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.