Targeted Supplemental Environmental Assessment
For the Parson's Slough Project

The National Oceanic and Atmospheric Administration's Community-based Restoration Program (CRP) is administered within the National Marine Fisheries Service's Office of Habitat Conservation, under the authority of the Fish and Wildlife Coordination Act, 16 U.S.C. 661, as amended by the Reorganization Plan No. 4 of 1970 and the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006. The CRP proposes to provide financial assistance to a habitat restoration activity entitled "Parson's Slough Project" through the American Recovery and Reinvestment Act of 2009 (ARRA).

The ARRA provides that "[a]dequate resources within this bill must be devoted to ensuring that applicable environmental reviews under the National Environmental Policy Act are *completed on an expeditious basis and that the shortest existing applicable process under the National Environmental Policy Act shall be utilized*." Pub. L. 111-5, § 1609(b) (emphasis added). In accordance with CEQ guidance, as clarified, concise EAs may be used by federal agencies when there is consensus that there are not unresolved conflicts concerning alternative uses of available resources. In these cases, NOAA may consider the proposed action and proceed without consideration of additional alternatives. Accordingly, the analysis in this TSEA analyzes the potential impacts of the preferred alternative and the no action alternative.

Purpose and Need for Action

This targeted supplemental environmental assessment (TSEA) has been developed in accordance with the NEPA process related to the proposed Parson's Slough Project. The purpose of this project is to increase Coastal Pelagic and Pacific Coast Groundfish species survival by reducing tidal scour of essential fish habitat in Parson's slough.

After reviewing the proposed project, NOAA RC determined that the action described below falls within the scope and effects of activities analyzed in the February 6, 2002 Programmatic Environmental Assessment (PEA) for the Community-based Restoration Program Implementation Plan and the June 23, 2006 Supplement (SPEA), except for impacts related to species listed under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). The PEA and the SPEA are incorporated by reference into this TSEA.[1]

Pursuant to the ESA, a formal section 7 consultation was initiated by the NOAA RC with the U.S. Fish and Wildlife Service (USFWS), Ventura Office on April 27th, 2010 due to potential adverse impacts to the Southern Sea Otter (*Enyhydra lutra nereis*). A Biological Opinion (BiOp) was issued by the USFWS on August 3rd, 2010. The BiOp concluded that the Parson's Slough Project is not likely to jeopardize the continued existence of the federally threatened Southern Sea Otter. No critical habitat has been designated by the USFWS for this species, therefore none will be affected. The NOAA Restoration Center (NOAA RC) determined that this project would have no effect on North American Green Sturgeon and Central California

[1] Copies of the PEA and SPEA can be found at http://www.habitat.noaa.gov/partners/granteeresources.html

Coast Steelhead or their critical habitat. The no-effect determination was based on the Sturgeon and Steelhead not being present anywhere in Elkhorn Slough and the fact that Elkhorn Slough is not designated critical habitat for these species.

The NOAA RC conducted an Essential Fish Habitat (EFH) consultation with the NMFS Regional Habitat Conservation Office in Santa Rosa under provisions of the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended (MSA). The EFH consultation determined that the proposed action would adversely affect EFH for various federally managed fish species within the Pacific Groundfish, Coastal Pelagic and Pacific Salmonid Fisheries Management Plans (FMP's). However, the proposed action contains adequate measures to avoid, minimize and mitigate or otherwise offset the adverse effects to EFH so NMFS did not offer additional conservation recommendations.

This TSEA tiers to and incorporates by reference the above referenced PEA and SPEA in accordance with 50 C.F.R. §1502.20 and NAO 216-6, subsection 5.09a. This TSEA level of review is conducted in accordance with the implementation procedures described in the SPEA and appropriately focuses on consideration of effects to species listed under the ESA and protected under the MMPA . Beyond consideration of site-specific effects to these species, our review of the proposed action has not revealed any substantial changes in the proposed action or new potentially significant adverse effects to other elements of the human environment which would require additional review in the TSEA or supplementation of the pre-existing NEPA documents.

Alternatives Considered

I. No Action Alternative
Under the no-action alternative, the NOAA RC would not fund the proposed project to increase and enhance habitat, and the estuary's habitat conditions would continue to decline resulting in a less favorable environment for most species that use this estuary.

II. Preferred Alternative
Under the proposed action, NOAA RC would fund a habitat restoration project involving the construction of a partially submerged tidal barrier (sill) across the mouth of the Parson's Slough channel. The sill structure would help restore eroding tidal wetlands by protecting Parsons Slough from head cutting originating in the Elkhorn Slough channel and help retain sediment by reducing the tidal prism which has been scouring tidal wetlands throughout Parson's Slough and converting these tidal wetlands to mudflats. Materials for the sill would be transported to the construction site via barges which are accessed at the Kirby Park staging area on Elkhorn Road. Elkhorn Road runs south off of Salinas road, which is an exit on State Route 1. Construction of the sill would occur at the project site.

A span of 100 feet (30 meters) at the center of the sill structure would remain submerged more than 99 percent of the time, allowing for the exchange of water between Parson's Slough and Elkhorn Slough. Within this span, a notch 25 feet (7.6 meters) wide would permit the passage of water at all tide levels and allow for the movement of fish and wildlife between Parson's Slough and Elkhorn Slough. The top elevation of the notch would be -5 feet (-1.5 meters) North

American Vertical Datum (NAVD), whereas the remainder of the central span would have a top elevation of -2 feet (-0.6 meters) NAVD. Construction of the sill would commence as early as September 1st, 2010, and continue approximately 12-17 weeks. The sill is a series of sheet-piles and it would extend 270 feet across the mouth of the channel. The sheet-pile wall would be supported on two rows of seven end bearing piles, as well as a single row of sheetpile between the outer piles. All pile driving and construction-related equipment would be on barges and no equipment would enter the channel. The end bearing piles would be driven through soft soils to penetrate 10 feet beneath the surface. A submerged rockfill buttress would be placed on both sides of the sheet pile wall. In addition, up to 45 temporary end-bearing piles may be installed near the Kirby park staging area to facilitate the loading and unloading of equipment barges. All sheet pile and end-bearing piles would be driven starting with a vibratory hammer to set the sheets, but may require an impact hammer to complete driving. If an impact hammer is required, then cushioning blocks would be used to dampen the sound.

Affected Environment

The Parson's Slough Project is a tidal wetlands restoration project on the Elkhorn Slough National Estuarine Research Reserve in northern Monterey County, California. The Parson's Slough Channel leads to the Parson's Slough study area, which consists of the 254-acre (1-square-kilomter) Parson's Slough Complex and the 161-acre (0.7-square-kilomter) South Marsh Area. The goal of the Parson's Slough Project is to reduce the tidal prism throughout much of the Elkhorn Slough system. As such, the affected environment consists of the entire Elkhorn Slough Complex with the exception of North Marsh, Azevedo Marsh and Porter Marsh, which are tidally muted and isolated from the effects of the proposed action.

The site of construction is the mouth of Parson's Slough Channel, in the vicinity of the Union Pacific Railroad bridge (railroad bridge). Parson's Slough is located on the southeast side of the Elkhorn Slough Estuary, which is situated 90 miles (145 kilometers) south of San Francisco and 20 miles (32 kilometers) north of Monterey, in Monterey County, California.

Elkhorn Slough is a mosaic of tidally influenced wetlands and mudflats which provide habitat to a variety of species. Much of the wetland habitat has been converted to mudflats from tidal scour. This project would aid in converting some of the mudflat habitat back into wetland habitat. Currently, the Southern Sea Otters use the Elkhorn Slough Complex for foraging and to haul out of the water. Southern Sea Otters feed on fish species found in both wetland and mudflat habitats.[2] Harbor seals also use the Elkhorn Slough Complex for foraging and to haul out of the water. Harbor seals feed on fish species in both wetland and mudflat environments.

Environmental Effects

I. No Action Alternative

[2] A more detailed description of the affected environment can be found in U.S. Department of Commerce. 1979. Elkhorn Slough National Estuarine Sanctuary. Final Environmental Impact Statement.

Under the no-action alternative, NOAA CRP would not fund the proposed grant. Other agencies would still have the option to fund this project; however, the need for coastal habitat restoration is great, and fewer important projects would be funded if NOAA did not fund the project type outlined in the preferred alternative. Under the no action alternative, the Southern Sea Otters would not be impacted by construction activities but the habitat that their prey species depend on would continue to degrade. Under the no action alternatives, Harbor Seals would not be impacted by constructioin activities but the habitat that their prey species depend on would continue to degrade.

II. Preferred Alternative

Under the proposed action, NOAA RC would fund a habitat restoration project involving the construction of a partially submerged tidal barrier (sill) across the mouth of the Parson's Slough channel. As described in the USFWS BiOp, the proposed action has the potential to disturb resting, foraging and other activities of up to 40 sea otters known to utilize habitat in the vicinity of construction activities. The incidental take is expected to be in the form increased energetic demands and stress caused by displacement from routinely used areas, particularly those utilized for hauling out. Disturbance would be due primarily to construction noise and activity. The proposed action includes the following measures to minimize and avoid disturbance to sea otters:

Construction activities will be timed to avoid peak pupping periods for marine mammals. A birth peak generally occurs in California from late February to early April, although sea otters may reproduce at any time of year, and the birth peak may not be synchronous in all parts of California. In Elkhorn Slough, the birth peak appears to occur in March and April. Construction activities will begin as early as September 1st, 2010, and cease on or before March 1st, 2011. Before the onset of construction activities, a qualified biologist will conduct an education program for all construction personnel. At a minimum the training will include a description of southern sea otters and their habitat, the occurrence of the species within the project action area, an explanation of the status of the species and its protection under the ESA and MMPA, the measures that are being implemented to minimize disturbance to sea otters and their habitat as they relate to the construction, and the authority given to the biological monitor to stop construction at any point. A fact sheet conveying this information will be prepared for distribution to the construction personnel and other project personnel who may enter the project area. Upon completion of the program, personnel will sign a form stating that they attended the program and understand all the avoidance and minimization measures and requirements of the ESA and MMPA.

The occurrence of hauled-out sea otters near the proposed construction site is lowest at high tide. Construction activities causing noise-related disturbance, such as pile-driving, will be conducted at high tide to the maximum extent practicable.

In order to avoid startling animals with sudden loud noises, noise-producing construction activities will begin gradually. Biological monitors will be present 30 minutes before construction begins and will have the authority to halt operations if animals appear to be severely stressed or in danger of injury.

Fuel storage and all fueling and equipment maintenance activities will be conducted at least 100 feet (30 meters) from subtidal and intertidal habitat. Implementation of the proposed action will

require approval and implementation of a site-specific Storm Water Pollution Prevention Plan, which will include a hazardous spill prevention plan.

As indicated in the USFWS BiOp, the proposed action will impact an extremely small percentage of Southern Sea Otters compared to their overall distribution and abundance throughout their range (approximately 2500 individuals throughout central and southern California) and is not likely to jeopardize the continued existence of Southern Sea Otters.

The project will also result in a net increase of subtidal and wetland habitats. The project would entail the placement of approximately 2000 cubic yards (1529 cubic meters) of rock and sheetpile and would result in the loss of approximately 0.75 acres (4047 square meters) of subtidal habitat within the project footprint. Operation of the sill is expected to result in the conversion of 11 acres (0.045 square miles) of intertidal mudflat habitat to subtidal habitat. The increase in soft sediments within the Parson's Slough Complex resulting from reduced tidal scour would likely result in a beneficial effect on sea otters by increasing the availability of soft sediment habitat for burrowing prey. Operation of the sill may result in a slight increase in hypoxic conditions which may decrease habitat suitability for benthic (bottom-dwelling) invertebrates. However, both Parson's Slough and Elkhorn Slough contain an excess of intertidal mudflat habitat and a scarcity of subtidal and wetland habitat. Overall, a minimal amount of subtidal habitat for the Southern Sea Otter would be permanently affected (0.75 acre) by the proposed action, with an additional 11 acres benefitted by the operation of the sill. The action is expected to have long-term beneficial impacts on biodiversity and/or ecosystem function through restoration of natural estuarine habitat. This project will have short-term, minor construction related impacts to Southern Sea Otters due to noise related impacts from pile driving hammers.

In addition to protection as an ESA-listed species, Southern Sea Otters also are protected under the Marine Mammal Protection Act (MMPA), and an application for issuance of an Incidental Harassment Authorization under the MMPA implementing regulations was submitted to USFWS on July 9th, 2010. The proposed IHA for the Southern Sea Otter requires a noise monitoring plan and the halting of construction if noise levels are high enough to potentially cause harm or mortality to individual Southern Sea Otters.

The overall effect of the project will be beneficial to Southern Sea Otters in the long run by increasing the abundance of wetland based prey species of Southern Sea Otters. Effects of the proposed sill on levels of pathogens and contaminants in Parson's Slough or Elkhorn Slough are unclear because their sources and transport are not well understood. If pathogens or contaminants are entering the Elkhorn Slough system by means of Parson's Slough then the sill would tend to concentrate them by means of decreased flushing in the upper slough. However, if they are entering Elkhorn Slough by means of the Gabilan-Tembladero watershed or the Old Salinas River channel, then construction of the sill would lead to lower concentrations of pathogens and contaminants within the Parson's Slough Complex because flows into the complex from these other areas would be reduced. Levels of exposure of sea otters to pathogens and contaminants may not be appreciably different under either scenario, because animals using the Parson's Slough Complex also regularly enter and utilize Elkhorn Slough proper. Pathogens and contaminants associated with agricultural use of the uplands surrounding Elkhorn Slough

constitute the greatest potential threat to sea otters in the slough. Efforts to mitigate these inputs are currently underway and may result in an improvement in habitat quality in Elkhorn Slough. These efforts include riparian fencing to exclude livestock as well as wetland restoration to promote the bioremediation of these pathogens and contaminants generated from agricultural practices by newly restored wetland vegetation.

In addition to Southern Sea Otters, the proposed action has the potential to disturb resting, foraging and other activities of up to 100 harbor seals known to utilize habitat in the vicinity of construction activities. Request for issuance of an IHA under the MMPA was submitted to NMFS Office of Protected Resources on August 6th, 2010. The incidental take is expected to be in the form increased energetic demands and stress caused by displacement from routinely used areas, particularly those utilized for hauling out. Disturbance would be due primarily to construction noise and activity. Based on the assessment in the proposed IHA, the previous measures to minimize and avoid disturbance to sea otters will serve to minimize and avoid disturbance to harbor seals as they address the needs of marine mammals in general and both species in particular.

This project will have short-term, minor construction related impacts to harbor seals due to noise related impacts from pile driving hammers. The proposed IHA for harbor seals will require a noise monitoring plan and the halting of construction if noise levels are high enough to potentially cause harm or mortality to individual harbor seals. The overall effect of the project will be beneficial to harbor seals in the long run by increasing the abundance of wetland based prey species of harbor seals.

Agencies or Persons Consulted

National Marine Fisheries Service, Brian Hopper, Harbor Seals, MMPA
National Marine Fisheries Service, Jennifer Kunzelman, EFH, MSA
United States Fish and Wildlife Service, Lillian Carswell, Southern Sea Otter, ESA

Attachment – USFWS' August 3rd, 2010 Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2010-F-0277

August 3, 2010

Memorandum

To: Supervisor, NOAA Restoration Center, Southwest Region, NOAA Fisheries Office of Habitat Conservation, Santa Rosa, California

From: for Field Supervisor, Ventura Fish and Wildlife Office, Ventura, California

Subject: Biological Opinion on the Parson's Slough Project, Santa Cruz County, California (8-8-10-F-49)

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Parson's Slough Project and its effects on the federally threatened southern sea otter (*Enhydra lutris nereis*), in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your April 27, 2010, request for formal consultation was received on the same day.

This biological opinion is based on information that accompanied your March 23, 2010, request for informal consultation, including the biological assessment and addendum (Vinnedge Environmental Consulting 2010a and 2010b), pre-project monitoring information (Maldini *et al.* 2010), and information in our files. A complete administrative record of this consultation is available at the Ventura Fish and Wildlife Office.

Consultation History

We received your March 23, 2010, request for informal consultation on April 2, 2010. On April 27, 2010, we informed you that formal consultation would be necessary because of disturbance to sea otters hauling our near the site of the proposed project. On April 27, 2010, we received your confirmation that you were requesting formal consultation under the Act and Incidental Harassment Authorization under the Marine Mammal Protection Act.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Parson's Slough Project is a tidal wetlands restoration project on the Elkhorn Slough National Estuarine Research Reserve in northern Monterey County, California. The proposed

TAKE PRIDE® IN AMERICA

action is to construct a partially submerged tidal barrier (a sill) at the mouth of Parson's Slough Channel. The Parson's Slough Channel leads to the Parson's Slough study area, which consists of the 254-acre (1-square-kilometer) Parson's Slough Complex and the 161-acre (0.7-square-kilometer) South Marsh Area. The sill would be a fixed structure, consisting of steel sheet piles extending 270 feet (82 meters) across the mouth of the channel. A span of 100 feet (30 meters) at the center of the structure would remain submerged more than 99 percent of the time, allowing for the exchange of water between Parson's Slough and Elkhorn Slough. Within this span, a notch 25 feet (7.6 meters) wide would permit the passage of water at all tide levels and allow for the movement of fish and wildlife between Parson's Slough and Elkhorn Slough. The top elevation of the notch would be -5 feet (-1.5 meters) North American Vertical Datum (NAVD), whereas the remainder of the central span would have a top elevation of -2 feet (-0.6 meters) NAVD. Construction of the sill would commence as early as September 1, 2010, and continue approximately 12-17 weeks. The site of construction is the mouth of the Parson's Slough Channel, in the vicinity of the Union Pacific Railroad bridge (railroad bridge). Parson's Slough is located on the southeast side of the Elkhorn Slough Estuary, which is situated 90 miles (145 kilometers) south of San Francisco and 20 miles (32 kilometers) north of Monterey, in Monterey County, California.

The purpose of the proposed action is to reduce tidal scour within the Elkhorn Slough action area in general and the Parson's Slough study area in particular. Conversion of wetlands to pasture during the 1900s by means of diking and draining caused the subsidence of land to an elevation too low to support marsh vegetation (Elkhorn Slough Tidal Wetland Project Team 2007). Since the mid-20th century, tidal erosion and the inundation of interior marsh areas have caused a reversal of the proportion of salt marsh habitat to mudflat habitat within Elkhorn Slough. The Parson's Slough Complex, historically characterized by tidal marsh and tidal creeks, now consists primarily of mudflats intersected by subtidal channels. The average land elevation in the Parson's Slough Complex is now approximately 2.4 feet (0.7 meters) below the level that can support tidal marsh vegetation. Without intervention, excessive erosion will continue to widen tidal channels and convert salt marsh to mudflat, resulting in a significant loss of habitat function and a decrease in estuarine biodiversity.

Minimization Measures

As described in Vinnedge (2010a) and in correspondence between the Applicant and the Service, the following measures would be implemented to avoid and minimize the effects of the proposed action on southern sea otters:

a. Timing of construction will avoid the birth peak for sea otters in Elkhorn Slough.

Construction activities will be timed to avoid peak pupping periods for marine mammals. A birth peak generally occurs in California from late February to early April, although sea otters may reproduce at any time of year (Siniff and Ralls 1991), and the birth peak may not be synchronous in all parts of California (Riedman *et al.* 1994). In Elkhorn Slough, the birth peak appears to occur in March and April (Maldini 2010). Construction

activities will begin as early as September 1, 2010, and cease on or before March 1, 2011.

b. Elkhorn Slough National Estuarine Research Reserve will provide construction awareness training specific to marine mammals for all personnel.

Before the onset of construction activities, a qualified biologist will conduct an education program for all construction personnel. At a minimum the training will include a description of southern sea otters and their habitat, the occurrence of the species within the project action area, an explanation of the status of the species and its protection under the ESA and MMPA, the measures that are being implemented to minimize disturbance to sea otters and their habitat as they relate to the construction, and the authority given to the biological monitor to stop construction at any point. A fact sheet conveying this information will be prepared for distribution to the construction personnel and other project personnel who may enter the project area. Upon completion of the program, personnel will sign a form stating that they attended the program and understand all the avoidance and minimization measures and requirements of the ESA and MMPA.

c. Construction activities causing noise-related disturbance will be conducted at high tide to the maximum extent practicable.

The occurrence of hauled-out sea otters near the proposed construction site is lowest at high tide (Maldini *et al.* 2010). Construction activities causing noise-related disturbance, such as pile-driving, will be conducted at high tide to the maximum extent practicable.

d. Ramp-up procedures will be used.

In order to avoid startling animals with sudden loud noises, noise-producing construction activities will begin gradually. Biological monitors will be present 30 minutes before construction begins and will have the authority to halt operations if animals appear to be severely distressed or in danger of injury.

e. Fuel storage and all fueling and equipment maintenance activities will be conducted at least 100 feet (30 meters) from subtidal and intertidal habitat.

Fuel storage and all fueling and equipment maintenance activities will be conducted at least 100 feet (30 meters) from subtidal and intertidal habitat. Implementation of the proposed action will require approval and implementation of a site-specific Storm Water Pollution Prevention Plan, which will include a hazardous spill prevention plan.

ANALYTICAL FRAMEWORK FOR JEOPARDY DETERMINATIONS

Jeopardy Determination

The jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which describes the range-wide condition of the southern sea otter, the factors

responsible for that condition, and the species' survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the condition of the southern sea otter in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the southern sea otter ; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the southern sea otter; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the southern sea otter.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the current status of the southern sea otter, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the southern sea otter in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the southern sea otter and the role of the action area in the survival and recovery of the southern sea otter as the context for evaluation of the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

STATUS OF THE SPECIES

Listing History

The southern sea otter was listed as threatened in 1977 [42 FR 2965]. Critical habitat was not designated. The factors leading to the listing included the southern sea otter's reduced population size and range and increased tanker traffic and the corresponding potential for oil spills. The rulemaking also acknowledged the potential degradation of habitat caused by pollution or competition with humans. The southern sea otter is also considered "depleted" under the Marine Mammal Protection Act (MMPA) and is designated as a Fully Protected Species under California state law (California Fish and Game Code §4700). Fully protected species may not be taken or possessed, except under a few narrow circumstances.

General Ecology

The sea otter is the second largest member of the family Mustelidae and the second smallest marine mammal. The only marine mammal that is smaller is the South American marine sea otter (*Lutra felina*). Southern sea otters can weigh up to 88 pounds (40 kilograms) and attain lengths of 55 inches (140 centimeters). Males are larger than females. Southern sea otters have a typical life span of 11-15 years (Riedman and Estes 1990), although one animal has been documented to have reached at least 19 years of age in the wild (USGS unpub. data).

Unlike most other marine mammals, sea otters have little subcutaneous fat. They depend on their clean, dense, water-resistant fur for insulation against the cold. Sea otters also maintain a

high level of internal heat production to compensate for their lack of blubber. Consequently, their energetic requirements are high, and they are estimated to consume an amount of food equivalent to 23 to 33 percent of their body weight per day (Riedman and Estes 1990). Contamination of the fur by oily substances can destroy its insulating properties and lead to hypothermia and death. The loss of the insulating properties of the fur greatly heightens the adverse effects of oil spills on southern sea otters and is one of the reasons that increased tanker traffic and the potential for oil spills was considered in the listing of the species.

Southern sea otters generally forage in both rocky and soft-sediment communities in water depths of 82 feet (25 meters) or less, although individuals occasionally move into deeper water. Dive depth and dive pattern vary by sex (males tend to make deep dives more frequently than females), geographic location, and diet specialization (Tinker *et al.* 2006a, Tinker *et al.* 2007). Sea otters occasionally make dives of up to 328 feet (100 meters), but the vast majority of feeding dives (about 95%) occur in waters less than 131 feet (40 meters) in depth (Tinker *et al.* 2006a). Therefore, sea otter habitat is typically defined by the 131-foot (40-meter) isobath (Laidre *et al.* 2001), and most southern sea otters reside within 1.2 miles (2 kilometers) of shore.

The density of southern sea otters within most of the population's range is likely related to substrate type. Rocky habitats that are topographically heterogeneous and support kelp forests tend to support the greatest diversity and abundance of sea otter food resources, which include abalone (*Haliotis* spp.), rock crabs (*Cancer* spp.), sea urchins (*Strongylocentrotus* spp.), kelp crabs (*Pugettia* spp.), clams [*e.g.,* littleneck (*Prothothaca staminea*), Washington (*Saxidomus nuttallii*), jackknife (*Tagelus californianus*), Pacific gaper (*Tresus nuttallii*) and Pismo (*Tivela stultorum*)], turban snails (*Tegula* spp.), mussels (*Mytilus* spp.), octopus (*Octopus* spp.), sea stars (*e.g., Pisaster* spp.), and a range of other invertebrate species. Rocky bottom habitats support an average equilibrium density of 12.24-14.56 individuals per square mile (4.65-5.62 individuals per square kilometer), whereas areas with sandy bottoms and areas of mixed habitat support average equilibrium densities of 2.18-3.42 and 1.14-3.01 individuals per square mile (0.84-1.32 and 0.44-1.16 individuals per square kilometer), respectively (Laidre *et al.* 2001).

Because of their ability to eat large quantities of marine invertebrates, sea otters play an important role in the nearshore marine community. Their mobility, forelimb dexterity, and ability to crush large invertebrates, either with their teeth or rocks, enable sea otters to prey on most invertebrates. The best refuges for invertebrates from predation by sea otters appear to be in deep holes and crevices in rocky areas or deep water. The energetic inefficiency of consuming small prey items may also protect invertebrates of small size, although specialists who prey on small items may be able to compensate for low energetic return with increased efficiency (Tinker *et al.* 2006a, Chapter 5). Shallow water may also provide refuge for invertebrates: southern sea otters failed to find an "unusually dense concentration of Pismo clams [that occupied a very narrow band of habitat in the high intertidal (zone)] ... for several years" (CDFG 1999a). Numerous reports exist of sea urchin, crab, and clam populations declining after sea otters inhabit an area. Generally, only more widely scattered, well-hidden, and smaller individuals remain after sea otters become established. Other studies have shown that populations of invertebrates begin to rebound once sea otters have left a site. Although other

factors are also involved, kelp forests tend to grow profusely in suitable areas where sea otters reduce the number and size of sea urchins (Van Blaricom and Estes 1988, Estes and Duggins 1995). In turn, kelp forests provide shelter and food for various species of fish, which become established in areas where kelp forests regenerate.

The annual patterns that characterize the movements of southern sea otters along the coast are complicated and vary between males and females. Generally, the home ranges of southern sea otters consist of several heavily used areas with travel corridors between them. Animals often remain in an area for a long period of time and then suddenly move long distances. These movements can occur at any time of the year (Riedman and Estes 1990).

Sub-adult male southern sea otters have the largest home ranges, followed by adult males, sub-adult females, and adult females (Tinker *et al.* 2006a, Chapter 3). Compared to males, most female southern sea otters are more sedentary. Occasionally, females travel long distances; 3 tagged adult females routinely moved between Monterey and Santa Cruz, a distance of 25 to 31 miles (40 to 50 kilometers), for over 4 years. Juvenile males move further from natal groups than do juvenile females. Aggressive behavior exhibited towards the juvenile males by breeding males may be partially responsible for their more extensive travels (Ralls *et al.* 1996). Jameson (1998) noted that adult male sea otters are territorial and exclude juvenile and subordinate males from their territories. However, females move freely across these territories. Generally, southern sea otters occupy territories on a seasonal basis. Many males migrate to the range peripheries during the winter and early spring, apparently to take advantage of more abundant prey resources, but then return to the range center during the period when most breeding occurs (June to November) in search of estrous females (Jameson 1989; Tinker *et al*, 2006a, Chapter 6, Tinker *et al.* 2006b).

Reproduction

Southern sea otters mate and pup throughout the year. The northern and southern portions of the population seem to exhibit different mating peaks. A peak period of pupping occurs from January to March, and a secondary pupping season occurs in late summer and early fall. Pupping is seasonally uniform in the Monterey Bay area (Riedman *et al.* 1994). In Elkhorn Slough, March and April are the peak months for pupping (Maldini *et al.* 2010). Parental care is provided solely by the female.

Distribution and Population Trends

Sea otters once ranged along the North Pacific rim from the northern Japanese islands to mid-Baja California, Mexico. Southern sea otters occupied the southern portion of this range, but the historical northern range limit of the subspecies is somewhat in question. Authors have placed it in northern California or Oregon or as far north as Prince William Sound in Alaska (Riedman and Estes 1990, Wilson *et al.* 1991). More recent genetic studies suggest that the historic northern range limit is between Newport, Oregon, and Neah Bay, Washington (near the Straits of Juan de Fuca) (Larson *et al.* 2002; Valentine *et al.* 2008). The California population prior to

exploitation is thought to have numbered about 16,000 animals (CDFG 1976; Laidre *et al.* 2001). Following near-extinction because of fur-trade exploitation during the 18th and 19th centuries, sea otters were legally protected from take in 1911 through the International Fur Seal Treaty. Information on the distribution and abundance of sea otters in California prior to 1990 is summarized by Riedman and Estes (1990). Although both range and numbers have increased during the 20th century, these variables are not well correlated. In particular, although population abundance has declined during several periods, distribution evidently has not retracted during these periods.

Range delineation has been somewhat arbitrary in the past because individuals frequently wander well beyond the distributional limits of most of the rest of the population. However, the geographic range of the southern sea otter has expanded considerably since 1938, at which time most individuals occurred from about Bixby Creek in the north to Pfeiffer Point in the south. At present the range extends from San Mateo County, California, in the north to Santa Barbara County, California, in the south. Although sea otters are occasionally sighted outside of this range, these sightings generally represent the transient movements of individual animals, almost always males, and are not considered part of the permanent range, now defined as "the points farthest from the range center (to the north and south) at which 5 or more otters are counted within a 10-kilometer contiguous stretch of coastline (as measured along the 10-meter bathymetric contour) during the two most recent spring censuses, or at which these same criteria were met in the previous year" (http://www.werc.usgs.gov/Project.aspx?ProjectID=91). Range expansion continues to occur both to the north and south, with more rapid range expansion occurring to the south (Tinker *et al.* 2006a, Chapter 4). Since the mid 1990s, when sea otters moved south of Point Conception, the distribution at the southern end of the range has been particularly variable from year to year (M. Harris, pers. comm).

Sea otter abundance varies considerably across the range, with the highest densities occurring in the center part of the range (Monterey peninsula to Estero Bay), where sea otters have been present for the longest. Sea otter densities tend to be most stable from year-to-year in rocky, kelp-dominated areas that are primarily occupied by females, dependent pups, and territorial males. In contrast, sandy and soft-bottom habitats (in particular Monterey Bay, Estero Bay, and Pismo Beach to Pt. Sal) tend to be occupied by males and sub-adult animals of both sexes (but rarely by adult females and pups), and are more variable in abundance from year to year (Tinker pers. comm.). This variation is apparently driven in part by the long-distance movements and seasonal redistribution of males (Tinker *et al.* 2006b). The variability of counts at the south end of the range is also related to seasonal movements: many males migrate to the range peripheries during the winter and early spring, apparently to take advantage of more abundant prey resources, but then return to the range center during the period when most breeding occurs (June to November) in search of estrous females (Jameson 1989; Tinker *et al.*, 2006a, 2006b).

Standardized range-wide counts of southern sea otters were initiated in 1982. The survey data consist of uncorrected counts and thus do not represent population abundance estimates. Rather, they are used to assess trends. From 1983 to 2009, the spring population count increased from 1,277 animals to 2,654 animals (http://www.werc.usgs.gov/Project.aspx?ProjectID=91).

However, the pattern of change was highly inconsistent, with periods of growth, stability and decline. The 3-year running average is the index recommended by the recovery team to reduce the influence of variable survey conditions and to allow for the assessment of long-term population trends. The 3-year running average for 2009 (2,813) is slightly lower than that for the previous year, and trends are suggestive of a population that is stable or slightly declining. Sea otters may be approaching local carrying capacity in some areas (Tinker *et al.* 2006b). Sea otters at San Nicolas Island are larger and spend less time foraging than those in the central part of the range, providing evidence that food limitation is a factor in the recovery of southern sea otters in central California (Bentall 2005, Tinker *et al.* 2008).

Mortality

An effort to document all southern sea otter strandings (live and dead sea otters that wash ashore) has been underway since 1968 (USFWS 2003). While most stranded sea otters are found dead, some live sea otters are also retrieved and are included in the stranding database. Assessment of sea otter mortality in recent years is based almost exclusively on information obtained from beach-cast carcasses (Estes *et al.* 2003). Relative mortality (measured by dividing the number of carcasses retrieved in a given year by the number of otters counted in the spring survey of that same year) suggests that mortality was roughly constant at about 5 percent during the period when the population was growing (from about 1985 through 1995) but was somewhat higher during periods of apparent decline (*i.e.*, the early 1980s and from 1996 through 1999). During the last several years, mortality has remained high, at nearly 10 percent.

Estes *et al.* (2003) reported that elevated mortality appeared to be the main reason for both sluggish growth and periods of decline in southern sea otters. A period of decline from 1976 to 1984 was likely due to incidental mortality in set-net fisheries (Estes *et al.* 2003), and an analysis by Tinker *et al.* (2006b) indicated that increased mortality of sub-adult and prime-age females, particularly in the northern and central part of the range, was responsible for the period of decline from 1995-2000, though no single cause was identified. Based on analysis of beach-cast carcasses, it appears that the two causes of death most important for limiting population growth are white shark attacks and infectious disease (Gerber *et al.* 2004), with the prevalence of disease appearing to be unusually high (Thomas and Cole 1996, Estes *et al.* 2003, Kreuder *et al.* 2003). One such disease is toxoplasmosis, caused by the protozoan *Toxoplasma gondii*, a parasite that is shed in the feces of both wild and domestic cats (Miller *et al.* 2002). Other sources of disease in sea otters include *Sarcocystis neurona* (another protozoan parasite), acanthocephalan worms (*Profilicollis* spp; Mayer *et al.* 2003), bacterial and viral infections, domoic acid toxicity, and cardiac lesions (Kreuder *et al.* 2005). Food limitation and nutritional deficiencies may also play a role in driving patterns of disease mortality (Tinker, pers. comm.), as may the degree of exposure to chemical contaminants such as PCBs (Kannan *et al.* 2006). While coastal live trap fisheries are known to have intensified in recent years, and there are unconfirmed reports of otters having been incidentally drowned, sufficient information to evaluate this potential source of mortality is not presently available. From 2002 through 2006, there were 4 known sea otter mortalities due to recreational fishing gear (fishing line and/or fish hook ingestion), 17 due to

presumed boat strike, and 13 due to intentional shooting throughout the range (CDFG unpublished data), representing relatively low but persistent sources of mortality.

ENVIRONMENTAL BASELINE

Elkhorn Slough is one of two estuaries occupied by southern sea otters rangewide (the other is Morro Bay). Sea otters use Elkhorn Slough for foraging, resting, and other activities. Important prey items for sea otters in the estuary include California butter clams (*Saxidomus nuttallii*), gaper clams (*Tresus nuttallii*), fat innkeeper worms (*Urechis caupo*), moon snails (*Polinices lewisii*), California mussels (*Mytilus edulis*), and crabs (*Cancer productus* and *C. gracilis*) (Maldini *et al.* 2010).

The Elkhorn Slough population consists of two recognizable sub-groups, those in the Moss Landing Harbor near the north jetty (mostly males, ranging in age from juvenile to aged adult, and ranging in status from non-territorial to territorial in other parts of the range), and those in Elkhorn Slough proper (females with or without dependent pups and territorial males). Most animals in the Moss Landing Harbor group feed offshore, but some forage in lower Elkhorn Slough or Moss Landing Harbor. Intermittent groups of 4-5 females, rarely with pups, and possibly with an associated territorial male, rest in other areas of Moss Landing Harbor. Elkhorn Slough proper tends to be occupied by females (juvenile, sub-adult, and adult, either with or without pups) and a small number of territorial males. These animals are apparently residential, in that they are not known to leave the slough to forage or for other reasons. The eelgrass (*Zostera marina*) beds near Seal Bend are a preferred location for anchoring, but the distribution of sea otters within the slough is variable and is likely influenced by tide, time, human disturbance, and prey distribution. Utilization of back channels tends to be associated with daytime high tides, whereas foraging in the main channel tends to be associated with daytime low tides (K. Mayer, pers. comm.).

In recent years, sea otters have increasingly utilized protected side channels of the slough and the Parson's Slough Complex. Detailed pre-project monitoring of marine mammal use of the Parson's Slough area was conducted by Okeanis researchers under contract to the Elkhorn Slough National Estuarine Research Reserve from October, 2009, to January, 2010. In the course of 19 daytime counts and 6 nighttime monitoring sessions, during which the number of sea otters entering and exiting the Parson's Slough Complex was counted, researchers observed sea otters using 3 main areas near the site of the proposed sill. One of these areas (used by up to 20 animals) was located within the Parson's Slough Complex. The two other areas (used by approximately 10 animals each) were located on Yampah Island, outside but adjacent to the Parson's Slough Complex. These areas appeared to be centered on three male territories. At least some of the associated females used multiple male territories and the Seal Bend area in the main channel of Elkhorn Slough (Maldini *et al.* 2010).

Sea otters using the Parson's Slough Complex regularly transited into and out of the complex via the channel below the railroad bridge to forage in the main channel of Elkhorn Slough. At least two other male sea otters were detected accessing the Parson's Slough Complex via land and

using the channel to the northeast of the railroad bridge. Hourly scans of the complex during daylight hours revealed that sea otters using the complex spent most of their time resting in water (62 percent) and the remainder of their time resting on land (10 percent), foraging (15 percent), grooming (3 percent), traveling into and out of the complex (7 percent), and interacting with other sea otters (3 percent). Sea otters using the Yampah Island area tended to access it via land from the main channel of Elkhorn Slough and spent a large proportion of time hauled out on pickleweed (*Salicornia virginica*) during low tides, dispersing into Elkhorn Slough at high tides (Maldini *et al.* 2010). Foraging within Parson's Slough occurs in minor tidal channels, within which the prey composition is similar to that elsewhere within Elkhorn Slough (Moss Landing Marine Laboratories 2007), and also atop or near pickleweed, where the primary prey consumed are shore crabs (Maldini *et al.* 2010).

EFFECTS OF THE ACTION

Potential Impacts of Sill Construction on Sea Otters

The proposed activities have the potential to disturb resting, foraging, and other activities of up to 40 sea otters known to utilize habitat in the vicinity of construction activities. Disturbance would be due primarily to construction noise and activity. Construction of the sill would entail driving 2 rows of 7 end-bearing piles to an elevation of approximately -80 feet (-24 meters) and a single row of sheetpile (between the end-bearing piles) using a vibratory hammer and, if necessary, an impact hammer to complete the driving. An additional 14 temporary end-bearing sheet piles would be installed in the main channel of Elkhorn Slough at a staging site near Kirby Park, where sea otter presence has historically been minimal (1 or occasionally 2 animals) and limited to foraging activity (D. Maldini, Okeanis, pers. comm.).

Little is known regarding the effects of sound on sea otters. Sea otters have not been reported as being particularly sensitive to sound disturbance, especially in comparison to other marine mammals such as pinnipeds (Riedman 1983; Riedman 1984; Efroymson and Suter 2001). However, observed sea otter responses to disturbance are highly variable, probably reflecting the level of noise and activity to which they have been exposed and become acclimated over time and the particular location and social or behavioral state of that individual (G. Bentall, pers. comm.). Ambient sound levels within the action area are generally low, with the notable exception of the Union Pacific Railroad tracks, which are located within the project footprint and accommodate approximately 15-10 trains per day (Vinnedge Environmental Consulting 2010b). Noise and disturbance associated with construction will likely cause sea otters utilizing the Parson's Slough Complex and Yampah Island area to disperse into the main channel of Elkhorn Slough, and may discourage the use of areas near the construction site even when construction activities are not under way. Female sea otters with pups are expected to be most sensitive to human disturbance and most vulnerable to the energetic costs of avoidance behavior (K. Mayer, pers. comm.; T. Nicholson, pers. comm.). The temporary displacement of sea otters, particularly from routine haul-out locations, due to construction activity may result in adverse effects on

individual fitness if sea otters relocate to areas that are prone to repeated human disturbance (*i.e.*, from kayakers). However, Elkhorn Slough likely provides sufficient high-quality alternate habitat for resting, foraging, and other activities to minimize these effects.

Other potential impacts on sea otters include disturbance due to light during periods of nighttime construction and the risk of oiling/ingesting oil in the event of a spill of petroleum hydrocarbon products used in construction equipment. Sea otters are susceptible to the adverse effects of oiling due to fuel spills because they depend on the insulation of their dense fur to keep warm. They may also ingest oil during grooming and feeding. Disturbance due to artificial light is not expected to cause additional effects beyond those caused by construction noise and activity. The risk of accidental release of construction-related fluids will be minimized by means of measures outlined in "Minimization Measures" above.

Potential Effects on Habitat

Construction of the Parson's Slough Project would entail the placement of approximately 2,000 cubic yards (1,529 cubic meters) of rock and sheetpile and would result in the loss of approximately 0.75 acres (4047 square meters) of subtidal habitat within the project footprint. However, operation of the proposed sill is expected to result in the conversion of approximately 11 acres (0.045 square kilometers) of intertidal mudflat habitat to subtidal habitat. The increase in soft sediments within the Parson's Slough Complex resulting from reduced tidal scour would likely result in a beneficial effect on sea otters by increasing the availability of soft sediment habitat for burrowing prey. However, muted tidal flows could also result in a small (5-percent) increase in hypoxic (lack of oxygen) conditions, which may decrease habitat suitability for benthic (bottom-dwelling) invertebrates.

Other potential effects on habitat include the introduction of a barrier to movement into and out of the Parson's Slough Complex (either by direct physical means or by means of increased water velocities flowing over the sill during ebb and flood tides) and changes in concentrations of pathogens and contaminants. Noise and activity may deter animals from entering the Parson's Slough Complex during sill construction, but in the long term the sill would not likely present a physical barrier to sea otter movement, because a central span of 100 feet (30 meters) would remain submerged more than 99 percent of the time, within which a notch of 25 feet (7.6 meters) would remain submerged at all times. Water flows across the sill would not prevent access to the Parson's Slough Complex, because the modeled peak tidal velocities across the sill—7-12 feet/second (2.1-3.7 meters/second) (Ducks Unlimited *et al.* 2010)—are much slower than average wave velocities in the turbulent waters regularly negotiated by sea otters, and because most sea otter movements into and out of the complex occur during slack tides (Maldini *et al.* 2010), during which flows across the sill would remain unchanged from current conditions.

Effects of the proposed sill on levels of pathogens or contaminants in Parson's Slough or Elkhorn Slough are unclear because their sources and transport are not well understood. If pathogens or contaminants are entering the Elkhorn Slough system by means of Parson's Slough, then the sill would tend to concentrate them by means of decreased flushing in the upper slough.

However, if they are entering Elkhorn Slough by means of the Gabilan/Tembladero watershed or the Old Salinas River channel, then construction of the sill would lead to lower concentrations of pathogens and contaminants within the Parson's Slough Complex because flows into the complex from these other areas would be reduced (McCarthy 2009). Levels of exposure of sea otters to pathogens and contaminants may not be appreciably different under either scenario, because animals using the Parson's Slough Complex also regularly enter and utilize Elkhorn Slough proper.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Pathogens and contaminants associated with agricultural use of the uplands surrounding Elkhorn Slough constitute the greatest potential threat to sea otters in the slough. Efforts to mitigate these inputs are currently underway and may result in an improvement in habitat quality in Elkhorn Slough.

CONCLUSION

After reviewing the current status of the southern sea otter, the environmental baseline for the action area, the effects of the proposed sill construction and associated cumulative effects, it is the Service's biological opinion that the Parson's Slough Project, as proposed, is not likely to jeopardize the continued existence of the southern sea otter. No critical habitat has been designated for this species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. To "take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. To "harm" is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. To "harass" is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service anticipates that 40 southern sea otters could be taken as a result of this proposed action. The incidental take is expected to be in the form of harassment only and to result from the increased energetic demands and stress caused by displacement from routinely used areas, particularly those utilized for hauling out.

We are not exempting any take of the southern sea otter at this time because the incidental take of southern sea otters has not been authorized under section 101(a)(5) of the Marine Mammal Protection Act (MMPA) and/or its 1994 amendments. We are making the current non-jeopardy determination in order that NOAA Restoration can complete its documentation under the National Environmental Policy Act (NEPA). A proposed Incidental Harassment Authorization was published in the Federal Register on July 20, 2010 (75 FR 42121). Following issuance of a final Incidental Harassment Authorization, the Service may amend this biological opinion to include an incidental take statement for southern sea otters, as appropriate.

REASONABLE AND PRUDENT MEASURES

The Service will not provide Reasonable and Prudent Measures until processes under NEPA and the MMPA are complete and a valid Incidental Harassment Authorization is issued.

TERMS AND CONDITIONS

The Service will not provide Terms and Conditions until processes under NEPA and the MMPA are complete and a valid Incidental Harassment Authorization is issued.

MONITORING AND REPORTING REQUIREMENTS

The Service will not provide Monitoring and Reporting Requirements until processes under NEPA and the MMPA are complete and a valid Incidental Harassment Authorization is issued.

DISPOSITION OF DEAD OR INJURED SPECIMENS

As part of this incidental take statement and pursuant to 50 CFR 402.14(i)(1)(v), upon locating a dead or injured southern sea otter, initial notification within one working day of its finding must be made by telephone and in writing to the Ventura Fish and Wildlife Office (805-644-1766). The report must include the date, time, location of the carcass, a photograph, cause of death or injury, if known, and any other pertinent information.

Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. Injured animals must be transported to a qualified veterinarian. Should any treated southern sea otter survive, the Service should be contacted regarding the final disposition of the animals.

Any injured sea otter should be reported immediately to the Monterey Bay Aquarium at (831) 648-4840. Any dead sea otter should be reported immediately to Mike Harris, California Department of Fish and Game, (805) 772-1135, and Lilian Carswell, (805) 612-2793.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. NOAA Restoration should provide funding for monitoring and research on the effects of estuarine restoration activities on southern sea otters.

2. NOAA Restoration should provide funding for monitoring and research on the effects of water quality on sea otters in Elkhorn Slough.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

LITERATURE CITED

Bentall, G.B. 2005. Morphological and behavioral correlates of population status in the southern sea otter: a comparative study between central California and San Nicolas Island. Masters Thesis, University of California, Santa Cruz, CA, unpublished.

CDFG (California Department of Fish and Game). 1976. A proposal for sea otter protection and research, and request for the return of management to the state of California. 270pp. Available from the California Department of Fish and Game, Sacramento.

CDFG (California Department of Fish and Game). 1999a. Letter to Michael Spear, U.S. Fish and Wildlife Service, regarding the draft evaluation of the southern sea otter translocation program and the draft biological opinion on the containment program for the southern sea otter. Dated May 11. Sacramento, California.

Doroff, A.M., J.A. Estes, M.T. Tinker, D.M. Burn, and T. Evens. 2003. Sea otter population declines in the Aleutian archipelago. Journal of Mammalogy 84(1):55-64.

Ducks Unlimited.2010. Task 3.2—30 percent design report, Parsons Slough Sill Project. Prepared for Elkhorn Slough Foundation, Moss Landing, California, January 15, 2010. Draft report. 134 pp.

Efroymson, R.A. and G.W. Suter, II. 2001. Ecological Risk Assessment Framework for Low-Altitude Aircraft Overflights: II. Estimating Effects on Wildlife. Risk Analysis 21:263-274.

Elkhorn Slough Tidal Wetland Project Team. 2007. Elkhorn Slough Tidal Wetland Strategic Plan. A report describing Elkhorn Slough's estuarine habitats, main impacts, and broad conservation and restoration recommendations. 100 pp.

Estes, J.A. 1990. Growth and equilibrium in sea otter populations. J. Anim. Ecol. 59:385-401.

Estes, J.A. and D.O. Duggins. 1995. Sea otters and kelp forests in Alaska: generality and variation in a community ecological paradigm. *Ecological Monographs* 65 (1), 75-100.

Estes, J.A., M.T. Tinker, T.M. Williams, and D.F. Doak. 1998. Killer whale predation on sea otters linking oceanic and nearshore ecosystems. Science 282:473-476.

Estes, J.A., B.B. Hatfield, K. Ralls, and J. Ames. 2003. Causes of mortality in California sea otters during periods of population growth and decline. Marine Mammal Science 19(1):198-216.

Estes, J.A., M.T. Tinker, A.M. Doroff, and D.M. Burn. 2005. Continuing sea otter population declines in the Aleutian archipelago. Marine Mammal Science. 21:169-172.

Gerber, L.R., M.T. Tinker, D.F. Doak, J.A. Estes, and D.A. Jessup. 2004. Mortality sensitivity in life-stage simulation analysis: A case study of southern sea otters. Ecological Applications 14:1554-1565.

Jameson, R.J. 1989. Movements, home range, and territories of male sea otters off central California. Marine Mammal Science 5:159-172.

Jameson, R.J. 1998. Sexual segregation in sea otters and its role in range expansion. The Otter Raft (newsletter of Friends of the Sea Otter) 60:6-8.

Kannan, K., E. Perrotta, and N.J. Thomas. 2006. Association between perfluorinated compounds and pathological conditions in southern sea otters. Environmental Science & Technology 40:4943-4948.

Kreuder, C., M.A. Miller, D.A. Jessup, L.J. Lowenstine, M.D. Harris, J.A. Ames, T.E. Carpenter, P.A. Conrad, and J.A.K. Mazet. 2003. Patterns of mortality in southern sea otters (*Enhydra lutris nereis*) from 1998-2001. Journal of Wildlife Diseases 39:495-509.

Kreuder, C., M.A. Miller, L.J. Lowenstine, P.A. Conrad, T.E. Carpenter, D.A. Jessup, and J.A.K. Mazet. 2005. Evaluation of cardiac lesions and risk factors associated with myocarditis and dilated cardiomyopathy in southern sea otters (*Enhydra lutris nereis*). American Journal of Veterinary Research 66:289-299.

Laidre, K.L., R.J. Jameson, and D.P. DeMaster. 2001. An estimation of carrying capacity for sea otters along the California coast. Marine Mammal Science 17(2):294-309.

Larson, S., R. Jameson, M. Etnier, M. Fleming, and P. Bentzen. 2002. Loss of genetic diversity in sea otters (Enhydra lutris) associated with the fur trade of the 18th and 19th centuries. Molecular Ecology 11:1899–1903.

Maldini, D., R. Eby, and R. Scoles. 2010. Impact of proposed alterations of tidal flow on sea otters and harbor seals using Elkhorn Slough and the Parsons Slough Complex. Unpublished report. Available from Okeanis, 7981 Moss Landing Road, Unit A1, Moss Landing, California 95039.

Mayer, K.A., M.D. Dailey, and M.A. Miller. 2003. Helminth parasites of the southern sea otter *Enhydra lutris nereis* in central California: Abundance, distribution and pathology. Diseases of Aquatic Organisms 53:77-88.

McCarthy, E. 2009. Factors controlling distribution and abundance of key species at Pacific coast estuaries: Southern Sea Otter. Draft Report. 26 pp.

Miller, M.A., I.A. Gardner, C. Kreuder, D.M. Paradies, K.R. Worcester, D.A. Jessup, E. Dodd, M.D. Harris, J.A. Ames, A.E. Packham, and P.A. Conrad. 2002. Coastal freshwater runoff is a risk factor for *Toxoplasma gondii* infection of southern sea otters (*Enhydra lutris nereis*). International Journal for Parasitology 32:997-1006.

Moss Landing Marine Laboratories. 2007. Characterization of the benthic and planktonic communities of Elkhorn Slough. Prepared for Monterey Bay National Estuarine Sanctuary, Sanctuary Integrated Monitoring Network SIMoN). 44 pp.

Ralls, K., T.C. Eagle, and D.B. Siniff. 1996. Movement and spatial use patterns of California sea otters. Canadian Journal of Zoology 74:1841-1849.

Riedman, M.L. 1983. Studies of the effects of experimentally produced noise associated with oil and gas exploration and development on sea otters in California. Report from Center for Coastal Marine Studies, University of California, Santa Cruz, California, for Minerals Management Service, Anchorage, Alaska. NTIS PB86-218575. 92 pp.

Riedman, M.L. 1984. Effects of sounds associated with petroleum industry activities on the behavior of sea otters in California. Pp. D-1 to D-12 in: C.I. Malme, P.R. Miles, C.W. Clark, P. Tyack, and J.E. Bird. Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior/Phase II: January 1984 migration. BBN Rep. 5586. Report from BBN Inc., Cambridge, Massachusetts, for Minerals Management Service, Anchorage, Alaska. NTIS PB86-218377.

Riedman, M.L. and J.A. Estes. 1990. The sea otter (*Enhydra lutris*): behavior, ecology, and natural history. U.S. Fish and Wildlife Service, Biol. Rep. 90(14). 126 pp.

Riedman, M.L., J.A. Estes, M.M. Staedler, A.A. Giles, and D.R. Carlson. 1994. Breeding patterns and reproductive success of California sea otters. J. Wildl. Manage. 58(3):391-399.

Thomas, N.J., and R.A. Cole. 1996. The risk of disease and threats to the wild population. Endangered Species Update 13:23-27.

Tinker, M.T., G. Bentall, and J.A. Estes. 2008. Food limitation leads to behavioral diversification and dietary specialization in sea otters. PNAS 105:560-565.

Tinker, M.T., J.A. Estes, K. Ralls, T.M. Williams, D. Jessup, and D.P. Costa. 2006a. Population Dynamics and Biology of the California Sea Otter (*Enhydra lutris nereis*) at the Southern End of its Range. MMS OCS Study 2006-007. Coastal Research Center, Marine Science Institute, University of California, Santa Barbara, California. MMS Cooperative Agreement Number 14-35-0001-31063.

Tinker, M.T., D.F. Doak, J.A. Estes, B.B. Hatfield, M.M. Staedler, and J. Bodkin. 2006b. Incorporating diverse data and realistic complexity into demographic estimation procedures for sea otters. Ecological Applications 16:2293-2312.

Tinker, M.T., D.P. Costa, J.A. Estes, and N. Wieringa. 2007. Individual dietary specialization and dive behaviour in the California sea otter: using archival time-depth data to detect alternative foraging strategies. Deep Sea Research II 54:330-342.