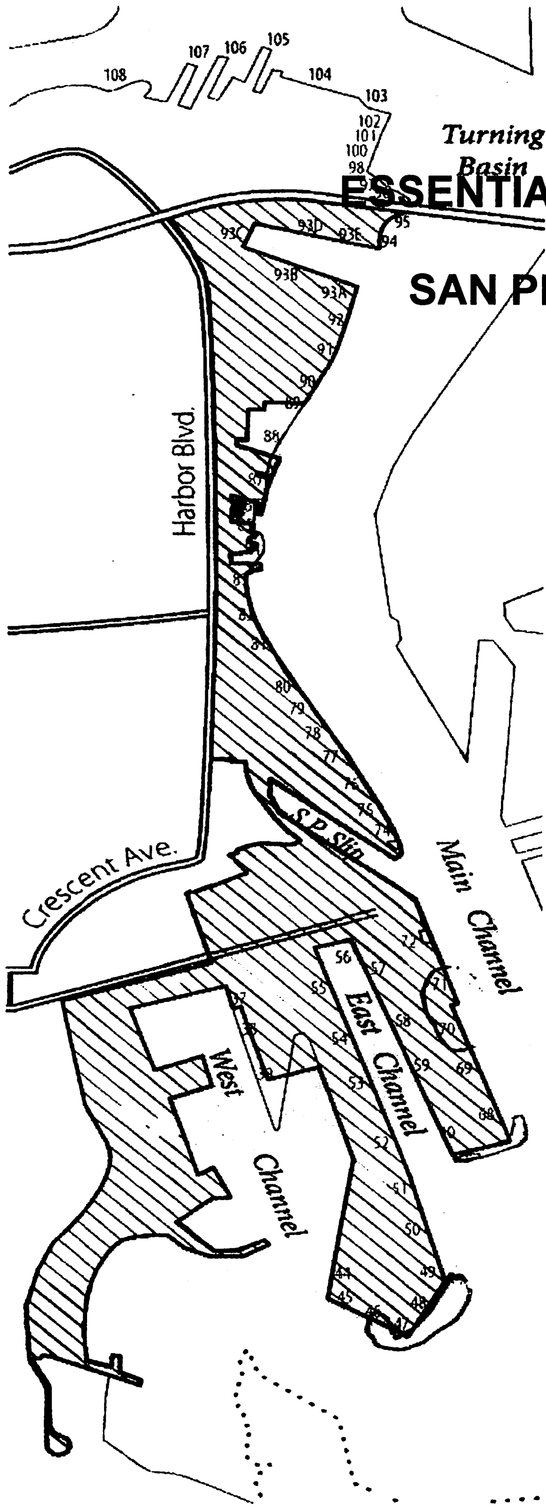
E.9

ESSENTIAL FISH HABITAT ASSESSMENT



ESSENTIAL FISH HABITAT ASSESSMENT

SAN PEDRO WATERFRONT PROJECT

June 2008

Prepared for:

Port of Los Angeles
425 S. Palos Verdes Street
San Pedro, CA 90731

Prepared by:

MBC *Applied Environmental Sciences*
ICF Jones & Stokes
Essentia Management Services

ESSENTIAL FISH HABITAT ASSESSMENT

SAN PEDRO WATERFRONT PROJECT

June 2008

Prepared for:

Port of Los Angeles
425 S. Palos Verdes Street
San Pedro, CA 90731

Prepared by:

MBC *Applied Environmental Sciences*
ICF Jones & Stokes
Essentia Management Services

PROJECT STAFF

MBC *Applied Environmental Sciences*

Marine Scientists

D. S. Beck
M. D. Curtis
E. F. Miller
M. R. Pavlick
D. G. Vilas

ICF Jones & Stokes

C. Beckstrom

Essentia Management Services

W. Fiore

TABLE OF CONTENTS

FIGURE and TABLE

Essential Fish Habitat Assessment

San Pedro Waterfront Project

1.0 INTRODUCTION

The San Pedro Waterfront Project (Project) involves development of a variety of land uses within the San Pedro waterfront project area, including public waterfront and open space areas, commercial development, transportation and parking facilities, and expansion of cruise ship facilities and operations. The proposed Project is located in the Port of Los Angeles (Port), adjacent to the San Pedro Community of the City of Los Angeles. The project area comprises approximately 400 acres along the western boundary of the Port (Figure 1).

1.1 Study Purpose.

This Essential Fish Habitat Assessment (EFH) addresses the potential impacts of specific development projects and associated infrastructure improvements from the Vincent Thomas Bridge to Inner Cabrillo Beach on fish and associated marine biota within the LAHD property (Figure 1).

The project site contains a variety of natural and developed land uses between the Vincent Thomas Bridge and Cabrillo Beach that are characteristic of current and former Port-related activities. In the northernmost portion of the project site at Berth 96 is Catalina Express, a ferry company that serves customers traveling to Catalina Island off the coast of California. Just south of Catalina Express is the S.S. Lane Victory at Berth 94. Berths 87–93 are currently used by the World Cruise Center. The World Cruise Center currently operates out of two existing terminals (Berths 91–92 Terminal and Berth 93 Terminal), with two permanent berths (91–92 and 93) and use of a temporary third berth on occasion at Berth 87. The Caltrans lot, located on North Beacon Street near the intersection of Harbor Boulevard and Swinford Street, provides approximately 300 surface parking spaces. South of the World Cruise Center are a variety of land and water uses. Anchored by the Los Angeles Maritime Museum, other existing land and water uses within the project area between 3rd and 6th Streets are tug vessel services (Crowley Maritime Corporation), Fire Station #112, the temporary location for the Ralph J. Scott historic fireboat, the Los Angeles Maritime Institute's Top Sail Program, the Los Angeles Maritime Museum, the Port police dock with four survey boats, the Angelina (Port-owned vessel), and John S. Gibson Park, located along the east side of Harbor Boulevard between 5th and 6th Streets. At the south end of the project is Ports O'Call Village, located between the harbor's Main Channel and Sampson Way from 7th to 13th Streets.

In addition to commercial retail and restaurant uses, existing uses within the Ports O'Call area include LA Harbor Sportfishing at Berth 79 and two harbor cruise operations - Fiesta Harbor Cruise at Berth 79 and Spirit Cruises at Berth 77. At the southern end of Ports O'Call is the Jankovich Company Fueling Station at Berth 74. Railroad lines extend through the project area from the Westway Liquid Bulk Marine Terminal (Westway Terminal), past Ports O'Call Village within the S.P. Railyard, and along the east side of Harbor Boulevard as they pass under the Vincent Thomas Bridge at the northern end of the project area. Just south of Ports O'Call Village, in the Southern Pacific Slip (SP Slip), is an active commercial fishing fleet. An operating municipal fish market located at Berth 72 and adjacent to the SP Slip is associated with these fishing operations. Westway Terminal is currently located within the project area at Berths 70-71. Just south of the Westway Terminal are Warehouse No. 1 and the Port of Los Angeles Pilot Station. The 22nd Street Landing, a public attraction within the project area, extends into the Cabrillo Marina. Several existing warehouses are currently operating in the project area, including the City Dock No. 1 warehouses at Berths 57–60, SSA Fruit Warehouse at Berths 51–55, and Crescent Warehouse in Warehouses Nos. 6, 9, and 10. Beyond the Cabrillo Marina, extending to the south along the east side of Shoshonean Drive, are the Cabrillo Beach Youth Waterfront Sports Center and the Salinas de San Pedro Saltwater Marsh. At the terminus of the project area is Inner Cabrillo Beach. As part of the proposed Project, a new fueling station would be developed at Berth 240 on Terminal Island.

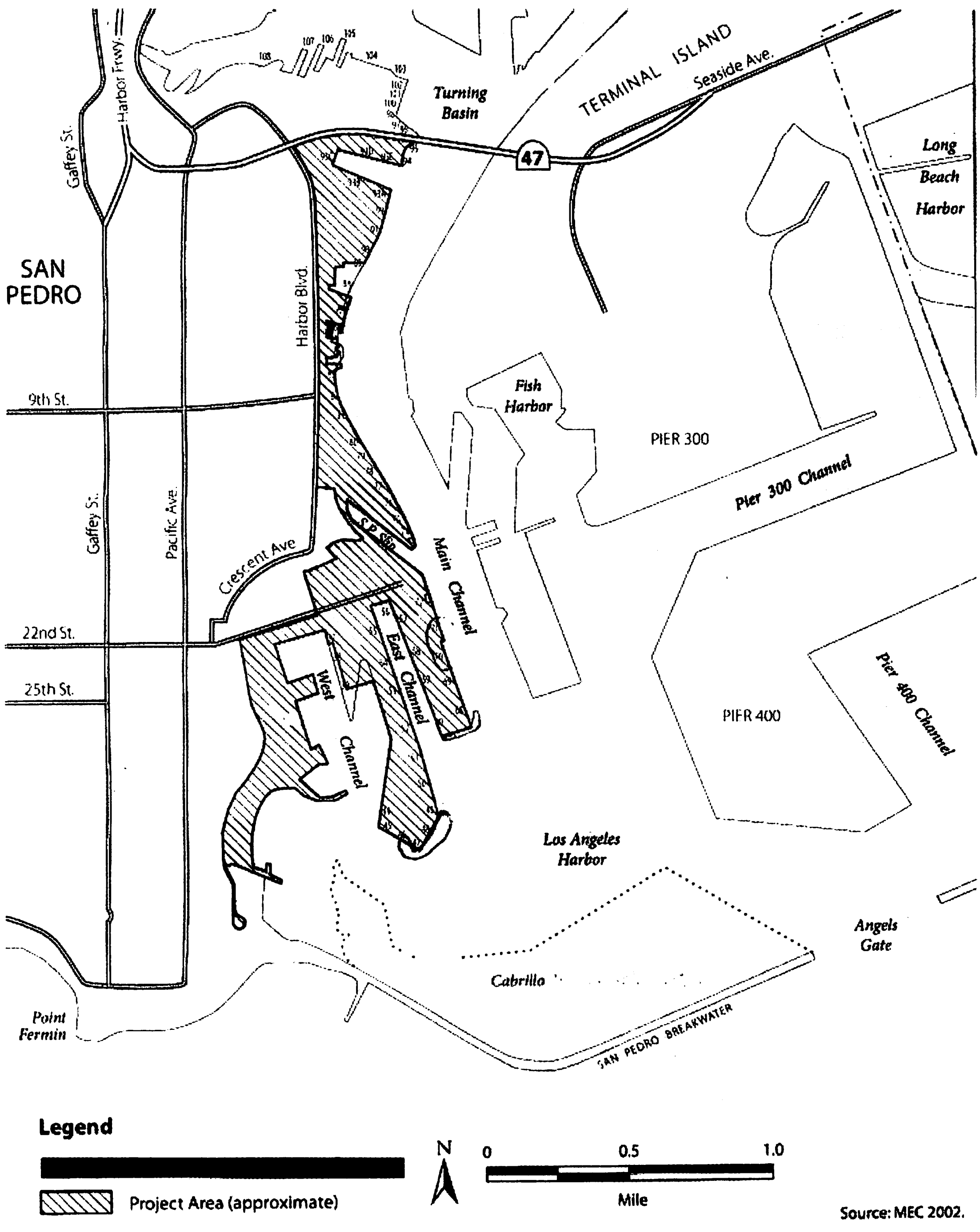


Figure 1. Location of the project area and area affected by proposed project.

As the Port of Los Angeles is proposing construction activities along the waterfront area of the above mentioned sites (the Project) to upgrade and modernize facilities, this Essential Fish Habitat Assessment was prepared to evaluate potential impacts of the project on fish species and upon marine biological resources found in habitats in the Los Angeles Harbor area that fish utilize.

Project activities that are assessed are those that will directly affect the marine environment such as dredging and disposal, riprap replacement, and removal and replacement of docks and pilings. Potential impacts from the disposal of dredged sediments at designated offshore Ocean Dredged Material Disposal Sites were reviewed in the Final Site Designation EIS for LA-3 which evaluated the final designation of LA-2 offshore of the Los Angeles/Long Beach Harbor complex, the likely destination of any dredged sediments disposed (USEPA and USACE 2005). Impacts to EFH from the disposal of dredged sediments were determined to be not significant, with no adverse impacts to any species on the Fishery Management Plans or their habitats determined. All other construction activities are terrestrial in nature and would not directly impact the marine environment or essential fish habitat.

2.0 ESSENTIAL FISH HABITAT ASSESSMENT

Essential Fish Habitat is managed under the Magnuson Fishery Conservation and Management Act (Magnuson Act). This act protects waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (Magnuson-Stevens Act, 16 U.S.C. 1801 et seq.). Substrates include sediment, hard bottom, structures underlying waters, and associated biological communities (NMFS 2005).

2.1 Fish Communities

Fish communities have been sampled extensively in both Los Angeles and Long Beach Harbors during the past three decades thereby allowing a reasonable assessment of the impact of any particular project on spawning, breeding, feeding, or growth to maturity of fish species in these communities (HEP 1979; Brewer 1983; MBC 1984; USACE and LAHD 1984; MEC Analytical Systems 1988; LAHD 1993; MEC Analytical Systems 2002).

The year 2000 investigations by MEC Analytical Systems (MEC) of the entire Harbor complex used a variety of sampling gear at all stations and seasons that revealed a similar dominance pattern for fish species. Using gear designed to capture demersal (trawls), pelagic (lampara nets), and nearshore fishes (beach seines), 74 species were collected. More species were collected at shallow water (4–6 meter) locations than at deepwater (11–24 meter) locations. Although fish populations of the entire Harbor appear diverse and abundant, a large proportion of the Harbor fish community is dominated by three species: white croaker (*Genyonemus lineatus*), northern anchovy (*Engraulis mordax*), and queenfish (*Seriphus politus*) (MEC 2002). Four other species consistently rank high in abundance in all studies and are considered important residents of the Harbor. These are white seaperch (*Phanerodon furcatus*), California tonguefish (*Symphurus atricaudus*), speckled sanddab (*Citharichthys stigmaeus*), and shiner perch (*Cymatogaster aggregata*) (MEC 2002).

Northern anchovy was the most abundant species collected with lampara net sampling (68%); white croaker, queenfish, topsmelt (*Atherinops affinis*), Pacific sardine (*Sardinops sagax*), shiner perch, and salema (*Xenistius californiensis*) were also abundant. The five schooling/aggregating species (northern anchovy, white croaker, queenfish, topsmelt, and Pacific sardine) accounted for 90% of the total abundance. These five species along with bat rays (*Myliobatis californica*) and California barracuda (*Sphyraena argentea*) accounted for 77% of the total biomass in lampara samples (MEC 2002).

In 2000, trawl sampling collected 61 species. Similar to lampara catches, 3 species constituted 89% of the total catch. Trawl sampling collected mostly northern anchovy, with white croaker and queenfish also high in abundance. These three schooling species along with the California halibut (*Paralichthys californicus*), bat ray, and shovelnose guitarfish (*Rhinobatus productus*) accounted for 63% of the total biomass in trawl samples (MEC 2002).

Beach seining was conducted at Inner Cabrillo Beach and at the beach at Pier 300 where, of the 17 species collected, topsmelt was the most abundant species; arrow goby (*Clevelandia ios*) and diamond turbot (*Pleuronichthys guttulatus*) were also commonly collected. These three species made up 95% of the total beach seine catch (MEC 2002). California grunion (*Leuresthes tenuis*) spawn at the beach in the Study Area (Curtis 2008, pers. comm.), but are generally only present in large numbers for a few hours at a time while spawning. When spawning, grunion may dominate local fish abundance of the spawning areas.

Harbor-wide (Long Beach and Los Angeles Harbors) estimates of the total number of fish were made using recent trawl and lampara net sampling methods during the day and night. For all species combined (day and night sampling), an estimate of 4.45 million fish was estimated to occupy both harbor areas. The top five species (northern anchovy, white croaker, queenfish, topsmelt, and Pacific sardine) account for nearly 92% of the total estimated fish abundance in the Harbor complex (MEC 2002).

Earlier, the United States Fish and Wildlife Service (USFWS) estimated seasonal fish densities from data collected from 1972 through 1982 (LAHD 1993). There was a trend recorded during those studies toward higher densities in the summer and fall, ranging from 40-55 fish per 100 m^2 of surface area, to lower densities in the winter ranging from 2-10 fish per 100 m^2 of surface area. Juvenile and adult individuals of most species are more abundant during the spring and summer than in winter (Horn and Allen 1981). The similarity of collections over the years suggests that there have been no long-term, large-scale changes in the Harbor fish fauna (MEC 2002).

The fish community in the Inner Harbor is dominated by a few species that make up a very high percentage of the total catch. The eight most abundant species collected in four surveys (summarized in USACE and LAHD 1984) are: white croaker, northern anchovy, bay goby (*Lepidogobius lepidus*), queenfish, California tonguefish, white seaperch, shiner perch, and Pacific pompano (*Peprilus simillimus*). Bay goby and Pacific pompano appear more abundant in the Inner Harbor than in the Outer Harbor community. Species richness and diversity decrease along a gradient from the Outer Harbor to the Inner Harbor (USACE and LAHD 1984;, MEC 2002).

In general, the habitat value for fish is highest in the Outer Harbor shallow areas followed by deep water in the Outer Harbor and diminishing as one proceeds into the Inner Harbor, and particularly in blind slip areas. Based on review of the last biological baseline (MEC 2002) by Federal and State agencies and the Port, Outer Harbor habitat values were determined to extend into historically Inner Harbor areas. Specifically, Outer Harbor fish assemblages can now be found up the Main Channel to the area of the Vincent Thomas Bridge, covering all of the waterfront improvement project area.

Peaks in seasonal abundance and species richness in the Inner Harbor do not coincide with Outer Harbor trends. High abundance and richness in the Inner Harbor occur in winter and early spring, and low abundance and richness occur in summer and early fall. Abundance and species richness may vary seasonally and yearly in the Outer Harbor. Outer Harbor abundance and species richness are high in late spring and early fall, peak in summer, and begin to decrease in late fall to yearly low levels in winter. Seasonal peaks in the Outer Harbor appear to reflect juvenile/young of the year recruitment (Brewer 1983). Summer abundance peaks in the Outer Harbor may be enhanced by recruitment of Inner Harbor species (USACE and LAHD 1984).

Studies of fish larvae and fish spawning have identified trends in abundance, density, and occurrence that help to characterize the Harbor in terms of a spawning and nursery grounds (MBC 1984; MEC 1988 and 2002). The Harbor is a viable, productive habitat for commercially and recreationally valuable species. The northern anchovy appears to be a key component in the Harbor ecosystem and is both a major consumer of zooplankton and a major forage food for fish of higher trophic levels. The northern anchovy uses the area inside and outside the breakwater for spawning, nursery, and adult habitat.

MEC (2002) found that peaks in the abundance of larval fishes occur in spring and summer with a secondary peak in the fall. Brewer (1983) found a similarity between the abundance of fish larvae and juvenile-adults in the Harbor. A large number of fish larvae and juvenile-adult species have been reported in the Harbor (HEP 1980; MEC 2002), which reflects the variety of nursery and adult habitats present.

Species composition of larval fishes varied among different areas and habitats in the Harbor. Larval abundance was generally lower on the Los Angeles side of the Harbor compared to the Long Beach side (MEC 2002). Larvae of pelagic or demersal species found over sand and/or mud bottoms as adults generally had a wide dispersal pattern within the Harbor complex. In addition, larvae of some species were strongly associated with deep-water habitats while others were strongly associated with shallow-water habitats. For example, bay goby larvae were more abundant at deep water locations. Larvae of flatfish generally had higher abundance in deep water habitats in the Outer Harbor, basins, and channels. Fish associated with aquatic vegetation and/or rocky substrate during some part of their life stage had a more localized larval distribution which was associated with the outer breakwater, riprap around Pier 400, eelgrass beds in the Pier 300 Shallow Water Habitat, other locations near riprap, or nearby macroalgae beds (MEC 2002).

Based on results from the 2000 Baseline Study and in accordance with the 1996 amendments to the Manuson-Stevens Fishery Conservation and Management Act, 19 managed fish species are found in the Los Angeles Harbor and are assumed to occur in the Study Area. These species are listed in Table 1.

These include four managed coastal pelagic fish species (northern anchovy, Pacific sardine, Pacific (chub) mackerel, and jack mackerel) and 15 managed Pacific coast groundfish (demersal) species (Table 1). Of these species, only the four coastal pelagic species have populations within the Harbor sufficient for the Harbor to be considered as part of their essential fish habitat. The most abundant species is the northern anchovy, while the Pacific sardine, Pacific mackerel, and jack mackerel were also found to be moderately abundant in 2000. None of the Pacific coast groundfish species were abundant in the Outer Harbor, nor based on their distribution in the Southern California Bight and life histories does the Harbor complex appear to constitute essential fish habitat for the groundfish species found during the Harbor surveys.

Like the anchovy, Pacific sardine, Pacific mackerel, and jack mackerel are coastal fish species that feed on planktonic organisms (Froese and Pauly 2005). However, in contrast to the anchovy, the other species spawn offshore, in the open water areas, and their larvae primarily develop as part of the pelagic plankton in the Pacific Ocean, using kelp forests and ocean piers as shelter from predators (Fitch 1974; Collette and Nauen 1983; Matarese et al 1989; Kailola et al. 1993). No larvae of sardine, Pacific mackerel, and jack mackerel were found in the Los Angeles or Long Beach Harbors in the 2000 Baseline Study and the abundance of adults was also substantially lower than that of the anchovy (less than 0.15% of the total fish caught) (MEC 2002).

Table 1. Managed fish species within habitats of Los Angeles/Long Beach Harbors.

Common Name	*Species*	*Potential Essential Fish Habitat in Study Area*	*Abundance during 2000 fish surveys (MEC 2002)*
Coastal Pelagics Fishery Management Plan Species			
Northern Anchovy	*Engraulis mordax*	Open water throughout.	Abundant throughout harbor in 2000[1]
Pacific Sardine	*Sardinops sagax*	Open water throughout.	Abundant throughout harbor in 2000[1]
Pacific (Chub) Mackerel	*Scomber japonicus*	Open water, primarily at Outer Harbor; juveniles off of sandy beaches and around kelp beds.	Common throughout harbor in 2000[1]
Jack Mackerel	*Trachurus symmetricus*	Near breakwater and Inner to Middle Harbor. Young fish over shallow rocky banks. Young juveniles sometimes school under kelp. Older fish typically further offshore.	Common in inner to middle harbor and uncommon in Outer Harbor, primarily in deep water[1]
Pacific Coast Groundfish Fishery Management Plan Species			
English Sole	*Parophrys vetulus*	On bottom throughout harbor. Benthic dwelling on sand or silt substrate.	Rare, 2 collected in Outer Harbor in 2000[1]
Pacific Sanddab	*Citharichthys sordidus*	Primarily Outer Harbor. Benthic on sand or coarser substrate. About 50 collected.	Uncommon, primarily Outer Harbor deep water areas in 2000[1]
Leopard Shark	*Triakis semifasciata*	Primarily in Outer Harbor. Over sandy areas near eelgrass, kelp, or jetty areas.	Rare, 3 collected in 2000, all in shallow water
Big Skate	*Raja binoculata*	Primarily in Outer Harbor. Over variety of substrates generally at >3 m depth.	Uncommon, primarily in shallow water[1]
Black Rockfish	*Sebastes melanops*	Primarily Cabrillo Shallow Water Habitat. Along breakwater and deep piers and pilings. Associated with kelp, pilings, eelgrass, high relief rock.	Rare, 4 collected in deep Inner and Middle Harbor waters in 2000
California Scorpionfish	*Scorpaena gutatta*	Common on rock dikes and breakwaters. Soft bottom at night.	Common in rock dikes and breakwaters, also on soft bottom at night[1-4]
Grass Rockfish	*Sebastes rastrelliger*	Along breakwater and in eelgrass off of beach areas. Associated with kelp, eelgrass, and jetty rocks.	Rare, 2 collected in Pier 300 Shallow Water Habitat in 2000, 1 in Long Beach Harbor
Vermilion rockfish	*Sebastes miniatus*	Usually associated with hard substrate. Found along breakwater and deep piers and pilings.	Rare, 4 collected in deep inner to middle

Common Name	*Species*	*Potential Essential Fish Habitat in Study Area*	*Abundance during 2000 fish surveys (MEC 2002)*
		Associated with kelp, pilings, eelgrass, high relief rock.	harbor waters[1]
Kelp rockfish	*Sebastes atrovirens*	Found in association with kelp along the breakwaters	Rare, in kelp along breakwater[2]
Calico rockfish	*Sebastes dalli*	Typically found in deeper water near hard substrate, kelp and algae.	Rare, 1 collected in Long Beach Harbor [4], shallow water[1]
California skate	*Raja inornata*	Usually associated with hard substrate. Found along breakwater and deep piers and pilings. Associated with kelp, pilings, eelgrass, high relief rock.	Uncommon, Outer Harbor in shallow water[1]
Olive rockfish	*Sebastes serranoides*	Found in association with kelp along the breakwaters	Common, juveniles in kelp around breakwater[2]
Bocaccio	*Sebastes paucispinis*	Typically found in deeper water near hard substrate, kelp and algae.	Uncommon, juveniles in kelp around breakwater[2]
Cabezon	*Scorpaenichthys marmoratus*	Primarily shallow waters, along breakwater and eelgrass areas. Benthic and use a variety of substrates including kelp beds, jetties, rocky bottoms and occasionally eelgrass beds and sandy bottoms.	Rare, shallow water[1]
Lingcod	*Ophiodon elongatus*	Primarily along breakwater and especially near Angels Gate. Typically on or near bottom over soft substrate near current swept reefs.	Rare, shallow water[1]

Source 1. MEC 2002; 2. MEC 1999; 3. MEC 1988; 4. SAIC and MEC 1997

Notes: Potential habitat use from McCain et al 2005. Species occurrence in LA and/or LB Harbors recorded by MEC 2002. Abundant: among ten most abundant species collected. Common: not one of the ten most abundant, but at least 100 individuals collected. Uncommon: between 10 and 100 individuals collected. Rare: less than 10 individuals collected (the designation rare does not mean the fish is rare, but only that the area sampled or gear used to collect would not sample them effectively). Pelagic and benthic sampling employed in the 2000 surveys (MEC 2002) did not sample rocky breakwater and kelp habitat that could potentially be occupied by some of the species.

2.2 Habitats within San Pedro Harbor

Water column habitats in the Study Area include mid channel, pier and piling, eelgrass, rip rap, and kelp forest habitats.

Mid channel habitat includes deepwater areas of the Inner and Outer Harbor without adjacent physical structures and typically overlies a soft substrate. In the Study Area this includes the portions of the Main Channel, West Channel, and East Channel. This habitat is somewhat protected from wave action but is subject to frequent boat and shipping traffic. Schooling fish and flatfish are commonly found in this habitat type.

Pier and Piling Habitat. Pier and piling habitat are prevalent all along the edges of Harbor channels. Surfperch and rockfish are sometimes attracted to pier and piling habitat. Vertical structures found along piers and pilings often provide points of attachment for a variety of invertebrate species including barnacles, anemones, mussels, and worms.

Riprap Habitat. Riprap provides a similar habitat as natural hard bottom reefs. It provides points of attachment for a variety of invertebrate and algal species including barnacles, anemones, mussels, and worms. Riprap lines a large portion of the waterfront and extends down from the intertidal to the subtidal. It provides shelter, habitat, and forage for fish.

Kelp Bed Habitat. Kelp beds in the study area provide shelter for a variety of fishes including several species of rockfish (*Sebastes* sp.) found along the breakwaters and jetties as well as fish species such as opaleye (*Girella nigricans*), blacksmith (*Chromis punctipinnis*), señorita (*Oxyjulis californicus*), halfmoon (*Medialuna californiensis*), and kelp bass (*Paralabrax clathratus*) that are typically found in and around the kelp throughout the water column. Giant kelp beds are typically found along the breakwaters or other submerged rocky riprap areas. A few giant kelp (Macrocystis pyrifera) are found near some of the berths near the main channel entrance growing on submerged riprap. However, no giant kelp beds are known to be present in the vicinity of the proposed harbor cuts, wharves, docks, piers, bulkheads, or rock placement areas. Harbor channel habitat does not provide habitat for kelp due to water depths, vessel traffic, and limited tidal flushing. Rocky structures such as the breakwater jetty offer attachment sites for kelp and other macroalgae, as well as shelter areas favored by some rockfish species. Kelp forest habitat offers shelter habitat for several fish species. The occurrence of giant kelp within the harbors is a relatively recent occurrence according to reports made in prior investigations. Studies conducted during the last biological baseline study demonstrated a tremendous productivity of giant kelp along the outer breakwater; however, the surveys conducted in 2000 did not attempt to quantify the distribution of kelp or other macroalgal flora. However, it is apparent that giant kelp distribution has increased in Los Angeles Harbor; in 1986-1987, the kelp was restricted to the San Pedro Breakwater, but studies conducted in 2000 mapped additional kelp along portions of the Middle Breakwater, Pier 400, on a submerged dike at the Cabrillo Shallow Water Habitat, and other riprap shorelines in outer Los Angeles Harbor (MEC 2002).

In 2006, giant kelp along the Los Angeles and Long Beach Breakwaters was recorded from quarterly aerial surveys conducted for the Los Angeles Regional Water Quality Control Board to be 121.2 acres (49.05 hectares) (MBC 2007). Kelp distribution varies seasonally and annually; the kelp canopy estimate declined along the breakwaters of Los Angeles and Long Beach Breakwaters in 2007, but appears to be increasing again in 2008 and was found fringing the perimeter of the Shallow Water Habitat seaward of Pier 400 late-2007(MBC 2008, in prep.). In March 2008, small patches of giant kelp were observed just offshore of Berths 70 and 71 near the mouth of the Main Channel. Giant kelp has also been reported to be present at Berth 48. Small kelp beds are present in the Outer Harbor along the breakwater and on the containment dike for the Cabrillo Shallow Water Habitat (MEC 2002).

Eelgrass Habitat. Water column habitat associated with eelgrass is an important source of cover for juvenile fish. The invertebrate community that inhabits eelgrass beds provides food for many fish species as well. These attributes make eelgrass an important nursery area for many fish species. Eelgrass habitat is found at Inner Cabrillo Beach in the study area. Eelgrass coverage was 25 acres in 1996, 55 acres in October 1999, 22 acres in March 2000, 42 acres in August 2000 (MEC 2002), and 27.4 acres in 2005 (Merkel & Associates 2005). MEC (2002) found that the greatest expanse of dense eelgrass and the greatest total area of eelgrass of these sites was located offshore of the Cabrillo Beach Youth Waterfront Sports Center. No eelgrass beds are present in the vicinity of the proposed harbor cuts, wharves, docks, piers, bulkheads, or rock placement areas. Harbor channel habitat does not provide habitat for eelgrass due to water depths and absence of suitable soft bottom habitat. The only eelgrass to be reported growing within the Study Area are the beds found at Inner Cabrillo Beach (MEC 2002, Merkel & Associates 2005). Eelgrass typically requires sand and/or silt substrate. Shallow water habitats that receive enough light to support eelgrass but have primarily hard substrates are unsuitable for eelgrass.

3.0 IMPACTS TO BIOLOGICAL RESOURCES

3.1 Impacts Resulting From Construction Activities

Impacts to species, communities, and habitats expected to occur as a result of project implementation were identified by examining the project description in view of the existing biological setting. Impacts to biota were assessed by estimating the amount of habitat that would be gained/lost or disturbed by the proposed Project or its alternatives. Construction activities such as pile driving, dredging, sheet pile installation, and promenade construction would occur in the Harbor for the proposed project which is considered EFH for several pelagic fish species. These activities are temporary in nature and would not permanently affect the use of the Harbor by these species. Construction of the North Harbor, Downtown Harbor, and 7th Street Harbor would create 6.82 acres of new open water, thus increasing the area in the Harbor available to these EFH species.

Temporary disturbances in the water during wharf, dock, and promenade construction may affect EFH or result in minimal loss of managed fish species, but would not substantially reduce their numbers. Additionally, conversion of a small amount of soft bottom to hard substrate habitat would occur as a result of the proposed Project, resulting in a minor loss of benthic invertebrates, but this is not a significant impact. Overall, a net increase in open water habitat of 6.82 acres would result from the proposed Project. Construction activities for upland areas such as cruise ship terminals, Ports O' Call, and parking structures would have no direct impacts on EFH because none is present at those sites. Indirect impacts through runoff of sediments during storm events would be less than significant because such runoff would be controlled with project-specific Storm Water Pollution Prevention Plans (SWPPPs) and implemented Best Management Practices (BMPs) such as sediment barriers and sedimentation basins. In addition, the work would be conducted in compliance with applicable permits, such as the USACE's Section 404 (Clean Water Act), Section 10 (River and Harbor Act), and Section 103 (Marine Protection, Research, and Sanctuaries Act) and the RWQCB's 401 water quality certification/Waste Discharge Requirements.

Activities associated with the construction of waterfront improvements such as a temporary increase in activity, noise, vibration, turbidity, and temporary lighting have the potential to displace individuals from the work area during construction. Dredging, rock placement, bulkhead installation, pile driving, and construction of wharfs, docks, piers, and promenades all have potential to affect managed fish species. Noise and vibration would occur from pile driving (steel and/or pre-stressed concrete piles) for wharf construction, and bulkhead installation. Impacts to EFH from the disposal of sediments at designated offshore Ocean Dredged Material Disposal Sites were determined to be not significant, with no adverse impacts to any species on the Fishery Management plans or their habitats determined (USEPA and USACE 2005). Construction activity accidents could release contaminants to the water column such as oil or fuel. All other construction activities are terrestrial in nature and would not directly impact the marine environment.

The potential impacts resulting from construction of the waterfront are expected to be minimal and temporary to the four managed fish species demonstrating moderate to high abundance in the Los Angeles Harbor. As none of the Pacific groundfish species are particularly abundant nor does the Harbor provide critical habitat, there would be no biologically significant impacts upon essential fish habitat for the groundfish species found within the Harbor. During construction activities, should any individuals of the managed pelagic species (northern anchovy, Pacific sardine, Pacific mackerel, and jack mackerel) occur within the immediate vicinity of the project area they would relocate to another area of open water to avoid disturbances caused by pile driving or excessive noise. At the current design stage it is not certain whether the proposed Project would require steel and/or pre-stressed concrete piles. However, present considerations are that steel and pre-stressed concrete piles would be used which are known to produce greater sound ranges than concrete pile driving. However, regardless of whether steel or concrete piles would be used, a brief relocation of individuals represented by these transient species would not result in biologically significant impacts to their populations with regard to competition, predation, or spawning.

A moderate to large oil spill (greater than 238 bbl), while unlikely, could have an impact on the four managed fish species demonstrating moderate to high abundance in Los Angeles Harbor. Research on the life history and reproduction strategies of these species, discussed following, provided insight into the managed fisheries and their respective susceptibility. Due to the ability of the adult Pacific sardine, Pacific mackerel, and jack mackerel to relocate from an oil-contaminated area, and the lack of their larvae and eggs within the harbors, it is unlikely that a large oil spill would impact these fisheries in the long-term; however, short-term effects of oil exposure may be experienced by some individuals within the area of the spill. In most cases, small spills of oil would not be detrimental to managed fish populations because few individuals within a population would be affected. Northern anchovy, however, is found along the Pacific coast and is well known to enter bays and inlets to feed on organisms such as copepods and sometimes to spawn, thus leaving their offspring to develop in these protected areas (Hunter and Goldberg 1980; Whitehead et al. 1988). Because a large number of adult and larval anchovies were found in Los Angeles Harbor (relative to other species present in the harbor) during the 2000 Baseline Study, of all of the managed species, individuals of this species would be the most likely to be affected by a large oil spill. The northern anchovy is the only species in which more than a few individuals could be affected due to their numerical abundance in the Harbor, presence of eggs and larvae at some times of the year, and schooling behavior near the water surface. This is a common species that is very abundant in coastal areas outside the Harbor as well, and loss of some individuals within the Harbor would not adversely affect populations in the region. Similarly, loss of some zoo- or phytoplankton (not fish eggs or larvae) under the spilled oil would not substantially reduce the amount of food available to anchovies or any other species of fish due to the small area affected and rapid regeneration of plankton.

The habitat found in the area of the proposed waterfront construction ranges from open water habitat with a sloping, soft bottom comprised of silt and clay, to deepwater habitat. Marine resources including benthic infaunal organisms and macroinvertebrates that live in the soft bottom habitat along the waterfront as well as subtidal invertebrates on the rocky riprap habitat would likely be disturbed during the construction effort. Specifically, a small amount of the benthic infauna (e.g., polychaete worms, crustaceans, and molluscs), as well as the macroinvertebrates found in the channel (i.e., black spotted shrimp, tuberculate pear crab, Xantus' swimming crab, etc.) would be lost within the footprint of the piles being driven and the rock placed around the base of these piles. Suspension of sediments during in-water construction could also have sub-lethal to lethal effects on the invertebrates immediately adjacent to the work. This impact, however, would be temporary given the relative abundance, rapid colonization rates, and movement of at least some individuals of these species. The soft bottom habitat lost would be replaced by hard substrate habitat on the bottom (rock) and in the water column (piles).

Fish eggs and larval, juvenile, and adult fish would likely experience few effects due to construction activities. Fish eggs and larval fish are primarily found in the water column in this area and are dispersed by water movement, while juvenile and adult fishes have the ability to move to avoid the disturbance during construction activities. Short-term water quality impacts (e.g., turbidity) may slightly affect resident fishes; however, these impacts would likely have no effect on the success of fish populations due to the ability of the juvenile and adult fishes to relocate to other areas, and the constant water replenishment that occurs in harbors and bays which transports fish larvae and eggs to various areas within harbors. A brief relocation of these transient species would not result in biologically significant impacts with regard to competition, predation, or spawning.

Other effects of the construction of the new berth and associated structures along the San Pedro waterfront include the unnatural occurrence of light and noise. Both would be short-term during construction activities. It is unlikely that these effects would lead to reduced survival, and if so, only a small percentage of individuals would be affected.

Activities from barges and ships bringing equipment, piles, and shoring materials would cause a short-term disturbance to fish in the immediate vicinity of the work sites. These disturbances would be similar to boat and ship traffic that presently use the channel and would have little additional affect and result in very little effect on individuals of managed fish species.

Sound pressure waves in the water from pile driving can affect fish, particularly those with a swim bladder, with the level of effect influenced by factors such as species, size of fish (smaller fish are affected more), physical condition of fish, peak sound pressure and frequency, shape of the sound wave, depth of water at the piles, location of fish in the water column, amount of air in the water, size and number of waves on the water surface, bottom substrate composition and texture, tidal currents, and presence of predators (NMFS 2004). Types of effects on fish can include mortality from swim bladder rupture or internal hemorrhaging, changes in behavior, and hearing loss (permanent or temporary) (Vagle 2003). The most common behavioral changes include temporary dispersal of fish schools. Sound pressure waves caused by the steel pile driving could affect fish near the piles with mortality of some individuals. The four fish species in the Coastal Pelagics FMP (northern anchovy, Pacific sardine, Pacific mackerel, and jack mackerel) are common water-column species in the Harbor that could be affected by pile driving. The number of fish affected would depend on the distribution and abundance of these species near the construction site at the time of construction. However, there have been no documented cases of fish mortality as a result of pile driving in the Harbor. Fish in the Groundfish FMP are generally not very abundant in the Harbor, and most occur in habitats away from the Project work area. Fish would generally avoid the work area while construction activities were occurring. Thus, few individuals would be present in or near the work area, and those present would likely move out of the work area.

Effects of proposed Project construction activities would be of short duration (a few weeks to months) and would occur in a small area. A small amount of the benthic infauna and the epibenthic macroinvertebrates found in the Harbor water adjacent to the construction activities would be lost within the footprint of the piles being driven and the rock placed around the base of these piles and soft bottom habitat would be converted to hard bottom at these locations. The turbidity generated by driving each pile would be localized immediately adjacent to the pile and would dissipate rapidly with minor effects on invertebrates and fish at the pile locations. The small loss of prey for managed fish species would not adversely affect their populations within the Harbor due to the large amount of undisturbed foraging area available and the small number of individuals of managed groundfish species that feed on benthic organisms in the Harbor. Construction disturbances such as turbidity would have negligible effects on eggs and larvae of managed species, located primarily in the water column and moving with water currents, due to measures in place to reduce the level of impact, their brief exposure to the disturbances, and the small number that could be affected in the construction area relative to those present in all marine habitats in the Harbor. Adult and juvenile fish of managed species would likely avoid the disturbance area during construction activities and would not be adversely affected.

Project construction activities could have the potential to affect several special aquatic sites in the project area including eelgrass habitat adjacent to the Youth Camp and Salinas de San Pedro Salt Marsh, and scattered giant kelp outcroppings at Berths 66-72 and Berths 45-57, and the Outer Harbor Cruise Terminal. Avoidance measures that will be required under USACE permits will reduce the chance of interactions with the eelgrass beds and giant kelp outcropping and reduce the potential for impacts to a less than a significant level.

To mitigate impacts associated with shading of the mudflat habitat at Berth 78 -Ports O' Call and shading created by the installation of the Promenade at the Salinas de San Pedro salt marsh, LAHD will expand the mudflat and salt marsh habitat within Salinas de San Pedro salt marsh. These improvements will occur by re-contouring the side slopes to increase mudflat area, removing the rocksill within the inlets, removing nonnative vegetation, removing the rock-sloped island within the marsh, and potentially constructing a rock groin at the marsh inlet to block littoral sediment from entering the marsh. Driving of steel piles and sheet pile as part of the Salinas de San Pedro promenade may occur at high tide and could their briefly exposure local fish to elevated noise impacts. These and other construction activities will be temporary in nature and will not permanently affect the use of the harbor by managed species. During construction, turbidity would be monitored in accordance with MM BIO-1 so that eelgrass and mud flat habitat would not be significantly affected. No disturbance to eelgrass located in Harbor waters adjacent to these areas is anticipated. Enhancement of the salt marsh would result in short-term impacts to the existing EFH through temporary loss of prey production and habitat for managed fish species, However, these improvements would provide long-term benefits to aquatic organisms by removing accreted sediments, improving circulation, and resulting in a net increase of unshaded open water habitat available.

Upland construction activities (e.g., cruise terminal facilities, Port O' Call redevelopment, parking structures, etc.) would have no direct effects on EFH, which by definition is located in the water. Runoff of sediments from such construction could enter Harbor waters. However, implementation of sediment control measures (e.g., sediment barriers and sedimentation basins) would minimize such runoff and result in minimal effects on water quality that could affect EFH.

Mitigation for impacts to marine biological resources has been developed by LAHD in coordination with NOAA Fisheries, USFWS, and CDFG through agreed-upon mitigation policy (City of Los Angeles et al 1984;, City of Los Angeles et al 1997). These policies define the value of different habitats within the Harbor relative to a system of mitigation credits accrued by creating or enhancing habitat in the Harbor and at off-site locations. The current mitigation policy is "No net loss of in-kind habitat value, where 'in-kind' refers to coastal, marine, tidally-influenced habitat with value to fish and birds." (USACE and LAHD 1992). Losses to EFH from the proposed project are anticipated to be temporary with no net loss to species and some increases in habitat expected. As the EFH loss is temporary with a net habitat benefit for fisheries, there will be no mitigation credits needed.

3.2 Impacts Resulting From Project Operations

Effects of Shading

A potential long-term effect on biological resources from the construction of wharves, docks and promenades would be the shading of 5.29 acres of existing open water habitat available to EFH species. As shading does not eliminate the value of open water habitat, but may affect its function by varying degrees depending on the angle of the sun and how long the area is shaded, the actual impact of limited shading is not known. In order to determine the significance of changes in overwater shade and the degree to which the area is potentially affected, a study specific to southern California harbors analyzing the potential effects on managed fish species would be necessary to evaluate the significance properly. However, since the proposed Project would result in a net increase of EFH available of 6.82 acres of open water habitat, and only 5.29 acres are shaded, the evaluation of the effect of shading would not be necessary since there would be an overall increase of 1.53 acres of unshaded habitat. Since the new marine habitat area would be greater than the increase in covered area, the project would not reduce the area of EFH.

Only small amounts of kelp and eelgrass are found within the proposed waterfront construction site and the inconsequential shading would not affect biological populations or communities. The pilings and rock installed as part of the new waterfront project would also provide substrate hard-substrate organisms such as barnacles, mussels, and algae. Though these communities tend to be less diverse on vertical substrate such as sheet pile than on more rugose habitat such as riprap, these added resources would still benefit fish populations within Los Angeles Harbor.

Effects of Spills

Although, a large oil spill would likely spread to other areas of the Port, direct and indirect effects on habitats important for managed fish species and individuals of managed species would not adversely affect sustainable fisheries for the reasons described above. Additional impacts to EFH could occur as a result of large-scale spill cleanup activities. The extent and magnitude of impacts would depend on the cleanup methods used (e.g., physical collection and removal or chemical dispersants) and the type of habitat affected (Cox et al. 1980). Cleanup methods are closely evaluated by the on-scene spill coordinator based on a number of site and spill-specific conditions, including potentials for spill cleanup activities to reduce or exacerbate impacts to biological resources.

Effects of Invasive Species

Introduction of invasive species (from ballast water exchange or hull fouling, for example) could occur in the project area during operations. Invasive species could potentially result in altered habitats, modified predatory-prey relationships, and affect the abundance/distribution of native species. No feasible mitigation is currently available to totally prevent introductions of invasive species via vessel hulls, equipment, or ballast water, due to the lack of a proven technology. New technologies are being explored, and if methods become available in the future, they would be implemented as required at that time.

3.3 Mitigation

Since no significant adverse effects to EFH would result from the construction and operation of the proposed project, no mitigation is required. The proposed project would result in an increase in open water habitat, and enhancement of the Salinas de San Pedro Salt Marsh would provide ecological benefits to Los Angeles Harbor.

4.0 REFERENCES

City of Los Angeles, CA Department of Fish and Game, National Marine Fisheries Service, and US Fish and Wildlife Service. 1984. Memorandum of Understanding to Establish a Procedure for Advance Compensation of Marine Habitat Losses Incurred by Selected Port Development Projects within the Harbor District of the City of Los Angeles. Harbor Department Agreement # 1327.

City of Los Angeles, CA Department of Fish and Game, National Marine Fisheries Service, and US Fish and Wildlife Service. 1997. Memorandum of Understanding to Establish a Procedure for On-Site Compensation of Marine Habitat Losses Incurred by Port Development Landfills Within the Harbor District of the City of Los Angeles. Harbor Department Agreement # 1972.

Collette, B.B. and C.E. Nauen. 1983. FAO species catalogue. Vol. 2. Scombrids of the World. An annotated and Illustrated Catalogue of Tunas, Mackerels, Bonitos and Related Species Known to Date. FAO Fish. Synop. 125(2). 137 p.

Brewer, G.D. 1983. Fish Spawning in the Los Angeles-Long Beach Harbors: Comparison with Shallow Open Coast Habitats off Southern California. National Oceanographic and Atmospheric Administration, National Marine Fisheries Service, Port of Long Beach.

Cox, G. V., A. Barnett, J. R. Gould, K. G. Hay, J. Hirota, C. D. McAuliffe, and A. D. Michael. 1980. Oil Spill Studies: Strategies and Techniques. Sponsored by American Petroleum Institute, Bureau of Land Management, and National Oceanic and Atmospheric Administration. Pathotox Publishers, Inc. Park Forest South, Illinois.

Fitch, J.E. 1974. Offshore Fishes of California. Department of Fish and Game, Sacramento, California. 80 p.

Froese, R. and D. Pauly (eds.). 2005. FishBase. World Wide Web Electronic Publication. www.fishbase.org, version (10/2005).

HEP. See University of Southern California, Harbors Environmental Projects.

Horn, M.H. and L.G. Allen. 1981 A Review and Synthesis of Ichthyofaunal Studies in the Vicinity of Los Angeles and Long Beach Harbors, Los Angeles County, California. U.S. Fish and Wildlife Service.

Hunter, J.R. and S.R. Goldberg. 1980. Spawning Incidence and Batch Fecundity in Northern Anchovy, *Engraulis mordax*. Fish. Bull. 77(3):641-652.

Kailola, P.J., M.J. Williams, P.C. Stewart, R.E. Reichelt, A. McNee and C. Grieve. 1993. Australian fisheries resources. Bureau of Resource Sciences, Canberra, Australia. 422 p.

LAHD. See Los Angeles Harbor Department.

Los Angeles Harbor Department. 1993. Shell Oil Company, Mormon Island Lease Renewal, Environmental Improvements, and Transfer Facility Modifications. Final EIR. SCH No. 89092017. February.

Matarese, A.C., A.W. Kendall, D.M. Blood and M.V. Vinter. 1989. Laboratory guide to early life history stages of Northeast Pacific fishes. NOAA Tech. Rep. NMFS 80:1-652.

MBC. See MBC Applied Environmental Sciences.

MBC Applied Environmental Sciences. 1984. Outer Long Beach Harbor-Queensway Bay biological baseline survey. Prepared for the Port of Long Beach, Division of Port Planning, Contract HD-3628, August 1984.

MBC Applied Environmental Sciences 2007. Status of the Kelp Beds 2006 Ventura and Los Angeles Counties. Prepared for the Central Region Kelp Survey Consortium, June. 29 p. plus appendices.

MBC Applied Environmental Sciences 2008. In Prep. Status of the Kelp Beds 2007 Ventura and Los Angeles Counties. Prepared for the Central Region Kelp Survey Consortium, June. 29 p. plus appendices.

McCain, B.B., S.D. Miller, and W.W. Wakefield II. 2005. Life History, Geographical Distribution, and Habitat Associations of 82 West Coast Groundfish Species: A Literature Review. Northwest Fisheries Science Center - National Marine Fisheries Service. Seattle, WA. DRAFT – January 2005.

MEC. See MEC Analytical Systems, Inc.

MEC Analytical Systems, Inc. 1988. Biological Baseline and Ecological Evaluation of Existing Habitats in Los Angeles Harbor and Adjacent Waters. Final Report. Prepared for Port of Los Angeles.

MEC Analytical Systems, Inc. 1999. Port of Los Angeles Special Study. Prepared for Port of Los Angeles. August 1999.

MEC Analytical Systems, Inc. 2002. Ports of Long Beach and Los Angeles Year 2000 Biological Baseline Study. In Association With: Science Applications International Corporation, Merkel & Associates, Inc., Keane Biological Consulting, and Everest International Consultants. Prepared for the Ports of Long Beach and Los Angeles. June. 651 pp.

Merkel & Associates. 2005. Port of Los Angeles Eelgrass – Summer 2005. August 10-11, 2005. Cabrillo Beach and Adjoining Areas. Map. M&A # 02-085-02. October 7, 2005.

National Marine Fisheries Service. 2004. Final Report on the National Oceanic and Atmospheric Administration "Shipping Noise and Marine Mammals: A forum for science, management, and technology". Presented 18-19 May 2004. Arlington, Virginia. 40 pp.

National Marine Fisheries Service. 2005. Essential Fish Habitat. National Marine Fisheries Service.

NMFS. See National Marine Fisheries Service.

SAIC. See Science Applications International Corporation.

Science Applications International Corporation and MEC Analytical Systems, Inc. (SAIC and MEC). 1997. Biological Baseline Study of Selected Areas of Long Beach Harbor. Final Report. Submitted to Port of Long Beach. Contract No. HD-5394.

University of Southern California, Harbors Environmental Projects. 1980. The Marine Environment in Los Angeles and Long Beach Harbor During 1978. *In*: Marine Studies of San Pedro Bay, California, Part 17. D. Soule and M. Oguri, (eds.). The Office of Sea Grant and Alan Hancock Foundation, University of Southern California.

U.S. Army Corps of Engineers and Los Angeles Harbor Department. 1984. Appendices for Los Angeles/Long Beach Harbor Channel Improvements and Landfill Development.

U.S. Army Corps of Engineers and Los Angeles Harbor Department. 1992. Final EIS/EIR for Deep Draft Navigation Improvements, Los Angeles and Long Beach Harbors, San Pedro Bay, California. September.

U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. 2005. Final Environmental Impact Statement for the Site Designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay, Orange County, California. Prepared with the assistance of RECON Environmental.

USEPA and USACE. See U.S. Environmental Protection Agency and U.S. Army Corps of Engineers.

USACE and LAHD. See U.S. Army Corps of Engineers and Los Angeles Harbor Department.

Vagle, S. 2003. On the impact of underwater pile-driving noise on marine life. Report prepared for the Canadian Coast Guard, Department of Fisheries and Oceans, Canada (unpublished). 41 p.

Whitehead, P.J.P., G.J. Nelson and T. Wongratana. 1988. FAO Species Catalogue. Vol. 7. Clupeoid Fishes of the World (Suborder Clupeoidei). An Annotated and Illustrated Catalogue of the Herrings, Sardines, Pilchards, Sprats, Shads, Anchovies and Wolf-Herrings. Part 2 - Engraulididae. FAO Fish. Synop. 125(7/2):305-579.

PERSONAL COMMUNICATIONS

Curtis, M.D. 2008. Senior Scientist, MBC Applied Environmental Sciences, Costa Mesa, CA.