Appendix F3

Essential Fish Habitat Assessment

This page left intentionally blank

ESSENTIAL FISH HABITAT ASSESSMENT
APL TERMINAL PROJECT

EFH ANALYSIS

Prepared by
MBC *Applied Environmental Sciences*
Costa Mesa, California

and

Camp, Dresser, McKee
Irvine, California

for

Port of Los Angeles
San Pedro, California

November 7, 2011

This page left intentionally blank

TABLE OF CONTENTS

SECTION PAGE

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The Berths 302-306 (American President Lines [APL]) Container Terminal Project (the proposed Project) would expand the existing APL container terminal located on Terminal Island within Los Angeles Harbor (the Harbor) (**Figure 1**). This project would redevelop, expand, and operate the container terminal on Terminal Island. Essential Fish Habitat (EFH) is managed under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which is designed to protect waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (Magnuson-Stevens Act, 16 U.S.C. 1801 et seq.). This EFH Assessment was prepared pursuant to the Magnuson-Stevens Act to analyze potential impacts to federally managed fishes and invertebrates from construction and operation of the proposed Project.

2.0 PROJECT DESCRIPTION

The existing Berths 302-305 container terminal occupies approximately 291 acres, and the proposed Project would expand the terminal to 347 acres (see **Figure 1**). The proposed Project would redevelop, expand, and operate the container terminal at Berths 302-306 on Terminal Island in the Port of Los Angeles. Physical improvements proposed at the existing APL Terminal include adding cranes, modifying the main gate (conversion of existing outbound lanes to inbound lanes), modification of the in-gate processing area, and the relocation of out gates), converting a portion of the existing dry container storage unit area to a refrigerated container storage area with a permanent distributed electrical power source, replacement of the existing roadability inspection facility where container transport trucks are inspected after arriving containers are attached to the trailer, expanded power shop facilities to facilitate separation of tractor maintenance bays and marine offices into separate annex buildings, and installation of necessary infrastructure improvements. The proposed expansion of the terminal includes usage of 41 acres of new terminal container backlands on previously constructed landfill (created from approximately 1.6 million cubic yards (cy) of dredge material as part of the Channel Deepening Project in 2008), which has remained undeveloped and unused since its creation, nine acres at the former Los Angeles Export Terminal (LAXT) site, two acres of existing land northeast of the main gate, and four acres of new wharf area.

Improvements within the expansion areas would include: extension of the existing concrete wharf to the east by 1,250 linear feet (lf); addition of a new berth (Berth 306) with Alternative Maritime Power (AMP) receptacles and new cranes, paving and infrastructure for electric rail mounted gantry's (RMGs) within the new terminal container backlands; development of a new out-gate location; and addition of a parking area in the backlands behind Berth 301. The proposed Project also involves dredging the new berth (Berth 306) to -55 ft Mean Lower Low Water (MLLW).

Dredged sediments would be disposed of via three potential methods:

- Suitable sediments would be used as fill at the Cabrillo Shallow Water Habitat (CSWH) in the Outer Harbor;

- Suitable sediments could be used at the LA-2 Ocean Dredged Material Disposal Site (ODMDS); and
- Sediments unsuitable for unconfined aquatic disposal would be used at the Los Angeles Harbor Berths 243-245 CDF. Some suitable sediments could also be used at the CDF depending on the space availability at the CDF.

Environmental effects associated with disposal at the LA-2 ODMDS were evaluated during the site designation process for LA-3 (USEPA and USACE, 2005). Biological impacts due to construction and fill of the CDF, as well as expansion and fill of the CSWH, were evaluated in the *Final Supplemental Evironmental Impact Statement / Final Supplemental Environmental Impact Report (EIS/EIR) for the Port of Los Angeles Channel Deepening Project* (USACE and LAHD, 2009). This evaluation included mitigation for habitat loss at the Berths 243-245 CDF. A sediment characterization study was performed off proposed Berth 306 in 2010 (AMEC, 2011). Off Berth 306, the majority of the sediments were determined to be unsuitable for unconfined aquatic disposal. However, a small portion of the sediments may qualify for unconfined aquatic disposal.

Currently Eagle Marine Services, LTD (EMS) operates the existing 291 acre APL Terminal. The Terminal includes 261 acres covered by an existing lease (LAHD Permit No. 733) and an additional approximately 30 acres of adjacent backlands authorized for use under a month-to-month space assignment (Non-Exclusive Berth Assignment No. 01-31). The proposed Project would make available an additional 26 acres which would be operated by EMS under an amendment to the existing LAHD Permit No. 733. In addition, EMS would continue to utilize the 30 acres currently authorized for use under the month to month Non-Exclusive Berth Assignment No. 01-31. The term of the amended permit would remain unchanged (1998 to 2027), but the permit would be amended to include the additional 56 acres. The liner companies American President Lines (APL), Ltd. and APL Co. Pte Ltd., together doing business as “APL”, are the main EMS customers. EMS is a wholly owned subsidiary of American President Lines, Ltd.

Figure 1. Map of proposed Project area.

Construction of the proposed Project is anticipated to commence in 2012 and extend for approximately two years. The proposed Project would be constructed in two phases. Phase I consists of dredging, constructing Berth 306, installing AMP behind Berth 306, and improving the 41-acre fill site. Phase II consists of all other project modifications.

The proposed Project would take approximately two years to construct and would be operational until 2027, which is the duration of the current lease.

The primary project elements that could affect the marine environment, including EFH, include:

- Dredging and disposal of approximately 20,000 cy of sediment,
- Extending the wharf to Berth 306 by 1,250 lf (an area of approximately four acres),
- Operating the terminal until 2027.

Six alternatives to the proposed Project are also considered. There is no dredging or wharf construction proposed for Alternatives 1 through 4; therefore, potential impacts from EFH would only be related to runoff from the terminal and future vessel operations. Alternatives 5 and 6 would include wharf construction at Berth 306, and dredging and disposal of approximately 20,000 cy of sediment from Berth 306.

3.0 DESCRIPTION OF THE STUDY AREA

The site of the proposed Project is on Terminal Island in the Port of Los Angeles (**Figure 1)**. The Los Angeles-Long Beach Harbor Complex (Port Complex) was historically an estuary formed at the mouth of the San Gabriel and Los Angeles Rivers with extensive mudflats and marsh areas. The natural mudflats and marshlands provided habitat for birds, fish, and invertebrates. Urbanization and development led to the construction and modifications associated with the Port Complex. Dredging, filling, channelization, and construction over the past 100 years has completely altered the local estuarine physiography. The Los Angeles River course and the harbor area are no longer true estuaries because they do not maintain significant year-round fresh water input, and the biota are not distributed along salinity gradients as in most estuarine systems.

The habitats available for plants and animals have also changed as a result of harbor modifications. Very little sandy beach, shallow subtidal, and salt marsh habitats remain. Dredge and fill activities have resulted in changes to the benthic (bottom) habitat. The placement of shoreline structures, such as bulkheads, riprap, and pier pilings, has greatly increased the hard substrate available for fouling organisms, including mussels and barnacles. The construction of the breakwaters greatly affected water movement patterns within the Port Complex, which in turn affected overall circulation and water quality.

3.1 Physical Features

The Port Complex consists of Inner, Middle, and Outer Harbors. Just north of the breakwaters, the Outer Harbors consist of deeper, open water habitat, and channels that lead to basins and slips in the Middle and Inner Harbors. The channels, basins, and slips vary in size and distance from the harbor entrances. In Los Angeles Harbor, the channels were recently dredged to --53 ft.

During the mid-1900s, three breakwaters (i.e., San Pedro, Middle, and Long Beach) were constructed to protect the harbors from damaging wave action. Combined, these structures are also referred to as the Federal Breakwater. From the mid-1900s on, the development of the Port Complex continued with a series of dredge and fill operations to deepen channels and accommodate deep draft vessels, and provide fill for additional shoreline areas necessary for terminal development.

Los Angeles Harbor is the number one port by container volume and cargo value in the United States, handling 6.7 million TEUs (twenty-foot equivalent units) in calendar year 2009. In addition, the Harbor provides berthing for cruise ships, sportfishing vessels, commercial fishing vessels, pleasure boaters, and Harbor support vessels. The physical size of the Harbor, diversity of Harbor uses, and ongoing upgrade and development projects results in continuous Harbor modifications. Thus, Harbor waters are subjected to continuous vessel traffic and periodic construction or modification, such as dredging and filling. Commercial vessels and recreational boats produce high levels of underwater noise; ambient noise in San Francisco Bay/Oakland Harbor has been estimated at 120 to 155 dB_{PEAK} (or the peak sound pressure level in decibels) (ICF and Illingworth and Rodkin, 2009). By comparison, ambient noise in the open ocean has been estimated at 74 to 100 dB_{PEAK} on the central California coast (ICF and Illingworth and Rodkin, 2009).

3.1.1 Water Quality Parameters

Waters within the Port Complex are primarily marine (saline), though there are fresh water inputs from regulated discharges, urban runoff, and flows from Dominguez Channel and the Los Angeles River. In July 2008, three stations were sampled near the APL Terminal (in the Channel off Berth 303, in the Shallow Water Habitat, and in the Seaplane Lagoon). During that sampling event, water temperatures ranged between 15.8° and 23.5°C (60° to 74°F), dissolved oxygen ranged from 4.38 to 9.69 mg/L, hydrogen ion concentration (pH) ranged from 7.19 to 7.48, salinity ranged from 33.3 to 33.5 parts per thousand (ppt), and light transmission averaged 14.4 to 72.3 percent (SAIC, 2010). The pH values were unusually low for marine waters and are not typical of those found commonly in Los Angeles Harbor (MEC and Associates, 2002; LAHD, 2009). Results of quarterly water quality studies in 2000 at four stations near APL Terminal (in the Channel off Berth 303, two stations in the Shallow Water Habitat, and in the Seaplane Lagoon) indicated water temperatures averaged 15.0° to 18.9°C (59° to 66°F), dissolved oxygen averaged 5.97 to 8.13 mg/L, pH averaged 7.91 to 8.05, salinity averaged 33.2 to 33.4 ppt, and light transmission averaged 22.4 to 54.9 percent (MEC and Associates, 2002).

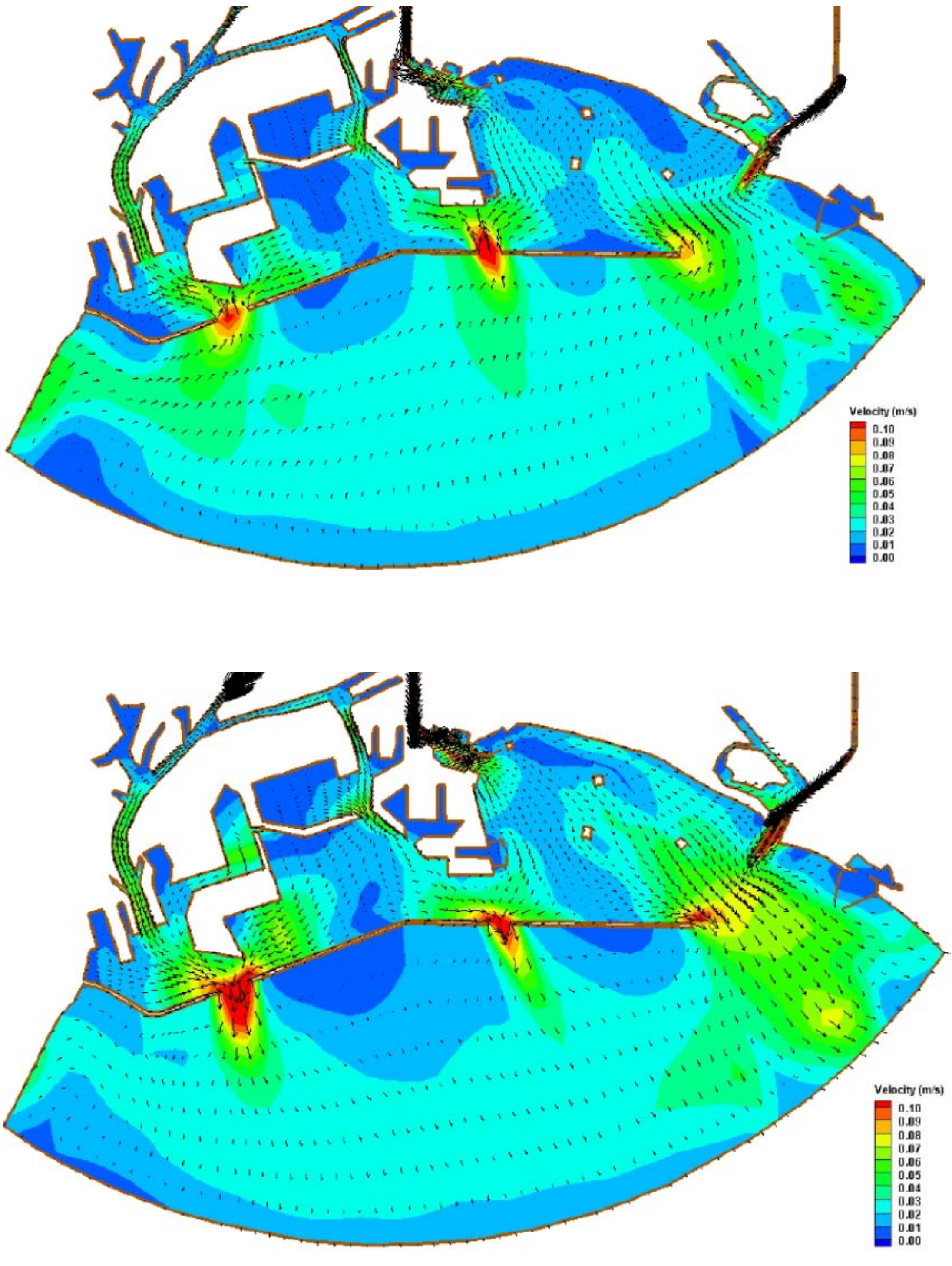
3.1.2 Tides and Currents

Tides in southern California are classified as mixed, semi-diurnal, with two unequal high tides (lower high water and higher high water) and two unequal low tides (higher low water and lower low water) each lunar day (approximately 24.5 hr). Since 2003, water level extremes in Outer Los Angeles Harbor ranged from -2.34 ft to + 7.92 ft (-0.71 m to +2.41 m) MLLW (NOAA, 2010).

To better understand circulation patterns and watershed inputs into the Port Complex, the Ports undertook a program to develop a hydrodynamic and water quality model for the Port Complex to improve their predictions of the effectiveness of current and future control measures (the WRAP Model) (POLA and POLB, 2009).

Circulation patterns are established and maintained by tidal currents. Flood tides in the Port Complex flow into the Harbor and up the channels, while ebb tides flow down the channels and out of the Harbor (POLA and POLB, 2009). The Port Complex is protected from incoming waves by three breakwaters: the San Pedro, Middle, and Long Beach Breakwaters, also referred to as the Federal Breakwater. In addition to protecting the ports from waves, the breakwaters reduce the exchange of the water between the Port Complex and the rest of San Pedro Bay, hence creating unique tidal circulation patterns. Modeled current direction and velocity throughout the Port Complex during both ebb and flood tides is summarized in **Figure 2**.

Figure 2. Current patterns in Los Angeles and Long Beach Harbors predicted by the WRAP Model (POLA and POLB, 2009). **Top: Typical flood tide currents. Bottom: Typical ebb tide currents.**



3.2 HABITATS OF THE PORT COMPLEX

The following sections describe the aquatic biological habitats and communities in the vicinity of the proposed project.

3.2.1 Habitat Variation

The habitats available for plants and animals within the Port Complex have changed through time as a result of harbor modifications. Very little sandy beach and shallow subtidal habitats remain, and salt marsh habitat is essentially absent within the Port Complex. Dredge and fill activities have resulted in ongoing changes to the seafloor throughout the Port Complex. During the 2000 studies of the Port complex, sediments in the channel off Berth 305 were primarily silt (52 percent) and clay (32 percent) with a mean grain size of 8 μm (MEC and Associates, 2002). Sediments at two stations in the Shallow Water Habitat were coarser, and primarily sand (79 percent and 50 percent) and silt (12 percent and 33 percent), with mean grain sizes of 79 μm and 22 μm. Sediments in the Seaplane Lagoon more closely resembled those off Berth 305, consisting primarily of silt (57 percent) and clay (38 percent) with a mean grain size of 5 μm.

Giant kelp (*Macrocystis pyrifera*) distribution in the Port Complex is limited to the outer breakwaters, and riprap structures in the Outer Harbors that face harbor entrances (SAIC, 2010). The placement of shoreline structures, such as bulkheads, riprap, and pier pilings, has greatly increased the hard substrate available for algae and sessile organisms, including mussels and barnacles. The construction of the breakwaters greatly affected water movement patterns within the Port Complex, which in turn affected overall circulation and water quality. Eelgrass (*Zostera marina*) occurs in a few places in Los Angeles Harbor (Cabrillo and Pier 300). Surveys of the Port Complex in 2000 and 2008 documented eelgrass beds along Cabrillo Beach and in three areas near Pier 300: the Seaplane Lagoon, a mitigation site at the Shallow Water Habitat, and on the northeastern side of Pier 300 (MEC and Associates, 2002; SAIC, 2010). Eelgrass was also recently discovered in Cabrillo Way Marina (Los Angeles Harbor) and Cerritos Channel (Long Beach Harbor).

Pilings that support piers and wharves are prevalent along the edges of harbor channels. Many fish species are attracted to the structure, such as surfperches and some rockfishes (e.g., black rockfish). Pier pilings support intertidal/subtidal invertebrate communities, such as algae, barnacles, and mussels that are fed upon by fishes and other invertebrates. Riprap provides similar habitat as natural reefs. As with pier pilings, riprap supports diverse invertebrate communities, but also provides habitat, shelter, and forage opportunities for fishes.

3.2.2 Nursery Grounds

The role as a nursery grounds for juveniles of coastal fish species is probably the most widely recognized and accepted function of bays and estuaries in their status as important fish habitats (Allen et al., 2006). In southern California, harbors provide nearshore habitats that supplement, but do not adequately replace, the habitats of natural bays and estuaries (Cross and Allen, 1993). The subtidal areas of the Port Complex provide several habitat types that support a diverse and abundant fish community. Due to its physiography and biological assemblages, the Port Complex is also considered a nursery for several fish species. MEC and Associates (2002) found that juvenile white croaker (*Genyonemus lineatus*) prefer deepwater basins and slips within the Port Complex, although a greater variety of fish, such as bat rays (*Myliobatis californica*), California halibut (*Paralichthys californicus*), diamond turbot (*Pleuronichthys guttulatus*), queenfish (*Seriphus politus*), and topsmelt (*Atherinops affinis*) use the shallow waters of the harbors as nursery grounds.

Several features of bays and estuaries may be important to settling species, such as California halibut, including warmer water temperatures, decreased turbulence, finer sediments, and different biological communities compared with those on the open coast. MBC (1991) determined densities of recently settled California halibut in southern California increased with decreasing depth. The semi-protected waters of Queensway Bay and Outer Harbors are also important habitats for juvenile fishes and invertebrates. Recently transformed cheekspot goby (*Ilypnus gilberti*), California tonguefish (*Symphurus atricaudus*), white croaker, and queenfish were the most abundant juvenile fishes collected in seasonal surveys of Queensway Bay using beam trawls in 1990–1991 and 1994 (MBC, 1994).

4.0 FISH AND INVERTEBRATE COMMUNITIES

4.1 FISH DIVERSITY

The 2000 Biological Baseline Study (MEC and Associates, 2002), the Biological Surveys of 2008 (SAIC, 2010), as well as long-term monitoring data from Back Channel in Long Beach Harbor (MBC, 2009a) and West Basin in Los Angeles Harbor (MBC, 2009b) have documented a fish community that appears to have changed little in decades. The 2000 and 2008 surveys used several gear types to adequately characterize different habitat types within the Port Complex. The long-term trawl surveys in Los Angeles and Long Beach Harbor used otter trawls, which target demersal (epibenthic) fish (MBC, 2009a,b). In various biological studies, more than 130 fish species have been collected within the Port Complex, with 60 to 70 of those species commonly occurring (MEC, 1988; MEC and Associates, 2002; SAIC, 2010).

Ichthyoplankton

A comprehensive, year-long study of the ichthyoplankton (fish eggs and larvae) of the Port Complex was performed from January through December 2006 (MBC et al., 2007). The study also analyzed the abundance and distribution following larval shellfish taxa: crab megalopa, market squid (*Doryteuthis opalescens*, formerly *Loligo opalescens*) paralarvae, and California spiny lobster (*Panulirus interruptus*) phyllosoma. As part of this study, one entrainment station in Inner Los Angeles Harbor was sampled weekly, and a total of six source water stations positioned throughout the Port Complex were sampled monthly (**Figure 3**).

A total of 8,692 larval fishes representing 48 taxa was collected from entrainment station E1 (in Inner Los Angeles Harbor) during 26 surveys in 2006. In addition, 14,845 fish eggs from 10 taxa were enumerated in the entrainment samples. Unidentified gobies (*Clevelandia*, *Ilypnus*, and *Quietula* [CIQ] goby complex), yellowfin goby (*Acanthogobius flavimanus*), white croaker, and bay goby (*Lepidogobius lepidus*) were the four most abundant taxa comprising nearly 90 percent of the specimens collected.

Nearly 50 percent of the fish eggs could not be identified to species. Larval abundance peaked in March 2006 and was lowest in September, while fish eggs were most abundant in February 2006. Fish larvae were generally more abundant at night than during the daytime, but there was less of a diel difference with fish eggs.

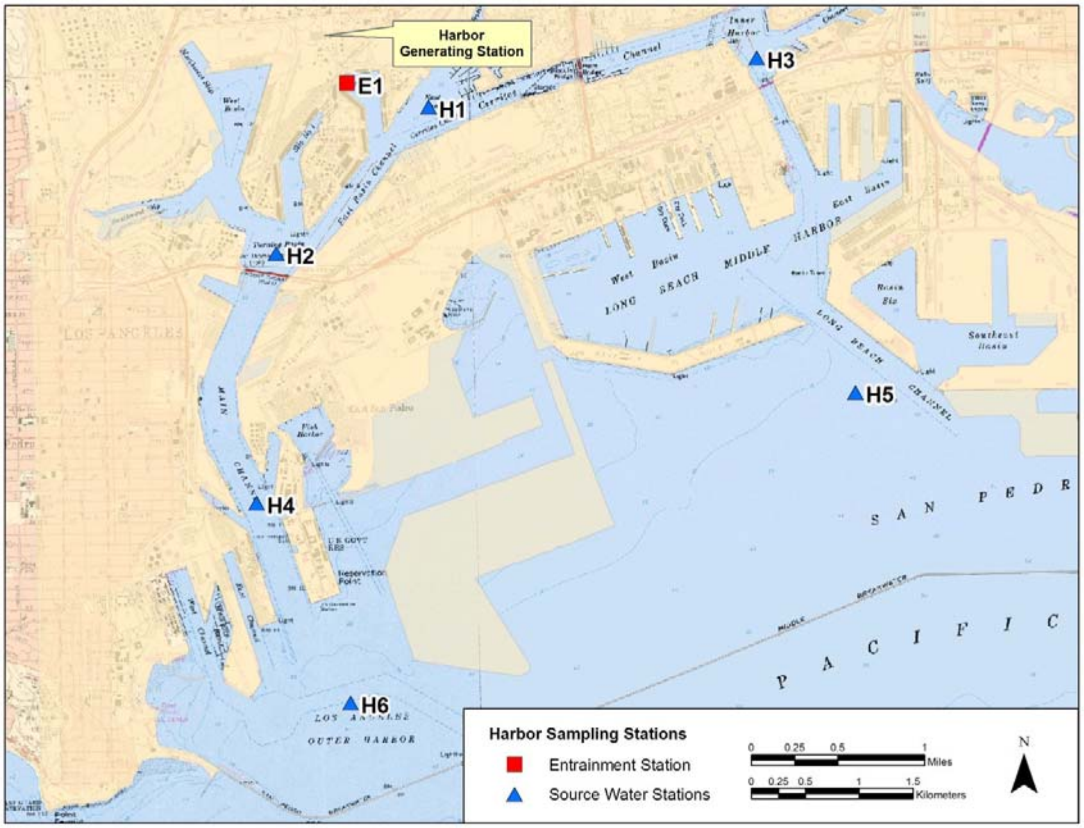


Figure 3. Entrainment and source water stations sampled January-December 2006. From: MBC et al. [2007]).

A total of 14,025 larval fishes representing 72 taxa was collected from the six source water stations (H1-H6) in the Port Complex during 12 monthly surveys in 2006 (MBC et al., 2007). White croaker, combtooth blennies (*Hypsoblennius* spp.), unidentified gobies (CIQ goby complex), anchovies (Engraulidae), bay goby, unidentified croakers (Sciaenidae) and yellowfin goby were the most abundant taxa and comprised nearly 90 percent of all specimens collected. The greatest concentrations of larval fishes occurred during May 2006 and the fewest in November 2006. Damaged fishes that could not be positively identified comprised 2 percent of the total collection.

Three ichthyoplankton surveys were conducted at stations throughout the Port Complex in February, April, and July 2008 (SAIC, 2010). A total of 71 different larval taxa were identified during the study, and the most abundant taxa were CIQ gobies (45 percent), combtooth blennies (34 percent), bay goby (9 percent), and clingfishes (Gobiesocidae; 3 percent). Overall, densities were lowest in surface waters (38.9

larvae per 100 m^3), and higher in the epibenthos (134 larvae per 100 m^3) and midwater (139 larvae per 100 m^3). The average weighted mean larval abundance was highest in shallow Outer Harbor areas (1,523 larvae per 100 m^2), lowest in the deeper Outer Harbor areas (1,157 larvae per 100 m^2), and intermediate in Inner Harbor areas (1,297 larvae per 100 m^2). Larval density was substantially higher in July (2,889 larvae per 100 m^2) than in February or April (566 and 426 larvae per 100 m^2, respectively).

Juvenile and Adult Fishes

MEC and Associates (2002) found little variability in the abundance of pelagic, schooling fishes, between the Inner and Outer Harbor areas of the Port Complex. In contrast, deepwater habitats of the Outer and Middle Harbors generally had greater number, biomass, and diversity of demersal fishes than Inner harbor areas. However, species diversity was generally consistent throughout the year. In 2000, a total of 76 taxa representing 74 unique species was collected from the Port Complex using a combination of gear types designed to capture demersal, pelagic, and schooling fishes. Non-indigenous species comprised about 15 percent of the invertebrate species that inhabit the Port Complex. The most abundant fish species in the Port Complex, in order of decreasing abundance, were northern anchovy (*Engraulis mordax*), white croaker, queenfish, Pacific sardine (*Sardinops sagax*), topsmelt, specklefin midshipman (*Porichthys myriaster*), and California tonguefish.

Consistent with the 2000 studies, there was little variability in the abundance of pelagic fishes between Inner and Outer Harbor areas, attributed to the highly mobile nature of most pelagic fishes (SAIC, 2010). There were also no apparent spatial patterns in the demersal fishes. A total of 62 taxa representing at least 58 species was collected using multiple gear types in 2008. More species were collected with otter trawl (62) than with lampara (20) or beach seine (at least 8) in 2008. The lampara catch was highest in January, and the trawl catch was highest in July. Shallow water fishes sampled by beach seine were most abundant at Pier 300 in April and July, but at Cabrillo Beach abundance peaked in January.

Long-term surveys of demersal fishes and invertebrates have been conducted in the West Basin of Los Angeles Harbor (MBC, 2008, 2009b). At least 41 species of fishes have been collected since 1978, although only about 14 species are collected annually on average. Abundance has been dominated by white croaker, northern anchovy, bay goby, and queenfish, which combined account for nearly 95 percent of the long-term abundance. In 2009, abundance and species richness in summer were substantially greater than that in winter. The most abundant fish species collected in 2009 included bay goby (25 percent of the total), white croaker (22 percent), yellowchin sculpin (*Icelinus quadriseriatus*; 11 percent), white seaperch (*Phanerodon furcatus*; 10 percent), and shiner perch (*Cymatogaster aggreagata*; 9 percent) (MBC, 2010).

4.2 Invertebrate Diversity

Planktonic Invertebrates

A total of 2,262 larval target shellfishes (late-stage larvae of crabs, spiny lobsters, and market squid) representing 16 taxa was collected at the HGS entrainment station (Station E1) during 26 bi-weekly surveys in 2006 (**Figure 3**; MBC et al., 2007). The highest concentrations were collected in May 2006.

The megalops stage of kelp crabs (*Pugettia* spp.), spider crabs (Majidae), and pea crabs (*Pinnixa* spp.) comprised over 90 percent of all specimens collected. Advanced larvae of species with commercial fishery value (i.e., cancer crabs [Cancridae], California spiny lobster, market squid) each comprised less than 1 percent of the target shellfish collection.

A total of 6,942 larval target shellfishes representing 20 taxa (combined species designations) was collected from the six source water stations (Stations H1-H6) in the Port Complex during 12 monthly surveys in 2006 (**Figure 3**; MBC et al., 2007). The highest concentrations were collected during the May 2006 survey. Megalops of kelp crabs, pea crabs, spider crabs, unidentified megalops, California spiny lobster, and cancer crabs were the most abundant taxa and comprised over 90 percent of all specimens collected.

Juvenile/Adult Invertebrates

During the biological baseline surveys of 2000, a total of 63 epibenthic macroinvertebrate taxa representing 61 unique species were collected throughout the Port Complex (MEC and Associates, 2002). Five species comprised 95 percent of total abundance: blackspotted bay shrimp (*Crangon nigromaculata*; 51 percent), tuberculate pear crab (*Pyromaia tuberculata*; 28 percent), Xantus swimming crab (*Portunus xantusii*; 10 percent), New Zealand bubble snail (*Philine auriformis*; 5 percent), and spotwrist hermit crab (*Pagurus spilocarpus*; 1 percent). On average, mean abundance was higher at deep-water stations than at shallow stations, and abundance and species richness were significantly greater in winter (February) than any other season. In the Back Channel of Long Beach Harbor, blackspotted bay shrimp comprised 76 percent of the trawl-caught abundance in 36 surveys between 1980 and 2008 (MBC, 2009a). Tuberculate pear crab and New Zealand bubble snail comprised 10 percent and 3 percent of the total abundance, respectively.

In 2008, at total of 61 epibenthic macroinvertebrate taxa were collected throughout the Port Complex (SAIC, 2010). Five species accounted for 86 percent of total abundance: blackspotted bay shrimp (38 percent), ridgeback rock shrimp (*Sicyonia ingentis*; 16 percent), blacktail bay shrimp (*Crangon nigricauda*; 14 percent), Xantus swimming crab (11 percent), and unidentified shrimp (*Heptacarpus* spp.; 8 percent). No apparent patterns in the spatial or depth distributions of invertebrates were identified during the study, although Xantus swimming crab was generally more abundant in shallower habitats. Three of the five most abundant taxa were collected at every station. Abundance was higher in the winter and spring surveys than in summer.

In West Basin of Los Angeles Harbor, trawl-caught invertebrate abundance since 1978 has been dominated by bay shrimp (*Crangon* spp.; 52 percent), tuberculate pear crab (5 percent), New Zealand bubble snail (2 percent), and yellow crab (*Metacarcinus anthonyi*; <1 percent). In 2009, abundance and species richness in summer were substantially greater than that in winter. The most abundant macroinvertebrates collected in 2009 included Alaska bay shrimp (*Crangon alaskensis*; 79 percent of the total) and blackspotted bay shrimp (12 percent) (MBC, 2010).

4.3 PROTECTED SPECIES

Some fish and invertebrate species (e.g., abalone) in southern California are protected under California Department of Fish and Game (CDFG) regulations, although few marine species are listed as either threatened or endangered. Special-status fish species that could occur in Los Angeles Harbor include garibaldi (*Hypsypops rubicundus*), and California grunion (*Leuresthes tenuis*); habitat in the Port Complex is unsuitable for tidewater goby (*Eucyclogobius newberryi*).

Garibaldi, designated as the California state marine fish, is a bright orange shallow-water species that is relatively common around natural and artificial rock reefs in southern California. Because of its territorial behavior it is an easy target for fishers and could be significantly depleted if not protected. Garibaldi spawn from March through October, and the female deposits demersal adhesive eggs in a nest that may contain up to 190,000 eggs deposited by several females (Fitch and Lavenberg, 1975). Larval duration ranges from 18–22 days (mean of 20 days) based on daily incremental marks on otoliths in recently settled individuals (Wellington and Victor, 1989). Garibaldi larvae were collected in the Long Beach Outer Harbor and in Fish Harbor in 2008 (SAIC, 2010).

California grunion is a species with special status not because the population is threatened or endangered, but because their spring-summer spawning activities on southern California beaches puts them at risk of overharvesting, and CDFG actively manages the fishery to ensure sustainability. Spawning occurs only three or four nights following each full or new moon, and then only for 1 to 3 hours immediately after the high tide, from late February to early September (Walker, 1949). The female swims onto the beach, digs tail-first into the wet sand, and deposits her eggs, which are then fertilized by the male. Normally, the eggs are triggered to hatch at the high tide of the subsequent new or full moon by the waves that reach high enough on shore to wash out the sand and carry the eggs to the ocean, approximately 10 days after fertilization (Walker, 1952). California grunion were collected at most of the lampara stations during the 2008 biological surveys of the Port Complex (SAIC, 2010). No spawning is known to occur in the immediate vicinity of the proposed Project.

The tidewater goby is a fish species endemic to California and is listed as federally endangered. The tidewater goby is threatened by modification and loss of habitat resulting primarily from coastal development. It appears to spend all life stages in lagoons, estuaries, and river mouths (Swift et al., 1989), but may enter marine environments when flushed out of these preferred habitats during storm events. Adults or larvae may not survive for long periods in the marine environment, but larval transport over short distances may be a natural mechanism for local dispersal. In Los Angeles County the only known location where a population is extant (by re-establishment) is Malibu Creek (Swift et al., 1993), and habitat near the proposed Project is not suited for establishment of this species.

Off southern California, species managed under the Magnuson-Stevens Fishery Conservation and Management Act are listed in the Coastal Pelagics Fishery Management Plan (FMP) and the Pacific Groundfish FMP. A discussion of these species is provided in Section 5.

5.0 EFH AND MANAGED SPECIES

Essential Fish Habitat is managed under the Magnuson-Stevens 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, 2002).

NMFS (2002) defines specific EFH terms as follows (50 Code of Federal Regulations [C.F.R.] §§ 600.05–600.930):

• "Waters" include all aquatic areas and their associated biological, chemical, and physical properties that are used by fish and may include aquatic areas historically used by fish where appropriate.

• "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities.

• "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "Spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle".

Fish and invertebrate communities of the study area are presented in Section 4.0 of this report.

5.1 FISHERY MANAGEMENT PLANS

Under the Magnuson Act, the federal government has jurisdiction to manage fisheries in the U. S. Exclusive Economic Zone (EEZ), which extends from the outer boundary of state waters (3 nm (5.6 km) from shore) to a distance of 200 nm (370 km) from shore. Fishery Management Plans (FMPs) are extensive documents that are regularly revised and updated. The goals of the management plans include, but are not limited to: the promotion of an efficient and profitable fishery, achievement of optimal yield, provision of adequate forage for dependent species, prevention of overfishing, and development of long-term research plans (PFMC, 1998, 2008a). There are two FMPs that include waters adjacent to the proposed project site: the Coastal Pelagics FMP (6 species), and the Pacific Groundfish FMP (89 species).

5.1.1 Coastal Pelagics

Until 2008, the Coastal Pelagics FMP covered one invertebrate (market squid) and four fish species (northern anchovy, jack mackerel [*Trachurus symmetricus*], Pacific [chub] mackerel [*Scomber japonicus*], and Pacific sardine). Amendment 12 to the FMP was finalized in 2009 "to ensure the preservation of a key trophic relationship between fished and unfished elements in the California Current ecosystem by protecting krill resources off the U. S. West Coast" (PFMC, 2008b; FR 74[132]33372-3). Krill (euphausiids) are small, shrimp-like crustaceans that serve as the basis of the marine food chain. They are eaten by many species of fish, whales, and seabirds. Although there was no fishery for krill off the U.S. West Coast, krill are fished in Antarctica, Japan, and off the west coast of Canada. They are used in aquaculture and livestock feed and for fish bait and pet foods. EFH for Coastal Pelagics is defined as all marine and estuarine waters from the shoreline of the coasts of California, Oregon, and Washington offshore to the limits of the EEZ and above the thermocline. The thermocline is the portion of the water column where water temperature changes rapidly, usually warmer surface waters transitioning to cooler subsurface waters. The habitat for the Coastal Pelagics is primarily above the thermocline.

5.1.2 Pacific Groundfish

There are 89 fish species covered under the Pacific Groundfish FMP, including ratfish (*Hydrolagus colliei*), finescale codling (*Antimora microlepis*), Pacific rattail (*Coryphaenoides acrolepis*); three species of sharks, three skates; six species of roundfish; 62 species of scorpionfishes and thornyheads; and 12 species of flatfishes. For Pacific Groundfish, EFH includes all waters off southern California between Mean Higher High Water (MHHW) and depths less than or equal to 11,483 ft (3,500 m). The FMP also considers EFH to include areas of the upriver extent of saltwater intrusion. Lastly, specific Habitat Areas of Particular Concern (HAPCs) have been identified as: estuaries, canopy kelp, seagrass, rocky reefs, and other specific areas (such as seamounts).

5.2 Relevant Species

Although there are nearly 100 fish/invertebrate species covered under the Coastal Pelagics and Pacific Groundfish FMPs, not all occur near the proposed project site. **Table 1** lists species that have been collected or observed during studies near the project site, including the Port Complex.

5.2.1 Coastal Pelagics

Two coastal pelagics—northern anchovy and Pacific sardine—are likely to occur in the vicinity of the proposed Project. As summarized in Section 4, northern anchovy is among the most common and abundant fish species in the Port Complex. In 2006, larvae were present in the Port Complex during two seasonal periods, a greater peak in March-July and a lesser peak in October-December (MBC et al., 2007). Juvenile and adult anchovies have consistently been collected during fish sampling near the proposed project site (MEC and Associates, 2002; SAIC, 2010). Northern anchovy are found from the surface to depths of 1,017 ft (310 m), though juveniles are generally more common inshore and in estuaries (Davies and Bradley, 1972).

Table 1. Managed fish/invertebrate species potentially occurring in Los Angeles Harbor based on past occurrences.

Common name	Potential Habitat Use	Occurrence: Larval[1,2,4]	Occurrence: Juvenile/Adult[2,3,4,5]
Coastal Pelagics			
northern anchovy (*Engraulis mordax*)	Open water.	Abundant	Abundant
Pacific sardine (*Sardinops sagax*)	Open water.	Uncommon	Common
Pacific (chub) mackerel (*Scomber japonicus*)	Open water, juveniles off sandy beaches and around kelp beds.	-	Uncommon
jack mackerel (*Trachurus symmetricus*)	Open water, young fish over shallow banks and juveniles around kelp beds.	Rare	Uncommon
market squid (*Doryteuthis opalescens*)	Open water. Rare near bays, estuaries, and river mouths.	Rare	-
Pacific Groundfish			
English sole (*Parophrys vetulus*)	Soft bottom habitats.	Rare	Uncommon
Pacific sanddab (*Citharichthys sordidus*)	Soft bottom habitats.	Rare	Common
butter sole (*Isopsetta isolepis*)	Soft bottom habitats.	Rare	-
black rockfish (*Sebastes melanops*)	Along breakwater, near deep piers and pilings. Associated with kelp, eelgrass, high relief reefs.	-	Rare
bocaccio (*Sebastes paucispinis*)	Multiple habitat associations, including soft and hard bottom, kelp, eelgrass, etc.	-	Rare
brown rockfish (*Sebastes auriculatus*)	Multiple habitat associations but prefer hard substrata and rocky interfaces.	-	Rare
calico rockfish (*Sebastes dallii*)	Multiple habitat associations but prefer hard substrata and rocky interfaces.	-	Rare
California scorpionfish (*Scorpaena guttata*)	Benthic, on soft and hard bottoms, as well as around structures.	-	Uncommon
grass rockfish (*Sebastes rastrelliger*)	Common on hard substrate, kelp, and eelgrass habitats.	-	Rare
kelp rockfish (*Sebastes atrovirens*	Common on hard substrate, kelp; reported along breakwater.	-	Rare
olive rockfish (*Sebastes serranoides*)	Common around hard substrate, kelp; reported along breakwater.	-	Rare
vermilion rockfish (*Sebastes miniatus*)	Juveniles over soft-bottom and kelp, adults associated with hard substrate.	-	Uncommon
lingcod (*Ophiodon elongatus*)	Multiple habitat associations but prefer hard substrata and rocky interfaces.	-	Rare
cabezon (*Scorpaenichthys marmoratus*)	Multiple habitat associations but prefer hard substrata and rocky interfaces.	Rare	Rare
Pacific hake (*Merluccius productus*)	Common offshore, juveniles in open water.	Rare	-

leopard shark (*Triakis semifasciata*)	Multiple habitat associations, including soft bottoms, and near structure, kelp, and eelgrass.	N/A	Rare
spiny dogfish (*Squalus acanthias*)	Pelagic and on muddy bottoms.	N/A	Rare
big skate (*Raja binoculata*)	Soft bottom habitat.	N/A	Rare
California skate (*Raja inornata*)	Soft bottom habitat.	N/A	Uncommon
Sources: 1 – MBC et al. (2007), 2 – MEC and Associates (2002), 3 – MBC (2009a,b), 4 – SAIC (2010), 5 – MEC (1999). N/A = Not applicable, internal fertilization. Abundant>Common>Uncommon>Rare. Note - Most rockfish larvae not identifiable to species.			

Pacific sardine were not abundant during 2006 ichthyoplankton sampling throughout the Port Complex; two sardine larvae were collected in the Outer Harbor in April 2006 (MBC et al., 2007). This species is also found less frequently than northern anchovy near the project site (MEC and Associates, 2002; SAIC, 2010). Pacific sardine is epipelagic, occurring in loosely aggregated schools (Wolf et al., 2001).

Jack mackerel and Pacific mackerel have been collected in Los Angeles Harbor, but in much lower frequency and numbers than northern anchovy and Pacific sardine. While no mature market squid have been reported in recent surveys, market squid paralarvae were collected in Inner and Outer Harbor areas in 2006 (MBC et al., 2007). All coastal pelagics are associated with the water column (as opposed to the seafloor like many of the groundfish); however, female squid also lay egg masses on sandy bottoms during spawning (at depths of about 16-180 ft [5-55 m], with most occurring between 66-115 ft [20-35 m]) (PFMC, 2008a).

5.2.2 Pacific Groundfish

None of the species covered under the Pacific Groundfish FMP are considered abundant in the proposed Project area. However, many are associated with hard substrate, kelp, and/or eelgrass, which are less frequently sampled habitats than soft bottoms. Pacific sanddab (*Citharichthys sordidus*) is considered common in the study area since it was collected by trawl in all three of the harbor-wide biological studies, though not in great numbers (MEC 1988; MEC and Associates, 2002; SAIC, 2010). One individual was collected in 1986, 51 were collected in 2000, and 171 were collected in 2008. English sole (*Parophrys vetulus*) has also been collected during all three trawl studies, but in relatively low numbers: one individual in 1986, three individuals in 2002, and 24 individuals in 2008. Larvae of English sole were also collected in 2008. English sole prefer soft bottoms from 60 to 1,000 ft (18-305 m), while Pacific sanddab are found between 30 and 1,800 ft (9-549 m)(Miller and Lea, 1972).

A total of 23 California skate (*Raja inornata*) were collected by trawl during the biological surveys of the Port Complex in 2008. Although they have been collected in other studies of the Port Complex, no big skate (*Raja binoculata*) were collected in 2008 (MEC and Associates, 2002). Like English sole, California skate has been collected in all three harbor-wide biological surveys, whereas big skate was only collected in 2002. Both skate species prefer soft bottom habitat, although California skate occurs in much deeper waters (60-2,200 ft) than big skate (10-360 ft) (Miller and Lea, 1972). California scorpionfish (*Scorpaena guttata*) is another species collected in all three harbor-wide surveys, with 11 individuals in 2008. Vermilion rockfish (*Sebastes miniatus*) was only collected in 2002 (four individuals) and 2008 (20 individuals). Vermilion rockfish occur between 20-1,440 ft (6-436 m), but are most common between 165-495 ft (50-150 m). Juveniles are common in shallower water (20-120 ft, or 6-36 m), where they hover over sand patches near alga or structures, including pier pilings (Love et al., 2002). The remaining species in Table 1 have only been collected sporadically and in low numbers.

6.0 ASSESSMENT OF POTENTIAL IMPACTS

The following section includes a discussion of potential impacts resulting from both the construction and operation of the proposed Project. Potential effects to the marine environment could result from:

- Dredging and disposal of approximately 20,000 cy of sediment alongside Berth 306 to achieve the desired design depth,
- Extension of the wharf to Berth 306 by 1,250 lf,
- Spills from shore or from vessels at the terminal,
- Introduction of invasive species.
- Construction and operational noise.

The assessment of impacts is based on the assumption that the proposed Project would include the following:

- Coverage under the General Construction Activity Storm Water Permit for the onshore portions of the proposed Project will be obtained by the Port as the "Legally Responsible Person" and delegate applicable responsibilities to the tenant. The associated Stormwater Pollution Prevention Plan (SWPPP) would contain the following measures:
    - Equipment shall be inspected regularly (daily) during construction, and any leaks found shall be repaired immediately.
    - Refueling of vehicles and equipment shall be in a designated, contained area.
    - Drip pans shall be used under stationary equipment (e.g., diesel fuel generators), during refueling, and when equipment is maintained.
    - Drip pans that are in use shall be covered during rainfall to prevent washout of pollutants.
    - Construction and maintenance of appropriate containment structures to prevent offsite transport of pollutants from spills and construction debris.
    - Monitoring to verify that the BMPs are implemented and kept in good working order.
- Other relevant standard operating procedures and best management practices for Port construction projects would be followed.
- The Port will prepare and submit to the Bureau of Sanitation, Watershed Protection Division, for approval a Standard Urban Stormwater Mitigation Plan (SUSMP) for

the stormwater Best Management Practices (BMPs) to be incorporated into the Project and implement the construction and operation and maintenance of the approved BMPs into the Project.

- All onshore contaminated upland soils would be characterized and remediated in accordance with the Los Angeles Harbor Department (LAHD), Regional Water Quality Control Board (RWQCB), Department of Toxic Substances Control (DTSC), and Los Angeles County Fire Department protocol and cleanup standards.
- The tenant will obtain and implement the appropriate stormwater discharge permits for operations.

Sediments suitable for unconfined aquatic disposal from the proposed dredging area would be used as fill at the Cabrillo Shallow Water Habitat (CSWH) in the Outer Harbor, potentially used in the Los Angeles Harbor Berths 243-245 CDF, and potentially disposed of at the LA-2 ODMDS. Sediments unsuitable for unconfined aquatic disposal would be used for fill in the CDF. These potential fill alternatives would require authorization under Section 404.

- A Section 10 permit from the USACE for dredging, crane installation, and wharf construction activities in waters of the U.S. A previously approved Section 404 permit for the Port of Los Angeles Channel Deepening Project (Corps Permit No. SPL-2008-00662-AOA) allows for in-harbor disposal of dredged material at the Berths 243-245 CDF and the CSWH. An MPRSA Section 103 permit would be required for ocean transport and disposal of qualifying material at a designated ocean disposal site (LA2).
- A CWA Section 401 Water Quality Certification from the RWQCB related to construction dredging and any in-water disposal activities that contains conditions including standard WDRs.
- A Debris Management Plan, Oil Spill Prevention, Control, and Countermeasure (SPCC) Plan and Oil Spill Contingency Plan (OSCP) would be prepared and implemented prior to the start of demolition, dredging, and construction activities associated with the proposed Project. The SPCC Plan and OSCP specifically identifies in-water containment and spill management in the event of an accidental spill. The plans shall require that emergency clean-up equipment is available onsite to respond to such accidental spills. All pollutants shall be managed in accordance with all applicable laws and regulations.
- The Water Quality Certification will define a "mixing zone" around the dredging and construction operations. The mixing zone will be equivalent to a zone of dilution and, per the Basin Plan (RWQCB, 1994b) "[a]llowable zones of dilution within which high concentrations may be tolerated may be defined for each discharge in specific Waste Discharge Requirements."
- During dredge and fill operations, an integrated multi-parameter monitoring program would be implemented by the Port in conjunction with both USACE and RWQCB permit requirements, wherein dredging performance would be measured in situ. The objective of the monitoring program would be adaptive management of the dredging operation, whereby potential exceedances of water quality objectives can be

measured and dredging operations subsequently modified. If turbidity levels exceed the threshold established in the WDRs issued by the RWQCB, water chemistry analysis would be conducted and the Port's Environmental Management Division would immediately meet with the construction manager to discuss modifications of dredging operations to reduce turbidity to acceptable levels. This could include alteration of dredging methods, and/or implementation of additional BMPs such as a silt curtain.

- Although BMPs, SWPPP, National Pollutant Discharge Elimination System (NPDES) Permit compliance, and SPCC/OSCP are requirements that must be implemented and that would prevent significant water quality impacts, compliance with these requirements will be included as conditions of approval to facilitate their tracking and implementation.

6.1 CONSTRUCTION

Dredging and Wharf Construction (Pile Installation) The proposed project includes dredging, dredged material disposal, and pile installation. Dredging of up to 20,000 cy of soft sediments would occur along the wharf face at the proposed Berth 306. Sediment testing indicated that most of the sediments would be unsuitable for unconfined aquatic disposal (AMEC, 2011). Sediments suitable for unconfined aquatic disposal from the proposed dredging area would be used as fill at the CSWH in the Outer Harbor, potentially used in the Los Angeles Harbor Berths 243-245 CDF, and potentially disposed of at the LA-2 ODMDS. Sediments unsuitable for unconfined aquatic disposal would be used for fill in the CDF. Impacts due to dredged material disposal at LA-2 were considered during the site designation of LA-2.

Dredging and pile installation for wharf construction would affect water quality in the vicinity of the proposed Project. The types of water quality impacts that could occur include short-term increases in suspended sediments and turbidity levels, decreases in dissolved oxygen (DO) concentrations, increases in nutrient concentrations, and increases in dissolved and particulate contaminant concentrations in areas where contaminated sediments would be disturbed by demolition and construction activities. These changes to water quality would be temporary and expected to be confined to the immediate vicinity (e.g., within 300 feet) of in-water construction and dredging activities (USACE and LAHD, 1992) off Berth 306 and in the mixing zone defined by the water quality certification issued by the RWQCB and included by reference in the permit issued by the USACE. Dredging would also remove some sediment-associated contaminants, which would provide some long-term benefits to the health of the harbor environment. Installation of approximately 515 concrete piles at Berth 306 would suspend bottom sediments into the water column, causing localized and temporary turbidity. Dredging would last approximately three months, whereas wharf construction (including pile driving) would occur over a 22-month period. Resuspended sediments would settle fairly rapidly (within hours to days) and turbidity levels would decrease once activities were completed. Contaminants already present in those sediments could be resuspended in the water column (see discussion below) and would settle to the bottom with the sediments.

The water quality certification and permit issued by the RWQCB and the USACE would be expected to include water quality standards that must be met at various distances from the dredging activities, the mixing zone, or other in-water activities. Based on past dredging projects in the Port Complex (explained further in this section), total suspended solids (TSS) concentrations would drop to levels approaching background concentrations in the vicinity of the dredging activity and, therefore, resuspended sediments would settle in the vicinity of the dredging activities. Because of this, the water quality standards at the specified distances in the certification/permit resulting from in-water activities are not expected to be violated, and significant impacts to water quality would not occur. Past water quality monitoring studies during dredging operations at Marina del Rey, Long Beach Harbor, and the Los Angeles River Estuary have shown that most metals and organics were either not detected in water column samples, or were detected at concentrations within a range deemed suitable for the protection of aquatic resources (Anchor Environmental, 2003).

The permit issued by the USACE would require the dredger to minimize the amount of water in the disposal vessel that flows back to the dredging site and prohibit the flow back of dredged water from containing any solid dredged material. Dredging would resuspend some bottom sediments and create localized turbidity plumes. For continuous dredging operations, elevated turbidity conditions would occur in the immediate vicinity of the dredge for periods of days to several weeks. Following completion or interruption of dredging, the size and persistence of the dredge plume would depend on the amount of material in the water column, the characteristics of the sediments in the water column, and the current velocity. Settling rates are largely determined by the grain size of the suspended material but are also affected by the chemistry of the particle and the receiving water (USACE and LAHD, 1992). Dredging sediments adjacent to Berth 306 would generate a relatively small turbidity plume (i.e., within the mixing zone defined in the WDR) that would settle fairly rapidly. Receiving water monitoring studies in the Harbor (MBC, 2002; USACE and LAHD, 2008; POLA, 2009a-I, 2010a-d) and other water bodies (Parish and Wiener, 1987; Jones & Stokes 2007a, b, 2008) have documented a relatively small, turbid dredge plume that dissipates rapidly with distance from dredging operations. Because of this, the water quality standards at the specified distances in the certification/permits resulting from in-water activities are not expected to be violated, and significant impacts to water quality would not result.

Contaminants, including metals and organics, could be released into the water column during the dredging and pile-driving operations. However, like pH and turbidity, any increase in contaminant levels in the water is expected to be localized in the mixing zone and of short duration. The magnitude of contaminant releases would be related to the bulk contaminant concentrations of the disturbed sediments, as well as the organic content and grain size that affect the binding capacity of sediments for contaminants.

The sediment testing performed in the proposed dredge footprint detected some elevated metal concentrations (AMEC, 2011). The contaminant concentrations associated with any potentially disturbed or resuspended sediments during dredging are not expected to result in any long-term effects in the waters near the APL Terminal.

Sediments containing contaminants that are suspended by the dredging and pile installations would settle back to the bottom in a period of hours to one day. Transport of suspended particles by tidal currents would result in some redistribution of sediment contaminants. The amount of contaminants redistributed in this manner would be small, and the distribution localized in the channel adjacent to the work area. Monitoring efforts associated with previous dredging projects in the Harbor have shown that resuspension followed by settling of sediments is low (generally 2 percent or less). Consequently, concentrations of contaminants in sediments of the Harbor waters adjacent to the dredged area are not expected to be measurably increased by dredging activities and other in-water activities. .

The WDRs would identify the monitoring requirements and potential BMPs that may be implemented to prevent water quality exceedances. The risk associated with potential impacts from increased TSS or decreased light transmittance would be temporary.

Nutrients could be released into the water column during the dredging and pile driving. Release of nutrients may promote nuisance growths of phytoplankton if operations occur during warm water conditions. Phytoplankton blooms have occurred during previous dredging projects, including the Deep Draft Navigation Improvement Project (USACE and LAHD, 1992). However, there is no evidence that the plankton blooms observed were not a natural occurrence or that they were exacerbated by dredging activities. The Basin Plan (RWQCB, 1994) limits on biostimulatory substances are defined as "…concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses." Given the limited spatial and temporal extent of project activities with the potential for releasing nutrients from bottom sediments, effects on beneficial uses of Harbor waters are not anticipated to occur in response to the proposed Project. Dredging and in-water construction operations are not expected to affect the temperature or salinity of waters off the APL Terminal because these activities would not involve any wastewater discharges or processes that would affect the baseline conditions.

Dredging for the proposed Project would require a permit from the USACE and a Section 401 (of the CWA) Water Quality Certification from the RWQCB. The Water Quality Certification would specify receiving water monitoring requirements. Monitoring requirements typically include measurements of water quality parameters such as DO, light transmittance (turbidity), pH, and suspended solids at varying distances from the dredging operations. Analyses of contaminant concentrations (such as metals, DDT, PCBs, and PAHs) in waters during the dredging operations may also be required if the WDR monitoring requires it. Monitoring data are used by the Port dredger to demonstrate that water quality limits specified in the permit are not exceeded. The dredging permit would identify corrective or adaptive actions, such as use of silt curtains, which would be implemented if the monitoring data indicate that water quality conditions outside the mixing zone could be below the permit-specified limits.

Creation of the 1,250-foot wharf at the proposed Berth 306 would increase the land surface area of the proposed Project site, which would result in proportional but small increases in volumes of stormwater runoff from the Project facilities. As discussed below, while runoff from the proposed Project site would contribute to contaminant mass loadings to the Harbor, the contribution would be negligible because the volume would be small and soil and runoff control BMPs would be used during construction to prevent impacts to surface water quality. While there would be some habitat conversion from soft-bottom sediment to hard substrate (pier piling) habitat, the affected area is relatively small. The total soft-bottom area converted to hard substrate would be approximately 1,700 square feet, or 159 square meters (assuming 515 concrete piles with a diameter of 24 inches).

There are no special aquatic habitats or other sensitive natural communities identified at the proposed Project site that would be affected by proposed Project construction. There is approximately 30.6 acres of eelgrass habitat in the Pier 300 Shallow Water Habitat/Seaplane Lagoon area; however, proposed Project construction is not expected to affect subtidal eelgrass. Turbid plumes can adversely affect eelgrass beds by direct smothering or burial, or through reduced light penetration and inhibition of photosynthesis. Prior to installation of in-water structures and dredging along Berth 306, eelgrass surveys would be conducted as required under the *Southern California Eelgrass Mitigation Policy* (NMFS, 1991 as amended). Although the absence of eelgrass along Berth 306 in the Pier 300 Channel has been confirmed, if eelgrass is found in the vicinity of any of the structures, a plan would be developed to ensure that there would be no net loss of eelgrass habitat, consistent with the policy. However, because the depths at the proposed construction site (-48 ft MLLW or deeper) are generally inadequate for eelgrass growth, the proposed Project would probably have no direct impact on eelgrass and associated biological communities. Based on water quality monitoring data summarized above, turbidity would be limited to between a few hundred feet and 1,000 ft from dredging operations. The nearest eelgrass beds are approximately 2,900 ft from the nearest (eastern) edge of the proposed dredge and in-water construction area. Results from required water quality monitoring would also be used to document the extent of the dredge plume, and adaptive management measures (such as implementation of BMPs, or compliance with permit conditions such as use of a silt curtain) would be implemented to reduce impacts from turbidity and siltation. Therefore, effects from dredging/pile-driving on eelgrass are not expected.

Noise

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.

The sound pressure waves from pile-driving could result in temporary avoidance of the construction areas as well as cause mortality of some fish in the Coastal Pelagics FMP, but these species are abundant in the Harbor and due to the limited area of potential effect, the numbers of fish exposed to harmful pressure waves would represent a very small proportion of the number of fish in the Port Complex at any given time. Because smaller fish are more susceptible to acoustic injury, the species most likely to suffer mortality would be northern anchovy, Pacific sardine, and topsmelt. These species play important roles in the cycling of energy and nutrients in the Harbor, which has been designated as EFH for both northern anchovy and Pacific sardine. A peak sound level of 180 dB_{PEAK} has been identified as an injury threshold for small fish. Impact driving of concrete piles would create sound of levels of about 183 to 193 dB_{PEAK} to a radius of up to 33 feet from each pile (Illingworth and Rodkin, 2007; ICF and Illingworth and Rodkin, 2009). However, due to the limited potential impact area, this is not considered a substantial disruption. With implementation of standard condition of approval SC BIO-1 (presented in Section 7.0), the pile-driving would initiate with a soft start, which would minimize potential impacts to fish, since they would likely leave the area as pile driving commenced. Avoidance of the area would be temporary; construction would take place for approximately 22 months, and occur mostly during daylight hours. There would be no physical barriers to movement, and the baseline condition for fish and wildlife access would be essentially unchanged. Due to the limited potential impact area and with the implementation of SC BIO-2, this is not considered a substantial disruption.

Runoff

Ground disturbances and construction activities related to the backlands development and construction could result in temporary impacts on surface water quality if uncontrolled runoff of soils, asphalt leachate, concrete washwater, and other construction materials enter Harbor waters. No upland surface bodies of water currently exist within the proposed Project boundaries. Thus, Project-related impacts to surface water quality would be limited to stormwater runoff and, eventually, waters of the Harbor that receive runoff from the watershed. Project-related runoff would be directed to the storm drain system, and would ultimately be discharge to the Pier 300 channel south of Berths 302-305. Runoff from the Project site would be controlled under a construction SWPPP prepared in accordance with NPDES General Permit Construction requirements and implemented prior to start of any construction activities. This construction SWPPP would specify BMPs to control releases of soils and contaminants and adverse impacts to receiving water quality. The SWPPP is prepared by the project proponent (or consultant) and is not issued by the RWQCB. A Notice of Intent (NOI) and appropriate fee is submitted to the State Water Resources Control Board (SWRCB) in accordance with construction General Permit conditions. The project proponent must keep the SWPPP onsite at all times and implement its measures.

Erosion and sediment controls would be used during construction to reduce the amount of soils disturbed and to prevent disturbed soils from entering runoff.

Prior to the start of construction activities for the proposed Project, the contractor would prepare a SWPPP that specifies logistics and schedule for construction activities that would minimize potentials for erosion and standard practices that include installation, monitoring, and maintenance of control measures. The SWPPP would be prepared and submitted prior to the start of construction and control measures would be installed at the construction sites prior to ground disturbance. Implementation of the SWPPP would minimize proposed Project-related runoff into the Harbor and impacts to water quality.

All applicable BMPs would be used during construction activities to minimize runoff of sediment and other contaminants in compliance with the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Water Quality Order 2009-0009-DWQ) and a construction SWPPP. One or more types of runoff control structures would be placed and maintained around the construction area to minimize loss of site soils to the storm drain system. As another standard measure, concrete truck wash water and runoff of any water that has come in contact with wet cement would be contained onsite so that it does not runoff into the Harbor.

USEPA reported that measures such as sedimentation basins, sediment traps, straw-bale barriers, and filter fabric fences were about 60 to 70 percent effective at removing soils from runoff (USEPA, 1993). Although the specific BMPs that would be used at the proposed Project site have not yet been designed, it is reasonable to estimate that erosion and runoff control BMPs would be 60 percent or more effective at removing soils from runoff that occurred during construction. Additionally, the amount of soils subject to erosion would be limited because the site is flat and runoff patterns can be easily controlled by grading and temporary berms and the duration and intensity of rainfall events in southern California typically are limited. Therefore, the amount of soil loading to the Harbor from runoff would be minimal.

In addition to soils, runoff from a construction site could contain a variety of contaminants, including metals and PAHs, associated with construction materials, stockpiled soils, and spills of oil or other petroleum products. Impacts to surface water quality from accidental spills are addressed below under ”Spills”.

Runoff from the upland portions of the proposed Project site would flow into the Harbor, along with runoff from other adjacent areas of the subwatershed. Runoff at the existing Project site flows towards the wharf and is discharged to the Pier 300 Channel. Runoff from the proposed Project site would continue to be directed to the Pier 300 Channel, away from the Shallow Water Habitat area. As discussed above, the SWPPP and implementation and maintenance of construction BMPs would minimize the potential for offsite transport of soils and contaminants from the proposed Project site that could degrade water quality in the Harbor.

Runoff from the construction site during a storm could form a plume of fresh or brackish water in the waters off Pier 300. Depending on the strength and duration of the storm event, the plume could have lower salinity and DO levels compared to the receiving waters. A plume associated with runoff from the proposed Project site could conceivably overlap with plumes from other drainage systems. Nevertheless, subsequent mixing of runoff and receiving waters, and settling of particles carried by runoff into the waters off Pier 300, would prevent persistent changes in the quality of receiving waters, including the Pier 300 Shallow Water Habitat area.

As mentioned previously, water quality within the Harbor is affected episodically by stormwater runoff from the watershed. Because the area of the proposed Project site represents only a small portion of the Harbor subwatershed, runoff from the upland portion of the proposed Project area during construction would represent a very small contribution to the total mass loading from stormwater runoff to the Harbor. While runoff from the proposed Project site would be discharged to the Harbor, implementation and maintenance of all applicable BMPs during construction of the proposed Project would prevent conditions that could substantially increase the relative contribution or contaminant mass loadings relative to baseline conditions.

Spills

Accidents resulting in spills of fuel, lubricants, or hydraulic fluid from equipment used during dredging and wharf construction could occur during Project construction. Based on the history for this type of work in the Harbor, accidental leaks and spills of large volumes of hazardous materials or wastes containing contaminants during onshore construction activities have a very low probability of occurring because large volumes of these materials typically are not used or stored at construction sites. Spills associated with construction equipment, such as oil/fluid drips or gasoline/diesel spills during fueling, typically involve small volumes that can be effectively contained in the work area and cleaned up immediately (Port of Los Angeles Spill Prevention and Control Procedures [CA012]). Construction and industrial SWPPPs and standard Port BMPs (e.g., use of drip pans, contained refueling areas, regular inspections of equipment and vehicles, and immediate repairs of leaks) would reduce the potential for materials from onshore construction activities to be transported offsite and enter storm drains.

Accidents or spills from in-water construction equipment could result in direct releases of petroleum materials or other contaminants to Harbor waters. The magnitude of impacts to water quality would depend on the spill volume, characteristics of the spilled materials, and effectiveness of containment and cleanup measures. Dredging contractors are responsible and liable for any accidental spills (hydraulic fluid leaks, fuel spills, or such) during dredging operations, including spills from the dredge, chase boats, the barge, and tugs. Equipment is generally available onsite to respond to such accidental spills, and the general spill response practice is to deploy floating booms (by specialized support vessels) made of material that would contain and absorb the spill. Vacuums/pumps may be required to assist in the cleanup depending on the size of the spill.

The Basin Plan (RWQCB, 1994) water quality objective for oil and grease states that "[w]aters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses." Spill prevention and cleanup procedures for the proposed Project would be addressed in a plan that would be prepared in accordance with Port guidelines and implemented by the construction contractor prior to the notice to proceed with construction operations. The plan would define actions to minimize potentials for spills and provide efficient responses to spill events to minimize the magnitude of the spill and extent of impacts.

Summary

In summary, water column impacts due to dredging, pile installation, runoff, and accidental spills are expected to be localized and temporary. Therefore, adverse effects to EFH are expected to be less than significant.

6.2 OPERATION

Once construction is completed, the marine terminal would continue operating until 2027. The number of vessel calls at the marine terminal is expected to increase from 247 (the CEQA baseline from July 2008 through June 2009) to 390 in 2027. Impacts from operations include the potential for shading impacts, accidental spills and introduction of invasive species.

Waters under the wharf (and adjacent to the wharf) that were once exposed to sunlight for some portion of the day would be shaded to some degree. This would depend on the physical location along the wharf, season, time of day, presence of ships, and locations of cranes. However, there are no kelp or eelgrass communities at Berths 302-306. While some soft-bottom benthic resources would be lost due to pile placement, macroalgae and invertebrate communities would quickly re-colonize the concrete piles once installed.

Accidental spills of fuel or other vessel fluids during operation could occur as a result of a vessel collision, although the likelihood is considered remote due to the use of Port Pilots to navigate the Harbor, because of the requirement that vessels travel in the Harbor at slow speeds, and due to the use of tugs to slowly guide vessels to and from the berths. SPCC regulations require that the Port have in place measures that help ensure oil spills do not occur, but if they do, that there are protocols in place to contain the spill and neutralize the potential harmful impacts. An SPCC plan and an OSCP would be prepared that would be reviewed and approved by the RWQCB or the CDFG Office of Spill Prevention and Response, in consultation with other responsible agencies. The SPCC and OSCP plans would detail and implement spill prevention and control measures. However, container shipping vessels hold larger amounts of fuels than construction-related vessels. If an accident occurs and fuels are spilled into Harbor or ocean waters, the fuel could harm biological resources, depending on the extent of the spill. Based on compliance with applicable regulations, and the nature and frequency of past spill events (see Section 3.8), impacts due to accidental spills are considered less than significant.

Accidental spills of pollutants during terminal operations on land would be small because large quantities of such substances would not typically be used at this container terminal. Also, compliance with standard laws and requirements would ensure that terminal facilities include containment and other countermeasures that would prevent upland spills from reaching Harbor waters. In addition, oil spill contingency plans are required to address spill cleanup measures after a spill has occurred. Furthermore, runoff from the newly paved areas of proposed Project site would be routed southward, treated via BMP devices, and discharged to the Pier 300 Channel. Because of these measures, upland spills from terminal operations are not expected to result in significant impacts to biological resources.

Runoff of pollutants to the Harbor from the new facilities on existing land and the new 41-acre landfill would have negligible effects on marine biological communities (fish, invertebrates, algae, plankton) because water quality standards for protection of marine life would not be exceeded. Such runoff could occur during dry weather and from storm events. The latter are periodic, primarily during the winter rainy season, and generally of short duration.

Vessel traffic at the proposed Project site would have minimal direct effects on marine organisms as a result of propeller wash (USACE and LAHD, 1992). This traffic increase would adversely affect organisms in the water column, such as fish and plankton, as each vessel passes. The disturbance would cause fish to move at least a short distance and could damage some individual planktonic organisms through turbulence. Turbidity from the propeller wash would form a small plume behind each vessel. However, this would dissipate rapidly. Biological communities would not be substantially disrupted, however, because the physical disturbance would occur in a small area, over a short duration (a few minutes at each location along the route from Angel's Gate to the proposed Project site), and relatively infrequently (once every 2 to 3 days). The Harbor historically has had a highly active environment with many ships, tugs, and work boats moving along the channels. Addition of vessels calls would not substantially change this environment.

The amount of ballast water discharged into the Pier 300 area, and thus, the potential for introduction of invasive exotic species could increase because more and larger container ships would use the Port as a result of the proposed Project. These vessels would come primarily from outside the EEZ and would be subject to regulations to minimize the introduction of non-native species in ballast water as described in the EIS/EIR. In addition, container ships coming into the Port Complex loaded would be taking on local water while unloading and discharging when reloading. This would also diminish the opportunity for discharge of non-native species. Current practices to reduce the likelihood for introduction of invasive species at and near the proposed Project site include:

- Training of seagoing staff on environmental awareness, ballast water management, and all applicable laws and regulations;
- Ballast water is exchanged mid-ocean for APL vessels en route to Los Angeles;
- APL ship crews perform routine inspections of ballast tanks and properly dispose of any accumulated sediments;
- All APL vessels comply with ballast water reporting requirements, and this is verified through routine audits;
- No ballast water is discharged into harbor waters unless in the event of a ship stability emergency; and
- APL vessel hulls are inspected and cleaned twice per year.

Thus, ballast water discharges during cargo transfers in the Port would be unlikely to contain non-native species but is still a possibility. The proposed Project would increase the annual ship calls relative to the CEQA and NEPA baselines. Operation of the proposed Project facilities has the potential to result in the introduction of non-native species into the Harbor via ballast water or vessel hulls and thus could substantially disrupt local biological communities. Impacts to EFH, therefore, would be significant. No feasible mitigation is currently available to totally prevent introduction of invasive species via vessel hulls or even 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.

7.0 ASSESSMENT SUMMARY

Impacts during construction would be localized and temporary. While there would be some habitat conversion from soft-bottom sediment to hard substrate (pier piling) habitat, the affected area is relatively small. The total soft-bottom area converted to hard substrate would be approximately 1,700 square feet (assuming 515 concrete piles with a diameter of 24 inches). Potential impacts from dredging, wharf construction (pile driving), construction runoff, and accidental spills are considered less than significant. Acoustic impacts from pile driving could result in adverse effects to fish species in the immediate construction area. However, due to the limited potential impact area, this is not considered a substantial disruption. Additionally, with implementation of standard condition SC BIO-1, the pile-driving would initiate with a soft start, which would minimize potential impacts to fish and marine mammals, as they would likely leave the area as pile driving commenced. Avoidance of the area would be temporary; pile driving would last for approximately 22 months, and occur mostly during daylight hours. There would be no physical barriers to movement, and the baseline condition for fish and wildlife access would be essentially unchanged. Due to the limited potential impact area and with the implementation of SC BIO-1, this is not considered a substantial disruption.

SC BIO-1. Avoid marine mammals. Although it is expected that marine mammals will voluntarily move away from the area at the commencement of the vibratory or "soft start" of pile-driving activities, as a precautionary measure, pile-driving activities occurring as part of the wharf extension shall include establishment of a safety zone, and the area surrounding the operations will be monitored by a qualified marine biologist for pinnipeds. A 100-meter-radius safety zone will be established around the pile-driving site and monitored for marine mammals. As the pile-driving site will move with each new pile, the 100-meter safety zone shall move accordingly.

Prior to commencement of pile-driving, observers on shore or by boat will survey the safety zone to ensure that no marine mammals are seen within the zone before pile-driving of a pile segment begins. If a marine mammal is observed within 10 meter of pile-driving operations, pile-driving shall be delayed until the marine mammals moves out of the area. If a marine mammal in the 100-meter safety zone is observed, but more than 10 meter away, the contractor shall wait at least 15 minutes to commence pile-driving. If the marine mammal has not left the 100-meter safety zone after 15 minutes, pile-driving can commence with a "soft start". This 15-minute criterion is based on a study indicating that pinnipeds dive for a mean time of 0.50 minutes to 3.33 minutes; the 15-minute delay will allow a more than sufficient period of observation to be reasonably sure the animal has left the Project vicinity.

If marine mammals enter the safety zone after pile-driving of a segment has begun, pile-driving shall continue. The biologist shall monitor and record the species and number of individuals observed, and make note of their behavior patterns. If the animal appears distressed, and if it is operationally safe to do so, pile-driving shall cease until the animal leaves the area. Prior to the initiation of each new pile-driving episode, the area shall again be thoroughly surveyed by the biologist.

Potential impacts resulting from operation of the APL Terminal include shading (from wharf construction and installation of cranes), accidental spills, runoff, disturbance from vessel movements, and introduction of invasive species through ballast water exchange or vessel fouling. Potential impacts resulting from shading, accidental spills, runoff, and disturbance from vessel movements are considered less than significant. Impacts to EFH resulting from the introduction of invasive species are considered significant. No mitigation, beyond implementation of measures required under existing regulations, is available to fully mitigate potential impacts related to the introduction of invasive species. No feasible mitigation is currently available to totally prevent introduction of invasive species via vessel hulls or even ballast water, due to the lack of a proven technology. The Port of Los Angeles and Port of Long Beach, California State Lands Commission, and the University of Maryland are collaborating with APL to test a shipboard ballast water treatment system designed to remove non-native species from ballast water, and prevent their introduction into Harbor waters. If methods become available in the future, they would be implemented as required at that time.

8.0 LITERATURE CITED

Allen, L. G., M. M. Yoklavich, G. M. Cailliet, and M. H. Horn. 2006. Bays and estuaries. Pp. 119–148 *In* The Ecology of Marine Fishes: California and Adjacent Waters, L. G. Allen, D. J. Pondella II, and M. H. Horn (eds.). Univ. Calif. Press, Berkeley. 660 p.

AMEC Earth & Environmental, Inc. (AMEC). 2011. Final APL Terminal Dredged Material Characterization Study: Berths 302-306, Port of Los Angeles, San Pedro, California. Submitted to MBC Applied Environmental Sciences. April 2011. 388 p.

Anchor Environmental CA, L.P. 2003. Literature review of effects of resuspended sediments due to dredging operations. Prepared for the Los Angeles Cont. Sed. Task Force, Los Angeles, CA. June 2003. 87 p. plus appendices.

Cross, J. N. and L. G. Allen. 1993. Fishes. Pp. 459-540 *In* Ecology of the Southern California Bight: A synthesis and interpretation. M. D. Dailey, D. J. Reish, and J. W. Anderson (eds.). Univ. Calif. Press, Los Angeles, CA. 926 p.

Davies, I. E. and R. P. Bradley. 1972. Deep observations of anchovy and blue sharks from Deepstar 2000. Fish. Bull., U. S. 70:510–511.

Fitch, J. E. and R. J. Lavenberg. 1975. Marine food and game fishes of California. Univ. Calif. Press, Berkeley, CA. 179 p.

ICF Jones & Stokes and Illingworth & Rodkin, Inc. 2009. Technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish. Prepared for the Calif. Dept. of Transportation. Feb. 2009.

Illingworth and Rodkin. 2007. Compendium of pile driving sound data. Prepared for the Calif. Dept. of Transportation. Sept. 27, 2007.

Jones & Stokes. 2007a. *Water Quality Monitoring Report, Snohomish River Dredging Project. March.* Contract: W912DW-05-D 1001 Task Order No. 23. (J&S 00095.07) Bellevue, WA. Prepared for U.S. Army Corps of Engineers.

Jones & Stokes. 2007b . *Water Quality Monitoring Report, Olympia Harbor Dredging Project. November (in-prep11/20/2007).* Contract: W912DW-05-D 1001 Task Order No. 24. (J&S 00916.07) Bellevue, WA. Prepared for U.S. Army Corps of Engineers.

Jones & Stokes. 2008. *Water Quality Monitoring Report. Snohomish River Dredging Project. March.* Contract: W912DW-07-D 1002 Task Order No. 4. (J&S 00035.08) Bellevue, WA. Prepared for U.S. Army Corps of Engineers.

Los Angeles Harbor Department (LAHD). 2009. Unpublished data. 2008-9 harbor-wide water quality sampling results.

Love, M.S., M. Yoklavich, and L. Thorsteinson. 2002. The rockfishes of the Northeast Pacific. (with contributions from J. Butler). Univ. Calif. Press, Los Angeles, CA. 405 p.

MBC Applied Environmental Sciences. 1991. Distribution of juvenile California halibut (*Paralichthys californicus*) in bay and coastal habitats of Los Angeles, Orange, and San Diego Counties in 1990. Final Report. Prepared for Southern Calif. Edison Co., Rosemead, CA. April 1991. 21 p. plus appendices.

MBC Applied Environmental Sciences. 1994. Marine biological baseline study Queensway Bay, Long Beach Harbor. Prepared for City of Long Beach.

MBC Applied Environmental Sciences. 2002. Summary Report: Berth 100 Wharf Construction Project, Receiving Water Monitoring, Los Angeles Harbor. Prepared for Traylor-Pacific, San Pedro, California. Oct. 2002. 8 p. plus appendices.

MBC Applied Environmental Sciences. 2008. National Pollutant Discharge Elimination System 2007 receiving water monitoring report, Harbor Generating Station, Los Angeles County, California. Prepared for Los Angeles Dept. of Water and Power.

MBC Applied Environmental Sciences. 2009a. National Pollutant Discharge Elimination System 2008 receiving water monitoring report, Long Beach Generating Station, Los Angeles County, California. Prepared for Long Beach Generation L.L.C.

MBC Applied Environmental Sciences. 2009b. National Pollutant Discharge Elimination System 2008 receiving water monitoring report, Harbor Generating Station, Los Angeles County, California. Prepared for Los Angeles Dept. of Water and Power.

MBC Applied Environmental Sciences. 2010. National Pollutant Discharge Elimination System 2009 receiving water monitoring report, Harbor Generating Station, Los Angeles County, California. Prepared for Los Angeles Dept. of Water and Power.

MBC Applied Environmental Sciences, Tenera Environmental, Inc., and URS Corporation. 2007. Final Report: Harbor Generating Station Clean Water Act Section 316(b) Impingement Mortality and Entrainment Characterization Study. Prepared for the City of Los Angeles Dept. of Water and Power. Dec. 26, 2007.

MEC Analytical Systems. 1988. Biological baseline and ecological evaluation of existing habitats in Los Angeles Harbor and adjacent waters. Vol. I - Executive Summary. Vol. II - Final report. Vol. III - Appendices. Prepared for Port of Los Angeles. MEC05088001.

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

MEC Analytical Systems (MEC and Associates). 2002. Ports of Long Beach and Los Angeles: Year 2000 Biological Baseline Study of San Pedro Bay. June 2002. Submitted to Port of Long Beach, June 2002.

Miller, D. J. and R. N. Lea. 1972. Guide to the coastal marine fishes of California. Calif. Dept. Fish and Game Fish Bull. 157. 249 p.

National Marine Fisheries Service (NMFS). 1991. *Southern California Eelgrass Mitigation Policy. Revision 11. Southwest Regional Office*. Adopted July 31, 1991.

National Marine Fisheries Service. 2002. The final rule for essential fish habitat. Federal Register 67(12):2343-2383. http://www.nero.noaa.gov/hcd/efhfinalrule.pdf

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 p.

National Oceanographic and Atmospheric Administration, 2010. NOAA Tides & Currents, online data for Station 9410660 (Los Angeles, CA). http://tidesandcurrents.noaa.gov/data_menu.shtml?bdate=20030101&edate=20091231&wl_sensor_hi

st=W5&relative=&datum=6&unit=1&shift=d&stn=9410660+Los+Angeles%2C+CA&type=Historic+Tide+Data&format=View+Data. Accessed Jan. 4, 2010.

Pacific Fishery Management Council. 1998. Coastal Pelagic Species Fishery Management Plan. Amendment 8 to the Northern Anchovy Fishery Management Plan. Dec. 1998. 40 p. plus appendices.

Pacific Fishery Management Council. 2008a. Pacific Coast Groundfish Fishery Management Plan: For the California, Oregon, and Washington Groundfish Fishery as Amended through Amendment 19 (including Amendment 15). July 2008. 155 p. plus appendices.

Pacific Fishery Management Council. 2008b. Amendment 12 to the Coastal Pelagic Species Fishery Management Plan. Management of krill as an essential component of the California Current Ecosystem. Environmental Assessment, Regulatory Impact Review, & Regulatory Flexibility Analysis. Submitted by the PFMS in conjunction with NMFS Southwest Region. Feb. 2008.

Parish and Wiener. 1987. *Preliminary Draft Environmental Impact Statement River Wall*. Prepared for Related Properties Inc.

Port of Los Angeles. 2009a. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Pre-Dredge Survey: June 18, 2009. July 14, 2009.

Port of Los Angeles. 2009b. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #1, Week of July 13-18, 2009. July 31, 2009.

Port of Los Angeles. 2009c. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #2, Week of July 20-24, 2009. Aug. 12, 2009.

Port of Los Angeles. 2009d. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #3, Period of July 26-Aug. 7, 2009. Sept. 1, 2009.

Port of Los Angeles. 2009e. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #4, Period of Aug. 10-14, 2009. Sept. 1, 2009.

Port of Los Angeles. 2009f. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #5, Period of Aug. 17-21, 2009. Sept. 8, 2009.

Port of Los Angeles. 2009g Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #6, Period of Aug. 24-28, 2009. Sept. 11, 2009.

Port of Los Angeles. 2009h. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #7, Period of Aug. 31 – Sept. 4, 2009. Sept. 25, 2009.

Port of Los Angeles. 2009i. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #8, Period of Sept.7-16, 2009. Oct. 1, 2009.

Port of Los Angeles. 2010a. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #9, Period of Sept.2-8, 2010. Sept. 15, 2010.

Port of Los Angeles. 2010b. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #10, Week of Oct. 4-10, 2010. Oct. 14, 2010.

Port of Los Angeles. 2010c. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Construction Dredge Survey #11, Week of Oct. 11-17, 2010. Oct. 29, 2010.

Port of Los Angeles. 2010d. Port of Los Angeles Receiving Water Monitoring Report: Berths 145-147 Wharf Improvements. Order No. R4-2008-0061, Program No. 9450, File No. 08-081. Post Dredge Survey Conducted Oct. 21, 2010. Nov. 3, 2010.

Port of Los Angeles and Port of Long Beach, 2009. Ports of Los Angeles and Long Beach Water Resources Action Plan. Final Report, August 2009.

Regional Water Quality Control Board (Los Angeles Region). 1994. *Water Quality Control Plan Los Angeles Region Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*. Available: http://www.swrcb.ca.gov/rwqcb4/html/meetings/tmdl/Basin_plan/basin_plan_doc.html>. Last posted or revised: November 22, 2005.

Science Applications International Corporation (SAIC). 2010. 2008 Biological Surveys of Los Angeles and Long Beach Harbors. In Association with Seaventures, Keane Biological Consulting, Tenera Environmental, ECORP Consulting Inc., and Tierra Data Inc. Apr. 2010.

Swift, C. C., J. L. Nelson, C. Maslow, and T. Stein. 1989. Biology and distribution of the tidewater goby, *Eucyclogobius newberryi* (Pisces: Gobiidae) in California. Contrib. in Science 404:1–19.

Swift, C.C., T.R. Haglund, M. Ruiz, and R.N. Fisher. 1993. The status and distribution of the freshwater fishes of southern California. Bull. So. Calif. Acad. Sci. 92(3):101-172.

U.S. Army Corps of Engineers (USACE) and Los Angeles Harbor Department (LAHD). 1992. Final EIS/EIR for Deep Draft Navigation Improvements, Los Angeles and Long Beach Harbors, San Pedro Bay, CA. Sept. 1992.

U.S. Army Corp of Engineers (USACE) and Los Angeles Harbor District (LAHD). 2008. Re-circulated Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for Berth 97-109 (China Shipping) Container Terminal Project.

U.S. Environmental Protection Agency. 1993. *Guidance Specifying Management Measures for Sources of Non-Point Pollution in Coastal Waters. (EPA-840-B-92-002.)*

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.

Walker, B.W. 1949. The periodicity of spawning by the grunion, *Leuresthes tenuis*, an atherine fish. Ph.D. Thesis, Scripps Inst. Oceanogr., La Jolla, CA. 166 p.

Walker, B.W. 1952. A guide to the grunion. Calif. Fish & Game 38(3):411-420.

Wellington, G. M. and B. C. Victor. 1989. Planktonic duration of one hundred species of Pacific and Atlantic damselfishes (Pomacentridae). Mar. Biol. 101:557–567.