONS

B.3.1 Project Description and Methods

This action is the Trustees' selected action for bald eagle restoration. The Trustees will defer making longer-term decisions on bald eagle restoration until the results of the NCI Bald Eagle Feasibility Study are known (in or around 2008). Also, the Trustees will discontinue funding for the Santa Catalina Island Bald Eagle Program during the interim period until the results of the NCI Bald Eagle Feasibility Study are known. When these study results are known the Trustees will re-evaluate all potential options for bald eagle restoration, including measures that may be taken even if bald eagles are not able to reproduce on their own anywhere in the Channel Islands. The Trustees will release a subsequent National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) document for public review and input once the results of the NCI Bald Eagle Feasibility Study are known. The remaining bald eagle restoration funds could then be used on any of the Channel Islands. This action conserves limited restoration funds until sufficient information is available to evaluate the ability of the different Channel Island environments to support bald eagles.

This action is modified from the one proposed in the draft Restoration Plan and programmatic Environmental Impact Statement (EIS)/ Environmental Impact Report (EIR), which was released for public comment in April 2005. The modification is a result of the Trustees' consideration of the public comments received. In the draft Restoration Plan and programmatic EIS/EIR, the Trustees had proposed that the restoration of bald eagles proceed only if it was ultimately found that they are able to reproduce on their own in the Northern Channel Islands. If the results of the NCI Bald Eagle Feasibility Study indicated that there were no territories in the Channel Islands where bald eagles could reproduce unaided, the preferred course of action proposed in the draft Restoration Plan called for bald eagle restoration efforts to cease, and the remaining funds to be either set aside or used for seabird restoration.

The Trustees received diverse and opposing public comments on the advisability of bald eagle restoration given the continued observation of contaminant effects on Santa Catalina Island. Predominantly, however, public comments expressed the desire to maintain the presence of bald eagles on the Channel Islands. After considering public comments, along with the evaluation criteria for this plan (particularly the preferences that actions have long-term benefits and minimal ongoing operation and maintenance requirements), the Trustees modified the preferred action for bald eagles to provide for a re-examination of all options once the results of the NCI Bald Eagle Feasibility Study are known, rather than predetermining subsequent actions. The re-examination will be conducted with opportunity for public review and comment in a subsequent document.

The results of the NCI Bald Eagle Feasibility Study are expected to be known in or around 2008. If it is found at that time that the birds released on Santa Cruz Island are able to fledge chicks without human intervention, the Trustees may continue releasing and monitoring bald eagles on Santa Cruz Island. The Trustees anticipate that if eagles can successfully reproduce on the Northern Channel Islands, then eagles will eventually repopulate the rest of the Channel Islands, including Santa Catalina Island. The general methods for additional hacking and monitoring would be the same as those outlined in the Feasibility Study for Reestablishment of Bald Eagles on the Northern Channel Islands (MSRP 2002).

In light of the continuing high levels of contamination in bald eagles on Santa Catalina Island, continued funding of the Santa Catalina Island Bald Eagle Program over the near term is unlikely to achieve of the goal of the long-term restoration of bald eagles to the Channel Islands. Thus, during the interim period until the NCI Bald Eagle Feasibility Study is completed, the Trustees have chosen to focus restoration efforts on the Northern Channel Islands, which continue to hold the potential for long-term restoration, and discontinue funding of the Santa Catalina Island Bald Eagle Program.

Even without continued Trustee funding for the current Santa Catalina Island Bald Eagle Program, it is highly likely that bald eagles will remain on Santa Catalina Island for several years despite their inability to hatch offspring naturally. Bald eagles in the wild typically live for 25 to 30 years, and Santa Catalina Island currently supports 15 to 20 birds of a wide range of ages. Currently, five active bald eagle nesting territories exist on the island, and the Institute for Wildlife Studies reports that two birds are currently establishing a new territory near Avalon. Even assuming the Santa Catalina Island bald eagles fail to hatch new chicks in the coming years, bald eagle experts do not expect that they will immediately break their pair bonds and abandon their Santa Catalina Island territories. Rather, it is likely that bald eagles will remain on Santa Catalina Island, with their numbers diminishing gradually over a period of as many as 10 years or longer as some of the birds die and are not replaced by others and as certain bald eagle pairs break their pair bonds and leave after several years of failing to produce chicks.

Thus, the Trustees anticipate that bald eagles will still inhabit several of the Channel Islands, including Santa Catalina Island, when the results of the NCI Bald Eagle Feasibility Study are known (in or around 2008). If the results of the NCI Bald Eagle Feasibility Study indicate that bald eagles throughout the Channel Islands still experience reproductive impairment due to the persistence of DDTs and PCBs in their diets, the Trustees would explore various options for further bald eagle restoration on one or more of the Channel Islands, including Santa Catalina Island. Some options may not be as costly as the current egg manipulation and chick fostering work being conducted on Santa Catalina Island. For example, the Trustees could fund a monitoring and hacking program to maintain a non-breeding bald eagle presence on the Channel Islands (and thus maintain their human use and ecological services) for as long as funds remain available or until contaminant levels decline to a level that would support naturally reproducing eagles.

The Trustees will release a subsequent NEPA/CEQA document for public review and input once the results of the NCI Bald Eagle Feasibility Study are known. The document will be released between 2008 and 2010 and will outline the next steps for bald eagle restoration on the Channel Islands.

B.3.2 Environmental Benefits and Impacts

Biological

Benefits

Bald eagles historically played an important role in the ecology of the Channel Islands, and the bald eagle fills a distinct niche there. Reintroducing bald eagles to the Channel Islands will restore this part of the ecosystem, which has been missing since their extirpation.

The presence of the bald eagle on some of the Channel Islands likely provides benefits to the endangered island fox. Predation of island foxes by golden eagles has resulted in precipitous declines in island fox populations on the Northern Channel Islands (Coonan et al. 1998, USFWS 2004). The presence of territorial bald eagles on the Northern Channel Islands would likely benefit the island fox if they deter golden eagles from inhabiting the islands.

Impacts

Individual bald eagles will be impacted by the restoration efforts. During the first 3 years of the NCI Bald Eagle Feasibility Study, 8 of the 34 released birds (approximately 24 percent) are known to have died from various causes (see Section B.2.4). The majority of these deaths (5 of 8, or 63 percent) were recently fledged eagles crossing the Santa Barbara Channel. This source of mortality was also reported by Sharpe and Garcelon (2000) when a bald eagle fledgling died while trying to fly to the mainland from Santa Catalina Island. Overall, the survival rate of eagles released on the Northern Channel Islands appears to be within the normal range of eagle survival in the wild and for a reintroduction program. The loss of several individuals is not considered significant in light of the overall recovery of the bald eagle in the United States and the efforts to restore this species to the Channel Islands.

This action suspends the Trustees' annual contribution of funds for the Santa Catalina Island Bald Eagle Program at least until the completion of the NCI Bald Eagle Feasibility Study, when subsequent decisions on restoring bald eagles to the Channel Islands will be made. Human intervention of one form or another is necessary to maintain a bald eagle presence on Santa Catalina Island, as these birds cannot reproduce on their own. If no other sources of funding are identified to support a program that maintains bald eagles on Santa Catalina Island and this intervention ceases, eventually the bald eagles currently inhabiting the island will die or disperse to other locations, and they may not be replaced by others.

As stated previously, even without continued Trustee funding for the current Santa Catalina Island Bald Eagle Program, it is highly likely that bald eagles will remain on the island for several years despite their inability to hatch offspring naturally. Bald eagles in the wild typically live for 25 to 30 years, and Santa Catalina Island currently supports 15 to 20 birds of a wide range of ages. Currently, five active bald eagle nesting territories exist on the island, and the Institute for Wildlife Studies reports that two birds are currently establishing a new territory near Avalon. Even assuming that the Santa Catalina Island bald eagles fail to hatch new chicks in the coming years, bald eagle experts do not expect that they would immediately break their pair bonds and abandon their Santa Catalina Island territories. Rather, it is likely that the bald eagles would remain on Santa Catalina Island, with their numbers diminishing gradually over a period of as many as 10 years or longer as some of the birds die and are not replaced by others and as certain bald eagle pairs break their pair bonds and leave after failing to produce chicks for several years.

Thus, it is highly likely that bald eagles will continue to inhabit Santa Catalina Island during the limited period this action addresses (i.e., until the subsequent bald eagle restoration decision-making after the NCI Bald Eagle Feasibility Study is completed, in or around 2008). At that time the Trustees will consider all options available for continuing efforts at restoring bald eagles to the Channel Islands.

It should be noted that the Trustees do not have ultimate responsibility for the continuation of the Santa Catalina Island Bald Eagle Program. This program is permitted (and was originally planned and funded) by the endangered species offices of the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

The potential impact of eagles on the avian populations, particularly seabird populations, of the Northern Channel Islands was analyzed in depth as part of the Feasibility Study for Reestablishment of Bald Eagles to the Northern Channel Islands (MSRP 2002). Because bald eagles have had a long historical presence on the Channel Islands before their extirpation and presumably coexisted with the seabird populations there, restoration of bald eagles is not expected to have a significant impact on the populations of these birds. The avian species known to be in the diet of eagles on Santa Catalina Island occur in greater numbers on the Northern Channel Islands. However, an increase in the availability of these birds would not necessarily result in a proportional increase in the eagle’s diet because it is energetically expensive for eagles to pursue and capture live birds (Sharpe and Garcelon 1999a), and pursuits of birds are usually unsuccessful (Bayer 1987, Ofelt 1975, Parrish 1995). Based on these factors, it is estimated that the overall bird component of the eagle’s diet would remain close to the 9 percent observed on Santa Catalina Island, though the species composition would likely differ among the islands (Sharpe and Garcelon 1999a).

Monitoring results from the NCI Bald Eagle Feasibility Study in 2002 and 2003 show that released bald eagles foraged primarily on pig carcasses provided by field biologists (Sharpe et al. 2004). Eagles were also observed feeding on marine mammal carcasses on Santa Cruz Island and on mule deer and elk carcasses or gut piles on Santa Rosa Island. In addition, a recreational fisherman reported seeing an eagle catch fish off of Santa Cruz Island (Sharpe et al. 2004).

Telemetry data have recorded little use of Anacapa Island by bald eagles during the seabird breeding season. Therefore, it is unlikely that released eagles have had a measurable impact on seabird populations on that island (Sharpe et al. 2004).

Physical

Benefits

This action will have no known benefits to the physical environment.

Impacts

This action will have no known impacts to the physical environment.

Human Use

Benefits

The presence of bald eagles provides both aesthetic and recreational benefits to visitors of Santa Catalina Island and the Northern Channel Islands. The presence of the bald eagle also provides human non-use or intrinsic value in that the bald eagle is a symbolically important species in the United States. In addition, bald eagles play an important role in the cultural history of the Channel Islands.

Impacts

This action suspends the Trustee's annual contribution of funds for the Santa Catalina Island Bald Eagle Program at least until the completion of the NCI Bald Eagle Feasibility Study, when subsequent decisions on restoring bald eagles to the Channel Islands will be made. Human intervention of one form or another is necessary to maintain a bald eagle presence on Santa Catalina Island, as these birds cannot reproduce on their own. If no other sources of funding are identified to support the program that maintains bald eagles on Santa Catalina Island and this intervention ceases, eventually the bald eagles currently inhabiting the island will die or disperse to other locations and may not be replaced by others. This absence of bald eagles would represent a loss of the human use and non-use services that bald eagles currently provide on Santa Catalina Island.

As stated previously, even without continued Trustee funding for the current Santa Catalina Island bald eagle intervention, it is highly likely that bald eagles will remain on the island for several years despite their inability to hatch offspring naturally. Bald eagles in the wild typically live for 25 to 30 years, and Santa Catalina Island currently supports 15 to 20 birds of a wide range of ages. Currently, five active bald eagle nesting territories exist on the island, and the Institute for Wildlife Studies reports that two birds are currently establishing a new territory near Avalon. Even assuming that the Santa Catalina Island bald eagles fail to hatch new chicks in the coming years, bald eagle experts do not expect that they will immediately break their pair bonds and abandon their Santa Catalina Island territories. Rather, it is likely that bald eagles will remain on Santa Catalina Island, with their numbers diminishing gradually over a period of as many as 10 years or longer as some of the birds die and are not replaced by others and as certain bald eagle pairs break their pair bonds and leave after several years of failing to produce chicks.

Thus, it is highly likely that bald eagles will continue to inhabit Santa Catalina Island during the limited period that this action addresses (i.e., until the subsequent bald eagle restoration decision-making after the NCI Bald Eagle Feasibility Study is completed, in or around 2008). At that time the Trustees will consider all options available for continuing efforts at restoring bald eagles to the Channel Islands.

It should be noted that the Trustees do not have ultimate responsibility for the continuation of the Santa Catalina Island Bald Eagle Program. This program is permitted (and was originally planned and funded) by the endangered species offices of the California Department of Fish and Game and the U.S. Fish and Wildlife Service. Thus, the Trustees' decision to suspend funding does not constitute an action that would in and of itself either directly or indirectly cause the disappearance of bald eagles from Santa Catalina Island and the loss of the human services they provide.

B.3.3 Likelihood of Success/Feasibility

This action addresses the interim period until the completion of the NCI Bald Eagle Feasibility Study. This study is being performed using proven, conventional methods to place bald eagles on Santa Cruz Island and monitor them until they attain reproductive age and are laying eggs. The purpose of the study is to determine whether they can reproduce unaided. The implementation of the study and the determination of its outcome are considered highly feasible. The outcome itself (i.e., whether or not the bald eagles nesting in the Northern Channel Islands are likely to experience the eggshell thinning injuries that impair reproduction by birds nesting on Santa Catalina Island) is uncertain.

The likelihood of success for bald eagle restoration efforts on the Channel Islands remains uncertain at present due to the continued presence of contamination and the uncertainty of the outcome of the NCI Bald Eagle Feasibility Study. However, this action only addresses the interim period until the study is completed; subsequent bald eagle restoration decision-making and documentation will address the likelihood of success and the feasibility of the various actions to be considered at that point.

B.3.4 Performance Criteria and Monitoring

Monitoring for this action will include the concepts outlined in the monitoring plan developed for the NCI Bald Eagle Feasibility Study (MSRP 2002). These concepts will be adapted accordingly. The specific performance criteria for successful reproduction (e.g., productivity) of the Northern Channel Islands birds will be defined by the Trustees, in consultation with experts, prior to 2007.

B.3.5 Evaluation

The Trustees have evaluated this action against the screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. The initial results of the NCI Bald Eagle Feasibility Study will likely not become available until 2008, when the birds reach maturity and begin breeding. If the NCI Bald Eagle Feasibility Study shows evidence of successful reproduction in bald eagles in the Northern Channel Islands, the Trustees may proceed with hacking additional eagles onto the Northern Channel Islands. If the NCI Bald Eagle Feasibility Study shows evidence of serious reproductive impairment, the Trustees may consider any number of options, including actions that maintain a bald eagle presence on one or more islands despite reproductive impairment. However, the determination of subsequent actions is beyond the scope of this analysis.

The Trustees have determined that this type and scale of interim restoration effort has the potential to provide long-term benefits to bald eagles in a way that doesn't require continuous operation and maintenance because the action places bald eagles into Channel Island territories where they may be able to reproduce unaided. This action may eventually facilitate the recovery of this species on all of the Channel Islands. For these reasons, the Trustees have chosen this action as the favored strategy for bald eagle restoration on the Channel Islands.

B.3.6 Budget

A total of $6.2 million will be allocated for bald eagle restoration on the Channel Islands. This allocation will cover the costs of the Santa Catalina Island Bald Eagle Program through 2005 (approximately $1.2 million spent since 2001) and the ongoing NCI Bald Eagle Feasibility Study (approximately $3.3 million). These expenditures will leave a balance of approximately $1–2 million. The Trustees will defer the decision on how to use these remaining funds until the results of the NCI Bald Eagle Feasibility Study are known. At that time, the Trustees will consider a range of restoration options and decide on the best course of action. The remaining funds could be used on any of the Channel Islands.

B.4 COMPLETE THE NCI BALD EAGLE FEASIBILITY STUDY; REGARDLESS OF ITS OUTCOME, CONTINUE FUNDING SANTA CATALINA ISLAND BALD EAGLE PROGRAM

B.4.1 Project Description and Methods

This action provides funding for bald eagle restoration on the Channel Islands regardless of the outcome of the NCI Bald Eagle Feasibility Study. Under this action, which is not an interim but a longer-term action, efforts to restore bald eagles to the Channel Islands focus on the continuous maintenance of the Santa Catalina Island Bald Eagle Program for as many years as funds are available, with the hope that eventually the Santa Catalina Island birds' exposures will decline to a level that allows them to reproduce on their own. Maintenance of the bald eagles on Santa Catalina Island is favored over the Northern Channel Islands due to the existing infrastructure and the ongoing program on Santa Catalina Island. Under this action, financial support of the Santa Catalina Island Bald Eagle Program would continue after 2005. The NCI Bald Eagle Feasibility Study would also continue until the results are known.

Summary of Program Activities on Santa Catalina Island

Currently, the reintroduced bald eagle population on Santa Catalina Island is maintained through manipulations of eggs and chicks at each nest site. Observation of adult eagles begins in January every year to determine the location of breeding pairs and their respective nest sites. Nest sites are located by observing areas of increased use by adults and searching previously used nesting areas. When nest sites are confirmed, observation blinds are set up to observe nests. From the blinds, data are collected on the chronology of nesting, behavior during incubation, nestling and adult behavior during brood rearing, the taxa of prey delivered to the nest, and the rates of prey delivery. At the West End and Seal Rocks nests, video cameras would be set up prior to the breeding season to allow for close observations of nesting activities.

All eggs laid by nesting pairs are replaced with artificial eggs within 1 to 4 days of the date that eagles are confirmed to be incubating. The adult eagles continue to incubate the artificial eggs, while the real eggs are removed and artificially incubated. In the past, eggs have been transferred from Santa Catalina Island to the San Francisco Zoo. In 2005, the Trustees funded the transport and establishment of artificial incubation equipment at a facility on Santa Catalina Island. Chicks that hatch from the eggs removed from nests on Santa Catalina Island, or those produced by captive adults at the ACC or by wild birds, are then fostered back into the nests after the adults have incubated the artificial eggs for approximately 30 days. Failed-to-hatch eggs are saved for contaminant analysis. Project staff return to the nests when the chicks are 8 weeks of age to equip them with USFWS and colored leg bands, wing markers, and a back-pack style radio transmitter. At this time, a blood sample is also collected for contaminant analyses and morphological measurements are made to determine sex. Radiotelemetry is used to locate and visually observe the behavior of fledged eagles. Each fledged bird is located every 1 to 3 days during its first month of flight. Observers record each bird’s locations, behavior, and interactions with other eagles.

In addition to egg manipulation, this action examines other potential management options to reduce contaminant exposure to bald eagles on Santa Catalina Island. These options may include experimenting with supplemental feeding of contaminant-free prey, treating the eggs in the nest to potentially allow the birds to hatch the chicks on their own, and reducing the number of nests actively manipulated to focus on those nests with less contaminated eggs.

B.4.2 Environmental Benefits and Impacts

Biological

Benefits

Bald eagles historically played an important role in the ecology of the Channel Islands, and the bald eagle fills a distinct niche there. The presence of the bald eagle provides benefits to the Channel Island ecosystem, as no other species fills the same ecological role.

Impacts

Bald eagles prey on avian species, particularly medium- to large-sized seabirds, such as gulls (*Larus* sp.) and loons. Data collected on eagle food habits on Santa Catalina Island show that they may occasionally take smaller bird species, either alive or as carrion (Garcelon 1997). Bald eagles prey primarily on fish and carrion and are, therefore, unlikely to have any major impact on other wildlife living on or around the Channel Islands. Birds have been reported to make up only 9 percent of an eagle's diet on Santa Catalina Island (Garcelon et al. 1997b). Based on this information, the Trustees do not expect a significant impact to seabirds from eagles. Seabird populations on Santa Catalina Island have not shown, to our knowledge, any measurable impact from the eagles already breeding on that island.

Physical

Benefits

This action would have no known benefits to the physical environment.

Impacts

This action would have no known impacts to the physical environment.

Human Use

Benefits

Santa Catalina Island is a popular tourist destination, and the presence of bald eagles provides both aesthetic and recreational benefits to both residents and visitors on the island. The presence of the bald eagle also provides human non-use or intrinsic value in that the bald eagle is a symbolically important species in the United States. Bald eagles also play an important role in the cultural history of the Channel Islands.

Impacts

This action would have no known impacts to cultural resources, recreation, aesthetics, or transportation.

B.4.3 Likelihood of Success/Feasibility

The growing number of bald eagle territories on Santa Catalina Island demonstrates that it is possible to actively maintain breeding bald eagles that successfully fledge young fostered into their nests despite ongoing exposure to contamination. However, the ultimate success of this action would be attained when eagles are able to breed on Santa Catalina Island without human assistance. The goal of the continued manipulation efforts outlined in this action is to enable the eagle pairs on the island to continue to fledge young and maintain pair bonds so that eagles would be present on the island when contamination levels are low enough to allow for successful reproduction without human intervention.

At this time, the likelihood of the ultimate success for this action is low. Based on the current levels of DDE and PCBs in their eggs and the lack of any significant trends in DDE levels in eggs (see Section B.2.3), Santa Catalina Island bald eagles are not likely to reach a state of self-sustainability in the foreseeable future. As outlined in Section 4.2, the Trustees, for the purpose of developing this Restoration Plan, have made several assumptions regarding future DDT and PCB distribution and exposure. These assumptions include the prediction that a substantial reduction of DDT and PCB contamination in the food web will take more than a decade after any sediment remediation. However, the feasibility and extent of such remediation remain unknown; therefore, the amount of time that contamination will remain in the food web could be much longer. In addition, the Trustees assume that elevated concentrations of DDTs and PCBs in some marine mammals, bald eagles, peregrine falcons, and seabirds will persist longer than a decade due to the longer life span of these animals and their foraging preferences, and that impacts from these contaminants would continue into the foreseeable future even if the U.S. Environmental Protection Agency undertakes a sediment source control effort.

B.4.4 Performance Criteria and Monitoring

As described in Section B.4.1, bald eagle adults and chicks would be closely monitored throughout the breeding season. Monitoring would continue using current protocols, and failed-to-hatch eggs would continue to undergo contaminant analysis. If funding of this program were to continue for the long term, the Trustees would evaluate the different components of the monitoring program and look for ways to maximize cost-effectiveness. For example, analysis of failed-to-hatch eggs may not need to be analyzed every year but rather at a set interval.

B.4.5 Evaluation

The Trustees have evaluated this action against the screening and evaluation criteria developed to select restoration actions and have concluded that it is consistent with these selection factors. However, this action is not considered to rank as high as the selected bald eagle restoration action. This action would provide benefits to injured bald eagles on Santa Catalina Island for as long as the intervention program continues. However, it is uncertain whether the program could operate until such a time that bald eagles will be able to reproduce unaided. The Trustees have determined that these benefits are outweighed by the size of the investment required to obtain the benefits, which would foreclose pursuit of other restoration actions that have a greater potential for long-term benefits and low ongoing operation and maintenance requirements. The Trustees assume that elevated concentrations of DDTs and PCBs are expected to persist in the environment and that these impacts will continue to impair successful reproduction into the foreseeable future even if the U.S. Environmental Protection Agency undertakes a sediment source control effort. For these reasons, the Trustees have not chosen this course of action (i.e., maintaining bald eagles on Santa Catalina Island for the long term) as a preferred restoration action.

B.4.6 Budget

Under this action, the Trustees propose to allocate a total of $10 million for bald eagle restoration on the Channel Islands. Approximately $4 million would be utilized through the end of the NCI Bald Eagle Feasibility Study (supporting both the NCI Bald Eagle Feasibility Study and the Santa Catalina Island Bald Eagle Program), leaving approximately $6 million to place into a long-term endowment or other financial mechanism to support the continuation of the Santa Catalina Island Bald Eagle Program for as long as possible or until such time that the birds are able to reproduce successfully on their own. A total of $6 million would fund approximately 22 years of restoration efforts on Santa Catalina Island if the average annual cost remains at approximately $270,000. This amount does not include any interest that would be generated.

Appendix C

Tier 2 Evaluation of Peregrine Falcon Restoration Actions

Appendix C1

Restore Peregrine Falcons to the Channel Islands

C1.1 GOALS AND NEXUS TO INJURY

The goal of this 5-year action is to facilitate recovery of peregrine falcons to the Channel Islands. Data collected in 1992 in the Southern California Bight demonstrated severe (>15 percent) eggshell thinning in peregrine falcons (Kiff 1994). Peregrine falcons were extirpated from the Channel Islands by the mid 1950s, largely due to DDT contamination, which led to eggshell thinning and reproductive failure (Kiff 2000).

C1.2 BACKGROUND

Peregrine falcons once numbered in the hundreds in Southern California (Walton 1997). Between 20 and 30 pairs are estimated to have nested on the Channel Islands prior to 1945 (Kiff 1980, Hunt 1994). However, the historical record of peregrine falcons on the Channel Islands is largely deficient, and the overall carrying capacity of the territories is unknown (Kiff 2000, Walton 1999). Peregrine falcons disappeared from the Channel Islands by 1955, and only two pairs were located in California in 1970 (Kiff 1980, Herman et al. 1970). In 1973, this species was listed as endangered under the Endangered Species Act. Contamination by organochlorines, in particular the pesticide DDT, was a major cause of the decline of the peregrine falcon on both the Channel Islands and the mainland (Risebrough and Peakall 1988). DDT is a mixture of several chemicals that are further metabolized in the environment; DDE is a component of DDT contamination in the environment that has specifically been implicated in reproductive failures of many species of birds. A mean DDE level of 15–20 parts per million (ppm) wet weight in peregrine eggs is a critical level associated with approximately 17 percent eggshell thinning and population declines (Peakall et al. 1975, Peakall and Kiff 1988).

C1.2.1 Recovery on the Channel Islands

The peregrine falcon has made a dramatic recovery since 1975, in large part due the restrictions placed on DDTs in 1972 and an active release program that was initiated soon afterward. Incubation of thin-shelled eggs removed from wild nests and a captive breeding program provided source birds for the release program. Between 1978 and 1993, the Santa Cruz Predatory Bird Research Group released over 719 peregrine falcons in California (Hunt 1994). On the Channel Islands, 34 birds were hacked or fostered between 1983 and 1998, including 6 birds on San Miguel Island and 17 birds on Santa Catalina Island (Linthicum, pers. comm., 2004). In 1987, the first reestablished pair was documented on San Miguel Island (Hunt 1994). In 1989, active nests were recorded on Anacapa and Santa Cruz Islands (Hunt 1994). Between 1992 and 1994, 8 to 10 pairs were noted on the Northern Channel Islands (Hunt 1994). Since 1995, an additional 165 birds have also been released on the proximate mainland to the Channel Islands at the Vandenberg Air Force Base and the Santa Ynez area (Linthicum, pers. comm., 2004).

The release program accelerated the recovery of the peregrine falcons in California and the rest of the United States. The peregrine falcon was delisted from the List of Threatened and Endangered Species on August 25, 1999 (USFWS 1999). The U.S. Fish and Wildlife Service (USFWS) recovery goal of five pairs for the Channel Islands was exceeded at the time of delisting (USFWS 1982). In this ruling, the USFWS acknowledges that there were areas where impacts from DDT were still occurring, but those impacts had been reduced to local mortality of eggs and local territory failures (USFWS 1999).

Eggshells collected in 1992–1993 averaged 19 percent thinner than pre-1947 museum specimens, and had elevated concentrations of DDE (Hunt 1994, Kiff 1994). Productivity rates are substantially lower when eggshells range between 17 and 20 percent thinner than normal (Peakall and Kiff 1988). It has been estimated that 1 ppm of DDE in the diet of peregrine falcons is sufficient to cause the eggshells to be 16 percent thinner, and 3 ppm DDE results in eggshells being 10 to 28 percent thinner (Enderson et al. 1982, Deweese et al. 1986, Hunt 1994). Peregrine falcons prey almost exclusively on other birds. Data collected in 1992 indicated that contamination in the food web was still at sufficient levels to result in substantial eggshell thinning on the Channel Islands.

In 1998, eggs from eight peregrine falcon territories on the Channel Islands were sampled to determine eggshell thinning (Walton 1999). Results indicated average eggshell thinning continued to exceed 17 percent for coastal Channel Islands territories, while most inland Channel Island territories demonstrated slightly reduced levels of thinning. These differences are likely a reflection of the higher levels of DDE in marine-oriented prey (i.e., seabirds) than terrestrial prey (i.e., land birds) (Walton 1999).

C1.2.2 Current Status on the Channel Islands

No data are available on peregrine falcon eggshell thinning on the Channel Islands since 1998. The Natural Resource Trustees for the Montrose case (Trustees) funded a study in 2004 to determine the occupancy and reproductive success of peregrine falcons on Santa Catalina Island, including current levels of eggshell thinning. Although occupancy was determined for two resident pairs, evidence of egg laying, incubation, and chick rearing was not observed (PBRG 2004). It is possible that any early nests failed due to eggshell thinning; however, this was not determined.

Despite the ongoing presence of DDTs in the marine environment surrounding the Channel Islands and the potential for eggshell thinning, it is clear that the number of peregrine falcon pairs is steadily increasing on the islands. In 2004, approximately 21 peregrine falcon pairs were occupying breeding territories on six of the eight Channel Islands (PBRG 2004). The majority of the pairs (18 of 21) occur on the Northern Channel Islands (San Miguel, Santa Rosa, Santa Cruz, and Anacapa), while 3 pairs occur on the Southern Channel Islands (2 pairs were recently confirmed on Santa Catalina Island and 1 on Santa Barbara Island). Recolonization to the Southern Channel Islands has been slower than to the Northern Channel Islands. Peregrine falcons have also been recently observed on San Clemente and San Nicolas Islands; however, breeding has not been confirmed to date (Walton, pers. comm., 2003, Smith, pers. comm., 2004).

C1.3 PROJECT DESCRIPTION AND METHODS

The overall goal of this action is to speed the recovery of peregrine falcons to the Channel Islands. Since the majority of the known occupied territories in 2004 occurred on the Northern Channel Islands (18 of 21), this 5-year action would involve active restoration of peregrine falcons to the Southern Channel Islands through hacking techniques. Hacking is a process that involves releasing fledgling peregrine falcons from a hack box and supplementing food for the birds until they develop adequate hunting skills. Because of the presence of federally endangered and threatened bird species on both San Clemente and San Nicolas Islands (that may be preyed upon by the falcons), this project would involve releasing birds only on Santa Catalina Island. Two hack towers would be used for the release of 10 birds per year, for a total of 50 birds over a 5-year period. Peregrine falcons of west coast origin that are either bred in captivity or removed from urban structures would be released. All released peregrine falcons would be banded with both USFWS bands and alphanumeric bands that can be read at a distance. A monitoring component of the project would also be developed, and additional documentation pursuant to National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) would be completed as needed.

C1.4 ENVIRONMENTAL BENEFITS AND IMPACTS

C1.4.1 Biological

Benefits

The active restoration of peregrine falcons would speed the recovery of this species into historically occupied habitat both on the Channel Islands and mainland. Based on the results of earlier release programs, this effort would likely result in the establishment of additional peregrine falcon territories on the Channel Islands (Walton 1997). This program would result in an influx of birds around the Southern Channel Islands, thus encouraging recolonization on these islands. Although peregrine falcons are recolonizing the Southern Channel Islands, as demonstrated by the recent breeding on Santa Barbara and Santa Catalina Islands, recolonization has not yet occurred on San Clemente and San Nicolas Islands. This program would encourage the recolonization of peregrine falcons into historically occupied habitat on the Channel Islands. In addition, peregrine falcons that fledge from the Channel Islands frequently disperse to the mainland (Walton 1999). Therefore, unoccupied territories on the mainland are also likely to benefit from the release program.

Raptors, such as the peregrine falcon, are an essential part of healthy, functioning ecosystems. The peregrine falcon is an apex predator that fills a particular ecological niche in the Channel Islands ecosystem. Significant efforts are underway to restore the ecosystems of the Channel Islands, such as the removal of nonnative species, habitat restoration, and reintroduction of top predators (e.g., bald eagle). Although peregrine falcons are once again a top predator on the majority of the Channel Islands, complete recovery has not yet been achieved. Additional active restoration would further encourage recovery on the Channel Islands in an effort to restore a missing component of the island ecosystem.

Impacts

The peregrine falcon is a highly specialized feeder, concentrating almost entirely on birds. Kiff (1980) reported that peregrine falcons prey on at least 22 species of birds on the Channel Islands and the Coronado Islands. On the Channel Islands, dietary studies of peregrine falcons in 1992 and 1993 showed that gulls, alcids, and land birds comprised between 73 and 82 percent of their diet depending on season (Hunt 1994). Grebes, shorebirds, and phalaropes constituted a smaller, but substantial part of their diet. Within these groups of birds, the species that accounted for 5 or more percent of the prey biomass included the California gull, western gull, Cassin's auklet, Xantus's murrelet, unidentified grebes, red phalarope, rock dove, mourning dove, and European starling.

The recovery of the peregrine falcon on the Channel Islands may have a negative impact on bird populations, particularly for those species that are in decline or have limited populations. Predators, such as the peregrine falcon, limit population growth by reducing nest productivity and increasing adult and juvenile mortality. The Channel Islands are critical breeding areas for seabirds and support important colonies of special-status or declining species, such as the state-threatened Xantus's murrelet, rare ashy storm-petrel, and federally threatened western snowy plover. Peregrine falcons are known predators of the Xantus's murrelet and western snowy plover (Hunt 1994, USFWS 2001). Peregrine falcons have also been documented preying on petrels (Walton 1997, White et al. 2002); therefore, ashy storm-petrels could be impacted as well. Because many seabirds are under constant threat (e.g., from oil spills, human disturbance, El Niño events), they may not be able to withstand peregrine falcon predation (Paine et al. 1990). In particular, depressed populations of seabirds may not be able to effectively absorb the additional predation pressure from increased peregrine falcons on these islands.

Recolonization of peregrine falcons to the Southern Channel Islands may also impact the federally endangered San Clemente loggerhead shrike *(Lanius ludovicianus mearnsi).* This bird subspecies is endemic to the U.S. Navy–owned San Clemente Island and was listed by the USFWS as endangered in 1977 due to its localized range, critically low population numbers, consistently low productivity, and intense predation pressure. Significant effort has been made to decrease the threat of extinction of the wild population. Although this population has been recently increasing, the subspecies remains highly endangered and vulnerable to predation pressure.

Peregrine falcons do not prey upon California brown pelicans (Walton 1997); therefore, release of additional birds is not expected to adversely impact this species.

C1.4.2 Physical

Benefits

This action has no known benefits to the physical environment.

Impacts

This action has no known impacts to the physical environment.

C1.4.3 Human Use

Benefits

The recovery of the peregrine falcon to the Channel Islands provides both aesthetic and recreational benefits to visitors of the islands. Peregrine falcons are known for their spectacular flights with an average speed of 40–55 kilometers (km)/hour (25–34 miles/hour) with speeds reaching 112 km/hour (70 miles/hour) (Cade 1982).

Impacts

This action has no known impacts to human uses.

C1.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

The methodology proposed for hacking peregrine falcons on Santa Catalina Island is one that has been successfully employed worldwide to reestablish peregrine falcons and other species. Hacking of peregrine falcons in California has been successful and has contributed to the ongoing recovery of this species on the mainland and in the Northern Channel Islands. Once birds are released from the hack towers, operational work beyond monitoring is minimal. The proposed methodology is technically sound and feasible and the likelihood of increasing the number of occupied peregrine falcon territories on the Channel Islands is high. While hacking is a feasible method for increasing the number of peregrine falcons on the Channel Islands, ongoing contamination of the food web of the Southern California Bight may impair the ability of peregrine falcons to successfully reproduce in certain territories.

C1.6 PERFORMANCE CRITERIA AND MONITORING

Specific performance criteria would be developed as part of the monitoring plan for this action. The plan would outline established methods for monitoring the distribution, number of pairs, reproductive success (i.e., productivity), recruitment, foraging behavior, and dispersal of released peregrine falcons on the Channel Islands.

C1.7 EVALUATION

The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and concluded that this action is consistent with these selection factors. Recovery of this species on the Channel Islands is under way, as documented by the current presence of approximately 21 pairs on six of the eight Channel Islands. Both the ongoing release program on the mainland and natural recruitment are responsible for the recolonization of these islands. Although the historical record is incomplete for the Channel Islands, between 20 and 30 pairs were estimated prior to 1945 (Kiff 1980, Hunt 1994). In 2004, the current number of pairs occupying the Channel Islands is within this estimated range and continues to increase.

The number of pairs on the Channel Islands has been steadily increasing. In the last 10 years, the number of pairs has doubled from 8 to 10 pairs in 1994 to 21 pairs in 2004. This increase can be attributed to both successful production on the islands and hacking efforts on the mainland. As peregrine falcon numbers continue to increase on the mainland, natural recruitment to the Channel Islands from the mainland is likely to increase as well.

Current levels of DDE-associated eggshell thinning are unknown for the breeding pairs on the Channel Islands. However, because some pairs are successfully reproducing, contaminant levels are not high enough to result in widespread failure on the Northern Channel Islands. This may not be the case with the Southern Channel Islands. The slower rate of colonization and lack of known successful breeding attempts on the Southern Channel Islands may indicate that contamination continues to negatively impact certain pairs. However, for the Channel Islands as a whole, ongoing impacts due to DDT contamination are being buffered by the natural recruitment of birds from other areas (Walton 1999).

Peregrine falcons are experiencing an overall expansion on the Channel Islands despite any ongoing effects from DDE in their diet. The number of breeding pairs on both the Northern and Southern Channel Islands is within the estimated range prior to their disappearance from the islands. Productivity on the islands, recruitment from the mainland, and ongoing hacking efforts on the mainland continue to result in the occupation of additional territories on the Channel Islands. Although additional active restoration may further speed recovery, the Trustees have determined that additional hacking efforts are not necessary at this time. However, as part of the Preferred Alternative, the Trustees will fund several peregrine falcon surveys over the next 5 years that will provide updated information on the status and distribution of these birds on the Channel Islands (see Appendix C2). Based on the results of these surveys, the Trustees may proceed with active restoration activities on the Channel Islands in Phase 2 of the restoration program. A subsequent NEPA/CEQA document would be released to the public to address future restoration projects in Phase 2.

C1.8 BUDGET

The estimated cost of a 5-year active restoration program on Santa Catalina Island is shown below. This budget does not include all the associated monitoring and contaminant analysis costs.

- Labor..$374,000
- Supplies..$99,000
- Equipment..$7,000
- Transportation..$13,000
- Overhead..$110,000
- **Total Cost Years 1–5..........................$603,000**

Appendix C2

Monitor the Recovery of Peregrine Falcons on the Channel Islands

C2.1 GOALS AND NEXUS TO INJURY

The goal of this project is to monitor the recovery of peregrine falcons on the Channel Islands. Data collected in 1992 in the Southern California Bight demonstrated severe (>15 percent) eggshell thinning in peregrine falcons (Kiff 1994). Peregrine falcons were extirpated from the Channel Islands by the mid 1950s, largely due to DDT contamination that led to eggshell thinning and reproductive failure (Kiff 2000).

C2.2 BACKGROUND

Section C1.2 of Appendix C1 (Restore Peregrine Falcons to the Channel Islands) provides a description of the background, recovery, and current status of the peregrine falcon on the Channel Islands.

C2.3 PROJECT DESCRIPTION AND METHODS

This action involves the development of a monitoring program to determine the extent and the factors affecting peregrine falcon recovery on the Channel Islands. Although it is known that peregrine falcons are increasing on the Channel Islands, a comprehensive survey has not been undertaken since the early 1990s; thus, the current distribution and number of breeding pairs is not fully known. For example, peregrine falcons were only recently confirmed (in 2004) to be breeding on Santa Catalina Island as a result of focused surveys funded by the Natural Resource Trustees for the Montrose case(Trustees). Also unknown is the extent to which (if any) the recovery of peregrine falcons on the Channel Islands is being affected by ongoing contamination in the food web. Some pairs may still be experiencing reduced productivity due to eggshell thinning, as may be the case with the pair on Santa Barbara Island that has not produced fledglings since nesting began in 1995 (PBRG 2004).

This action proposes to develop a comprehensive program to monitor the recovery of the peregrine falcon on the Channel Islands. At a minimum, this program will monitor the distribution, number of pairs, and reproductive success (i.e., productivity) of peregrine falcons on the Channel Islands. An essential part of this program will be contaminant analysis of addled eggs and the measuring of eggshell fragments, particularly in light of the lack of current data on levels of eggshell thinning and the potential ongoing effect of DDT contamination. The need to monitor additional parameters such as recruitment, foraging behavior, and dispersal will be assessed and prioritized during the development of the monitoring plan. The monitoring program will be designed so that the program data are comparable to previous studies on the islands (such as the study conducted in 1992). Standard monitoring protocols will be used. For example, egg and eggshell samples will be collected according to established protocols in a manner consistent with previously collected data. The scope of the monitoring program (including frequency and intensity) will be developed in consultation with experts.

The Monitoring Plan for the American Peregrine Falcon (USFWS 2003) will be considered during the development of this program. One focus of the monitoring plan will be the persistence of environmental contaminants, such as DDTs, and the need to continue to monitor levels in the peregrine falcon population. The monitoring plan for this project will be consistent with the regional monitoring plan to enable comparisons of the relative levels of contamination on the Channel Islands with other sites in the region.

C2.4 ENVIRONMENTAL BENEFITS AND IMPACTS

C2.4.1 Biological

Benefits

Due to the lack of focused surveys for peregrine falcons on the Channel Islands, the current status of this species is unknown. A monitoring program will provide information on territory occupancy, nest success, and productivity. These measures are all indicators of population health and are important to understanding the long-term recovery of this species on the Channel Islands. The monitoring data will inform natural resource managers of potential threats to peregrine falcon recovery and will thereby enable improved management of this species on the Channel Islands.

As top predators of their food chain, peregrine falcons are an excellent indicator species of the overall health of the ecosystem in which they live. The monitoring of egg contaminant levels in peregrine falcons will provide valuable information on the overall levels of contamination in the environment.

Impacts

A monitoring program will not result in significant impacts to the biological environment. Peregrine falcons pairs may be temporarily disturbed during certain monitoring activities (e.g., entering the nest to collect eggshell fragments or band young); however, the majority of the observations will be from a distance and will not disturb peregrine falcons. The monitoring plan will also consider the presence of seabird nesting colonies and avoid and minimize any impacts to nesting areas during the monitoring.

C2.4.2 Physical

Benefits

This action will have no known benefits to the physical environment.

Impacts

This action will have no known impacts to the physical environment.

C2.4.3 Human Use

Benefits

The recovery of the peregrine falcon to the Channel Islands provides both aesthetic and recreational benefits to visitors of the islands.

Impacts

This action will have no known impacts to human uses.

C2.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

The feasibility of this project is high. Similar monitoring programs have been developed and established monitoring protocols are available for peregrine falcons. The monitoring plan will be consistent with previous peregrine falcon monitoring efforts on the Channel Islands and the Monitoring Plan for the American Peregrine Falcon, as described in Section C2.3.

C2.6 PERFORMANCE CRITERIA AND MONITORING

A monitoring plan for this program will be developed using established protocols. The plan will be consistent with regional peregrine falcon monitoring efforts.

C2.7 EVALUATION

The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. Although the number of breeding pairs of peregrine falcons and the number of islands that they occupy have increased, the current status of the peregrine falcon on the Channel Islands is unknown. This monitoring program will be used to detect changes in the status and distribution of peregrine falcons on the Channel Islands. Because peregrine falcons are superior indicators of environmental health and ecological integrity, the monitoring program will provide valuable information about the presence of contamination within the Channel Islands ecosystem and the Southern California Bight. After considering the results of the monitoring, the Trustees may decide to proceed with active restoration activities on the Channel Islands in Phase 2 of the restoration program.

C2.8 BUDGET

For the purposes of this Restoration Plan, the Trustees have estimated the costs of two comprehensive monitoring events (including surveys and contaminant analysis) that will occur within Phase 1 of implementation. However, the scope and extent of the monitoring program will determine the ultimate budget for this project. Thus, this budget may be adjusted once the objectives and parameters of the monitoring program are more clearly defined.

The estimated budget for 1 year of monitoring is as follows:

- Labor..$82,000
- Supplies and equipment $7,000
- Transportation...$24,000
- Contaminant analysis..............................$12,000
- **Total cost per year $125,000**

Estimated amount needed for 2 years of monitoring: $250,000

Appendix C3

Restore Peregrine Falcons to the Baja California Pacific Islands

C3.1 GOALS AND NEXUS TO INJURY

The goal of this action is to restore peregrine falcons to the Baja California Pacific Islands. Data collected in 1992 in the Southern California Bight demonstrated severe (>15 percent) eggshell thinning in peregrine falcons (Kiff 1994). Peregrine falcons declined drastically in Baja California during the 1960s and 1970s (Castellanos et al. 1997, Porter et al. 1998). This decline was apparently at least in part caused by high levels of DDTs (Porter et al. 1988, Kiff 1988).

C3.2 BACKGROUND

The Baja California Pacific Islands are located along the western coast of Baja California, Mexico (see Figure D5-1 in Appendix D5). There are a total of 18 islands in this region and 3 of these islands or island groups (Coronado, Todos Santos, and San Martín) are oceanographically considered part of the Southern California Bight. Six individual islands (San Jeronimo, San Benito, Guadalupe, Natividad, Asunción, and San Roque) are located south of the bight but are still part of the California Current System.

The historical and current status of peregrine falcons in Mexico is not well known (Banks 1969, USFWS 1999). However, records indicate that the Baja California Pacific Islands historically supported important peregrine falcon breeding areas. Porter et al. (1988) reported a total of 42 occupied peregrine falcon territories on the western side of the Baja California Peninsula prior to 1966. However, peregrine falcons declined drastically on the west coast of Baja during the 1960s and 1970s and only 2 to 3 pairs were still nesting there between 1966 and 1971 (Porter et al. 1998). These breeding areas were often associated with dense seabird colonies that served as the principal food source (Kiff 1988).

C3.2.1 Northern Baja California Pacific Islands

The peregrine falcon was most abundant on the Coronado Islands and the historical density of breeding pairs may have been the highest ever recorded for the race *Falco peregrinus anatum* (Kiff 1980). At least three pairs regularly nested on these islands (Howell 1917), but the number was higher in certain years. Peregrine falcons were recorded on these islands as early as 1908, and field notes recorded 11 peregrine falcons on North Coronado Island in 1913 (Kiff 1980). The Coronado Islands supported at least four active peregrine falcon nests in 1940 and two in 1948 (Kiff 1980). The highest numbers of peregrine falcon pairs reported during a single year at the Coronado Islands is between five and nine pairs (Kiff 1980).

Peregrine falcons disappeared from the Coronado Islands during the same period as their extirpation on the Channel Islands. Peregrine falcons were not present during a visit in 1954 (Herman et al. 1970). As of 1988, peregrine falcons remained essentially extirpated from the northern Pacific coast region of Baja California (Kiff 1988).

Focused surveys for peregrine falcons have not been conducted recently on these islands. However, it is estimated that Coronado, Todos Santos, San Martín, and San Jeronimo Islands may currently support a total of 5 to 6 pairs (Keitt, pers. comm., 2004).

C3.2.2 Central Baja California Pacific Islands

The central west coast of the Baja California Peninsula was an important breeding area for peregrine falcons (Castellanos et al. 1997). San Benitos, Cedros, Natividad, San Roque, and Asunción Islands all supported breeding pairs (Castellanos et al. 1997). Natividad Island historically supported a high density of breeding peregrine falcons, with six pairs reported in 1924 (Banks 1969). Natividad Island supported dense colonies of seabirds, including a large population of black-vented shearwaters (see Appendix D5). It is currently estimated that 1 to 2 pairs are breeding on Natividad Island (Keitt, pers.comm., 2004).

In 1993, three active peregrine falcon nests were discovered in Ojo de Liebre (Scammon's Lagoon) on the western side of the Baja California Peninsula in an area without historical nesting records (Castellanos et al. 1997). Surveys between 1980 and 1994 documented a total of 10 nesting pairs in this area that included San Benito, Cedros, Natividad, San Roque, and Asunción Islands (Castellanos et al. 1997). These observations suggest some recent recovery on the central west coast of the Baja California Peninsula.

C3.3 PROJECT DESCRIPTION AND METHODS

The goal of this 5-year action is to restore peregrine falcons on the Baja California Pacific Islands. Projects under consideration include comprehensive surveys of the islands, efforts to reduce impacts from human disturbance, and habitat enhancement.

The first project under consideration is a comprehensive survey of the islands. Systematic surveys have not been conducted recently, and the current status and distribution of peregrine falcons on these islands are largely unknown. This survey would document the number of breeding pairs, their reproductive success, the condition of nesting sites, and the potential impacts to the nesting area (e.g., from human disturbance). The survey would also include collection of egg and eggshell samples for contaminant analysis. These samples would be collected according to established protocols.

Based on the results of the survey, subsequent restoration actions would be identified and evaluated, such as reducing human disturbance and habitat enhancement. Human activities are known to cause disturbance to peregrine falcon nests along the central Baja California Peninsula (Daneman and Guzman Poo 1992). Actions to reduce human disturbance would include placement of signs and restriction on access to nesting areas. Habitat enhancement would include improvements such as stabilizing nesting sites, removing debris, or adding favorable substrate in the nest site to enhance reproductive success (e.g., pea gravel).

Seabird restoration is also being considered for the Baja California Pacific Islands. Seabird restoration projects would increase the abundance and distribution of prey species of the peregrine falcon, including petrels, auklets, and gulls. Proposed activities range from social attraction to habitat restoration to reducing human disturbance. Specific seabird restoration projects on these islands that are being considered are detailed in Appendix D5.

C3.4 ENVIRONMENTAL BENEFITS AND IMPACTS

C3.4.1 Biological

Benefits

This restoration action would primarily benefit peregrine falcons. Although systematic surveys have not recently been conducted, the number of peregrine falcon pairs on these islands is below historical levels (Keitt, pers. comm., 2004, Castellanos et al. 1997). Focused surveys for peregrine falcons would provide essential information on the current status and distribution on these islands. This information is necessary to identify specific actions to protect and restore this species to historically occupied habitat. Actions taken to reduce human disturbance would likely result in recolonization of unoccupied habitat and increased reproductive success. The recolonization of peregrine falcons into historically occupied habitat on these islands would provide direct long-term benefits to this species, since peregrine falcon territories generally remained occupied indefinitely, with new adults being recruited from the floating population over time. In addition, peregrine falcons typically disperse 16 to 241 kilometers (10 to 150 miles) to adjacent unoccupied territories. An increase in the number of peregrine falcons on the Baja California Pacific Islands may lead to further recovery of peregrine falcons on the Channel Islands due to their proximity.

Raptors, such as the peregrine falcon, are an essential part of healthy, functioning ecosystems. The peregrine falcon is an apex predator that fills a particular ecological niche on island ecosystems. Significant efforts are under way to restore the ecosystems of the Baja California Pacific islands, such as the removal of nonnative species and habitat restoration. Recovery of this species on the Baja California Pacific islands would complement ongoing efforts to restore the island ecosystems of the region.

Impacts

The peregrine falcon is a highly specialized feeder, concentrating almost entirely on birds. Kiff (1980) reports that peregrine falcons prey on at least 22 species of birds on the Channel Islands and the Coronado Islands. A peregrine nest site examined on the Coronado Islands in 1924 contained 12 bird species, including 42 pairs of wings of Xantus's murrelets (Huey in Kiff 1980). On the Channel Islands, dietary studies of peregrine falcons in 1992 and 1993 showed that gulls, alcids, and land birds constituted between 73 and 82 percent of their diet, depending on season (Hunt 1994).

The presence of the peregrine falcon may have a negative impact on bird populations, particularly for those species that are in decline or have limited populations. Predators such as the peregrine falcon limit population growth by reducing nest productivity and increasing adult and juvenile mortality. The Baja California Pacific islands are critical breeding areas for seabirds and support important colonies of special-status or declining species, such as the state-threatened Xantus's murrelet and rare ashy storm-petrel. Because many seabirds are under constant threat (e.g., from oil spills, human disturbance, El Niño events), they may not be able to withstand peregrine falcon predation (Paine et al. 1990). In particular, depressed populations of seabirds may not be able to effectively absorb the additional predation pressure from increased peregrine falcons on these islands.

Peregrine falcons do not prey on California brown pelicans; therefore, an increase in the number of pairs is not expected to adversely impact brown pelicans.

C3.4.2 Physical

Benefits

This action would have no known benefits to the physical environment.

Impacts

This action would have no known impacts to the physical environment.

C3.4.3 Human Use

Benefits

The recovery of the peregrine falcon to the Baja California Pacific islands provides both aesthetic and recreational benefits to visitors and residents of the islands.

Impacts

This action would limit human disturbance in the vicinity of peregrine falcon nesting areas. This action may impact residents on the islands during the breeding season for this species. However, this impact is not anticipated to be significant due to the minimal number of people that inhabit the islands.

C3.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

This action would consist of the following: surveys, reducing human disturbance, and habitat enhancement. Methodologies for these specific actions have been established and used successfully in the past. Survey protocols have been developed and are standardized. The surveys would identify additional measures to protect and restore peregrine falcons. Once these specific actions are identified, they would be evaluated for their feasibility and likelihood of success.

C3.6 PERFORMANCE CRITERIA AND MONITORING

A monitoring plan for this action would be developed using established protocols. The plan would be consistent with regional peregrine falcon monitoring efforts.

C3.7 EVALUATION

The Natural Resource Trustees for the Montrose case (Trustees) have evaluated this action against all screening and evaluation criteria developed to select restoration actions and concluded that this action is consistent with these selection factors. A systematic survey of the Baja California Pacific islands is necessary to assess the current status, distribution, and threats to peregrine falcons on these islands. However, as outlined in Appendix C2, a similar inventory of peregrine falcons is needed on the Channel Islands because the existing survey information is largely outdated for these islands. In light of the lack of current information on the Channel Islands, the Trustees have determined that surveys on the Channel Islands are a higher priority at this time than are surveys on the Baja California Pacific islands.

Despite the lack of comprehensive surveys of the Baja California Pacific islands, the limited information available indicates that the population is recovering from drastic declines in the 1960s and early 1970s (Castellanos et al. 1997). Similarly, peregrine falcons are experiencing an overall expansion on the Channel Islands despite the potential ongoing effects from DDT contamination.

An important factor in the recovery of the peregrine falcon is the availability of sufficient prey resources. Because peregrine falcons concentrate on smaller seabirds, a robust seabird population is needed to sustain an increasing number of pairs. As part of the Preferred Alternative, the Trustees have selected a suite of seabird restoration actions on both the Channel Islands and the Baja California Pacific islands. These projects would likely provide benefits to peregrine falcons on the Baja California Pacific islands by increasing their prey base. Without robust seabird populations, peregrine falcon recovery on these islands would likely be limited.

Although the Trustees are currently proposing to focus their restoration efforts for peregrine falcons on the Channel Islands, additional consideration may be given to specific restoration opportunities on the Baja California Pacific islands in Phase 2 of restoration implementation.

C3.8 BUDGET

The estimated cost of a 5-year program (surveys, reducing human disturbance, and habitat enhancement) would be as follows:

- Labor..$295,000
- Supplies..$39,000
- Equipment..$64,000
- Transportation..$40,000
- Overhead..$109,000
- **Total cost, years 1–5 ....$547,000**

Appendix D5 presents the estimated budgets for seabird restoration actions in the Baja California Pacific islands.

Appendix D

Tier 2 Evaluation of Seabird Restoration Actions

Appendix D1	Restore Seabirds to San Miguel Island
Appendix D2	Restore Alcids to Santa Barbara Island
Appendix D3	Restore Seabirds to San Nicolas Island
Appendix D4	Restore Seabirds to Scorpion and Orizaba Rocks
Appendix D5	Restore Seabirds to Baja California Pacific Islands
Appendix D6	Create/Enhance/Protect California Brown Pelican Roost Habitat
Appendix D7	Implement an Entanglement Reduction and Outreach Program to Protect Seabird Populations
Appendix D8	Restore Ashy Storm-Petrels to Anacapa Island

Appendix D1

Restore Seabirds to San Miguel Island

D1.1 GOALS AND NEXUS TO INJURY

This action aims to restore seabird nesting habitat on San Miguel Island in the Channel Islands National Park by eradicating the introduced black rat (*Rattus rattus*). Target species for restoration include burrow/crevice nesting seabirds such as the ashy storm-petrel, Cassin's auklet, and Xantus's murrelet, as well as other seabirds such as the western gull, Brandt's cormorant, the pelagic cormorant, and the pigeon guillemot.

Eggshell thinning and/or elevated levels of DDTs were documented in eggs of ashy storm-petrels, Cassin's auklets, western gulls, Brandt's cormorants, pelagic cormorants, pigeon guillemots, and Xantus's murrelets in the Southern California Bight (SCB) (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of the seabird nexus to the injuries of the Montrose case.

D1.2 BACKGROUND

Island ecosystems are critical for the conservation of biodiversity. They represent about 3 percent of the world's surface, but support approximately 15 to 20 percent of all birds, reptiles, and plants (Whittaker 1998). Of the 484 extinctions that have been recorded since 1600, at least 75 percent have been island endemics (World Conservation Monitoring Centre 1992). Non-native species were implicated in the majority of these extinctions (Atkinson 1985). Introduced rats alone are responsible for about 40 to 60 percent of all bird and reptile extinctions from islands (Howald et al. 2003). Rats have been introduced onto more than 80 percent of islands worldwide, causing ecosystem-wide effects on the distribution and abundance of native flora and fauna (Atkinson 1985), including in the Channel Islands National Park (Collins 1979, Erickson 1990, Erickson and Halvorson 1990).

Seabird life history characteristics make them particularly vulnerable to increased predation from introduced predators such as rats. For example, adult Xantus's murrelets sporadically leave their eggs unattended during the incubation period while they forage at sea. The unattended eggs are then vulnerable to predation by rats. Most seabirds are long lived and have high adult survivorship (Russell 1999). Even small reductions in adult survivorship can cause drastic reductions in annual population growth and colony persistence (Keitt et al. 2002). Rats affect multiple life history stages of seabirds and have been known to significantly reduce or eliminate seabird colonies in ecologically short periods of time (Kaiser et al. 1997, Atkinson 1985).

Introduced rats have an ecosystem-wide impact on the California Channel Islands. As documented on nearby Anacapa Island, introduced rats are known to feed and prey on many floral and faunal organisms, including terrestrial and intertidal invertebrates, reptiles and amphibians, land birds, and a wide variety of plant material (Erickson 1990). In addition, black rats likely contributed to the 20-year extirpation of the Anacapa deer mouse (*Peromyscus maniculatus anacapae*) from East Anacapa Island (Collins et al. 1979, Drost, pers. comm., 2000). In 2001 and 2002, the American Trader Trustee Council successfully implemented the Anacapa Island Restoration Project, eradicating black rats in an effort to restore seabird populations on the island. Given the similar goals and biological setting between the two projects, the Anacapa Island Restoration Project will serve as a successful model for the proposed effort on San Miguel Island.

D1.2.1 San Miguel Island and the Introduction of Rats

San Miguel Island is the westernmost island of the Channel Islands National Park and is managed by the National Park Service (NPS). This island totals 37 square kilometers (km^2) (14 square miles) in size and is about 13 km (8 miles) long and 6 km (4 miles) wide. The island is primarily a plateau of about 150 meters (500 feet) in elevation with two 244-meter (800-foot) rounded hills. San Miguel Island is dominated by grassland, which covers most of the deeper, stabilized soils on the island terrace (Hochberg et al. 1979). San Miguel Island has a primitive campground, miles of hiking trails, and several large beaches.

It is unclear when rats were introduced to San Miguel Island. In the late 1980s, a small rat population appeared to have been restricted to the west side of the island along the coast from Harris Point to Tyler Bight (Erickson and Halvorson 1990). Collins (1979) documented rats using seabird nesting burrows for denning. Rats have also been documented on beaches and on the upper terraces of the island (Erickson and Halvorson 1990**,** Collins 1979). In March and July of 2004, a survey on San Miguel Island documented that rats are distributed along shorelines and within canyons on the island, but a more comprehensive survey is needed to determine the full extent of rat distribution on the island (IC 2004a). The many dry arroyos and erosion drainages provide key habitat and travel corridors for rats on the island, allowing rats to penetrate deep inland and across the island (Howald, pers. comm., 2004).

D1.2.2 Seabirds

San Miguel Island and its associated islets, Prince Island and Castle Rock, support regionally important and diverse seabird colonies, including one-third of the breeding seabirds in the Channel Islands (Wolf 2002). This area hosts at least 11 species of breeding seabirds, including significant populations of Brandt’s cormorants, ashy storm-petrels, and Cassin’s auklets. Other breeding species include Leach’s storm-petrel, double-crested cormorant, pelagic cormorant, western gull, pigeon guillemot, and rhinoceros auklet. San Miguel Island and its associated islets represent the southern range on the west coast of North America for rhinoceros auklets, tufted puffins, and common murres. Similarly, this area is the northern end of the range for Xantus’s murrelets and possibly black storm-petrels. Tufted puffins were recently observed on Prince Island (McChesney et al. 1995), and common murres were also observed in breeding plumage on Prince Island in 2004 (Whitworth, pers. comm., 2004).

Prince Island and Castle Rock are located 0.8 km (0.5 miles) and 1.2 km (0.75 miles) from San Miguel Island, respectively. There are currently no rats on either of these islets. The presence of rats on San Miguel Island presents a risk to the seabird colonies on Prince Island and Castle Rock, given their close proximity. It is possible that rats could disperse to these adjacent islets (e.g., via vegetation rafts or boats) and threaten these important seabird colonies.

D1.2.3 Marine Mammals

San Miguel Island is the only known place in the world where three different species of pinnipeds breed and the only area where five species are found. Breeding species include the California sea lion (*Zalophus californianus*), northern fur seal (*Callorhinus ursinus*), and northern elephant seal (*Mirounga angustirostris*). Harbor seals (*Phoca vitulina*) and Guadalupe fur seals (*Arctocephalus townsendi*) are also known to visit San Miguel Island.

D1.2.4 Endemic Species

The following endemic species on San Miguel Island are important considerations in the planning of this action: Channel Island song sparrow (*Melospiza melodia graminea*), San Miguel Island deer mouse (*Peromyscus maniculatus*), and San Miguel Island fox (*Urocyon littoralis littoralis*).

The Channel Island song sparrow is a resident sparrow endemic to the Channel Islands. This subspecies is considered to include the now-extirpated populations on San Clemente and Santa Barbara Islands (Patten 2001), and the formerly classified San Miguel song sparrow (*M.m. micronyx*).

The island fox (*Urocyon littoralis*) is a very small canid that inhabits six of the largest Channel Islands. The diminutive island fox is the largest native carnivore on the Channel Islands. Recent morphological and genetic studies support the division of the *U. littoralis* complex into six subspecies that are each limited in range to a single island, including San Miguel Island (USFWS 2004). The three most important food items in the diet of the San Miguel Island fox (*U.l. littoralis*) are deer mice, sea-fig (*Carpobrotus chilensis*), and insects (Collins and Laughrin 1979). Mice may be especially important prey during the breeding season because they are large, energy-rich food items that adult foxes can bring back to their growing pups (Garcelon et al. 1999).

The San Miguel, Santa Rosa, Santa Cruz, and Santa Catalina Island foxes have experienced precipitous declines in the last eight years (Coonan et al. 1998, Coonan et al. 2000, Roemer 1999, Roemer et al. 2001, Timm et al. 2000). Annual population monitoring documented a substantial decline in island fox populations on San Miguel Island between 1994 and 1999 (Coonan et al. 1998; Coonan et al. in press). During this time period, island fox populations dropped from an estimated 450 adults in 1994 (Coonan et al. 1998) to 15 foxes in 1999 (T. Coonan, unpublished data, as cited in USFWS 2004) as a result of predation by golden eagles (*Aquila chrysaetos*). Deer mouse densities rose sharply after the population crash of the island fox since the fox is the primary predator in the San Miguel Island ecosystem. The USFWS listed the San Miguel Island fox as an endangered species on March 5, 2004 (USFWS 2004).

In 1999, the NPS captured 14 (4 males and 10 females) of the 15 remaining foxes from San Miguel Island to protect the subspecies from further losses from predation by golden eagles and to initiate a captive propagation program. In 2003, the one remaining wild island fox was brought into captivity. In October 2001, NPS moved half of the captive foxes into a second breeding facility on the island to minimize the risk of a catastrophic event (e.g., wildfire or disease). The San Miguel Island fox captive population increased from 14 to 50 foxes after five years of captive breeding, and 10 of those foxes were released to the wild on San Miguel Island in fall 2004 (Coonan, pers. comm., 2005). Full recovery of the San Miguel subspecies may require annual releases of 10 to 20 foxes for as long as a decade (Coonan 2003).

In 2005, the NPS captive breeding program designed to restore the endangered island fox to the Northern Channel Islands produced a record 38 pups (NPS 2005). On San Miguel Island, 10 pups were born into captivity, bringing the total number of foxes in captivity to 49. A total of 4 new pups were recorded in the wild on San Miguel Island in 2005, thus increasing the total estimated number of foxes in the wild to 14 (NPS 2005).

D1.2.5 Project Goals

The goals of this action are to eradicate the introduced black rat, increase seabird populations, and prevent future rodent introductions. Due to the scale and complexity of the action, the NPS, with the assistance of the Natural Resource Trustees for the Montrose case (Trustees), will prepare a subsequent Environmental Impact Statement (EIS) or Environmental Assessment (EA) that will undergo public review and comment. This subsequent document will detail the specific methodologies of the action, the expected benefits and impacts, and the mitigation measures to reduce potential impacts. A general outline of the action is summarized below.

D1.3 PROJECT DESCRIPTION AND METHODS

D1.3.1 Approach

The use of rodenticides is critical to the successful eradication of rats from islands. Rats have been successfully removed from over 250 islands worldwide, the vast majority of which have been by the use of rodenticides (IC 2004b, Veitch and Bell 1990, Buckle and Fenn 1992, Taylor 1993). Nine rodenticides are registered for use in the United States. The anticoagulants (such as brodifacoum, warfarin, and diphacinone) are the only rodenticides that have resulted in complete eradication on islands. One or more of the anticoagulant rodenticides will be proposed for use on San Miguel Island. The U.S. Environmental Protection Agency (EPA) will be consulted to obtain registration of a rodenticide for rat eradication on San Miguel Island. Factors that will determine the rodenticide of choice include (1) previous successful use in island restoration projects, (2) demonstrated ability to eradicate the rat population, and (3) potential adverse effects on the San Miguel Island environment. Brodifacoum has been demonstrated to provide the greatest efficacy against the target species and has been used in the vast majority of successful island restoration projects, including the Anacapa Island Restoration Project.

Successful eradication requires the delivery of bait into every potential rat territory on the island, either by using bait stations deployed on a grid and/or by aerial broadcast from a helicopter, or, in some cases, broadcast by hand, or a combination of these techniques. Trapping rats has proven to be ineffective except on very small islands (e.g., Moors 1985b). San Miguel Island is within the size range of successful rat eradications that used bait stations or aerial broadcast. The specific methodology to be used on San Miguel Island will be determined by a combination of topography and size, previous successful uses, and a host of other biological constraints and considerations.

D1.3.2 Timing

The removal of the rats will be timed according to a set of biological conditions maximizing the probability of eradicating rats and minimizing the potential impact to the San Miguel Island environment (see below). Typically, eradication is more likely to be successful if bait is delivered during the dry season, when there is a food shortage and the rat population is in decline. The entire island will likely have to be treated at one time to prevent reinvasion of treated portions of the island.

D1.3.3 Mitigation Measures

This action will be designed and implemented in a manner that avoids, minimizes, and mitigates impacts to the natural environment on San Miguel Island. Measures to avoid and mitigate any impacts from the action will be developed during the planning phases and will be addressed in the subsequent EIS or EA. The successful mitigation program used on Anacapa Island will be considered during the development of a mitigation program for San Miguel Island. The following mitigation measures are examples that may be incorporated into the program design:

- Birds
  - Color and size bait appropriately to minimize direct consumption by seed-eating birds.
  - Use bait that will break down rapidly in the San Miguel Island maritime climate.
  - If possible, avoid bait application during bird breeding season and peak of land bird migration.
  - Design field transects in a manner that minimizes disturbance to seabird roosting habitat.
  - Avoid working for extended periods of time in vicinity of seabird roosts.
  - Reduce non-target poisoning of predatory birds with use of techniques such as live capture, holding, and/or translocation.
  - Protect Channel Island song sparrows by captive holding subset of the population of birds and releasing them once threat of exposure is removed.
- Marine Mammals
  - Avoid bait application during marine mammal pupping seasons.
  - Design field transects in a manner that minimizes disturbance to marine mammal haul outs.
  - Avoid working for extended periods of time in vicinity of rookeries and haul outs.
  - Work cautiously and slowly around animals using techniques that minimize disturbance.
- San Miguel Island Deer Mouse
  - Design a comprehensive protection plan for the deer mouse that incorporates successful techniques used in the Anacapa Island Restoration Project. Strategies to reduce impacts will likely include captive holding, as well as breeding mice in facilities on San Miguel Island for later release onto the island. Because the deer mouse is an important food source for the island fox, it will be necessary to protect more mice than would be necessary to strictly protect the species.
- San Miguel Island Fox
  - The presence of the endangered island fox presents a unique challenge since there is no precedent for rat eradication from an island with an endemic carnivore such as the island fox. An initial planning step will be to assemble a team of experts, including ecologists, veterinarians, NPS managers, behaviorists, toxicologists, and rodent control technicians, to address the feasibility of the project in light of the potential impacts of the project on the island fox. During this initial step, a comprehensive avoidance, minimization, and

mitigation program will be developed to reduce the potential impacts to the island fox to acceptable levels.

D1.4 ENVIRONMENTAL BENEFITS AND IMPACTS

D1.4.1 Biological

Benefits

The eradication of rats from San Miguel Island will benefit a variety of seabirds by increasing the amount of available seabird nesting habitat and decreasing predation on eggs, chicks, and adults. A reduction in predation will lead to increased population size and breeding success of seabirds on San Miguel Island. Small crevice-nesting seabirds, such as the ashy storm-petrel, Cassin's auklet, and Xantus's murrelet, will likely benefit from the elimination of a predator that is known to take eggs, chicks, and adults. Ecological monitoring on Anacapa Island after bait application has demonstrated an increase in the number of breeding Xantus's murrelets, and these birds were found in new habitat areas from which rats had previously excluded them (Howald et al. 2005). Within four months following bait application, two Cassin's auklet nests were found with chicks on Anacapa Island. This observation represented the first recorded nesting of this species on the island (Howald et al. 2005).

Although small burrow-nesting seabirds are particularly vulnerable to rat predation, larger seabirds have also been predated by rats. Studies have shown rats to be a source of predation to larger seabird eggs and chicks, including herring gulls and northern fulmars (Zonfrillo 2000), as well as Laysan albatrosses (Moors and Atkinson 1984). Therefore, larger seabirds on San Miguel Island (e.g., western gulls) are also likely to experience increased reproductive success from the elimination of rats on the island. Although the presence of the island fox limits the utility of much of San Miguel Island for seabirds, there are steep areas of suitable seabird habitat on the island that are accessible to rats but not to foxes. These areas in particular will benefit from rat eradication.

Prince Island and Castle Rock are located within less than 1 mile of San Miguel Island; therefore, the eradication of rats on San Miguel Island will remove a threat to the regionally significant seabird populations that nest on these islets. Eliminating this risk of rat introduction to these islets is an important benefit of the project.

In addition to benefiting seabirds, eradicating rats from San Miguel Island will likely have ecosystem-wide benefits. Based on the results of post-application monitoring efforts from Anacapa Island, positive changes have already been measured in the Anacapa Island deer mouse, side-blotched lizard, and vegetation. Monitoring results on Anacapa Island demonstrated a two-fold increase in the survival of juvenile side-blotched lizards after rat removal (Comendant and Sinervo 2002). As was observed on Anacapa Island, land birds, lizards, and other species will likely benefit from the action on San Miguel Island. Because peregrine falcons consume seabirds on the Channel Islands, they are also expected to benefit from an increase in their prey base.

In summary, rat eradication on San Miguel Island should result in: (1) increases in small crevice-nesting seabird populations (such as alcids and storm-petrels); (2) decreased predation on ground-nesting seabirds such as western gulls; (3) protection of the important seabird colonies on

Prince Island and Castle Rock from rat invasion; (4) decreased predation of some terrestrial and marine intertidal invertebrates; and (5) broad ecological benefits to the San Miguel Island ecosystem.

Impacts

To successfully eliminate rats from San Miguel Island, a highly efficacious rodenticide must be used to ensure complete eradication. Because there are no rat-specific toxicants, the use of a rodenticide to eradicate rats will pose a risk of poisoning non-target species on San Miguel Island. Non-target species are defined as those species that are unintentionally exposed to the rodenticide. Although non-target poisoning is likely, the probability of poisoning depends on the toxicity of and the organism's exposure to the rodenticide.

Non-target poisoning is generally categorized as primary or secondary poisoning. Primary poisoning occurs when a non-target species consumes the bait directly. The species most at risk for primary poisoning on San Miguel Island are the deer mouse (Erickson and Halvorson 1990), song sparrow and other granivorous birds, and the island fox. Any individual that feeds on a primarily poisoned organism is at risk of secondary poisoning (e.g., a bird that feeds on a poisoned rodent). Species most at risk for secondary poisoning include predatory birds and the island fox.

Record and Marsh (1988) and Taylor (1993) identified elements involved in determining whether a rodenticide poses a poisoning hazard to non-target species: (1) chemical and toxicological properties of the rodenticide; (2) composition of the bait and how it is applied; (3) behavior of non-target species at risk; (4) behavior of the target species both when intoxicated and at death; and (5) local environmental factors. Each of these variables will be analyzed and presented in the EIS or EA developed by NPS. Studies will be conducted to evaluate the potential risk of poisoning non-target species and to develop appropriate mitigation measures. This action will proceed only if the risks to non-target species, in particular the endangered island fox and endemic deer mouse, can be minimized to an acceptable level.

The recent successful rat eradication on Anacapa Island can be used to predict some of the potential impacts from the proposed action. Subsequent planning will determine whether the mitigation measures used on Anacapa Island will be appropriate for use on San Miguel Island. The presence of the endangered island fox, however, is a unique feature of the San Miguel Island project that will require a complete analysis of the feasibility of the project, the potential impacts of the project on the island fox, and the development of a comprehensive mitigation program for the island fox.

<u>Birds</u>

During the Anacapa Island Restoration Project, a total of 94 individual birds are known to have died from the use of brodifacoum, but the impact had a negligible effect at a population level (Howald et al. 2005). The presence of the endemic song sparrow on San Miguel Island will require additional effort to minimize and mitigate exposure risk, such as the captive holding of a representative population. Although there will likely be short-term impacts, the elimination of the non-native rats should directly benefit the sparrow population as a whole in the long term. On

Anacapa Island, land birds such as the song sparrow, house finch, and Bewick's wren were breeding within six months after the bait drop (Howald et al. 2005).

Birds that consume live rodents or carcasses will be at risk for secondary poisoning. The Anacapa Island Restoration Project demonstrated that the majority of monitored rats died underground after consuming the rodenticide and were therefore unavailable as food to avian scavengers after approximately one week (Howald et al. 2005). This is consistent with other field studies that evaluated the fate of anticoagulant-poisoned rodents (Taylor and Thomas 1993, Fenn et al. 1987). Nonetheless, western gulls, common ravens, and birds of prey will still be at risk for secondary exposure. Several measures implemented successfully on Anacapa Island, such as coloring the bait and timing the project outside the breeding season, will minimize potential impacts. Impacts to predatory birds will also be minimized by capturing and holding those birds until the period of risk is over. Monitoring results from the Anacapa Island Restoration Project confirm that insectivorous birds are not likely to experience extensive secondary poisoning by preying on invertebrates that ingested bait or tertiary poisoning by preying on invertebrates that fed on poisoned rat or mouse carcasses.

Roosting seabirds may be temporarily disturbed during either an aerial or bait station operation. However, the operation will be timed to coincide with seasonal minimums in the number of seabirds and land birds. Monitoring from the Anacapa Island Restoration Project demonstrated that seabirds were only temporarily disturbed by the operation.

Deer Mouse

The presence of the endemic deer mouse poses a biological challenge to the eradication of rats from San Miguel Island. Because rodenticides are designed to kill rodents, the bait will be attractive and poisonous to mice as well as rats. It is anticipated that any deer mouse that is not in captivity will be killed by the operation. However, deer mice are prolific breeders and can undergo considerable annual population fluctuation. Any reductions in the deer mouse population caused by rat eradication measures would probably not have a significant long-term effect on the population as long as an effective population size remains (Howald, pers. comm., 2004). Therefore, a strategy that removes the potential for rodenticide exposure to all mice will be necessary for the long-term protection of this endemic population.

The Anacapa Island Restoration Project clearly demonstrated that rats can be removed from an island with an endemic rodent. With the implementation of the mitigation measures and excellent environmental conditions for release and breeding, mouse densities on Middle Anacapa Island approximately 6.5 months after release were comparable to densities measured prior to the rat eradication (Howald et al. 2005). Application of established methods used on Anacapa Island (e.g., captive holding/breeding techniques) should effectively mitigate temporary impacts on the native mouse population of San Miguel Island.

Island Fox

There is no precedent for the eradication of rats from an island with an endemic carnivore such as the island fox. Any form of anticoagulant bait application on the island will present a secondary exposure risk to foxes through the consumption of any dead rodents that may be available. Because of the high likelihood of exposure to foxes, an effective mitigation strategy must be implemented to ensure that direct exposure is avoided. Such a strategy will involve captive holding of foxes for a period of time. Foxes may also be impacted by the temporary reduction in available mice following bait application. Strategies to minimize and mitigate potential short-term and long-term impacts to the foxes (e.g., captive holding) will be developed during the preparation of additional environmental documentation. Also, future consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act will ensure that the proposed action does not jeopardize the survival and recovery of the San Miguel Island fox.

Marine Mammals

Marine mammals hauled out on beaches may be temporarily disturbed during either an aerial or bait station operation. The operation will minimize disturbance to marine mammals using the minimization measures outlined earlier. However, minor disturbances to marine mammals from the helicopter activity and hand bait application are anticipated.

Erosion

Project implementation and monitoring may result in minor soil erosion and compaction. However, the benefits of the eradication (including stopping weed seed dispersal by rats) will offset any potential impacts from soil erosion. Careful planning and ongoing monitoring will minimize any negative impacts due to soil erosion and compaction. Procedures for staff will be implemented to minimize risks of weed seed dispersal.

Summary

The eradication of rats worldwide has documented ecosystem-wide benefits. In some cases, there have been short-term negative impacts; however, the impacts have been of short duration, and recoveries of some species to higher population levels and/or greater productivity than pre-eradication conditions have been documented (e.g., Towns 1991). In most cases, wildlife managers have determined that long-term benefits to island ecosystems with the removal of introduced rats greatly outweigh the short-term impacts to non-target species. All of the potential benefits and impacts of this action will be fully evaluated during the planning phase. Should the subsequent analysis show that this action is infeasible or that potential impacts are unacceptable, this action would not be implemented.

D1.4.2 Physical

Benefits

There are no known benefits to geology/earth resources, water resources, oceanographic and coastal processes, air quality, or noise receptors.

Impacts

There are no known impacts to geology/earth resources, water resources, air quality, and noise receptors. Specific measures will be developed and implemented to ensure that bait does not enter the marine environment. On Anacapa Island, a small amount of bait entered the water indirectly from bouncing off of cliffs. Divers documented that the pellets began to degrade 1.5 hours after the bait drop and became scattered crumbs at 5 hours after the bait drop (Howald et al. 2005). No fish or other animals were observed feeding on the bait. No brodifacoum residues were detected in any of the fish or invertebrate samples that were collected. In addition, no brodifacoum residues were detected in water samples taken from the marine environment at either 24 or 48 hours after the application (Howald et al. 2005). Unlike Anacapa Island, San Miguel Island does not have steep cliffs; therefore, there are very few areas where bait would bounce off of cliffs and into the water.

D1.4.3 Human Use

Benefits

This action will have no known benefits to cultural, socioeconomic, aesthetic, or transportation resources.

Because rats pose health and safety hazards (e.g., Pratt et al. 1977) and can cause destruction to supplies and equipment, the eradication of rats will benefit visitors and NPS personnel on San Miguel Island. Although there have been no known rodent-vectored diseases transmitted to island staff or residents in the recent past, there is potential in any rodent population for the transmission of disease to humans. Health and safety standards will be improved at NPS facilities on the island, and a potential source of disease will be eliminated. The removal of black rats from San Miguel Island will be expected to have long-term health, safety, aesthetic, and recreational benefits and will remove a destructive nuisance to human habitation and use of the island.

Impacts

This action will have no known impacts to cultural, aesthetic, or transportation resources. Cultural resources will be avoided on the island during the operation.

To minimize potential exposure to visitors, San Miguel Island will be closed for several days. Recreational activities such as camping and hiking will not be permitted during that timeframe. However, due to its distance from the mainland and the annual visitation rate of less than 200 campers each year, the closure of the island will not have a significant impact on recreational and visitor activities.

With the exception of possible skin irritation caused by contact with bait by project workers, negative impacts of the rodenticide on humans is not expected. Project workers will follow proper safety procedures to avoid contact with the bait.

D1.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

The eradication of rats from offshore islands has been successfully demonstrated worldwide. As of 2002, rats have been removed from more than 250 islands (IC 2004b). San Miguel is within the size range of successful eradications using bait stations or aerial broadcast. The recent successful removal of rats from Anacapa Island demonstrates that such a project can successfully overcome the complex regulatory and biological challenges facing these types of restoration projects in the United States. Although the presence of the endangered San Miguel Island fox is a significant factor not present on Anacapa Island, the experience, knowledge, and lessons learned from the Anacapa Island Restoration Project will be applied to this action. All of the potential benefits and impacts of this action will be fully evaluated during the planning phase through additional environmental documentation. Should the subsequent analysis show that the action is infeasible or that potential impacts are unacceptable, this action would not be implemented.

A key factor to the success of the action is the development and implementation of a plan to prevent the reintroduction of rats to San Miguel Island. The effort and conservation gains made from the eradication could be negated with the reintroduction of rodents or other non-native species. Invasive species, including vertebrates, invertebrates, weeds, and pathogens can all be transported to the island inadvertently and have detrimental impacts on breeding seabirds. The rodent reintroduction prevention plan will be one component of a comprehensive program designed to prevent many non-native species from being introduced onto the island. This program will build upon the rodent reintroduction prevention plan that is being implemented on Anacapa Island by the NPS. The plan will address rat spill[1] kits, quarantine, monitoring, and response actions.

With the use of techniques employed in successful eradication programs elsewhere and implementation of a comprehensive prevention plan, the probability of successful eradication of rats on San Miguel Island is high.

D1.6 PERFORMANCE CRITERIA AND MONITORING

The success of restoration activities on San Miguel Island will be measured by the complete removal of the rats from the island and subsequent increases in seabird populations. A long-term monitoring plan, to be developed and detailed in the subsequent EIS or EA, will expand on the following proposed research and monitoring actions:

- Collect baseline data on rat and mouse distribution patterns, relative abundance, and habitat use.
- Use a combination of trapping and ecological indicators to evaluate the presence/absence of rats using pre-eradication survey data to compare to post eradication data.
- Conduct mouse/seabird/land bird/fox monitoring before and after the bait application to quantify impact and recovery of these populations.
- Test unarmed bait consumption by non-target animals.
- Monitor the island fox captive breeding program following standard guidelines.
- Monitor populations of native fauna and flora before, during, and after bait application to document potential benefits and impacts.
- Develop long-term monitoring to detect any introductions as early as possible, and build the capacity to respond to and eliminate any introduction of non-native rodents or other species.

[1] A rat spill is the accidental importation of rats to a rat-free island.

The benefits of rat removal to seabirds that breed and roost on the island may be evaluated by increase in population number, increase in habitat availability, and reduced predation. Measuring statistically meaningful population increases in any seabird species on San Miguel Island may take years or even decades. However, increased habitat availability and reduced predation were demonstrated as soon as five months after the eradication of rats on Anacapa Island. In the absence of rats, sea cave nest monitoring of Xantus's murrelets demonstrated high nesting effort and hatching success, no nest depredation, and signs of an expansion of their nesting range on Anacapa Island (Whitworth et al. 2003).

Protocols for seabird monitoring in the Channel Islands were developed in the 1980s. Consequently, the methods for seabird monitoring in the Channel Islands are well established and standardized. The NPS periodically monitors seabirds on Prince Island (primarily Cassin's auklets), and historical information is available. However, currently no seabird monitoring occurs on San Miguel Island or Castle Rock, and minimal historical information exists. To evaluate the benefits of the action, baseline surveys of seabird populations will be conducted before project implementation.

D1.7 EVALUATION

The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and concluded that this action is consistent with these selection factors. The Trustees determined that this type and scale of action will provide long-term benefits to seabird populations, including small crevice-nesting seabirds such as the ashy storm-petrel, Cassin's auklet, and Xantus's murrelet as well as ground-nesting seabirds such as the western gull. This action will likely also have benefits to peregrine falcon populations in the Northern Channel Islands and will likely provide long-term benefits to the ecosystem on San Miguel Island.

Multiple government agencies and experts will be involved in the development, evaluation, and implementation of the rat eradication program. Consultation with these agencies is required before implementation of the rat eradication program. The USFWS will be consulted regarding potential effects to endangered species under Section 7 of the Endangered Species Act. Based on the Anacapa Island Restoration Project, this action will also seek a Migratory Bird Take Permit from the USFWS to address potential impacts to migratory birds. The EPA will be consulted to obtain registration of a rodenticide for rat eradication on San Miguel Island. In addition, a subsequent EIS or EA will be prepared for public review prior to project implementation.

D1.8 BUDGET

Project management (development, implementation, and monitoring)	$1,065,000
Project environmental compliance/project management (NPS)	$330,000
Eradication	$513,000
Mitigation (deer mice, birds)	$300,000
Mitigation (fox)	TBD
Supplies	$75,000
Equipment	$65,000

Transportation $75,000
Public outreach...$30,000
Estimated Total $2,453,000

Appendix D2

Restore Alcids to Santa Barbara Island

D2.1 GOALS AND NEXUS TO INJURY

The goal of this 5-year action is to re-establish an active Cassin's auklet breeding population on Santa Barbara Island through social facilitation and habitat improvement, and to improve recruitment and productivity of Xantus's murrelets through the installation of artificial nest boxes and habitat improvement. Eggshell thinning and/or elevated levels of DDT were documented in eggs of the Cassin's auklet and Xantus's murrelet in the Southern California Bight (SCB) (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of seabird nexus.

D2.2 BACKGROUND

The Channel Islands are critical nesting habitat for seabirds in the SCB. Santa Barbara Island is the smallest of the Channel Islands, measuring 2.6 square kilometers (km^2) (1 square mile [mi^2]) in size. This island is within the Channel Islands National Park and is owned and managed by the National Park Service (NPS). The vegetation communities contain a mixture of grass and shrublands, and eight community types have been identified (Hochberg et al. 1979). Habitat modification and degradation on Santa Barbara Island has been severe in the past due to human activities such as farming, burning, and livestock grazing. Vegetation and soil changes from non-native grazing mammals and past agricultural practices likely led to a large historical decline in seabird populations and may have caused an increase in the number of deer mice on the island (Murray et al. 1983). The endemic deer mouse is a known predator of seabird eggs on Santa Barbara Island (Murray et al. 1983). Seabirds were also severely affected by cats that were brought to Santa Barbara Island in the late 1800s. An effort to eradicate cats from the island was under way by the 1950s, and the last cat was removed in 1978 (Murray et al. 1983).

D2.2.1 Cassin's Auklets

In 1897, Cassin's auklets bred in large numbers on Santa Barbara Island (Grinnell in Hunt et al. 1979). However, cats decimated this population and by 1908 no signs of the species were seen (Howell 1917). A trip to the island in 1911 revealed only bones and feathers of auklets all over the island, and the observer concluded "that they had been exterminated by the cats with which the island is infested" (Willett in Hunt et al. 1979). Recent surveys have demonstrated that this colony has not recovered from the impacts of cat predation (Carter et al. 1992).

In 1991, Cassin's auklets persisted in small numbers on the offshore islet of Sutil Island and in a bluff at Elephant Seal Point on Santa Barbara Island (Carter et al. 1992). A few Cassin's auklets were regularly observed on Elephant Seal Point throughout the early to mid-1990s (Martin, pers. com., 2003). In 1999, a survey of Sutil Island was carried out to specifically capture Cassin's auklets. This effort resulted in the capture of five individuals (Martin, pers. com., 2003). However, recent surveys have not documented Cassin's auklets at Sutil Island, and it is possible they no longer breed at Santa Barbara Island (Martin, pers. com., 2003).

D2.2.2 Xantus's Murrelets

The worldwide breeding range of the Xantus's murrelet is restricted to the Channel Islands and the west coast of Baja California, Mexico. Currently there are only 12 nesting islands scattered along 500 miles of coastline (Burkett et al. 2003). The Xantus's murrelet population is highly concentrated, with approximately 82 percent of the population breeding on five islands/island groups (Santa Barbara, Anacapa, the Coronado Islands, San Benitos, and Guadalupe). Historical accounts and literature from the 1940s indicates that Xantus's murrelets were much more abundant at that time than today (Burkett et al. 2003). Currently, the Xantus's murrelet is considered an uncommon species, with approximately 3,460 breeding birds in California and less than 10,000 birds worldwide (Burkett et al. 2003). In light of the small breeding population and documented population decline of the species, the California Fish and Game Commission made a finding in February 2004 to list the Xantus's murrelet as a state threatened species under the California Endangered Species Act. This listing was finalized in June 2004. In addition, the Xantus's murrelet was identified as a candidate species in May 2004 for listing as a federally threatened species under the Endangered Species Act.

Little historical information exists on the size of the Xantus's murrelet population on Santa Barbara Island prior to the introduction of cats in the late 1800s. Similar to Cassin's auklets, this species was preyed upon by cats (Sumner and Bond 1939), and likely only persisted in small numbers on Sutil Island and inaccessible cliffs on Santa Barbara Island. Research from the 1970s to 2001 documented a decline in murrelet numbers on Santa Barbara Island. Surveys conducted on Santa Barbara Island from 1975 to 1978 estimated the number of breeding murrelets to be 3,000 (Hunt et al. 1979, Hunt et al. 1980). Surveys conducted in 1991 estimated 1,402 breeding birds (Carter et al. 1992). In 2001, surveys were again conducted to reassess the nesting population of murrelets on Santa Barbara Island. Results from this study showed a 14 percent decline in the number of active nest sites in 2001 compared to the 1991 survey. Monitoring has also documented that nest site occupancy rates have declined from approximately 35 to 70 percent in the mid-1990s to 30 percent or less since then (Wolf et al. 2000). The loss of some of these nest sites has been attributed to a reduction in shrub cover (Wolf et al. 2000).

Despite this marked decline, Santa Barbara Island has the most important colony of Xantus's murrelets within the Channel Islands National Park. This island supports 51 percent of the Xantus's murrelet population in California (Burkett et al. 2003). The Xantus's murrelet population on Santa Barbara Island is essential to the long-term survival and recovery of this species within its limited range. Efforts to increase this population on Santa Barbara Island is one focus of this proposed restoration action.

D2.3 PROJECT DESCRIPTION AND METHODS

The goal of this action is to facilitate the recovery of the Cassin's auklet and Xantus's murrelet on Santa Barbara Island. This action will improve nesting habitat for Cassin's auklets and Xantus's murrelets on Santa Barbara Island by removing exotic vegetation from nesting areas and revegetating the area with native plants. Vocalization playback systems will be used to attract Cassin's auklets to suitable nesting areas to re-establish the auklet colony. Also, artificial cavities and nest boxes will be installed for both Cassin's auklets and Xantus's murrelets to provide a stable and secure nesting area to improve productivity and assist in monitoring efforts. This habitat restoration and social attraction efforts aim to: (1) increase recruitment, (2) increase reproductive output, and (3) decrease egg and chick mortality by providing safe breeding habitat.

Several areas will likely be targeted for attracting Cassin's auklets, including the hillside behind the NPS Ranger Station and the summit and southeastern bluffs of Signal Peak. Within these areas, exotic vegetation will be removed and native plants installed to restore the area. Native plants such as tree sunflower (*Coreopsis gigantea*), buckwheat (*Eriogonum giganteum compactum*), and purple needlegrass (*Nacella pulchra*) will be used. The removal of exotic vegetation and planting of native plants will be done during the non-breeding season to avoid impacts to nesting birds.

Once the site is prepared, vocalization playback systems will be used to attract auklets. Nest boxes will be made for Cassin's auklets and will be placed in each target area. Artificial nest sites will be insulated against the elements (heat being more of a concern than cold) with dirt, sand, or rocks depending on the topography.

In addition to habitat enhancement, nest boxes will be made specifically for Xantus's murrelets. These nest boxes will provide a secure nesting area for this species with the goal of increasing recruitment and reproductive output.

NPS will complete additional planning, review, and environmental compliance before implementation of this action.

D2.4 ENVIRONMENTAL BENEFITS AND IMPACTS

D2.4.1 Biological

Benefits

By providing additional high-quality breeding habitat, this action seeks to re-establish a historic breeding colony of Cassin's auklets and aid in the recovery of the threatened Xantus's murrelet. The combination of habitat restoration and nest boxes will provide a favorable environment for both Cassin's auklets and Xantus's murrelets on Santa Barbara Island. In Northern California, nest boxes have enhanced the population growth rate of several cavity-nesting alcid species at various sites by increasing recruitment of breeding-age birds, improving productivity, and decreasing mortality (Sydeman et al. 2000). The use of playback systems will further facilitate the recolonization of the Cassin's auklet on the island. These techniques should increase the number of breeding pairs of Cassin's auklets and Xantus's murrelets on the island, thereby increasing the number of offspring produced. This action will restore critical seabird nesting habitat in the Channel Islands, as well as aid in the recovery of this important Xantus's murrelet colony. By re-establishing the historical colony of Cassin's auklets and increasing the number of breeding pairs of Xantus's murrelets, this action will have long-term benefits to these species.

Impacts

This action is expected to have minimal short-term biological impacts. The removal of exotic vegetation and the planting of native plants will be done during the non-breeding season to avoid impacts to nesting birds. There will be additional human activity on Santa Barbara Island as a result of this action that could result in temporary displacements of native wildlife or the trampling of native plants. However, it is expected that any impacts will be short term and minimal. If it is determined that herbicides are necessary for plant removal, they will be applied in a manner that avoids or minimizes adverse impacts and is in compliance with NPS policies.

Subsequent monitoring may temporarily disturb target species; however, the use of nest boxes will minimize such impacts to nesting alcids.

D2.4.2 Physical

Benefits

Restoration of native plants could have long-term benefits to the physical environment of Santa Barbara Island by stabilizing the soil and decreasing erosion.

Impacts

This action may result in short-term, minimal impacts due to trampling and increased soil erosion.

D2.4.3 Human Use

Benefits

This action will have no known benefits to cultural resources, recreation, aesthetics, transportation, or human health and safety.

Impacts

This action will have no known impacts to cultural resources, recreation, aesthetics, transportation, or human health and safety. Cultural resources will be avoided on the island during project implementation. It is expected that the nest boxes will be largely screened by vegetation and will not be visible to the public.

D2.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

Social attraction techniques, including the use of vocalization playback systems, have been successfully used for a variety of seabirds throughout the world. The use of artificial nest boxes has also proven to be successful for alcids such as the Cassin's auklet. Experts in the field of social attraction will be consulted during project planning and implementation to ensure that vocalization playback systems and artificial nest sites are designed in a manner that maximizes project success. This action will be determined to be successful when Cassin's auklets and/or Xantus's murrelets begin occupying the newly created nesting habitat.

Moderate operations and maintenance will be required for this action. Minimal maintenance is expected for cleaning and repair of nest boxes. The revegetation area may require periodic removal of exotic plants. Benefits are anticipated to be self-sustaining after project implementation.

D2.6 PERFORMANCE CRITERIA AND MONITORING

To quantify the efficacy of the restoration efforts, a minimum of four years of monitoring is proposed. Monitoring protocols for birds nesting in artificial cavities will follow those established by experts in the field of seabird ecology. A monitoring plan will be developed to allow the Natural Resource Trustees for the Montrose case (Trustees) to evaluate the success of the restoration efforts by collecting simultaneous information on reproductive success, site occupancy, and mortality. Due to the State threatened status and sensitivity to disturbance of Xantus’s murrelets, no adults of this species will be handled.

D2.7 EVALUATION

Santa Barbara Island supports the largest colony of Xantus’s murrelets in California. This island also at one time supported a sizable population of Cassin’s auklets before the colony was decimated by cats. Because these colonies have not recovered from past impacts, creation of additional nesting habitat is expected to result in a long-term measurable increase in the number of Xantus’s murrelets and Cassin’s auklets on Santa Barbara Island.

The Trustees have evaluated this action against all screening criteria developed to select restoration actions and have concluded that this action is consistent with the selection factors. The Trustees determined that this type and scale of action will effectively provide long-term benefits to the Cassin’s auklet and Xantus’s murrelet. Both of these seabirds are priority species for restoration. This action will create high-quality seabird nesting habitat and aid in the recovery of these species.

D2.8 BUDGET

*Year 1 costs (*allotment of costs across categories may change):

- Labor
  (wildlife biologists, housing, etc.).......................$88,000
- Supplies (nest boxes, playback systems) $30,000
- Transportation (boat, personnel).........................$20,000
- **Estimated total, year 1....................................$138,000**

Years 2–5 Costs:

- Labor
  (wildlife biologists, enforcement support)..........$88,000
- Supplies
  (nest box replacement/maintenance, etc.)...........$15,000
- Transportation (boat, personnel).........................$13,000
- Estimated per year cost.......................................116,000
- **Estimated total, years 2–5 ....$464,000**
- **Estimated total costs, years 1–5 ....$602,000**

Appendix D3

Restore Seabirds to San Nicolas Island

D3.1 GOALS AND NEXUS TO INJURY

The goal of this action is to restore western gull and Brandt's cormorant colonies on San Nicolas Island by eradicating feral cats. Eggshell thinning and/or elevated levels of DDTs were documented in eggs of the western gull and Brandt's cormorant in the Southern California Bight (SCB) (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of seabird nexus.

D3.2 BACKGROUND

Introduced predators, in particular feral cats and rats, are one of the greatest threats to seabird populations on islands (Moors et al. 1992, Whittaker 1998). On islands worldwide, feral cats are directly responsible for a number of extinctions and extirpations across multiple taxa (Iverson 1978, Moors 1985b, Kirkpatrick and Rauzon 1986, Cruz and Cruz 1987, Towns et al. 1990, Donlan et al. 2000, Veitch 2001). Cats are opportunistic hunters and consume a wide variety of mammals, reptiles, birds, and insects (Kirkpatrick and Rauzon 1986, Konecny 1987, Fitzgerald 1988, Fitzgerald and Turner 2000). Predation by feral cats is responsible for the extinction of at least 33 bird species (Lever 1994), including the Stephen Island wren (*Traversia lyalli*, New Zealand), Socorro dove (*Zenaida graysoni*, Mexico), and Guadalupe storm-petrel (*Oceanodrama macrodactyla*, Mexico). Cats have also led to local extirpations of seabird colonies on the Channel Islands, including the Cassin's auklet from Santa Barbara Island (Willet in Hunt et al. 1979).

D3.2.1 San Nicolas Island

The U.S. Navy–owned island of San Nicolas is one of four southern Channel Islands, and totals 58 square kilometers (km^2) (22 square miles [mi^2]) in size. The island is about 15 kilometers (km) (9 miles) long and 6 km (3.6 miles) wide. The highest elevation is 277 meters (908 feet). In general, the island exhibits sparse vegetation that is mostly attributable to past sheep ranching, the island's arid climate, and high winds.

San Nicolas Island provides missile and aircraft launch facilities and radar tracking in support of the Navy's mission. Infrastructure on the island includes an asphalt runway, water wells, a desalination plant, water distribution and sewage systems, roads, telecommunication facilities, and buildings. Approximately 200 people work and live on the island. There is no public access to the island primarily due to security and safety requirements.

D3.2.2 Fauna on San Nicolas Island

San Nicolas Island supports a number of species endemic either to the Channel Islands or the island itself, including at least 20 plant species, 25 invertebrates, 1 reptile, 2 birds, and 2 mammals (U.S. Navy 2003). State and federal threatened and endangered species on the island include the threatened western snowy plover (*Charadrius alexandrinus nivosus*), threatened island night lizard (*Xantusia riversiana riversiana*), endangered California brown pelican, and threatened San Nicolas island fox (*Urocyon littoralis dickeyi*). San Nicolas Island also supports important marine mammal rookeries, as well as breeding colonies of Brandt's cormorants and western gulls.

D3.2.3 Brandt's Cormorant

Historical records have shown that Brandt's cormorants have nested on San Nicolas Island since at least the late 1800s (McChesney 1997). Most documented nesting occurred at the west end of the island. Prior to the mid-1970s, a total of 600 to 800 pairs were estimated to breed on the island (McChesney 1997). This population subsequently declined in the mid-1970s to only 100 to 200 pairs. This decline is consistent with the widespread failure of cormorant nests throughout the SCB due to DDT contamination (Gress et al. 1973). The Brandt's cormorant colony then underwent dramatic increases from the late 1970s to the early 1990s. In 1991, San Nicolas Island supported the second largest Brandt's cormorant colony in the Channel Islands, with 5,089 breeding individuals (Carter et al. 1992). Between 1991 and 1995, the population on San Nicolas Island varied annually due to a variety of factors including human disturbance, El Niño conditions, and predation by the island fox. Annual aerial surveys since 1996 have documented that the Brandt's cormorant population has expanded and shifted into intertidal environments.

D3.2.4 Western Gulls

Historically, San Nicolas Island supported one of the largest western gull colonies in Southern California. A large western gull colony was first documented in 1991 and was estimated at 6,038 breeding individuals (Carter et al. 1992). However, more recent surveys have documented a decline in the western gull colony (Smith, pers. comm., 2004). Western gulls have become more distributed across the island, perhaps due to the increases in sea lion disturbance at the main colony site and predation by island foxes. Because western gulls nest on the ground, they are particularly susceptible to predation.

D3.2.5 San Nicolas Island Fox

The San Nicolas Island fox population has remained stable and is estimated at 614 individuals (USFWS 2004). This species is listed as threatened by the State of California. The U.S. Fish and Wildlife Service (USFWS) recently determined that the federal listing of the San Nicolas population of the island fox was not warranted under the Endangered Species Act (USFWS 2004). However, its small population size, insular nature, lack of resistance to canine distemper and other diseases, high densities, and low genetic variability increase the vulnerability of this subspecies (USFWS 2004).

San Nicolas Island foxes are omnivorous, foraging on insects, vegetation, mice, and seasonally available bird eggs. Predation by the island fox has caused nesting failure and abandonment of both Brandt's cormorant and western gull colonies on the island (McChesney 1997). The San Nicolas Island fox population is negatively affected both by competition with feral cats and impacts from humans.

D3.2.6 Presence and Impacts of Feral Cats on San Nicolas Island

Cats were first introduced to San Nicolas Island during the 1800s and later by Navy personnel. Negative impacts from feral cats on the island's fauna have been documented. Humboldt State University studies from 1992 to 1996 documented impacts to nesting Brandt's cormorant and western gulls from feral cats (McChesney 1997, Carter, pers. comm., 2004). As described in the Navy's 2003 Integrated Natural Resources Management Plan (INRMP) for San Nicolas Island:

> Feral cats have long been established on San Nicolas Island and pose a serious risk to the integrity of the entire ecosystem. Cats are implicated in the decline of small animal and bird populations worldwide and have especially devastating impacts on closed island systems. Cats have detrimental impacts on San Nicolas Island land bird populations, seabird colonies, and prey upon the federally listed island night lizard and the western snowy plover. Cats directly impact the San Nicolas Island fox through competition for prey and indirectly through spatial displacement.

In an effort to protect endangered species and sensitive seabird colonies, the Navy has funded intermittent efforts to control feral cats since the 1980s. The INRMP identifies the continued control/removal of cats as a recommended guideline to protect the western snowy plover, island night lizard, resident and migratory birds, island fox, and island deer mouse. In addition, Navy personnel are prohibited from bringing pets onto the island (U.S. Navy 2003).

D3.3 PROJECT DESCRIPTION AND METHODS

The goal of this action is to eradicate feral cats and increase seabird colonies on San Nicolas Island. This action will expand the ongoing control efforts by the Navy with the goal of eradicating cats from the island over an approximate three-year time frame. Proven techniques (e.g., trapping) used worldwide in recent cat removal programs will be employed as part of this action. However, given the overlap between cats and island foxes in terms of size and diet, the methods selected to eradicate cats will be given careful consideration to avoid impacts to the fox. This action will explore various techniques for eradication, but will use methods that pose the least risk to the island fox.

The specific methodologies for this action will be developed and evaluated in future additional environmental documentation prepared pursuant to the National Environmental Policy Act (NEPA) and/or the California Environmental Quality Act (CEQA) in coordination with the U.S. Navy.

D3.4 ENVIRONMENTAL BENEFITS AND IMPACTS

D3.4.1 Biological

Benefits

Eradication of cats from San Nicolas Island will provide long-term conservation benefits for Brandt’s cormorants and western gulls by removing a non-native predator from the island ecosystem. The Natural Resource Trustees for the Montrose case (Trustees) anticipate that this action will result in increased reproductive success for these species and therefore expansion of these colonies. Both of these species are endemic to the west coast of North America and have limited ranges. The colonies on San Nicolas are located within the center of their range and have historically supported large colonies. This action will contribute to the protection of these colonies, though they will still be subject to predation by the native island fox. However, it is anticipated that larger, more robust colonies will more effectively withstand the ongoing predation pressure from the island fox.

In addition to seabirds, this action will also have collateral benefits to the island ecosystem. Sensitive species such as the island fox, endemic deer mouse, threatened island night lizard, and threatened snowy plover will likely benefit from reduced predation and competition. This action will also likely benefit both resident and migratory land birds on San Nicolas Island because of the removal of this non-native predator. The Navy's INRMP identifies the control/eradication of cats as a recommended management action to protect the island's biological resources (U.S. Navy 2003).

Impacts

There is the potential for non-target impacts to the island fox due to its similarity in size and diet to the feral cat. However, techniques will be further developed to avoid and minimize potential impacts to the fox. Although there may be some short-term impacts to individual foxes, the fox population will benefit overall from the eradication of feral cats since they are competitors for food resources and habitat. The methodologies and potential impacts will be discussed fully in subsequent environmental documentation for the action.

D3.4.2 Physical

Benefits

This action will not result in benefits to the physical environment.

Impacts

This action will not result in impacts to the physical environment.

D3.4.3 Human Use

Benefits

Removal of non-native species is a critical step in the restoration of island ecosystems. The eradication of feral cats will help restore populations of native species on San Nicolas Island. Such restoration will provide aesthetic and recreational benefits to Navy personnel. Because the island has restricted access, this action will not likely provide aesthetic or recreational benefits to the general public.

Impacts

During the eradication program, there may be closures or restriction on use of certain areas for safety reasons. Such restrictions may limit recreational opportunities for Navy personnel. However, feral cat control was initiated in the 1980s and Navy personnel have accommodated this activity. Although the action is designed to be an intensive effort over approximately 3 years, it will be compatible with the military use of the island.

D3.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

Although difficult, feral cat eradication has been successfully carried out on at least 48 islands worldwide (Nogales et al. 2004). In northwest Mexico, cats have been successfully eradicated from 15 islands (Wood et al. 2002). Cats have been eradicated from large islands such as Marion Island (290 km^2 [112 mi^2]) and Macquarie Island (120 km^2 [46 mi^2]) in the Indian Ocean (Nogales et al. 2004). San Nicolas Island (58 km^2 [22 mi^2]) is within the size range of successful cat eradications. The experience, expertise, and lessons learned from previous efforts will be applied to this action to ensure its success.

The greatest challenge for this action is the presence of the island fox. Proven techniques used in past eradications may not be available for this action because of the potential for impact to this sensitive species. The success of the action will be defined by complete eradication of feral cats from the island. Therefore, should subsequent project developments indicate that complete eradication is infeasible due to limited available techniques or constraints, the Trustees will not consider this action further.

Close coordination and partnering with the Navy is essential to the success of this action. By supporting the ongoing control of cats and identifying this action in its INRMP, the Navy has demonstrated its support for the action. The Navy also prohibits personnel from bringing pets to the island and will continue to do so in the future (U.S. Navy 2003). The prevention of cat reintroduction to the island in the future is a key factor to the long-term success of the action.

D3.6 PERFORMANCE CRITERIA AND MONITORING

This action will be considered successful on the complete eradication of feral cats from the island. The benefits of cat removal to seabirds that breed and roost on the island may be evaluated by increase in population number, increase in habitat availability, and reduced predation. Monitoring of the colonies will determine breeding success, distribution, and predation levels. Measuring statistically meaningful population increases of these colonies may take years or even decades. Protocols for seabird monitoring are well established and standardized. A monitoring plan will be developed during the subsequent phase of this action.

D3.7 EVALUATION

The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. The Trustees determined that this type and scale of action will provide long-term benefits to Brandt's cormorants and western gulls. Both of these species are priorities for restoration in the SCB. This action will also provide long-term benefits to the ecosystem on San Nicolas Island. This action will undergo additional planning and evaluation during future subsequent environmental documentation prepared pursuant to NEPA and/or CEQA.

D3.8 BUDGET

Costs for years 1–3:

- Labor $1,121,500
- Equipment..$184,600
- Travel/housing $134,200
- Supplies..$32,900
- Contingency……………………………………….$71,900
- Overhead...$309,000
- **Estimated total $1,854,100**

Appendix D4

Restore Seabirds to Scorpion and Orizaba Rocks

D4.1 GOALS AND NEXUS TO INJURY

The goal of this 5-year action is to restore seabird habitat on Scorpion and Orizaba Rocks through exotic vegetation removal, installation of artificial nest boxes, and disturbance reduction. This action will directly benefit the following nesting or roosting species: the Cassin's auklet, ashy storm-petrel, western gull, Xantus's murrelet, California brown pelican, and the double-crested cormorant.

Eggshell thinning and/or elevated levels of DDT have been documented in the eggs of Cassin's auklets, ashy storm-petrels, western gulls, Xantus's murrelets, California brown pelicans, and double-crested cormorants in the Southern California Bight (SCB) (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of the seabird nexus to the injuries of the Montrose case.

D4.2 BACKGROUND

Scorpion and Orizaba Rocks, located off of Santa Cruz Island, are important nesting islands for burrow-nesting seabirds in California. Scorpion Rock is the largest of a four-rock complex. Both islets are under the jurisdiction of the National Park Service (NPS) and are within the Channel Islands National Park. Scorpion Rock supports a diverse community of breeding and roosting seabirds. Both ashy storm-petrels and Cassin's auklets are confirmed breeders at the rock. Ashy storm-petrels have been recorded to breed at Scorpion Rock since 1928 (Hunt et al. 1979). In 1992, the ashy storm-petrel breeding population was estimated at 140 breeding birds (Carter et al. 1992). In 1992, the estimated breeding population of Cassin's auklets for the Scorpion Rock complex was 546 breeding birds (Carter et al. 1992). In 2000, nest boxes were installed on Scorpion Rock as part of a survey conducted by the U.S. Geological Survey on the foraging ecology of Cassin's auklets. In 2003, the boxes had a 90 percent attendance by Cassin's auklets (Martin, pers. comm., 2004). Xantus's murrelets have also been observed using the rock and are suspected breeders. In 1991, murrelet vocalizations were heard during the breeding season, although no nests or eggshell fragments were found (Carter et al. 1992). In addition, ashy storm-petrels and Cassin's auklets are confirmed breeders at Orizaba Rock. The number of active ashy storm-petrel nest sites on Orizaba Rock has been declining over the last ten years.

Other seabirds utilizing Scorpion and Orizaba Rocks include California brown pelicans, pelagic cormorants, and pigeon guillemots. California brown pelicans historically nested on Scorpion Rock (Anderson et al. 1975) but are currently not breeding there, most likely due to human disturbance. The waters around Scorpion and Orizaba Rocks are popular destinations for sea kayakers. Although Scorpion Rock is closed to the public, kayakers occasionally land on the island. This human disturbance results in the flushing of roosting seabirds (e.g., brown pelicans and cormorants) and harassment of nesting birds. Trespassers have also been documented opening the nest boxes on Scorpion Rock (Martin, pers. comm., 2004). Such disturbance can lead to the abandonment of nests and decreased productivity. Disturbance is also an issue for birds using Orizaba Rock.

D4.3 PROJECT DESCRIPTION AND METHODS

This action proposes to enhance degraded habitat on Scorpion Rock through the removal of exotic plants and revegetation with native plants. Removal of exotic vegetation, primarily ice plant, will occur by mechanical removal without the use of herbicides. Native plants used to restore the area will include tree sunflower (*Coreopsis gigantea*), seaside wooly sunflower (*Eriophyllum staechadifolium*), island deer weed (*Lotus dendroideus*), one-sided blue grass (*Poa secunda*), meadow barley (*Hortium brachyantherum*), and maritime brome (*Bromus maritimus*). The use of matting or similar method to stabilize the soil may be needed in certain areas where erosion would normally prevent native plants from being established. Such measures will also limit soil erosion after the removal of invasive plants.

In addition, nest boxes will be installed on Scorpion Rock to provide a stable and secure nesting area for seabirds to improve their productivity and assist with monitoring efforts. Nest boxes will be installed on top of the rock for Cassin's auklets and Xantus's murrelets. Additional nest boxes will be placed around the top edge of the rock for ashy storm-petrels. Artificial nest sites will be insulated against the elements with dirt, sand, or rocks, depending on the topography.

Disturbance reduction efforts will also be implemented on Scorpion Rock to protect nesting and roosting seabirds from human disturbance. Signs will be posted around the rock and in the visitor center at Scorpion Ranch to inform the public that the rock is closed to protect nesting seabirds. In addition, the action will involve contributing funding for an additional NPS presence at the rock to enforce the closure and educate visitors.

Although no non-native vegetation removal or native vegetation planting will occur at Orizaba Rock, nest boxes will be deployed on the rock for ashy storm-petrels and Cassin's auklets. In addition to making the rock more attractive to petrels, the boxes will include a mechanism for measuring and confirming attendance at the site. The use of social attraction methods via playbacks will also be explored. Similar to Scorpion Rock, disturbance reduction efforts will include the posting of signs indicating that access to offshore rocks is prohibited. Light meters will also be deployed to gather information on the potential impact of high-intensity lights near these colonies.

The NPS will complete additional project planning, review, and environmental compliance before implementation of this action.

D4.4 ENVIRONMENTAL BENEFITS AND IMPACTS

D4.4.1 Biological

Benefits

The elimination of invasive plants and the restoration of native plants will benefit burrow-nesting species by providing increased nesting habitat and stabilization of the rapidly eroding soil horizon on Scorpion Rock. By providing additional high-quality breeding habitat, the action seeks to increase the number of breeding seabirds, in particular Cassin's auklets, Xantus's murrelets, and ashy storm-petrels, on Scorpion and Orizaba Rocks. The use of nest boxes will enhance suitable habitat, thereby increasing the number of successfully produced offspring and decreasing mortality.

Seabirds, such as the California brown pelican, are particularly sensitive to human disturbance (Schreiber and Risebrough 1972). Reducing human disturbance will have a positive influence on the energy budgets and survival of brown pelicans by reducing the energy costs associated with flushing and relocating due to human disturbance. Reducing disturbances will also protect nesting auklets and murrelets from harassment by trespassers on the rocks.

This action will target a suite of seabirds that demonstrate a strong nexus to the contaminants in the case. Also, seabirds such as the federally threatened California brown pelican, the rare ashy-storm petrel, and the state-threatened Xantus's murrelet are priority species for restoration due to their conservation status. The creation of additional habitat and a reduction in human disturbance will provide long-term benefits to these seabirds.

Impacts

This action is expected to have minimal, short-term adverse effects. The removal of exotic vegetation and the planting of native plants will be done during the non-breeding season to avoid impacts to nesting birds. However, roosting seabirds may be temporarily disturbed during the revegetation effort. Exotic vegetation will be removed through mechanical methods, thereby eliminating the need for herbicides. Mechanical removal may result in short-term impacts to surrounding native vegetation and soil. The use of matting will help minimize potential erosion and stabilize the soil. Subsequent monitoring may result in temporary disturbance to seabirds; however, the use of nest boxes will greatly minimize impacts to nesting alcids.

Roosting California brown pelicans may be disturbed during this project. The NPS will consult with the U.S. Fish and Wildlife Service regarding project implementation to ensure that California brown pelicans will not be adversely affected.

D4.4.2 Physical

Benefits

This action will have no known benefits to water resources, oceanographic and coastal processes, air quality, or noise receptors.

The restoration of native plants could have long-term benefits to the physical environment of Scorpion Rock by stabilizing the soil and decreasing erosion.

Impacts

This action will have no known impacts to water resources, oceanographic and coastal processes, air quality, or noise receptors.

The removal of invasive plants may result in limited short-term impacts to soils by increasing erosion until native plants are established. However, the use of erosion-control measures (e.g., matting) will mitigate any short-term negative impacts.

D4.4.3 Human Use

Benefits

This action will have no known benefits to cultural resources, recreation, aesthetics, transportation, or human health and safety.

Impacts

This action will have no known impacts to cultural resources, recreation, aesthetics, transportation, or human health and safety. Any cultural resources on the island will be avoided during the implementation of the action. It is anticipated that nest boxes will be invisible to visitors and will not change the character of the project area.

D4.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

This action will be determined to be successful when seabirds begin occupying the newly created nesting habitat. Both the habitat creation and the revegetation components of the action employ proven methods and techniques that have clearly demonstrated success in the past. As shown in Northern California and elsewhere, nest boxes have enhanced the population growth rate of several cavity-nesting alcid species at various sites by increasing recruitment of breeding-age birds, improving productivity, and decreasing mortality (Sydeman et al. 2000). Monitoring at Scorpion and Prince Rocks has demonstrated the effective use of pilot nest boxes to enhance degraded nesting habitat and facilitate monitoring for this species in the Channel Islands (Adams, pers. comm., 2003).

Minimal maintenance will be expected as part of this action to clean the nest boxes. The revegetation area on Scorpion Rock may require periodic removal of exotic plants.

D4.6 PERFORMANCE CRITERIA AND MONITORING

To quantify the efficacy of the restoration efforts, a minimum of 4 years of monitoring is proposed. The monitoring protocols for birds nesting in artificial cavities will follow those established by experts in the field of seabird ecology. A monitoring plan will be developed to evaluate the success of the restoration efforts by collecting simultaneous information on reproductive success, site occupancy, and mortality. Due to the status of Xantus's murrelets and their sensitivity to disturbance, no adults of this species will be handled. For ashy storm-petrels, monitoring will be conducted on the offshore rocks and on Santa Cruz Island to compare the effectiveness of this action to projects on other nearby colonies. Monitoring sites will include Bat Cave, Cove of the Bird Eggs, Cavern Point Caves, Dry Sandy Beach Cave, Orizaba Rock (natural and artificial sites), and Scorpion Rock (artificial sites). In addition to monitoring the caves and islets for reproductive effort and success, mist-netting will be employed at Scorpion Rock to collect population (mark/recapture) information. Also, the success of the exotic vegetation removal and the survival of native plants will be monitored using established success criteria for re-vegetation projects.

D4.7 EVALUATION

The Natural Resource Trustees for the Montrose case (Trustees) have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. The Trustees have determined that this type and scale of action will provide long-term benefits to ashy storm-petrels, Cassin's auklets, and Xantus's murrelets. This action will also provide long-term benefits to California brown pelicans, western gulls, and double-crested cormorants from a reduction in human disturbance.

D4.8 BUDGET

Year 1 estimated costs:

- Labor (biologists, enforcement support, housing) $46,000
- Supplies (nest boxes, signs, plants, etc.) $ 23,000
- Transportation (boat, personnel) $6,600
- Estimated total, Year 1 $70,600

Years 2–5 estimated costs:

- Labor (biologists, enforcement support, housing) $180,000
- Supplies (nest box and sign replacement, plants) $44,000
- Transportation (boat, personnel) $26,400
- Estimated total, Years 2–5 $250,400
- **Total estimated costs, Years 1–5 $326,000**

Appendix D5

Restore Seabirds to Baja California Pacific Islands

The Natural Resource Trustees for the Montrose case (Trustees) have evaluated a variety of seabird restoration actions for the Baja California Pacific islands in Mexico. These islands support a wide range of seabirds that nest in or use the Southern California Bight (SCB). Restoration efforts would target a suite of seabird species, including the Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, ashy storm-petrel, and Xantus's murrelet. To streamline the evaluation of these actions, the general background and regulatory framework is provided below. Detailed project descriptions are then provided for the following islands: (1) Guadalupe Island, (2) Coronado and Todos Santos Islands, (3) San Jeronimo and San Martín Islands, and (4) San Benito, Natividad, Asunción, and San Roque Islands. The actions discussed in this appendix do not cover all of the potential seabird restoration actions for the Baja California Pacific islands; therefore, the Trustees will consider additional actions in the future for implementation under this Restoration Plan, as appropriate.

D5.1 GENERAL BACKGROUND

The Baja California Pacific islands are located in the northwestern portion of Mexico, off of the Pacific coast of Baja California (Figure D5-1). Of the 12 islands or island groups (18 total islands) in this region, nine present unique opportunities for seabird restoration. Three of these islands or island groups (Coronado, Todos Santos, and San Martín) are oceanographically considered part of the SCB. The remaining six islands (San Jeronimo, San Benito, Guadalupe, Natividad, Asunción, and San Roque) are located south of the SCB but are still part of the California Current System. This system, which extends from southern British Columbia to Baja California, is one of the most highly productive eastern boundary currents in the world.

The Baja California Pacific islands support a diverse group of breeding seabirds and are known for their overall high levels of biological diversity and endemism. As shown in Table D5-1, 17 species and 8 subspecies of seabirds breed on the Baja California Pacific islands. Ten of these species also breed on the California Channel Islands (Wolf 2002). Of these 10 shared species, 5 have special-status listings in the United States as endangered, threatened, or species of special concern.

Most of the seabird colonies in Mexico and California form part of a larger metapopulation of seabirds that breed, forage, and disperse into and through the SCB and surrounding marine environment. Breeding seabirds in this region have been documented moving between islands, and crossing the U.S./Mexico border to use islands in the Mexican portion of the SCB and other islands further south and into the Gulf of California. This is best illustrated by the California brown pelican metapopulation, which is divided into four populations: the Southern California Bight, the Baja California Coastal, the Gulf of California, and the Mexican Mainland populations (Gress and Anderson 1983). The SCB population includes colonies both on the Channel Islands and the northwestern Baja California Pacific islands of Coronado, Todos Santos, and San Martín. California brown pelicans within the SCB population have demonstrated interchange of birds, use of same prey resources, and population shifts in response to prey availability (Anderson and Gress 1983). California brown pelicans also demonstrate regular multidirectional movement across the border, with birds from the Gulf of California and Baja California moving into the SCB and Salton Sea regions (Anderson and Gress 1983).

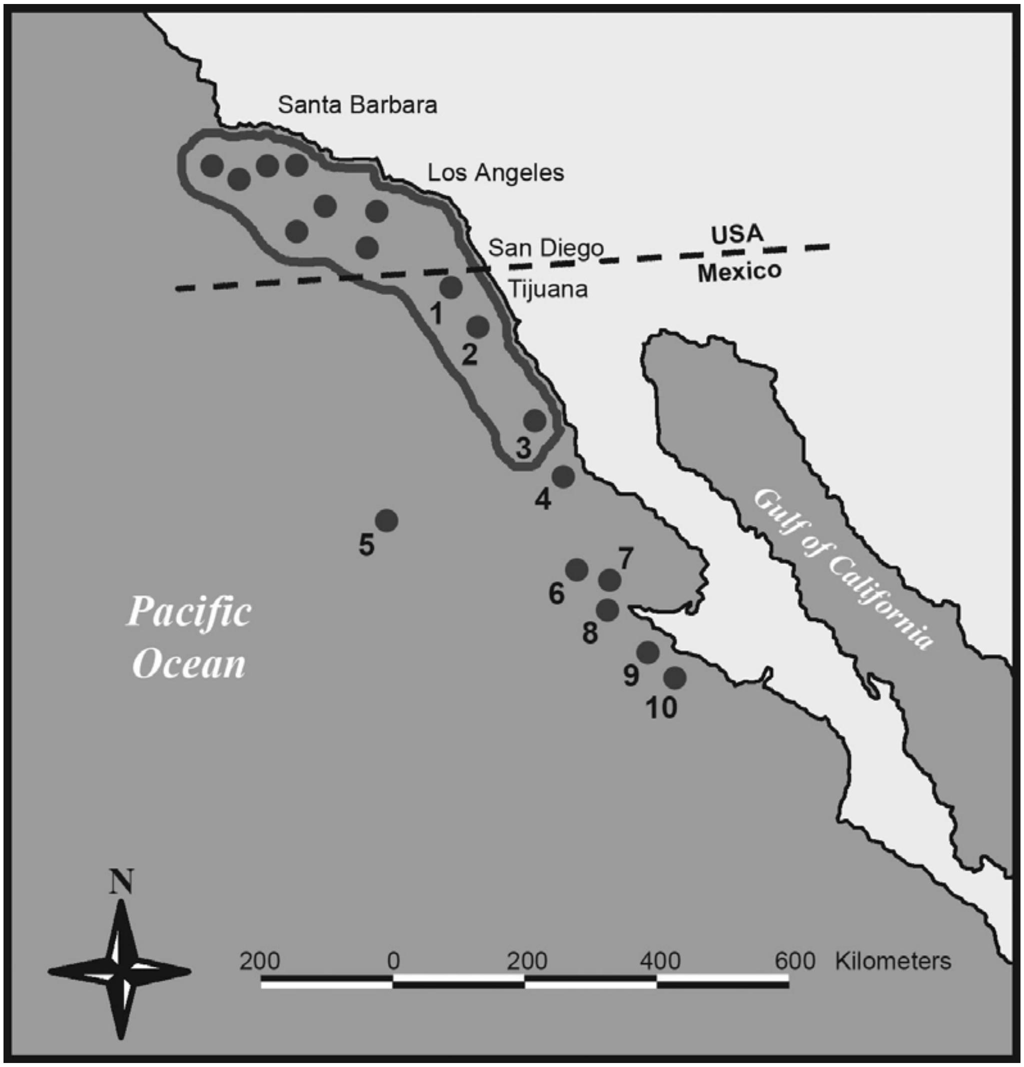


Figure D5-1. Baja California Pacific islands.

Identification of islands: (1) Coronado (2) Todos Santos (3) San Martín (4) San Jeronimo (5) Guadalupe (6) San Benito (7) Cedros (8) Natividad (9) San Roque (10) Asunción. The solid line indicates islands located within the Southern California Bight.

Table D5-1
Characteristics of Birds That Breed on the Baja California Pacific Islands

Breeding Seabirds on Baja California Pacific Islands	Breeding on Channel Islands?	Disperse/ Forage in SCB?	Status in Mexico	Status in United States	International Union for Conservation of Nature and Natural Resources (IUCN) Status
Leach's storm-petrel	Yes	Yes	FE, FT [1]		
Ashy storm-petrel	Yes	Yes	FT	SSC	LR/nt
Black storm-petrel	Yes	Yes	FT	SSC	
California brown pelican	Yes	Yes		FE, SE	
Double-crested cormorant	Yes	Yes		SSC	
Brandt's cormorant	Yes	Yes			
Pelagic cormorant	Yes	Yes			
Western gull	Yes	Yes			
Xantus's murrelet	Yes	Yes	FE	ST	VU
Cassin's auklet	Yes	Yes	FT	SSC	
Laysan albatross	No	Yes	FT		
Black-vented shearwater	No	Yes	FE		
Least storm-petrel	No	Yes	FT		
Magnificent frigatebird	No	Yes			
Heermann's gull	No	Yes	SP		LR/nt
Least tern	No	Yes	FE	FE, SE	
Craveri's murrelet	No	Yes	FT		

[1] Three subspecies are listed: *O.l. chapmani* (FT), *O.l. socrroensis* (FE), O.l. *cheimomnestes* (FT)

FE = Federal Endangered, FT = Federal Threatened, LR/nt = Lower Risk/near threatened, SE = CA State Endangered, SP = Special Protection, SSC = Species of Special Concern, ST = CA State Threatened, VU = Vulnerable

Metapopulations serve to create more stable and viable populations because each individual colony buffers the others against extinction (Petersen and Frederiksen 2000). This is especially important when populations undergo large perturbations such the DDT-induced reproductive failures of pelicans and cormorants in this region. As the SCB population of brown pelicans recovered from DDT-induced population declines, the Baja California Coastal population and most likely the Gulf of California population supplied pelicans that helped to restore the SCB population. San Martín Island in Mexico is likely one such source for pelicans in the U.S. portion of the SCB (Anderson and Gress 1983).

In addition to movement of breeding birds and natal dispersal between colonies on either side of the U.S./Mexico border, a large number of birds breeding in Mexico annually disperse during the non-breeding season into the U.S. portion of the SCB. Dispersal also occurs in the reverse direction, with birds from the U.S. going south to roost on islands in Mexico. During the fall and winter, populations of Brandt's cormorants, double-crested cormorants, and California brown pelicans increase dramatically, surpassing the total number of breeders in the U.S. alone

(Thelander 1994). Other species that breed along the Pacific coast of Baja California or in the Gulf of California but not in the U.S. portion of the SCB are also observed in large numbers during the non-breeding season, indicating that they disperse into U.S. waters for foraging. These species include the Craveri's murrelet (Deweese and Anderson 1976), black-vented shearwater (Keitt et al. 2000), Heermann's gull (Islam 2002), elegant tern (Burness et al. 1999), the southern subspecies of Xantus's murrelet (Drost and Lewis 1995), least storm-petrel, and black storm-petrel (Ainley and Everett 2001). Thus, large portions of these species' populations are exposed to threats within the U.S. and along the northwest coast of Baja California during the non-breeding season.

Because seabird populations overlap international boundaries, protection and restoration of seabird colonies in Mexico directly benefits seabirds nesting on the Channel Islands and foraging in the SCB. Robust seabird colonies in Mexico are also important to ensure the survival of shared species should catastrophic events (e.g., oil spills) lead to a severe decline in seabird numbers on the Channel Islands.

D5.1.1 Jurisdictional and Legal Framework in Mexico

The Baja California Pacific islands are owned by the Mexican government, and access to them is controlled by the Secretariat of Gobernación (Gobernación). Because these islands support globally important populations of marine birds, Mexico's federal government recognizes the Baja California Pacific islands as critical habitat (Ezcurra, pers. comm., 2004). Several seabirds that breed on the Baja California Pacific islands are listed as endangered or threatened under the Norma Oficial Mexicana 059 (the Mexican equivalent of the U.S. Endangered Species Act). The federal designation of seabirds such as Xantus's murrelet, Cassin's auklet, and the ashy storm-petrel further facilitates protection of nesting habitat on these islands (Ezcurra, pers. comm., 2004).

Several Mexican laws are applicable to the conservation of natural resources on the islands, including the General Wildlife Law of 2000 and the General Law of Ecological Balance and Environmental Protection (LGEEPA) of 1988. The General Wildlife Law is implemented primarily by the Secretary of the Environment and Natural Resources (SEMARNAT) Wildlife Directorate General and provides general authority for conservation of migratory species and species restoration, as well as more detailed regulation of wildlife management and use. The LGEEPA focuses on the preservation and restoration of ecological balance and addresses the issues of Natural Protected Areas, jurisdiction, ecological zoning, and enforcement.

Within the Mexican government, several entities are responsible for management and enforcement on the islands. Gobernación is responsible for access to the Baja California islands. Visitors to the islands must obtain permits from the Gobernación prior to landing on the islands. Regulatory enforcement on the islands is the responsibility of the Federal Environment Protection Agency (PROFEPA). Created in 1992 and operating under the SEMARNAT umbrella, PROFEPA is responsible for enforcing Mexican environmental law such as the LGEEPA. The Mexican Navy has responsibility for the waters surrounding the islands and has agreements with the Secretariats (including SEMARNAT, Gobernación, and the National Fisheries and Aquaculture Commission) to enforce their regulations.

D5.1.2 Natural Protected Areas

The National System of Natural Protected Areas was created in 1983 and is one of Mexico's fundamental biodiversity conservation policy tools. This status is meant to protect the most diverse and ecologically important areas of Mexico. The Natural Protected Areas are "areas within the national territory, where the original environmental conditions haven't been significantly altered by human activity or areas that require protection and restoration…" (LGEEPA, Article 3). There are six different categories of Natural Protected Areas in Mexico: (1) Biosphere Reserves, (2) National Parks, (3) Natural Monuments, (4) Areas for the Protection of Natural Resources, (5) Areas for the Protection of Wildlife, and (6) Natural Sanctuaries. The National Commission of Natural Protected Areas (CONANP) is a decentralized organization of SEMARNAT and is charged with management of Natural Protected Areas. PROFEPA is responsible for enforcing rules on Natural Protected Areas through inspection and surveillance.

D5.1.3 Status of Baja California Pacific Islands

The current status of the Baja California Pacific islands varies among the different islands. Because of their unique ecology and biodiversity, the islands are designated a Marine Priority Area for Conservation by the Mexican National Commission for Knowledge and Use of Biodiversity.

The islands under consideration in this proposal fall under three categories: (1) Biosphere Reserve, (2) Natural Protected Area, and (3) proposed Biosphere Reserve. Natividad Island, San Roque Island, and Asunción Island were incorporated into the Vizcaíno Biosphere Reserve in 1988. Guadalupe Island first received special status in 1928 (Munoz et al. 2003) and was designated a Biosphere Reserve on April 25, 2005, as recorded in the Diario Oficial (Mexican Federal Register).

Efforts between local groups and the Mexican government are currently under way to establish the remaining Baja California Pacific islands (including Cedros, San Jeronimo, San Martín, Todos Santos, San Benito and Coronado) as a protected area. A technical study was completed by Grupo de Ecología y Conservación de Islas in support of the designation. In July 2003, the Mexican Congress called upon Gobernación and SEMARNAT to determine the legal and environmental status of the islands (Congress of the Union 2004). On June 3, 2005, SEMARNAT published in the Mexican Federal Register a public notification of their intent to decree a new Biosphere Reserve for 19 islands off the Pacific Coast of Baja California and Baja California Sur and the marine waters around them, as recorded in the Diario Oficial. The designation of these islands as a protected area would create a legal infrastructure for enforcing regulations and developing management plans.

D5.1.4 Recent Conservation Efforts

For the past 10 years, significant efforts have been made to conserve island ecosystems in northwest Mexico. A successful collaboration between local universities, Mexican and U.S. non-profit conservation organizations, local fishing cooperatives, and Mexican governmental agencies has resulted in the removal of introduced species from 24 islands in the region, 12 of which are in the Baja California Pacific islands (Keitt, pers. comm., 2004). Of 19 recorded animal extinctions on islands in northwest Mexico, 18 can be attributed in whole or part to introduced mammals (Donlan et al. 2000). With the recent efforts, 35 exotic mammal species have been removed from islands in the region (IC 2004b). With the removal of these introduced species, suitable habitat is once again available to seabirds for nesting and roosting. The success of this regional conservation effort has provided unique opportunities to enhance recovery of seabird populations on the Baja California Pacific islands.

D5.1.5 Risks and/or Uncertainties

The Trustees recognize that there is a certain level of uncertainty in funding actions outside of the U.S. Factors such as government support, enforcement, and accountability are of greater concern when implementing actions outside of U.S. jurisdiction. Given the limited staffing and funding in the Mexican resource agencies, there is less certainty of the long-term benefit of an action in Mexico than one in the U.S. As such, the Trustees may consider additional mechanisms or tools to enhance the viability and success of restoration actions in Mexico. Such tools may include: (1) funding a U.S. organization that can be held accountable in U.S. jurisdiction, (2) withholding full payment until project completion, (3) partnering with other conservation programs that successfully implement restoration actions in Mexico (e.g., U.S. Fish and Wildlife Service [USFWS] Sonoran Joint Venture), and (4) seeking matching payments or in-kind contributions.

D5.2 RESTORE SEABIRDS ON GUADALUPE ISLAND

D5.2.1 Goals and Nexus to Injury

The goal of this action is to eradicate feral cats and restore seabird populations on Guadalupe Island, Mexico. This action would target a suite of seabirds including Cassin’s auklet, Brandt’s cormorant, Xantus’s murrelet (subspecies *S. h. hypoleucus*), and the western gull.

Eggshell thinning and/or elevated levels of DDT have been documented in the eggs of Cassin’s auklets, Brandt’s cormorants, Xantus’s murrelets, and western gulls in the SCB (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of the seabird nexus to the injuries of the Montrose case.

D5.2.2 Background

Guadalupe Island measures 255 square kilometers (km^2) (98 square miles [mi^2]) with three satellite islands of <1 km^2 in size. This island group is located 386 kilometers (km) (240 miles) south of San Diego and 370 km (230 miles) off the coast of Baja California. Although outside of the SCB, Guadalupe Island is biogeographically affiliated with coastal Southern California, and is part of the critically endangered California coastal sage and chaparral ecoregion. Human presence on the island includes a small fishing community and a Mexican Navy station.

Guadalupe Island is a Biosphere Reserve managed by the Mexican government. World-renowned for its high level of biodiversity, Guadalupe Island supports 34 endemic plants (including two endemic genera), 2 endemic subspecies of seabirds, 10 endemic land birds, 11 endemic land snails, and at least 18 endemic insects. Birdlife International recognizes Guadalupe

Island as one of two regionally important Endemic Bird Areas in the California Floristic Province Hotspot (Stattersfield et al.1998).

The overwhelming threat to the degradation of the ecosystem of Guadalupe Island is the presence of introduced goats and cats. Goats introduced in the 1850s have completely transformed the island through habitat degradation and loss from erosion and trampling. The top of the island, once covered with an endemic Guadalupe Island pine forest, is now sparsely vegetated with only about 200 adult trees. In 2002, a team of international experts from Australia, New Zealand, Mexico, United States, and Ecuador visited Guadalupe Island to develop a plan for goat and cat eradication. This plan has the full support of the Mexican National Institute of Ecology, the Mexican National Commission of Natural Protected Areas, the Mexican Navy, and the local fishing community. Efforts to eradicate the goats began in 2004 with funding from the Mexican government and private donors.

Feral cats are a significant threat to seabird populations on Guadalupe Island. Introduced prior to 1880, cats are responsible for the likely extinction of the endemic Guadalupe storm-petrel and the likely extirpation of many other seabird populations from the main island of Guadalupe, including Xantus's murrelet, the black-vented shearwater, Cassin's auklet, and Leach's storm-petrel (Keitt et al. in press). These species now occur only on small offshore islets of Guadalupe Island (Jehl and Everett 1985). In addition, cats have caused the extinction of five endemic species or subspecies of landbirds on Guadalupe Island, and currently threaten the survival of one of the three Laysan albatross colonies found outside of Hawaii. Cats are known to kill large numbers of seabirds and are particularly effective at taking smaller species such as shearwaters, alcids, and storm-petrels (Keitt et al. 2002, Van Aarde 1978).

As a result of habitat degradation by goats and predation by cats, the main island of Guadalupe has likely experienced one extinction (Guadalupe storm-petrel) and possibly five extirpations of seabirds (Table D5-2). Currently the offshore islets support eight taxa of seabirds, including Brandt's cormorant, Laysan albatross, western gull, Xantus's murrelet, black-vented shearwater, Cassin's auklet, and two endemic subspecies of Leach's storm-petrel (Table D5-2). Of these eight taxa (or seven species), recent surveys have only confirmed Brandt's cormorant and Laysan albatross nesting on the main island of Guadalupe; however, it is possible small breeding populations of murrelets, shearwaters, auklets, and petrels are present in areas restricted or inaccessible to cats (Keitt et al. in press).

D5.2.3 Project Description and Methods

The goal of this action is to eradicate feral cats to restore seabird colonies on Guadalupe Island. A 4-year restoration action is proposed to achieve this goal. Proven techniques used worldwide in recent cat removal programs would be employed on this action. In general, the most successful methods used in feral cat eradication efforts have been trapping and hunting (Wood et al. 2002, Nogales et al. 2004). An important component of this action would be to ensure that cats are not reintroduced to the island after the removal. A prevention program would be developed as part of the overall management plan for Guadalupe Island.

Important seabird colonies and plant populations that still occur on small offshore islets of Guadalupe would likely serve as source populations that may naturally recolonize the main island of Guadalupe once cats and goats are removed. Additional restoration activities could be undertaken to facilitate the recovery of seabird populations back onto the main island, such as social attraction, artificial nests and burrows, habitat enhancement, and light shielding. Although the Trustees may contribute to these additional restoration efforts in the future, the focus of the proposed action is the eradication of feral cats.

Table D5-2
Historical and Current Status of Seabird Species on Guadalupe Island

	Historically Present		Currently Present	
	Main Island	**Offshore Islets**	**Main Island**	**Offshore Islets**
Guadalupe storm-petrel	Yes	No	No[1]	No
Xantus's murrelet	Yes	Yes	Unknown[2]	Yes
Black-vented shearwater	Yes	Yes	Unknown[2]	Yes
Cassin's auklet	Unknown[5]	Yes	Unknown[2]	Yes
Leach's storm-petrel ssp.	Yes	Yes	Unknown[2]	Yes
Leach's storm-petrel ssp.	Yes	Yes	Unknown[2]	Yes
Laysan albatross	Yes[6]	Yes	Yes[3]	Unknown
Brandt's cormorant	Yes	Yes	Yes[4]	Yes
Western gull	Yes	Yes	Yes	Yes

[1]Cats likely caused extinction.
[2]Unknown, but reduced from historical numbers and likely at risk of local extirpation from main island due to cats.
[3]Cats are currently threatening the survival of colony.
[4]Confirmed nesting on main island.
[5]Cassin's auklets never recorded on main island, but suitable habitat is available.
[6]Laysan albatross colonized naturally in 1980.

D5.2.4 Environmental Benefits and Impacts

Biological

Benefits

Eradication of cats from Guadalupe Island would have both immediate and permanent conservation benefits for seabirds. In 2003, cats were removed locally around the Laysan albatross colony on Guadalupe Island to protect it from heavy predation pressure. Mortality from cats decreased from more than 30 birds found dead in the previous 60 days to zero birds over the next 60 days (Keitt et al. in press). Although no specific monitoring was done on these species, this local removal is also believed to have spared prospecting storm-petrels, Xantus's murrelets, and black-vented shearwaters from predation in the area. The immediate benefit of cat removal was also documented on Natividad Island where more than 1,000 black-vented shearwaters were found dead each month at the colony when cats were present (Keitt et al. 2002). Once cats were eradicated, fewer than 100 shearwaters were found dead each month as a result of sustainable, natural mortality (Keitt and Tershy 2003).

It is anticipated that seabirds would naturally recolonize historical habitat on the main island of Guadalupe from the nearby islets within several years of cat eradication. On Marion Island, the common diving petrel (*Pelecanoides urinatrix*) recolonized the island after cats were successfully eradicated (Hanel and Chown 1998). Because of its size and the amount of suitable nesting habitat, Guadalupe Island has significant potential for seabird recovery. Seabirds such as the Cassin's auklet, Brandt's cormorant, Xantus's murrelet, western gull, black-vented shearwater, and Leach's storm-petrel would significantly benefit from the action in terms of increased available nesting habitat and improved reproductive success as a result of reduced predation from cats.

In addition to seabirds, this action would also have collateral benefits to the island ecosystem. Endemic landbirds, such as the critically endangered Guadalupe junco (*Junco insularis*), would benefit from cat removal (Mendoza et al. in press).

Impacts

There is the potential for limited short-term soil disturbance and compaction from the proposed human activity associated with hunting and trapping. Guadalupe Island does not support other large native mammals that could be impacted by the action.

Physical

Benefits

This action would not result in benefits to the physical environment.

Impacts

This action would not result in impacts to the physical environment.

Human Use

Benefits

The eradication of feral cats and goats from Guadalupe Island is the first step in the restoration of this unique island ecosystem. Ecological restoration of the island would provide aesthetic and recreational benefits to inhabitants and visitors.

The proposed cat removal action would not result in benefits to cultural resources, transportation, or health and safety issues.

Impacts

Island users, including the Mexican military and the local fishing cooperative, have strict policies against the importation of any live animal or potential weedy plant to the island. Since Guadalupe Island is a Biosphere Reserve, these policies would be enforced in perpetuity. Therefore, the eradication program and subsequent prevention program would not impact human uses on the island.

This action would not result in impacts to cultural or socioeconomic resources, recreation, aesthetics, transportation, or health and safety.

D5.2.5 Likelihood of Success/Feasibility

Although difficult, feral cat eradication has been successfully carried out on at least 48 islands worldwide (Nogales et al. 2004). In northwest Mexico, cats have been successfully eradicated from 15 islands (Wood et al. 2002). The experience, knowledge, and lessons learned from these previous efforts would be applied to this action. Guadalupe Island is within the size range of other islands that had successful cat eradications; therefore, the feasibility and likelihood of success is high.

The proposed cat removal action is a critical step in the ecological restoration of Guadalupe Island. Several Mexican agencies would oversee management and enforcement on Guadalupe Island (see Section D5.1.1), and would be responsible for ensuring that the long-term success of this action is not compromised by the introduction of exotic species. In light of Guadalupe Island's protected status, and the local, national, and international effort being directed to the restoration of the island, the cat removal action would result in long-term benefits to seabird populations and the overall island ecosystem.

D5.2.6 Performance Criteria and Monitoring

The benefits of cat eradication may be evaluated by recolonization and recovery of seabird colonies onto the main island of Guadalupe, increased breeding success, and reduced predation. Protocols for seabird monitoring are well established and standardized. Efforts to document baseline seabird populations would be undertaken before project implementation to evaluate the benefits from the action.

D5.2.7 Evaluation

The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. The Trustees determined that this type and scale of action would effectively provide long-term benefits to priority seabirds, including the Cassin's auklet, western gull, Xantus's murrelet, and Brandt's cormorant. All of these species also breed in the Channel Islands and are part of a larger metapopulation of seabirds that breed, forage, and disperse into and throughout the SCB and surrounding marine environment. In addition, this action would provide long-term benefits to the unique ecosystem on Guadalupe Island.

D5.2.8 Budget

Table D5-3 shows the estimated budget for a 4-year restoration action on Guadalupe Island.

Table D5-3
Estimated Budget for 4-Year Guadalupe Island Restoration Project

Personnel	$767,000
Travel	$18,000
Equipment	$67,000
Communications	$10,000
Operating Supplies	$35,000
Research/Monitoring	$194,000
Overhead	$45,000
Total	**$1,136,000**

D5.3 RESTORE SEABIRDS ON CORONADO AND TODOS SANTOS ISLANDS

D5.3.1 Goals and Nexus to Injury

The goal of this action is to restore seabird populations on the Coronado and Todos Santos Islands. These islands are oceanographically considered part of the SCB. Restoration efforts would target a suite of seabirds including the Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, ashy storm-petrel, and Xantus's murrelet.

Eggshell thinning and/or elevated levels of DDT have been documented in the eggs of the Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, ashy storm-petrel, and Xantus's murrelet in the SCB (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of the seabird nexus to the injuries of the Montrose case.

D5.3.2 Background

Coronado Islands

The Coronado Islands consist of four islands that lie 11 km (7 miles) offshore of the Mexican mainland near Tijuana, Baja California Norte. These islands total 2.5 km^2 (1 mi^2) in area. The largest two islands are the North and South Island; the Middle Island is smaller, and Middle Rock is smaller still. The topography of the islands is steep and rugged and supports several vegetation communities including maritime succulent scrub and coastal sage scrub.

Human presence is limited on the Coronado Islands. With the exception of a Mexican Navy garrison and the lighthouse on South Island, these islands do not support human habitation. The Coronado Islands are owned and managed by the Mexican government (see Section D5.1.1).

Historically, the Coronado Islands supported significant colonies of Cassin's auklets, Xantus's murrelets, and brown pelicans (Grinnell and Daggett 1903, Howell 1910). During the 1930s, the California brown pelican colony reached its maximum size, with approximately 5,000 birds nesting on the North Island, 100 on the Middle Island, and several nests on the South Island (Jehl 1973). As with other brown pelican colonies in the SCB, the Coronado colony experienced

DDT-related reproductive failure in the late 1960s and early 1970s (Jehl 1973, Risebrough 1972). Of the 375 California brown pelican nests on the Coronado Islands in 1969, no young fledged (Jehl 1973).

In addition to negative effects from DDT contamination, seabird populations on the Coronado Islands also declined due to the presence of introduced animals (cats, goats, burros) and human disturbance. The mean productivity of California brown pelicans dropped precipitously in the 1980s when increased fishing around the islands caused a high level of nest abandonment (Anderson 1988). Brown pelicans are particularly sensitive to human disturbance and have been documented crushing or knocking eggs and small nestlings from the nest when they flush in panic (Schreiber and Risebrough 1972, Kushlan and Frohring 1985). Eggs and small nestlings left unattended are then susceptible to predators and hyperthermia (Anderson and Keith 1980).

It is currently estimated that approximately 4,000 breeding seabirds of 10 species nest on the Coronado Islands, including Brandt's cormorants, double-crested cormorants, California brown pelicans, western gulls, Cassin's auklets, black storm-petrels, and Xantus's murrelets (Wolf 2002). Although recent surveys have shown signs of seabird recovery, seabird colonies remain significantly lower than historical levels. For example, a survey in 2002 documented 643 pairs of brown pelicans on North Coronado Island, and no pairs nesting on the other islands (Palacios et al. 2003). These islands also currently support one of the world's largest threatened Xantus's murrelet colonies, and support the southernmost breeding colony of the rare ashy storm-petrel. Cassin's auklets and Leach's storm-petrels have yet to recolonize North Coronado Island after their extirpation due to cat predation (Donlan et al. 2000).

In recent years, efforts have been taken to protect and conserve the flora and fauna of the Coronado Islands. In addition to important seabird colonies, the Coronado Islands support one endemic species of small mammal, four endemic species of reptiles, and two subspecies of endemic land birds. Efforts to remove introduced species from the Coronado Islands included the eradication of feral cats from North Island in 1995 and 1996, the removal of one cat from South Island in 2004, and the removal of goats and burros from South Island in 2004. The American Trader Trustee Council contributed funding to these removal efforts. With the eradication of these introduced species, suitable habitat is once again available to seabirds for nesting and roosting.

Todos Santos Islands

The Todos Santos Islands consist of two islands located approximately 90 km (60 mi) south of the U.S./Mexico border. These islands total 1.2 km^2 (0.5 mi^2) in size. Vegetation on the Todos Santos Islands consists of coastal sage scrub. The Todos Santos Islands are owned and managed by the Mexican government. Human presence on Todos Santos North is maintained by the Mexican Navy (two radio personnel) and the Secretary of Transportation (one lighthouse keeper). Todos Santos South, the larger of the two islands, has a small facility formerly used by an abalone aquaculture company and recently purchased by a tuna aquaculture company. An illegal fishing camp was recently removed from the island, and the area was cleaned up by a coalition, including the Grupo de Ecologia y Conservacion de Islas, Mexican Navy, and the National University in Ensenada.

Historically, the Todos Santos Islands supported important colonies of seabirds, including the California brown pelican and double-crested cormorant (Howell 1912). However, seabird colonies and island vegetation have been heavily impacted by introduced cats and rabbits, regular human use and development, and occasional human-caused wildfires. By 1920, the brown pelican colony had disappeared, largely due to human disturbance (Jehl 1973, Jehl 1984).

An estimated 3,500 breeding seabirds of six species currently nest on the Todos Santos Islands, including double-crested cormorants, Brandt's cormorants, pelagic cormorants, western gulls, Cassin's auklets, and Xantus's murrelets (Wolf 2002). Todos Santos North is the southernmost known breeding colony of pelagic cormorants (Palacios and Mellink 2000). Xantus's murrelets and Cassin's auklets were extirpated from Todos Santos South likely due to cat predation and have not yet recolonized this island (Donlan et al. 2000). To date, California brown pelicans have not recolonized either island for breeding, likely because of ongoing human disturbance. However, surveys in 2002 documented 108 nesting attempts by double-crested cormorants and 336 active Brandt's cormorant nests on Todos Santos South (Palacios et al. 2003). Because brown pelicans and cormorants often nest in mixed colonies, the presence of these nesting cormorants demonstrates the potential for Todos Santos to be recolonized by brown pelicans (Palacios et al. 2003).

Recent eradication efforts have been undertaken to restore the Todos Santos island ecosystem. Cats and rabbits were eradicated in 1998, and burros were removed in 2004. During the burro removal, illegal camps were cleaned up and more than two tons of garbage was removed from Todos Santos North. With the removal of these introduced animals, suitable habitat is once again available to seabirds for nesting and roosting.

D5.3.3 Project Descriptions and Methods

With the recent removal of introduced species from these islands, opportunities exist to enhance the recovery of these seabird colonies within the SCB. Due to their proximity, and to maximize restoration efforts on these islands, a combined 5-year restoration action is proposed for the Coronado and Todos Santos Islands. On the Coronado Islands, restoration actions will include using social attraction techniques (including decoys and vocalizations), improving nesting opportunities with artificial nests, and reducing human disturbance. Standard social attraction techniques that have been used successfully elsewhere would be employed on these islands. Target species for restoration on the Coronado Islands include the Brandt's cormorant, double-crested cormorant, California brown pelican, western gull, Cassin's auklet, ashy storm-petrel, black storm-petrel, and Xantus's murrelet. An example restoration activity would be to facilitate the recolonization of Cassin's auklets to North Coronado Island through the use of playback systems and artificial nests.

On the Todos Santos Islands, restoration actions would include social attraction techniques (e.g., decoys and vocalizations), improving nesting opportunities with artificial nests, shielding lights, and reducing human disturbance. For example, efforts to restore California brown pelican breeding would focus on reducing human disturbance around historical colonies. Target species on Todos Santos Islands include Brandt's cormorant, double-crested cormorant, pelagic cormorant, California brown pelican, western gull, Cassin's auklet, and Xantus's murrelet.

Although the Trustees are focusing on the above-mentioned restoration activities, consideration would be given to additional restoration opportunities that may arise in the future on these islands.

D5.3.4 Environmental Benefits and Impacts

Biological

Benefits

This action involves multiple restoration activities that will likely provide long-term benefits to target seabird populations. Social attraction efforts will facilitate the recolonization of seabirds on these islands after the removal of introduced species, and will encourage seabirds to use suitable and historically occupied habitats. Once seabirds are attracted to the island, the presence of nest boxes will further encourage the seabirds to nest in suitable habitat. The use of nest boxes will also allow biologists to effectively monitor the success of the restoration efforts and minimize disturbance to nesting seabirds. Although social attraction may only be used for a limited time, the recolonization and recovery of historically occupied colonies will provide long-term benefits to seabird populations in the SCB, as the re-established presence of a colony of birds will likely serve as an ongoing natural attractant in perpetuity.

A reduction in human disturbance around the colonies will significantly benefit roosting and breeding seabirds, particularly those that are sensitive to disturbance, such as California brown pelicans and cormorants. On islands in the Gulf of California, brown pelican subcolonies disturbed by humans produced 0.0 to 0.6 fledglings per nest compared with 1.2 to 1.5 fledglings per nest in undisturbed colonies (Anderson and Keith 1980). A reduction in human disturbance can have dramatic impacts on seabird populations, as illustrated on the Farallon Islands, off the coast of Northern California. At least six species of marine birds had experienced severe population declines on these islands due to human disturbance. Subsequent protection from disturbance resulted in almost complete recovery of all populations (Anderson and Keith 1980).

The increase in seabird populations on the Coronado and Todos Santos Islands will also likely benefit resident peregrine falcon pairs that prey on seabirds such as petrels and auklets. Because peregrine falcon pairs prey on a variety of seabird species (Huey in Kiff 1980, Nelson and Myres in Kiff 1980), increases in seabird populations may help buffer the impacts of predation.

Impacts

The proposed activities have the potential for limited short-term impacts. These impacts could include soil disturbance in the areas where nest boxes are used or short-term disturbance to seabirds during monitoring efforts. However, the proposed activities would not result in significant impacts to biological resources.

Physical

Benefits

This action will not result in benefits to the physical environment.

Impacts

This action will not result in impacts to the physical environment.

Human Use

Benefits

The waters around the Baja California Pacific islands offer many recreational and economic opportunities. Healthy and complete ecosystems support fishing communities around these islands (Anderson and Keith 1980). Seabird colonies are a valuable part of island ecosystems and provide economic benefits in the form of tourism.

Impacts

This action proposes to limit human disturbance in the vicinity of seabird colonies. This action would likely impact people that either inhabit or illegally camp on the islands. However, this impact is not anticipated to be significant due to the minimal number of people that inhabit the islands.

The action will not result in impacts to cultural resources, transportation, or health and safety.

D5.3.5 Likelihood of Success/Feasibility

Social attraction efforts, including the use of playback systems and decoys, have been successfully used for a variety of seabirds, including terns (Kress 1983), Atlantic puffins (Kress and Nettleship 1988), Laysan albatross (Podolsky 1990), dark-rumped petrels (Podolsky and Kress 1992) and Leach's storm-petrels (Podolsky and Kress 1989). The use of artificial nests has also proven to be successful for seabirds such as the ashy storm-petrel, Leach's storm-petrel, Cassin's auklet, and the pigeon guillemot. Experts in the field of social attraction will be consulted during project planning and implementation to ensure that playback systems, decoys, and artificial nests are designed in a manner that maximizes the success of the action.

As discussed earlier, a concerted effort is under way to conserve and protect the Baja California Pacific islands. Part of that effort is the designation of the Baja California Pacific islands, including the Coronado and Todos Santos Islands, as a Biosphere Reserve. The restoration activities are both feasible and compatible with these ongoing efforts. In light of the successful efforts to remove introduced species from these islands in the last decade, the support from the Mexican government, the designation of these islands as a Marine Priority Area for Conservation, and the current momentum to designate these islands as a Biosphere Reserve, it is likely that restoration activities undertaken on these islands will be successful and will result in long-term benefits to seabird populations in the SCB.

D5.3.6 Performance Criteria and Monitoring

The benefits of these restoration activities to seabirds can be evaluated by increases in colony size, recolonization of seabirds into historically occupied habitats, and reduced disturbance to seabird colonies. Protocols for seabird monitoring are well established and standardized. Efforts to document baseline seabird populations and levels of human disturbance will be undertaken before project implementation to evaluate the benefits from the action.

D5.3.7 Evaluation

The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. This action has a strong nexus to the Montrose case and is located in the SCB. Recent eradication efforts on these islands provide a unique opportunity to facilitate seabird recolonization and recovery. The Trustees determined that this type and scale of action will likely provide long-term benefits to ashy storm-petrels, Cassin's auklets, Xantus's murrelets, Brandt's cormorants, double-crested cormorants, and California brown pelicans.

D5.3.8 Additional Considerations

The Trustees are aware of plans by ChevronTexaco to build a liquefied natural gas receiving facility just east of South Coronado Island. The proposed terminal would receive tankers loaded with liquefied natural gas several times a week and process up to 1.4 million cubic feet of the fuel daily. ChevronTexaco has recently received a permit from Mexico's environmental ministry and is in the process of securing the remaining permits. It is unknown at this time if this project will be permitted and constructed. Because of the potential impacts to seabirds from the proposed terminal (from the effects of lighting, disturbance, and spills), the Trustees would carefully evaluate the potential ramifications of this liquefied natural gas project on the feasibility and long-term success of this proposed restoration action. Should the Trustees decide that the proposed liquefied natural gas terminal would compromise the success of this restoration action, the Trustees would reconsider this action and may allocate funds to other seabird restoration efforts.

D5.3.9 Budget

Table D5-4 shows the estimated budget for a 5-year restoration action on the Coronado and Todos Santos Islands.

Table D5-4
Estimated Budget for 5-Year Coronado and Todos Santos Islands Restoration Action

Personnel	$587,000
Travel	$64,000
Equipment	$92,000
Communications	$7,000

Table D5-4
Estimated Budget for 5-Year Coronado and Todos Santos Islands Restoration Action

Operating Supplies	$84,000
Overhead	$208,000
Total	**$1,042,000**

D5.4 RESTORE SEABIRDS ON SAN MARTÍN AND SAN JERONIMO ISLANDS

D5.4.1 Goals and Nexus to Injury

The goal of this action is to restore seabirds on San Martín and San Jeronimo Islands, Mexico. San Martín Island is oceanographically considered part of the SCB, whereas San Jeronimo Island is just south of this boundary. Restoration efforts would target a suite of seabirds, including the Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, western gull, and Xantus's murrelet.

Eggshell thinning and/or elevated levels of DDT have been documented in the eggs of Cassin's auklets, Brandt's cormorants, double-crested cormorants, California brown pelicans, western gulls, and Xantus's murrelets in the SCB (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of the seabird nexus to the injuries of the Montrose case.

D5.4.2 Background

San Martín Island

San Martín Island is 3.2 km^2 (1.2 mi^2) in size and is located 5 km (3.1 miles) offshore from San Quintin, Mexico (see Figure D5-1). This rugged volcanic island is dominated by cliffs except on the northeast side, which has a small sandy beach and tidal lagoon. Vegetation on the island consists of dense Californian coastal scrub vegetation. In addition to six species of breeding seabirds, San Martín Island also supports three endemic reptiles and one endemic mammal. A permanent fishing camp exists on the island as well as two automated navigational lights that receive at least biannual maintenance by personnel of the Secretary of Communications and Transportation.

San Martín Island historically supported a large mixed colony of California brown pelicans, double-crested cormorants, and Brandt's cormorants from at least 1913 until the late 1960s (Palacios and Mellink 2000). This colony was the largest historic double-crested cormorant colony in North America, estimated at close to 350,000 nests (Gress et al. 1973, Wright 1913). Although this number is thought to be an overestimate (Carter et al. 1995), San Martín Island clearly supported an important breeding colony for the double-crested cormorant. In 1969 and 1971, approximately 5,000 double-crested cormorants were documented in the colony. During the 1970s, human disturbance was thought to be the principal factor in the decline of these colonies (Anderson and Keith 1980, Jehl 1973), which were also heavily impacted by introduced cats, fisherman, and egg harvesters (Everett and Anderson 1991). Consequently, it was believed that this colony was essentially abandoned in 1987 and 1988 (Everett and Anderson 1991).

In recent years, efforts have been taken to protect and conserve San Martín Island, including the removal of feral cats in 1999 and 2000. A survey in 1999 documented the reoccupation of this regionally important colony, including 600 occupied double-crested cormorant and 30+ brown pelican nests (Palacios and Mellink 2000). Additional nesting seabirds on San Martín Island include Brandt's cormorants, western gulls, Cassin's auklets, and Xantus's murrelets (Wolf 2002). With the removal of feral cats and the recent reoccupation of the cormorant/pelican colony, opportunity exists to facilitate the recovery of this important colony as well as other seabird colonies on the island.

San Jeronimo Island

San Jeronimo Island is 0.7 km^2 (0.3 mi^2) in size and is located south of San Martín Island (Figure D5-1). A permanent fishing camp exists on the island with up to 40 residents on the island during peak fishing seasons. A lighthouse keeper is permanently stationed on the island to maintain the lighthouse.

San Jeronimo Island historically supported large colonies of Brandt's cormorants and Cassin's auklets (Everett and Anderson 1991). The Brandt's cormorant colony was displaced and large sections of the Cassin's auklet colony were destroyed during an unauthorized guano mining operation in 1999 (Wolf 2002). Since that time, all guano mining operations have been stopped on the island (Keitt, pers. comm., 2004).

Efforts to remove introduced animals have also been undertaken on this island. Feral cats were eradicated in 2000. Seabirds currently nesting on San Jeronimo Island include the double-crested cormorant, western gull, Xantus's murrelet, and Cassin's auklet (Wolf 2002). The Cassin's auklet colony is currently the largest colony on the island. After the unauthorized guano mining operation, Brandt's cormorants did not re-nest in 2002, and it is unknown if they have reoccupied this colony since then.

D5.4.3 Project Descriptions and Methods

To maximize restoration efforts on these islands, a combined five-year action is proposed on San Martín and San Jeronimo Islands. The goal of this action is to enhance the recovery of seabird colonies following the removal of introduced species. Activities on San Martín Island would focus on restoring the California brown pelican, double-crested cormorant, and Brandt's cormorant colonies by reducing human disturbance through signage, public education, and redesign of the trail system on the island to avoid the colonies.

Efforts on San Jeronimo Island would focus on restoring the extirpated Brandt's cormorant colony through social attraction efforts (e.g., decoys) and reducing human disturbance. Additional restoration actions for Cassin's auklets and Xantus's murrelets would include shielding light sources, constructing a boardwalk to stop the destruction of burrows by fisherman walking through the colony, and controlling waste on the island.

Although the Trustees are focusing on the above-mentioned restoration activities, additional restoration opportunities would be considered for implementation under this restoration plan, as appropriate.

D5.4.4 Environmental Benefits and Impacts

Biological

Benefits

The action combines restoration activities that would provide long-term benefits to priority seabird populations, in particular Brandt's cormorants, double-crested cormorants, California brown pelicans, and Cassin's auklets. Social attraction efforts would facilitate the recolonization of seabirds on these islands after the removal of introduced species. These types of efforts would encourage seabirds to use suitable and historically occupied habitats. Although social attraction may only be used for a limited time, the recolonization and recovery of historically occupied colonies would provide long-term benefits to seabird populations in the SCB since the re-established presence of a colony of birds would likely serve as an ongoing natural attractant in perpetuity.

A reduction in human disturbance around colonies would benefit roosting and breeding seabirds. Nesting seabirds that are sensitive to disturbance, such as California brown pelicans and cormorants, would in particular benefit from a reduction in human disturbance. Protection of the seabird colonies from human disturbance would likely result in increased reproductive success. Construction of a boardwalk on San Jeronimo Island would greatly reduce the number of Cassin's auklet burrows that are crushed by fisherman walking through the colony.

Impacts

The proposed activities have the potential for limited short-term impacts. These impacts could include soil disturbance in the areas where social attractants are used or short-term disturbance during monitoring efforts.

Physical

Benefits

This action would not result in benefits to the physical environment.

Impacts

This action would not result in impacts to the physical environment.

Human Use

Benefits

The waters around the Baja California Pacific islands offer many recreational and economic opportunities. Healthy and complete ecosystems support fishing communities around these islands (Anderson and Keith 1980). Seabird colonies are a valuable part of island ecosystems and provide economic benefits in the form of tourism.

This action would not result in benefits to cultural resources, transportation, or health and safety.

Impacts

This action proposes to limit human disturbance in the vicinity of seabird colonies. This action would likely impact fisherman on the islands; however, alternative trails would be provided. This impact is not anticipated to be significant due to the minimal number of people that inhabit the islands.

This action would not result in impacts to cultural resources, transportation, or health and safety.

D5.4.5 Likelihood of Success/Feasibility

Social attraction efforts, including the use of playback systems and decoys, have been successfully used for a variety of seabirds (see Section D5.3.5). Experts in the field of social attraction would be consulted during project planning and implementation to ensure that decoys are designed to maximizes the success of the action. Activities to reduce human disturbance (e.g., redesign of trails, posting signs, and shielding lights) are feasible and would provide long-term benefits as long as measures are complied with and enforced.

As discussed earlier, a concerted effort is under way to conserve and protect the Baja California Pacific islands. Part of that effort is the designation of the Baja California Pacific islands as a Biosphere Reserve, including San Jeronimo and San Martín Islands. The proposed restoration activities are both feasible and compatible with these ongoing efforts. In light of the successful efforts to remove introduced species from these islands, the designation of these islands as a Marine Priority Area for Conservation, and the current momentum to designate these islands as a Biosphere Reserve, it is likely that restoration activities undertaken on these islands would be successful and would result in long-term benefits to seabird populations in the SCB.

D5.4.6 Performance Criteria and Monitoring

The benefits of these restoration activities to seabirds may be evaluated by increases in colony size, recolonization of seabirds into previously occupied habitats, and reduced disturbance to seabird colonies. Protocols for seabird monitoring are well established and standardized. Efforts to document baseline seabird populations and levels of human disturbance would be undertaken before project implementation to evaluate the benefits from the action.

D5.4.7 Evaluation

The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. The Trustees determined that this type and scale of action would provide benefits to priority seabirds, including the Brandt's cormorant, double-crested cormorant, Cassin's auklet, Xantus's murrelet, and California brown pelican.

D5.4.8 Budget

Table D5-5 shows the estimated budget for a 5-year restoration action on San Jeronimo and San Martín Island.

Table D5-5
Estimated Budget for 5-Year San Jeronimo and San Martín Islands Restoration Project

Personnel	$411,000
Travel	$70,000
Equipment	$76,000
Communications	$4,500
Operating Supplies	$40,000
Overhead	$150,000
Total	**$751,500**

D5.5 RESTORE SEABIRDS ON SAN BENITO, NATIVIDAD, ASUNCIÓN, AND SAN ROQUE ISLANDS

D5.5.1 Goals and Nexus to Injury

The goal of these actions is to restore seabird colonies on the central Baja California Peninsula Islands. The San Benito, Natividad, Asunción, and San Roque Islands are clustered around central Baja California (see Figure D5-1). Restoration efforts would target a suite of seabirds including the Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, and Xantus's murrelet.

Eggshell thinning and/or elevated levels of DDT were documented in eggs of the Cassin's auklet, Brandt's cormorant, double-crested cormorant, California brown pelican, and Xantus's murrelet in the SCB (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of seabird nexus.

D5.5.2 Background

San Benito Islands

The San Benito Islands consist of three islands (East, Middle, and West) with a combined area of approximately 2.5 km^2 (1 mi^2). The islands are located 65 km (40 miles) west of the mainland

(Figure D5-1). Permanent fishing camps exist on West Benito Island. The San Benito Islands are owned by the Mexican government.

The San Benito Islands support the largest and most diverse seabird colony in the California Islands (which includes the Channel Islands and Baja California Pacific islands). The islands host approximately 2 million breeding seabirds of 12 species, including three species of storm-petrel, brown pelican, western gull, double-crested cormorant, Brandt's cormorant, Xantus's murrelet (*S.h. hypoleucus*), and Cassin's auklet (*P.a. australe*) (Wolf 2002). In addition, these islands harbor at least three endemic plants (one of which is restricted only to West San Benito), three endemic landbirds, and one endemic lizard.

Recent eradication efforts have been undertaken to restore the island ecosystem. In 1998, feral goats and rabbits were removed from the three islands. Donkeys were removed in 2004. The presence of these introduced animals had degraded seabird nesting habitat on the islands, particularly on West Benito Island.

Natividad Island

Natividad Island is 7.2 km^2 (3 mi^2) in size and is located 7 km (2.7 miles) off of Punta Eugenia (see Figure D5-1). There is a town of 400 permanent residents on the south end of the island, and most inhabitants are members of a fishing cooperative. Natividad Island is owned and managed by the Mexican government and was incorporated into the Vizcaíno Biosphere Reserve in 1988.

Limited information is available on historical seabird population numbers on Natividad Island. It is estimated that Natividad Island supports approximately 160,000 breeding seabirds of five species, including the California brown pelican, double-crested cormorant, Brandt's cormorant, western gull, and black-vented shearwater (Wolf 2002). This island supports the second-largest seabird breeding population on the California Islands (after the San Benito Islands), in large part because it supports over 95 percent of the world's black-vented shearwaters (Keitt et al. 2000). It is presumed that Xantus's murrelets historically bred on Natividad Island but were extirpated by cat predation (Drost and Lewis 1995, Keitt 2000). Cassin's auklets were also extirpated by cat predation.

Recent eradication efforts have removed feral cats, goats, domestic pigs, rabbits, and sheep from the island. Cat eradication was initiated in 1998 in response to the large number (more than 1,000) of dead shearwaters found in the colony each month (Keitt et al. 2002). Despite the removal of cats, Cassin's auklets have not yet recolonized Natividad Island (Keitt 2000).

Asunción Island and San Roque Island

Asunción Island (0.9 km^2 [0.4 mi^2]) and San Roque Island(4 km^2 [0.2 mi^2]) are located inside Asunción Bay (see Figure D5-1). There are no permanent settlements on these islands, though people regularly visit from the nearby town on the mainland. Asunción and San Roque Islands are owned and managed by the Mexican government and were incorporated into the Vizcaíno Biosphere Reserve in 1988.

These islands once supported large nesting colonies of seabirds including the Xantus's murrelet, Cassin's auklet (subspecies *P. a. australe*), and Brandt's cormorant (Everett and Anderson 1991, Drost and Lewis 1995, Wilbur 1987). Asunción and San Roque Islands were once the southernmost breeding colonies of Cassin's auklet (Kaeding 1905). However, predation by cats extirpated the large populations of Cassin's auklets on these islands by 1992 (McChesney and Tershy 1998). Xantus's murrelets were likely extirpated by cats much earlier. Human disturbance has caused abandonment of the double-crested cormorant and Brandt's cormorant colonies on San Roque Island and the brown pelican colony on Asunción Island on repeated occasions. Ongoing human disturbance has kept the populations of these species well below their historical numbers.

Within the last 10 years, efforts have been made to restore the ecosystem on these islands. In 1994, feral cats and rats were removed and human visitation was ended through education and signage. These actions resulted in secure roosting habitat for thousands of brown pelicans and cormorants. In 1996, playback devices were used to encourage the return of the Cassin's auklet and Leach's storm-petrel (*O. leucorhoa*). In 2001, Brandt's cormorants (more than 2,000 nests) and California brown pelicans (approximately 10 nests) had begun breeding again on San Roque Island (Keitt, pers. comm., 2004). However, in 2002, after a long lapse in education efforts, local fishermen began visiting the island again on a regular basis and virtually all of the cormorants and brown pelicans abandoned their breeding efforts. Currently on San Roque Island, double-crested cormorants, elegant terns, royal terns, Xantus's murrelets, and Cassin's auklets have yet to recolonize the island. On Asunción Island, brown pelicans, elegant terns, and Xantus's murrelets have yet to recolonize. In 2004, Cassin's auklets were documented using artificial burrows on the island; however, it is unknown whether breeding occurred (Keitt, pers. comm., 2004).

D5.5.3 Project Descriptions and Methods

San Benito Islands

A 5-year restoration action is proposed on the San Benito Islands that would focus on rehabilitation of degraded habitat to increase the number of breeding seabirds. Efforts would concentrate on West San Benito Island, which supports considerably lower densities of seabirds than the Middle or East Islands. Target species for restoration include Cassin's auklets, Xantus's murrelets, and Leach's storm-petrels. Restoration efforts would include removal of exotic plant species and restoration of native plant communities disturbed by human activities and burros. Efforts would also focus on reducing human disturbance through signage, shielding lights around the fishing village, and managing waste on the island.

Natividad Island

A 5-year restoration action is proposed on Natividad Island that would focus on establishing Xantus's murrelets and restoring a historic Cassin's auklet colony by using playback systems and artificial nests. The goal of the action would be to attract birds from nearby colonies on the San Benito Islands. In addition, habitat protection and enhancement would be targeted for double-crested cormorants, Brandt's cormorants, California brown pelicans, and black-vented shearwaters. A reduction in human disturbance would be accomplished through signage, light shielding, public education, and road closures.

San Roque and Asunción Islands

To maximize restoration efforts on these islands, a 5-year joint project is proposed on San Roque Island and Asunción Islands, due to their proximity. The goal of this restoration action would be to facilitate the recolonization and recovery of seabird populations on these islands. Activities would include social attraction (both decoys and playback systems), use of artificial burrows, and actions taken to reduce human disturbance. Seabirds would be attracted from large source colonies on the nearby San Benito Islands and the Gulf of California. Target species for these efforts include Brandt's cormorants, California brown pelicans, Heermann's gulls, elegant terns, Cassin's auklets, storm-petrels, and Xantus's murrelets.

D5.5.4 Environmental Benefits and Impacts

Biological

Benefits

The action combines restoration activities that would provide long-term benefits to target seabirds. Social attraction efforts would facilitate the recolonization of islands after the removal of introduced species. These types of efforts would encourage seabirds into suitable and historically occupied habitats. Once attracted to the island, the presence of nest boxes would further encourage nesting in suitable habitat. The use of nest boxes would also allow biologists to effectively monitor the success of the restoration efforts. Although social attraction may only be used for a short time, the recolonization of a historically occupied colony would provide long-term benefits to seabird populations since the re-established presence of a colony of birds would likely serve as an ongoing natural attractant in perpetuity.

A reduction in human disturbance around colonies would benefit roosting and breeding seabirds. Nesting seabirds that are sensitive to disturbance, such as brown pelicans and cormorants, would in particular benefit from a reduction in human disturbance. Protection of the seabird colonies from human disturbance would likely result in recolonization of the islands and increased reproductive success. A reduction in human disturbance would also protect existing colonies, such as the world's largest black-vented shearwater colony on Natividad Island.

Peregrine falcons would also likely benefit from this action. Because peregrine falcons prey on smaller seabirds, increased seabird populations on these islands would benefit this species.

Impacts

There is the potential for limited short-term impact from the proposed activities. Such impacts could include soil disturbance in the areas where nest boxes are used or short-term disturbance during monitoring efforts.

Physical

Benefits

The proposed actions would not result in benefits to the physical environment.

Impacts

The proposed actions would not result in impacts to the physical environment.

Human Use

Benefits

The waters around the Baja California Pacific islands offer many recreational and economic opportunities. Healthy and complete ecosystems support fishing communities around these islands (Anderson and Keith 1980). Seabird colonies are a valuable part of island ecosystems and provide economic benefits in the form of tourism.

The proposed actions would not result in benefits to cultural resources, transportation, or health and safety.

Impacts

This action proposes to limit human disturbance in the vicinity of seabird colonies. This action would likely impact people that either inhabit or illegally camp on the islands. However, this impact is not anticipated to be significant due to the minimal number of people that inhabit the islands.

The proposed actions would not result in impacts to cultural resources, transportation, or health and safety.

D5.5.5 Likelihood of Success/Feasibility

Social attraction efforts, including the use of playback systems and decoys, have been successfully used for a variety of seabirds, including terns, puffins, albatross, and petrels. The use of artificial nests has also proven to be successful for seabirds such as the ashy storm-petrel, Leach’s storm-petrel, Cassin’s auklet, and pigeon guillemot. Experts in the field of social attraction would be consulted during project planning and implementation to ensure that playback systems, decoys, and artificial nests are designed in a manner that maximizes success of the action.

Long-term success of these actions would also be dependent on whether these islands remain free from introduced species. The education of island users about the impact of introduced species is critical to the success of these restoration actions.

D5.5.6 Performance Criteria and Monitoring

The benefits of these restoration activities to seabirds may be evaluated by increases in colony size, recolonization of seabirds into previously occupied habitats, and reduced disturbance to seabird colonies. Protocols for seabird monitoring are well established and standardized. Efforts to document baseline seabird populations and levels of human disturbance would be undertaken prior to project implementation to evaluate the benefits from the action.

D5.5.7 Evaluation

The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors.

D5.5.8 Estimated Budget

Table D5-6 shows the estimated budget for a 5-year restoration action on San Benito, Natividad, Asunción, and San Roque Islands.

Table D5-6
Estimated Budget for 5-Year Restoration Project on San Benito, Natividad, Asunción, and San Roque Islands

	San Benitos	Natividad	Asunción/San Roque
Personnel	$382,000	$382,000	$636,000
Travel	$76,000	$70,000	$129,000
Equipment	$49,000	$63,000	$134,000
Communications	$8,000	$2,000	$6,000
Operating Supplies	$42,000	$53,000	$68,000
Overhead	$139,000	$142,000	$244,000
Total	**$696,000**	**$712,000**	**$1,217,000**

Appendix D6

Create/Enhance/Protect California Brown Pelican Roost Habitat

D6.1 GOALS AND NEXUS TO INJURY

The goal of this action is to restore non-breeding California brown pelican habitat by enhancing and protecting coastal roosts along the Southern California mainland. Eggshell thinning and elevated levels of DDT have been documented in California brown pelican eggs in the Southern California Bight (SCB) (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of seabird nexus to the injuries of the Montrose case.

D6.2 BACKGROUND

Communal roost sites are essential habitat for California brown pelicans (Gress and Anderson 1983). The primary roost sites for brown pelicans in the western United States are offshore rocks and islands on the outer coast and sand islands within large estuaries (Briggs et al. 1987, Jaques 1994). Intense shoreline development, wetland filling, and other habitat alteration has eliminated much of the natural onshore roost habitat. Loss of historical roost habitat from human encroachment has been partially offset by the addition of artificial structures, such as jetties, breakwaters, and floating structures. Pelicans now rely heavily on these types of structures for roost sites in California (Jaques et al. 1996). Few roosts along the mainland fall under the jurisdiction of natural resource agencies, and several major roost sites on privately owned structures have been lost in recent years.

The basic requirements for California pelican roosts include (1) terrestrial substrates where pelicans can keep their bodies dry while resting and maintaining their plumage, (2) a buffer from mammalian predators and human disturbances, and (3) presence of prey resources within energetically efficient distances (Jaques et al. 1996). Human disturbance at many existing roost sites in Southern California is high relative to other portions of their range. The most frequent cause of this disturbance is recreational activities and the most heavily disturbed habitats used by pelicans are estuaries (Jaques and Anderson 1987)

D6.3 PROJECT DESCRIPTIONS AND METHODS

The goal of this action is to improve roost sites for California brown pelicans along the Southern California mainland. Several methods are being considered to improve roosting locations, including creation, enhancement, and protection. Site selection and specific methods would be determined through further project development and consultation with appropriate stakeholders. All projects would have a complementary interpretive element such as educational panels or displays.

Roost site creation projects would fill in gaps in the availability of large-capacity, high-quality roosts along the Southern California coastline. Potential creation projects that would be explored include placing a large barge or roosting structure in outer Santa Barbara Harbor, Aqua Hedionda (San Diego County), and Batiquitos Lagoon (San Diego County). In 2005, the American Trader Trustee Council installed a floating platform in the San Diego Bay National Wildlife Refuge to provide a secure roosting location for California brown pelicans. A monitoring program has been developed to evaluate the success of the project. This project will provide valuable information for the creation of additional roost sites in Southern California.

Roost site enhancement projects would be designed to increase the capacity and quality of existing roost sites. Potential enhancement projects include adding rock riprap to the tops of selected jetties, and breakwaters where pelican use is limited by high tides and large waves. Potential sites include the Zuniga Point jetty, the Channel Islands Harbor breakwater, and the Ventura Harbor breakwater.

California brown pelican roost site protection would be aimed at reducing human disturbance at selected coastal wetlands, breakwaters, jetties and offshore rocks through educational outreach panels and signs. Installation of fence barriers to prevent disturbance of favored pelican roost habitat at the tips of selected jetties would be considered if the local harbor districts would support this measure. Potential sites include the Santa Clara River mouth, Malibu Lagoon, Ventura Harbor, Channel Islands Harbor, and the outer tips of King Harbor, Dana Point, and Oceanside Harbor.

Specific roost site enhancement projects would be developed and evaluated in future environmental documentation prepared pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

D6.4 ENVIRONMENTAL BENEFITS AND IMPACTS

D6.4.1 Biological

Benefits

Improvements in the existing network of communal roosts along the coast would have a positive influence on the energy budgets of California brown pelicans by reducing the energy costs associated with (1) commuting between prey locations and roosts, (2) flushing and relocating due to human disturbance, and (3) using suboptimal microclimates within roosts. The costs of migration would also be reduced by the increased availability, quality, and capacity of stopover sites. Cumulative energy reductions should result in improved body condition of individual birds. Expected population-level effects from improving the condition of individual birds are increased juvenile and adult survival, and increased reproductive success of pelicans in California. Juvenile survival and adult reproductive success are the primary life history parameters affecting the SCB California brown pelican metapopulation (Gress and Anderson 1983).

Other bird species that occur in association with roosting pelicans are likely to benefit from the proposed roost projects as well. Bird groups that would benefit from the increased availability of island habitat and reduced human disturbance in coastal environments include gulls, terns, cormorants, shorebirds, herons, egrets, and ducks. The suite of species receiving benefits would vary with the type of roost treatment and project site. The restoration projects would inform and enrich the public through associated interpretive displays and would help foster an awareness and stewardship ethic that should result in reduced disturbance to roosting California brown pelicans and other coastal waterbirds at other locations.

Impacts

The environmental consequences of increased California brown pelican use of lagoons and other roosting areas may include impacts on water quality if guano accumulation exceeds the circulation ability of the affected lagoons. However, in some locations brown pelican guano in the vicinity of roosts could provide a desirable source of nutrient enrichment and may enhance local food webs.

Negative aspects of California brown pelican use of harbors for roosting include the increased risk of contact with environmental contaminants such as oil, the increased likelihood of injury due to scavenging (e.g., entanglement in fishing line, puncture from fishing hooks, etc.), and the development of nuisance issues. However, this action is not expected to result in major increases in pelican use of harbors. Rather, the goal would be to improve the quality of resting time within harbors.

D6.4.2 Physical

Benefits

This action would not result in benefits to the physical environment.

Impacts

This action would not result in impacts to the physical environment.

D6.4.3 Human Use

Benefits

Public enjoyment of California brown pelicans would be increased by projects that allow the public to view communal roosting groups without causing disturbance.

Impacts

Restoration projects would be designed to minimize impacts to recreational activities such as fishing, boating, and kayaking. Because California brown pelicans are very susceptible to human disturbance, projects would be sited in areas that are compatible with human uses. Potential impacts to navigation would be evaluated for each site-specific project.

Pelican roost site creation projects would be associated with variable degrees of liability, and some projects would require ongoing management oversight. Careful site selection, project design, selection of raw materials, and adequately funded maintenance programs would offset potential liability costs. Signs, posts, or fences may need to be replaced during the projected life of the project due to fading, corrosion, or vandalism. Vegetation on any earthen islands that are created may need to be periodically controlled or removed.

D6.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

California brown pelicans respond readily to novel roost sites as long as key habitat elements are provided. These key elements have been described in this document and in Gress and Anderson (1983) and Jaques and Anderson (1987). All projects that involve physical manipulation of habitat are likely to succeed. The successes of projects that rely on alteration of human behavior include a wider range of uncertainties. Projects that provide the most secure island habitat in areas that harbor reliable food resources would be expected to receive the highest level of use and would function as communal night roosts as well as daytime use areas. Projects conducted under this plan would be designed and implemented using the best available expertise and information on brown pelican habitat selection, microclimate preference, and behavioral ecology. Monitoring results from similar projects, such as the American Trader Trustee Council floating dock project, would be used to improve the success of future projects.

Education and awareness programs, including displays, signs, and brochures, nearly always attract public attention. Informational and warning signs to protect seabirds have a high probability of reducing human behaviors that are detrimental to the resource.

D6.6 PERFORMANCE CRITERIA AND MONITORING

Performance criteria would be developed for each specific project. Success would be based on increases in roost attendance and increases in population abundance.

To monitor the success of restoration efforts, a combination of aerial surveys and ground-based observations at roosts would be conducted for the duration of the project, as appropriate. Ground-based observations at selected roost sites would be designed to monitor the response of pelicans to individual roost treatments. The amount of time spent observing each site would vary according to the type of roost, the type of project, and the questions that need to be addressed. A monitoring plan would be designed for each particular project prior to implementation.

D6.7 EVALUATION

The Natural Resource Trustees for the Montrose case (Trustees) have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. The Trustees determined that this type of action would benefit California brown pelicans injured as a result of DDT contamination. Future environmental documentation would further develop and evaluate potential roost projects.

D6.8 BUDGET

The costs of potential projects vary considerably depending on the method used to improve pelican roosting habitat and the site selected. For example, the costs of the installation and monitoring of the American Trader floating dock in San Diego Bay totaled $47,000. An example of a larger construction project would be raising the height of Zuniga Point jetty in San Diego Bay by 1.5 meters (5 feet) to provide a dry roosting location for pelicans during high tides. The estimated cost for this larger project is $2,000,000.

Appendix D7

Implement an Entanglement Reduction and Outreach Program to Protect Seabird Populations

D7.1 GOALS AND NEXUS TO INJURY

The goal of this action is to benefit the California brown pelican and other seabirds by reducing injuries from fish hooks and entanglement in fishing line. Hooking by anglers and entanglement in fishing line are factors affecting the survival of California brown pelicans. Eggshell thinning and elevated levels of DDT have been documented in California brown pelican eggs in the Southern California Bight (SCB) (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of the seabird nexus to the injuries of the Montrose case.

D7.2 BACKGROUND

Most avid recreational anglers have interacted with seabirds while fishing along the California coast. Seabirds may eat the same fishes being targeted by anglers or may be attracted to bait at the end of fishing lines. As a result, seabirds can accidentally be hooked or entangled. An entanglement situation is not resolved when the line breaks and the seabird flies away. Both hooks and broken lines injure and kill seabirds. Hooks that penetrate the birds' hollow bones can lead to infection, and broken lines can wrap around legs, wings, or beaks and result in death due to starvation or the inability to fly or swim.

Although seabird entanglements can occur during any type of recreational fishing activity, conflicts most often arise at piers where large numbers of bait fishes concentrate. This concentration attracts both anglers and the seabirds that primarily feed on bait fishes, such as California brown pelicans. An example of this conflict occurred in 2001 at the Santa Cruz City Pier in Northern California. Nearly 200 brown pelicans with hooks or line entanglements were rescued, and 59 of those died or had to be euthanized due to the severity of their injuries. Many other injured birds could not be rescued. Due to the severity of the problem, the City of Santa Cruz and the California Department of Fish and Game (CDFG) closed two-thirds of the city's pier to fishing for several weeks.

D7.3 PROJECT DESCRIPTION AND METHODS

This action involves expanding the American Trader Trustee Council (ATTC) Seabird Entanglement Education and Outreach Program to the fishing piers and wharves in Southern California where entanglement has occurred. The goal of the program is to provide information in the form of brochures, signs, and wildlife guides that heightens public awareness about the potential hazards to the California brown pelican and other seabird species that are vulnerable to being hooked by fishing tackle or entangled by monofilament line. This action would adopt the designs and materials from the ATTC program and modify them slightly. The program would produce a minimum of ten signs that would be placed at key areas in Los Angeles and Orange Counties. The signs would educate anglers about ways to avoid hooking birds and what to do if one is hooked. The specific locations where the signs would be installed would be identified during project implementation.

In addition to educational signs, the program would produce a brochure designed to educate anglers about measures to avoid and minimize impacts to seabirds from fishing lines and human disturbance. The ATTC has produced a brochure of this type for Southern California. By using existing products that have been developed for Southern California, the Natural Resource Trustees for the Montrose case (Trustees) would be able to reduce the initial design costs for the signs and brochures.

D7.4 ENVIRONMENTAL BENEFITS AND IMPACTS

D7.4.1 Biological

Benefits

The use of signs and brochures would help promote public awareness and thus reduce bird injuries and deaths. The seabirds that would benefit from this action include California brown pelicans, cormorants, and gulls. A successful outreach program would aid in the ongoing recovery of the endangered California brown pelican by reducing a source of injury and mortality to the species.

Impacts

Because this action involves public outreach and education, the Trustees do not anticipate any impacts to biological resources. There would be no adverse effects to California brown pelicans from the action.

D7.4.2 Physical

Benefits

This program would provide information on the proper disposal of fishing line. A reduction in fishing line debris would provide benefits to the marine environment.

Impacts

This action would not have negative impacts to the physical environment.

D7.4.3 Human Use

Benefits

The proper handling and disposal of fishing line would result in improved health and safety because discarded hooks can injure humans as well as wildlife. Humans are also at risk of injury when attempting to disentangle a hook or line from a seabird. A reduction in seabird/angler interaction would result in improved recreation, as hooking seabirds is a frustrating and unwelcome experience for anglers. The proper disposal of fishing line would also enhance the aesthetics of the fishing structure and vicinity.

Impacts

Because this action focuses on education rather than fishing restrictions, no negative impacts would occur to human use. Minor impacts could result to aesthetics depending on the design, size, and placement of signs. The design of the signs would likely be adopted from the design developed and employed by the ATTC. The signs would be placed in consultation with appropriate local authorities in such a way as to minimize any impacts to the aesthetics of the surrounding area.

D7.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

Education and awareness programs, including display signs and brochures, nearly always attract public attention. Successful public educational programs instill knowledge and appreciation of the subject considered. Informational and warning signs to protect seabirds have a high probability of reducing detrimental human behaviors in the targeted outreach areas.

D7.6 PERFORMANCE CRITERIA AND MONITORING

Public feedback and reaction would be the primary means of monitoring the success of educational activities. To be effective over time, this program would require the periodic updating and replacement of outreach materials.

D7.7 EVALUATION

California brown pelican survival is affected by factors such as entanglement in fishing line and hooking by anglers. The Trustees have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors.

D7.8 ESTIMATED BUDGET

Table D7-1 shows the estimated cost of implementing an entanglement reduction and outreach program.

Table D7-1
Estimated Budget for Entanglement Reduction and Outreach Program

Item	Estimated Cost
Signs (10)	
Design modification	$1,400
Signs	$3,600
Posts and brackets	$8,000
Sign assembly	$1,000
Subtotal	*$14,000*
Brochures	
Design modification	$1,500
Printing	$4,000
Content writer/editor	$2,500
Subtotal	*$8,000*
Total	**$22,000**

Appendix D8

Restore Ashy Storm-Petrels to Anacapa Island

D8.1 GOALS AND NEXUS TO INJURY

This goal of this action is to establish a breeding population of ashy storm-petrels on Anacapa Island. Eggshell thinning and elevated levels of DDT have been documented in ashy storm-petrel eggs in the Southern California Bight (SCB) (Kiff 1994, Fry 1994). Section 5.1.1 provides a detailed description of seabird nexus to the injuries of the Montrose case.

D8.2 BACKGROUND

Anacapa Island is located within the Channel Islands National Park and is managed by the National Park Service (NPS). Anacapa Island consists of three separate islets (West, Middle, and East Anacapa) that together are approximately 9 kilometers (km) (6 miles) in length and 2.9 square kilometers (km^2) (1 square mile) in area. All of the islets are bordered by steep slopes that rise 50 to 250 meters (160 to 820 feet) above the sea. East Anacapa Island supports a lighthouse, dock, and several buildings. Middle and West Anacapa Islands have no permanent structures and receive little human visitation.

Island ecosystems such as Anacapa Island are key areas for conservation because they are critical habitat for seabirds and pinnipeds, species that use thousands of square kilometers of open ocean, but depend on a limited number of islands for breeding and resting. Islands represent about 3 percent of the world's surface, but support approximately 15 to 20 percent of all birds, reptiles and plants (Whittaker 1998). Unfortunately, vertebrate predators have been introduced onto islands worldwide, resulting in profound effects on the distribution and abundance of native flora and fauna (e.g., Crafford 1990, Copson 1986). Black rats were introduced onto Anacapa Island in the mid-1800s and early 1900s, and their detrimental effects on the ecosystem of Anacapa Island have been well documented (Collins 1979, Erickson 1990, Erickson and Halvorson 1990).

In an effort to restore nesting habitat for seabirds impacted by the American Trader oil spill in 1990, the American Trader Trustee Council funded a program to eradicate the black rat from Anacapa Island. Crevice-nesting seabirds, such as alcids and storm-petrels, were target species for restoration because they are particularly susceptible to predation from rats. Black rats were known to occupy prime nesting habitat on Anacapa Island and likely prevented the ashy storm-petrels from breeding over large portions of suitable habitat (ATTC 2001). Ashy storm-petrels were mist-netted on Anacapa Island in 1994, but to date no active nests have been found (Whitworth et al. 2003). Ashy storm-petrels are known to nest on adjacent Santa Cruz Island (Carter et al. 1992).

The black rat eradication program was successfully completed in 2003, and Anacapa Island has been declared rat-free. The recent removal of the rat provides an excellent opportunity for ashy storm-petrels to colonize the island, as the amount of suitable habitat for nesting seabirds has increased substantially. Anacapa Island is a high-quality nesting site for the ashy storm-petrel for multiple reasons, including lack of other non-native predators, the presence of suitable burrow habitat, such as talus slopes, native vegetative cover, and restricted human access.

The ashy storm-petrel is a globally rare seabird species that is endemic to the California islands. The ashy storm-petrel is currently listed by the International Union for Conservation of Nature and Natural Resources as "near threatened" (Bird Life International 2000), has been designated as a Category 2 Candidate Species under the Endangered Species Act (USFWS 1994), and is considered a Species of Management Concern by the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG).

D8.3 PROJECT DESCRIPTIONS AND METHODS

The goal of this 5-year action is to establish breeding ashy storm-petrels on Anacapa Island. This action would facilitate the colonization of the island by ashy storm-petrels by attracting them to suitable nesting areas using vocalization playback systems and olfactory cues.

The conspicuous calls of nocturnal petrels, shearwaters, and storm-petrels are generally considered to promote pair establishment through sexual advertisement (Brooke 1978, Storey 1984, James 1985). The use of vocalizations has been used successfully in the past to attract ashy storm-petrels (Brown et al. 2003). A minimum of two areas would be targeted for recolonization on Anacapa Island. Optimal habitat areas would be determined based on seabird monitoring data and in consultation with seabird experts. Artificial nest boxes would also be installed in each area targeted for recolonization to provide a stable nesting area and assist in monitoring efforts.

A monitoring plan would be developed to evaluate the success of the action. Monitoring may include inspection of nesting burrows, evaluation of overhead flights, and capture. Monitoring would likely occur during every year of the action, although the intensity of the effort may vary from year to year. Reporting requirements would include annual reports that discuss data collected, data analysis, and recommendations for subsequent years.

The NPS would complete additional project planning, review, and environmental compliance before implementation of this action.

D8.4 ENVIRONMENTAL BENEFITS AND IMPACTS

D8.4.1 Biological

Benefits

The Channel Islands are critical nesting habitat for the ashy storm-petrel. With the recent removal of rats from Anacapa Island, high-quality breeding habitat is again available to crevice-nesting seabirds such as the ashy storm-petrel. The combination of social attraction and nest boxes would provide a favorable environment for the establishment of ashy storm-petrels. Although social attraction may only be used for a short amount of time, the colonization of Anacapa Island would provide long-term benefits to the ashy storm-petrel in the SCB, as the established presence of a colony of birds would likely serve as an ongoing natural attractant over the long term.

This action seeks to aid in the recovery of the ashy storm-petrel. Given the limited range and overall small population size of this species, the establishment of additional secure breeding sites would be a significant benefit. For seabirds that are restricted in distribution, additional breeding sites buffer the potential catastrophic effects from oil spills, non-native species, and other environmental factors.

Impacts

This action would have minimal, short-term biological impacts. Playback of tape-recorded vocalizations causes little disturbance or trauma to birds. Researcher activity in the vicinity of nesting areas would be minimized to avoid destruction of the local habitat and disturbance (Johnson et al. 1981, Baptista and Gaunt 1997). Storm-petrels are sensitive to disturbance, including that generated by researchers, especially during the incubation period (Ainley et al. 1974). The action would be implemented in a manner that avoids impacts to nesting seabirds on Anacapa Island, especially the California brown pelican.

D8.4.2 Physical

Benefits

There are no known benefits to the physical environment.

Impacts

This action would have no known impacts to the physical environment.

D8.4.3 Human Use

Benefits

Ashy storm-petrel adults are nocturnal and are difficult to observe. Therefore, it is unlikely that the public would benefit from viewing ashy storm-petrels on Anacapa Island.

Impacts

This action would have no known impacts to human uses. Cultural resources on the island would be avoided during the action. A slight increase in human use might occur during the implementation of the action. However, this use would be expected to have minimal, short-term impacts.

D8.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

Social attraction efforts, including the use of playback systems, have been successfully used for a variety of seabirds. For ashy storm-petrels (Brown et al. 2003), playback systems have been used successfully to capture birds in mist nests. The use of playback systems has also been used to attract dark-rumped petrels (Podolsky and Kress 1992) and Leach’s storm-petrels (Podolsky and Kress 1989) to nest in new habitat. Nesting ashy storm-petrels on adjacent Santa Cruz Island could be attracted to the new nesting sites on Anacapa Island. The use of artificial nests has also proven to be successful for seabirds such as the ashy storm-petrel, Leach’s storm-petrel, and Cassin’s auklet. Because petrels typically show a high degree of tenacity to the same nest from year to year, once pairs are established, they would likely continue to breed at the same sites. The attraction of prebreeding petrels may be a useful tool to influence the nest-site selection process by encouraging first-breeding petrels to concentrate their breeding in new areas. Experts in the field of social attraction would be consulted during project planning and implementation to ensure that playback systems and artificial nests are designed in a manner that maximizes the success of the action.

D8.6 PERFORMANCE CRITERIA AND MONITORING

The ultimate success of this action would be the colonization and successful breeding of ashy storm-petrels on Anacapa Island. A monitoring plan would be developed to evaluate the success of the restoration effort using standardized protocols for seabird monitoring.

D8.7 EVALUATION

The Natural Resource Trustees for the Montrose case (Trustees) have evaluated this action against all screening and evaluation criteria developed to select restoration actions and have concluded that this action is consistent with these selection factors. The Trustees determined that the establishment of a breeding population of ashy storm-petrels on Anacapa Island would provide significant benefits to this rare seabird, which is endemic to the California islands.

D8.8 BUDGET

Year 1 costs:

- Labor $91,000
- Supplies $38,000
- Transportation $13,000
- **Estimated total, year 1 .... $142,000**

Years 2–5 costs:

- Labor $410,000
- Supplies $6,000
- Transportation $51,000
- Estimated total, years 2–5 .... $467,000
- **Estimated total costs, years 1–5 .... $609,000**

Appendix E

Montrose Natural Resource Damage Assessment and Litigation Timeline

1985	California issues interim consumption advisory for white croaker in Palos Verdes area.
1985–87	Preliminary Natural Resource Damage Assessment (NRDA) investigative reports by National Oceanic and Atmospheric Administration (NOAA).
1987	California expands consumption advisory.
1989	Study designs/injury determination series of reports for NOAA.
	Pre-assessment Screen Determination issued.
	Draft Damage Assessment Plan completed.
1/90	NOAA General Counsel (GC) sends 60-day notice of intent to file suit under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
3/90	Governments meet with potentially responsible parties (PRPs) to discuss funding of cooperative damage assessment (PRPs decline to participate).
	90-day tolling agreement signed.
	60-day public comment period on draft Damage Assessment Plan begins.
5/90	Trustees meet with scientific panel to discuss injury determination.
	First meeting of co-trustee advisory panel.
	California adopts emergency regulation banning commercial take of white croaker in a portion of Palos Verdes Shelf.
6/90	Complaint for natural resource damages and response costs filed in federal district court in Los Angeles naming eight defendants.
	First amended complaint filed, which added Los Angeles County Sanitation Districts (LACSD).
8/90	Trustees meet to refine science and economic strategies.
2/91	Emergency ban on commercial take of white croaker becomes permanent.
3/91	Draft Injury Determination Plan issued.
	Public comment period on Draft Injury Determination Plan begins.
	First hearing in federal district court.
	Judge dismisses w/o prejudice claim for natural resource damages due to vagueness of complaint.
8/91	Second amended complaint filed (addresses vagueness issue and adds Rhone Poulenc as corporate successor).
9/91	California issues broader consumption advisory covering a number of fish species.

1/92	Damage assessment case management plan completed, establishing structure and procedures, funding requirements, tasks, and schedules.
4/92	Trustee council approves assessment plan for 60 studies.
5/92	Potlatch/Simpson (PCBs) consent decree entered.
mid-1992–9/94	Trustees and their investigators work on studies.
	Trustees meet repeatedly to review progress and make adjustments to studies and budgets.
3/93	Judge establishes 6/94 deadline for Trustee injury expert reports; 8/94 for damages and restoration reports.
4/93	LACSD consent decree entered.
5/94	Judge revises deadline for Trustee expert reports to 10/94.
	Non-settling defendants appeal entry of LACSD consent decree to Ninth Circuit Court of Appeal.
10/94	Governments produce 28 expert reports and designate 84 expert witnesses.
3/95	Deposition of governments' experts begins.
	Ninth Circuit vacates and remands LACSD consent decree to district court.
	District court dismisses Trustees' claim on statute of limitation grounds.
	District court certifies appeal of dismissal to Ninth Circuit.
4/95	Plaintiffs' petition for interlocutory (interim) appeal filed.
5/95	Ninth Circuit accepts interlocutory appeal.
fall 1995	Trustees meet to discuss litigation strategy for biological injuries.
1/96	Oral argument before Ninth Circuit on dismissal.
7/96	U.S. Environmental Protection Agency (EPA) decision to initiate engineering evaluation and cost analysis (EE/CA) for the offshore contamination.
1996-1997	Trustees complete twelve supplemental expert reports.
1/97	Ninth Circuit reverses District Court's dismissal.
3/97	Defendants file petition for rehearing at Ninth Circuit.
4/97	Ninth Circuit denies rehearing.
5/97	District Court reinstates Trustees' claim.
8/97	Governments amend expert witness designations, reducing witnesses to 35.

late summer 1997–April 2000	Depositions of governments' experts (most completed by 12/99).
10/97	Court permits depositions of governments concerning factual basis of LACSD amended consent decree.
12/97	Depositions concerning LACSD amended consent decree conducted.
8/99	LACSD amended consent decree entered.
	Potlatch/Simpson amended consent decree entered.
	CBS (formerly Westinghouse) consent decree entered.
10/99	Third amended complaint filed to include EPA's claim to include response activities related to the site.
	Defendants appeal entry of consent decrees.
11/99	New judge assigned to case.
2/00	Judge establishes trial date (10/3/00) and deadlines: all expert designations by 4/15/00, completion of expert and non-expert opinion discovery by 5/31/00, and other deadlines for filing motions.
4/00	Governments submit additional expert and other reports.
	Defendants submit expert reports and designate 27 experts.
	Court excludes governments' economic study.
6/00	Court rules fish have been injured pursuant to Department of Interior (DOI) regulations.
	Court denies defendants' motion to preclude reliance on California's fish advisories and ban as evidence of injury.
	Court grants governments' motion to limit direct testimony of expert and factual witnesses to written narrative statements.
7/00	Court orders exclusion of certain U.S. government expert witnesses.
8/00	Court orders exclusion of certain state government expert witnesses.
	Governments' and defendants' written witness testimony due.
9/00	Court strikes two government fact witnesses related to bird injury.
	Court orders that no further motions be filed.
	Court continues trial from October 3 to October 17.
10/00	Court denies defendants' motion to exclude evidence of ocean dumping and LACSD data from 1969–75.
	Court rules that peregrine falcons and bald eagles have been injured by DDE pursuant to DOI regulations.
	Court strikes a number of defendants' experts.

	Court denies defendants' motion to dismiss natural resource claim; excludes one government expert witness.
	Court dismisses defendants' counterclaim to invalidate white croaker regulation.
10/17/00	Trial begins (and runs for 4 days).
10/20/00	Trial continued for one week.
10/27/00	Trial suspended until 2001 pending completion of settlement with remaining defendants.
3/01	DDT defendants' consent decree entered.

Appendix F

Summary of Montrose Settlements

1. Montrose, Aventis CropScience,[1] Chris-Craft & Atkemix (DDT Defendants) Consent Decree

- **A. Entered:** March 15, 2001.
- **B. Payment Terms: $73,000,000** to be paid as follows: **$33,000,000** plus interest to the U.S. Environmental Protection Agency (EPA); **$30,000,000** plus interest to the Natural Resource Trustees (Trustees); **$10,000,000** plus interest (swing money) to Court Registry.
- **C. Other Terms:** Swing money goes to the Trustees in the event that EPA decides not to select any in situ response or remedial action.

2. Potlatch & Simpson Amended Consent Decree

- **A. Entered:** August 9, 1999 (original consent decree entered May 19, 1992).
- **B. Payment Terms:** Original consent decree provided for **$12,000,000** to the Trustees in three equal payments, including interest on the first installment, over 4 years. The amended decree required that the Trustees transfer **$70,000** plus interest to the California Department of Toxic Substances Control (DTSC) and **$3,930,000** plus interest to EPA.
- **C. Other Terms:** The period for calculating interest for DTSC and EPA begins on January 4, 1996.

3. CBS Corporation (formerly Westinghouse) Consent Decree

- **A. Entered:** August 9, 1999.
- **B. Payment Terms: $9,500,000** to be paid as follows: **$7,250,000** plus interest to EPA; **$2,250,000** plus interest to the Trustees.

4. Los Angeles County Sanitation Districts (LACSD) & Settling Local Governmental Entities Amended Consent Decree

- **A. Entered:** August 9, 1999 (original decree entered April 26, 1993).
- **B. Payment Terms:** Original terms provide **$42,200,000** plus interest to the Trustees. Amended decree provides a total of **$45,700,000** to be paid as follows: **$21,860,000** plus interest to EPA; **$140,000** plus interest to DTSC; and **$23,700,000** plus interest to the Trustees.

[1] Formerly Rhone-Poulenc, Inc. and corporate successor to Stauffer Chemical Co.

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