US Army Corps
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Los Angeles District (LAD)

DRAFT

# DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
# FOR
# OPERATIONS AND MAINTENANCE (O&M)
# BREAKWATER REPAIRS
# PORT SAN LUIS HARBOR
# SAN LUIS OBISPO COUNTY, CALIFORNIA

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**April 2021**

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## 1.0 INTRODUCTION

This environmental assessment (EA) evaluates the potential environmental impacts associated with repairing the Port San Luis (PSL) breakwater, PSL Harbor, San Luis Obispo County, to maintain the breakwater's integrity (Proposed Action).

This document has prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code (USC) 4321, et seq.); Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 Code of Federal Regulations (CFR) parts 1500-1508); and the United States Army Corps of Engineer's (Corps) procedures for implementing NEPA (33 CFR Part 230).

### 1.1 PROPOSED ACTION

**Overview**
The Proposed Action includes breakwater repairs, minor excavation of sediment adjacent to the breakwater to provide equipment access, placement of this sediment (material) and restoration and establishment of eelgrass to offset project impacts.

**Project Location**
PSL Harbor is located on the central California Coast, approximately midway between Los Angeles and San Francisco, in San Luis Obispo County [See Figure 1 Regional Vicinity Map; Figure 2 Local Vicinity Map; PSL Site Map - Figure 3] (Port San Luis Harbor District 2004). PSL Harbor is located in San Luis Obispo Bay, approximately 20 miles southeast of Morro Bay Harbor and approximately 100 miles northwest of Santa Barbara Harbor, and is adjacent to the town of Avila Beach. Avila Beach Drive, which is maintained by the county of San Luis Obispo, provides the vehicular access route to PSL Harbor (Port San Luis Harbor District 2004).

**Background**
Breakwaters are large rubble-mound structures located outside of harbors/ports, anchorage, or coastline to protect the inner waters and shoreline from the effects of heavy seas (Unified Facilities Criteria 2001). These manmade barriers help to ensure safe mooring, operating, loading, or unloading of boats and ships within harbors/ports.

PSL Harbor breakwater was constructed between 1889 and 1913 (Corps of Engineers 2017) as a rubble-mound breakwater that extended outwards 2,400 feet (ft) from the tip of Point San Luis, in a southeasterly direction. The Federal breakwater was designed to protect the inner bay, harbor, and small craft marine facilities from heavy surf and wave action approaching from the west. The breakwater structure was designed and constructed to act as a protected area of low current and reduced wave action within the PSL Harbor. Repairs have been performed six times to remedy the damage inflicted primarily by waves but also, on one occasion, by seismic activity (Corps of Engineers 2017). Historical documentation suggests that the original design of the breakwater was based on limited engineering, and that subsequent repair efforts sought to restore the structure to the original configuration rather than implement engineered improvements.

A Corps comprehensive condition survey of the PSL breakwater was performed in 2015 – 2017 that included bathymetric and topographic survey data, site inspections, and an assessment of construction and repair records. The functional effectiveness and structural integrity of the breakwater were assessed in terms of wave overtopping, wave transmission, and armor stability. Recommendations for repairs were developed from the findings of these tasks (Corps of Engineers 2017). The Proposed Project area map is shown in Figure 4. The current breakwater condition reflects the original construction, periodic damage sustained over the past century, and multiple repair operations. While it fulfills the functional intent of sheltering PSL Harbor against waves arriving from the west and northwest, it is in need of repair. It no longer retains the design crest elevation (+13 ft) along the entire length of Segment A (from the shoreline to Whalers Island) and along more than 85% of Segment B (from Whalers Island to the seaward end). The largest discrepancy, nearly 5 ft, occurs at the bow in the breakwater alignment near the midpoint of Segment B. The crest widths generally meet or exceed the design value of 20 ft. The side slopes on the seaward side of the breakwater tend to be milder than the design template (1.5H:1V), while those on the leeward side are consistent with the design value (also 1.5H:1V). The structure is highly porous with large void spaces between stones and lacks a traditional core of smaller stones. The smallest stones are found on portions of Segment A and near the middle of Segment B. Interlocking of the armor stone is poor along the entire length of Segment A and on most of the crest and the seaward side slopes of Segment B. A failure of the armor layer culminating in a breach in the structure is a distinct possibility under extreme wave conditions. If this damage scenario were to occur, it would cause a significant increase in the wave energy reaching the harbor, disrupting operations and potentially damaging infrastructure at the harbor and the town of Avila Beach. The middle portion of Segment B is most susceptible to such damage. Substantial armor displacement is predicted to occur in this region during a 10-year (yr) storm, with failure possible during a 25-yr storm and probable during a 50-yr storm event.

The breakwater is subject to frequent overtopping and relatively high wave transmission during extreme events (Corps of Engineers 2017). However, these phenomena exert only modest impacts on operations and facilities in the lee of the breakwater due to the substantial distance between the structure and the PSL Harbor itself.

Over the years, local sea and deep water swells from the Pacific storms have subjected the PSL breakwater and coastline to significant forces, including significant storms in 1983 and the December 2003 San Simeon earthquake, which caused damages to the breakwater (Corps of Engineers 2004). It is believed that ground motion from the 2003 San Simeon earthquake (a 6.6-magnitude quake occurring about 45 miles northwest of PSL near San Simeon) caused damage to the head section of the breakwater (Corps of Engineers 2017). The harbor and local shoreline/beach are situated such that strong seasonal waves from the open Pacific Ocean on the west have the potential to damage vessels and facilities within the harbor without protection from a functional breakwater.

In portions of the breakwater, sections of stone have collapsed including the length of the leeward side of the breakwater trunk, and damage to the head. Subsequently the condition of the structure has deteriorated further, to a point where repairs are necessary to maintain structural integrity and navigational safety. Under present conditions the effectiveness of the breakwater structure to protect the harbor has been reduced. During periods when the harbor is exposed to storm conditions, in combination with high tides, the potential exists for damage to vessels and facilities in the mooring area and harbor. The repair of the breakwater would serve to maintain protection from wave action within the harbor to assure continued safe navigation for various private and commercial vessels entering and traversing the harbor.

**Project Description**

The Proposed Action involves repairing the breakwater by resetting and replacing stone along the approximately 2,400-f-long and 20 ft wide breakwater. Operation and maintenance (O&M) repair work would focus on the most heavily damaged sections, approximately 1,420 ft of the structure located between approximately Stations 4+00 and 18+20. O&M repair work would be conducted from the leeward side of the breakwater. The footprint of the breakwater would not be changed, but the crest elevation would be raised from +13 ft Mean Lower Low Water (MLLW) to +16 ft MLLW as a consequence of the armor stone size required for hydraulic stability and the breakwater prism. It is estimated that approximately 29,000 tons of existing stone would need to be reset and approximately 60,000 tons of new stone (individual stone size range is anticipated to range from approximately 5 to 20 tons) would be placed to restore the most heavily damaged portion of the breakwater. Repair work elevations on the seaward side of the breakwater are anticipated to extend down to approximately +4 ft MLLW and to approximately 0 ft MLLW on the leeward side of the breakwater.

Minor excavation of shoaled sediment (approximately 15,000 cubic yards) adjacent to the leeward side of the breakwater would be necessary to create adequate depths for barges and other vessels to access the breakwater for repairs. The excavated material would be relocated approximately 1,000 ft north of the breakwater and utilized to create an engineered eelgrass mitigation site. For figures of the proposed excavation site and mitigation sites see Appendix B, Eelgrass Mitigation and Monitoring Plan in Support of the Port San Luis Breakwater Repairs (Merkel & Associates 2021). The estimated direct impact to Pacific eelgrass (*Zostera pacifica*) due to shoal excavation is 1.8 acres. The estimated worst-case potential impact to Pacific eelgrass within the entire work area, including direct and indirect impacts, is 4.39 acres. The LAD has developed an eelgrass mitigation plan (Appendix B) in coordination with the National Marine Fisheries Service (NMFS), California Department of Fish & Wildlife, and other agencies to address minimization and offsetting measures to reduce eelgrass impacts and to mitigate the impacts in accordance with the California Eelgrass Mitigation Policy (CEMP). Based on past (1991, 2013) and recent (2020) characterization of the sediment in the vicinity of the breakwater and in PSL Harbor, the sediment has been determined to be clean, sand suitable for placement in the engineered eelgrass mitigation site. The placement of the excavated sediment into the engineered eelgrass mitigation site would raise the seafloor from a deeper margin at -22 ft MLLW up to a crest elevation of -12 ft MLLW, an elevation centered nearly precisely within the depth range presently occupied by Pacific eelgrass at PSL. While breakwater repair construction activities would be limited to daylight hours (approximately 11 hours a day), excavation of shoaled sediment could potentially occur during day and night hours (approximately 11 to 22 working hours a day).

Construction would be sea-based, conducted by a crane-equipped barge(s), barges carrying rock, tugboats, small craft support vessels, and possibly a scow. Construction crew parking areas have been identified within PSL Harbor District's paved public parking lot for the Proposed Action. The first phase of construction would involve excavating shoaled sediment adjacent to the breakwater to allow for access of the equipment required to repair the breakwater. The excavation of shoaled sediment would require a crane-equipped barge, possibly a scow or barge, tugboats, and small craft support vessels. The second phase of construction would consist of the repair work to the breakwater structure, requiring a crane-equipped barge, barges carrying rock, tugboats, and small craft support vessels. Repair work would consist of resetting of existing stone and placement of new stone on the breakwater structure. Dropping of armor stone would not be permitted, but it should be expected that some stones may be accidentally dropped during placement. Stones would be carefully placed and interlocked with existing stones to maximize stability and minimize the intensity of sound due to stone placement.

The project duration is anticipated to last approximately six to seven months, generally from April to October, with extensions, and additional work windows varying due to weather patterns. The breakwater repair schedule is time dependent on weather conditions, equipment availability, working performance of the equipment, contractual commitments, and availability of funds.

Breakwater repair activities are proposed to be limited to the immediate area surrounding the PSL breakwater (with the crane-equipped barge and barges carrying rock extending into the leeward waters immediately adjacent to the breakwater the majority of the time). During non-working hours at night the crane-equipped barge and attached rock storage barge would be pulled away from the breakwater and remain moored overnight in the lee of the breakwater. In the event of adverse weather, the contractor would relocate the equipment from the lee of the breakwater and seek shelter, mooring within the established PSL Harbor District designated anchorage or within Morro Bay Harbor. The project area is approximately 20 acres including the engineered eelgrass mitigation site.

The following is a description of the type of the primary pieces of equipment to be utilized for the excavation and repair of the breakwater.

*Crane-equipped Barge(s).* The crane-equipped barge is a barge with an attached crane that can be utilized for the excavation of shoaled sediment and breakwater repair work. During excavation of shoaled sediment, the crane would be outfitted with a clamshell bucket. During excavation the clamshell bucket would be lowered by the crane operator to the sea floor to excavate sediment. The crane would place material on an adjacent storage barge or into a scow for placement at the designated site for the engineered eelgrass mitigation site. During breakwater repair construction a barge with an attached crane would be outfitted with lifting tongs to reset existing stone and retrieve stones from the storage barge, and then place those stones on damaged sections of the breakwater. A boat operator in a skiff, and spotter on the breakwater, would direct the operation of the crane to pick and place the stones. The picked stone must be able to match the dimensions of the voids along the breakwater. Approximately 30 to 35 stones can be picked and placed per day using this vessel, or roughly three to four stones per hour on average.

*Support Vessels.* Self-propelled vessels that serve as tenders, tugs, and spotting craft. The main purpose of a support vessel is to assist the crane operator as well as to ferry equipment and crew back and forth from the shore, breakwater, crew areas, and the crane and storage barges. The compliment of these vessels is usually just one operator unless ferrying other crew.

*Storage/Rock Barge(s).* A floating barge which serves as the stockpile of stone for repair work. This barge is typically towed in from an offsite quarry location (likely Pebbly Beach Quarry on Santa Catalina Island) and is then anchored next to the crane-equipped barge. The compliment of this vessel is usually a spotter/oiler who works with the crane operator to select stones. The rock barge is expected to carry approximately 2,000 to 4,000 tons of stone per trip. Excavated material would be placed on a storage barge (possibly a specialized storage barge known as a scow) for transport and placement at the designated site for the engineered eelgrass mitigation site. Unused/awaiting barges would be stored within a designated area within PSL Harbor.

*Land-Based Quarry/Storage.* While it is less likely that a land-based quarry for stone would be utilized for breakwater repair, this is a possibility. Previous LAD marine rock work projects have utilized stone sourced from an inland quarry, most recently stone was sourced from an inland quarry in Apple Valley/Victorville, San Bernardino County. It cannot be determined at this time what specific inland quarry or port a contractor may utilize for the Proposed Action. For the purposes of this analysis, we have assumed the following in-land quarry and port would be utilized based on the geographic proximity to PSL Harbor; stone would be sourced from the Apple Valley/Victorville in-land quarry and transported using large flatbed trailers or dump trucks on roadways, highways, and freeways to Port Hueneme, Ventura County, where the stone could be off-loaded directly onto a marine barge or offloaded into a designated land-based staging/storage area for transfer at a later time to a marine barge. The stone would then be transported by sea to PSL Harbor. Should land-based staging/storage construction equipment areas (contractor laydown areas) be required at Port Hueneme they would be designated on land that has been developed (i.e., paved), and/or already designated for such purposes.

**Previous Environmental Documentation for Port San Luis Breakwater Projects**

The PSL breakwater has been subject to continued storm and wave action since constructed between 1889 and 1913, and has had O&M repairs in the past (1894; 1926-1927; 1935; 1983-1984; 1992; 2005) (Corps of Engineers 2017). The Proposed Action is similar in kind to the previous breakwater O&M repair projects performed in PSL Harbor (Corps of Engineers 1992; Corps of Engineers 2004).

A Corps Engineering Study on PSL, completed in February 1988 (Corps of Engineers 1988), which included a comprehensive condition survey on the breakwater, recommended that the structure be returned to design specification by resetting old and adding new capstone to the crest of the breakwater and raising depressed areas to an approximate elevation of + 13 ft MLLW. The proposed recommendation was incorporated and the repairs to the breakwater were completed in the summer of 1992 (Corps of Engineers 1992) and have been maintained since that time by the Corps.

In December 1991, LAD prepared a Draft Environmental Assessment (DEA) for the repair of the breakwater, and the Final Environmental Assessment (FEA) and signed Finding of No Significant Impact (FONSI) was completed in March 1992 and is hereby incorporated by reference per 40 CFR 1502.21. The 1992 FEA included a Clean Water Act (CWA) Section 404(b)(1) analysis that determined that the proposed project would have no impacts to aquatic resources. A cultural resources investigation concluded there were no historic properties within the area of potential effect (APE). In 1992, O&M repair work was accomplished by resetting stones and placing new quarry stone by barge to restore the design elevation of +13 ft MLLW. Approximately 22,000 tons of quarry stone were transported by barge and the quarry stones were placed by a barge-mounted crane by moving the stones from the barge onto the breakwater. For construction to access, the breakwater required minor excavation of approximately 10,000 cy of material due to shallow bathymetry adjacent to the breakwater, and then was side cast (lifted and deposited to the side) adjacent to the same location where it was excavated. Prior to placement, in December 1991, the sediments were tested (see Appendix D of this EA), and chemical analysis results showed no chemical or petroleum contaminants present.

In December 2003, the San Simeon earthquake, approximately 40 miles north of PSL, damaged portions of the breakwater including the outer approximately 50-feet of the tip of the breakwater, and quarry stones in the outer approximately 250-feet of the portion of the breakwater being displaced. Approximately 5,000 tons of stone and resetting of large quarry stones were displaced by the earthquake. In June 2004, the LAD prepared a DEA for the repair of the breakwater, and a FEA and FONSI was completed in September 2004. The FEA for the Repairs to the Port San Luis Breakwater, Corps, LAD, was completed in September 2004 (2004 FEA), and is hereby incorporated by reference per 40 CFR 1502.21. In 2005, the Corps excavated approximately 15,000 cy of material to allow adequate water depths for the barges to access the breakwater and completed repairs. As funding was limited for the breakwater repairs in 2005, the breakwater has not been performing as a functional breakwater per design criteria.

## 1.2 SCOPE AND CONTENT OF THE EA

The resources evaluated in this Environmental Assessment are:

- **Air Quality and Greenhouse Gases (GHG)**
- **Noise**
- **Land Use and Recreation**
- **Water Quality**
- **Marine Resources**
- **Cultural Resources**
- **Aesthetics**
- **Sea Vessels Traffic and Safety/Land-Based Traffic and Transportation**
- **Environmental Justice**

These resources are discussed and analyzed in Chapter 4.0, Affected Environment and Environmental Consequences. Environmental Justice is discussed and analyzed in Chapter 7.0 Compliance with Environmental Requirements.

## 1.3 NEPA SCOPE OF ANALYSIS

As part of the NEPA process, the Corps is responsible for establishing the NEPA scope of analysis pursuant to 33 CFR Part 230. The Corps' NEPA scope of analysis encompasses the approximate 20-acre project area within the Port San Luis Harbor in San Luis Obispo County, plus sea vessel barging the rock on the Pacific Ocean from Catalina Island located in Los Angeles County to the project site (project area) at Port San Luis Harbor or a potential transportation of rock from an inland (land-based) quarry in Apple Valley/Victorville in the High Desert area of San Bernardino County using large trucks on roadways to a potential staging/storage area in Port Hueneme/Port of Hueneme in Ventura County to off load the rock, and then loading rock onto sea vessel barges from Port Hueneme/Port of Hueneme to Port San Luis Harbor.

### 1.4 AGENCY AND PUBLIC INPUT

This document is available for public review and comment for a period of 30 days, beginning April 9, 2021 through May 8, 2021, and will be posted on the Corps website. Comments should be mailed to:

U.S. Army Corps of Engineers
Los Angeles District, Planning Division
Attn: Kirk Brus
915 Wilshire Boulevard, Suite 930
Los Angeles, California 90017

and via electronic submission to: kirk.c.brus@usace.army.mil

If you have questions or would like additional information, please contact Kirk Brus at (213) 452-3876.

### 1.5 RELATIONSHIP TO ENVIRONMENTAL PROTECTION STATUTES, PLANS, AND OTHER REQUIREMENTS

The Corps is required to comply with all pertinent federal laws and regulations; project compliance is summarized in Section 7.0.

## 2.0 PROJECT PURPOSE

### 2.1 PURPOSE AND NEED

The PSL breakwater serves as protection from offshore waves and currents and therefore facilitates navigability within PSL Harbor. Maintenance repairs on the PSL breakwater are needed to ensure navigational safety and to prevent degradation of the structural integrity of harbor facilities. The purpose of the Proposed Action is to repair the existing PSL breakwater for the authorized purpose of maintaining navigability within PSL Harbor.

### 2.2 AUTHORIZATION

The breakwater in PSL, which is situated extending in a southeasterly direction approximately one-fourth (1/4) of a mile along the sunken reef commencing at or near Whalers Point, at San

Luis Obispo Bay, California, was authorized as described in Executive Document # 81 (Senate), 49th congress, 2nd session, 10 February 1887, titled “Reports of Engineers Relative to a Breakwater at Whalers Point, California”. Construction of a federal breakwater was authorized by the River and Harbor Act of August 11, 1888 (s. Doc 81, 49th Congress, 2nd Session; Corps of Engineers 1969). Federal responsibility for maintenance of the breakwater structure was authorized by the River and Harbor Act of 1899, as amended, and modified by Public Law 99-62 (House Document 303, 81st Congress, 2nd session) provides for the establishment and maintenance of a breakwater. The breakwater is a Federal structure, maintained by the Corps, and the Proposed Action is solely a Federal project, funded with Federal dollars.

## 3.0 PROJECT ALTERNATIVES

### 3.1 ALTERNATIVES CONSIDERED

Two alternatives are considered in this document - the “No Action Alternative,” under which no repair would be conducted, and the “Preferred Alternative,” which is the Proposed Action. The terms Preferred Alternative, Proposed Action and Proposed Project are synonymous and used interchangeably in this Environmental Assessment. The terms project site and project area are synonymous and used interchangeably in this Environmental Assessment. The federal agency name U.S. Army Corps of Engineers, Corps of Engineers, USACE, Corps, Los Angeles District, and LAD are synonymous and used interchangeably in this Environmental Assessment. The words Section and Chapter are synonymous and used interchangeably in this Environmental Assessment.

**No Action Alternative.** Under this alternative, the proposed repairs would not take place. In the absence of breakwater repair, the breakwater would become increasingly susceptible to erosion and structural failure, which would jeopardize safety. Continued disrepair of the structure would eventually require emergency work to avoid public safety hazards, and/or closure of the harbor. Additional damages would also incur additional costs to restore the breakwater with emergency repairs.

**Preferred Alternative.** The Proposed Action, described more fully in Section 1.1, consists of performing O&M repair work on the most heavily damaged sections of the PSL breakwater; approximately 1,420 ft of the structure located approximately between Stations 4+00 and 18+20. Repair work would be sea based and conducted from the leeward side of the breakwater. Minor excavation of shoaled sediment (approximately 15,000 cubic yards) adjacent to the leeward side of the breakwater would be necessary to create adequate depths for barges and other vessels to access the breakwater for repair. Environmental commitments incorporated in the project description to avoid or minimize adverse impacts are listed in Section 5.

### 3.2 ALTERNATIVES REJECTED FROM CONSIDERATION

Congressional legislation directs that operations, maintenance, repair, replacement, and rehabilitation work associated with PSL Harbor must occur specifically at PSL Harbor on the PSL, no other alternative sites for maintenance construction and repair of existing facilities are considered viable. A reduced scope of repairs, or limiting work to a smaller footprint, would not adequately address all of the damage and would not fully meet the purpose and need.

Alternative placement sites were considered. Alternative sites were not considered practicable due to the increased cost the project would incur to place sediments at sites further distances from the Port San Luis Harbor breakwater given the limited operations and maintenance funding available. Alternative sites would also not provide the opportunity to support creation of the eelgrass mitigation site, which has specific location requirements based on parameters such as depth and limited wave action. Based on this information, alternative placement sites were rejected from further consideration.

## 4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section summarizes the existing condition of the physical and human environment within the scope of analysis, and also provides an assessment of potential direct and indirect impacts associated with each alternative. Direct impacts (or effects) are caused by the action and occur at the same time and place. Indirect impacts (or effects) are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

## 4.1 WATER QUALITY

### 4.1.1 Affected Environment

Water quality is typically characterized by salinity, pH, temperature, clarity, and dissolved oxygen (DO). The 1992 Corps Final Environmental Assessment (FEA) on the Port San Luis (PSL) Harbor breakwater repair included a Clean Water Act (CWA) 404(b)(1) analysis that determined the Proposed Action would have no impacts to aquatic resources.
Section 303(d) of the 1972 Federal Clean Water Act (CWA) requires states to identify water bodies that do not meet water quality objectives and are not supporting their beneficial uses. Each state must submit an updated list, called the 303(d) list, to the United States Environmental Protection Agency (USEPA) every two years. In addition to identifying the water bodies that are not supporting beneficial uses, the list also identifies the pollutant or stressor causing impairment, and establishes a priority for developing a control plan to address the impairment. The list also identifies water bodies where 1) a total maximum daily load (TMDL) has been approved by USEPA and an implementation is available, but water quality standards are not yet met, and 2) water bodies where the water quality problem is being addressed by an action other than a TMDL and water quality standards are not yet met. The most current USEPA approved 303(d) list is the 2014 and 2016 California Integrated Report (Clean Water Act Section 303(d) List And 305(b) Report). The California 303(d) list was approved by USEPA on April 6, 2018 (State Water Resources Control Board 2020). Port San Luis (Water Body Type: Bay and Harbor) is listed as a 303(d) impaired water body with pollutants of arsenic, dieldrin, polycyclic aromatic hydrocarbons (PAHs), and Polychlorinated biphenyls).

**Sediment Characteristics**. Based on past (1991-1992, 2012-2013) and recent (2020) characterization of the sediment in the vicinity of the breakwater and in PSL Harbor, the sediment has been determined to be clean, sand suitable for creating an engineered eelgrass mitigation site. The testing results can be found in Appendix D of this EA.

### 4.1.2 Environmental Consequences

**Significance Criteria**

An impact to Water Quality will be considered significant if the alternative would:

- Cause substantial, long-term alteration of chemical properties and turbidity within the water column outside of a 500' buffer area around the project area;
- Cause release of toxic substances that would be deleterious to human, mammal, fish, or plant life.

**Preferred Alternative**

Sea based Proposed Action operations would include a crane-equipped barge(s), storage barges, tugboats and a crew boat. Barge, crane and small watercraft boats do not generally create extensive turbidity plumes. Small amounts of soil adhering to the stones may become temporarily suspended in the water column, causing a slight increase in turbidity. Due to the small amounts of suspended sediment material involved, however, the impact would be negligible. Removal of stone displaced from the breakwater, along with minor excavation and sediment placement, may also cause turbidity. However, due to the nature of the sediment, (i.e., clean sand) and the small excavation footprint, the sediment is expected to quickly settle. The addition of stone may also cause some turbidity, however, this should be minor, as the original footprint of the breakwater would not be changed. Increases in turbidity levels above background levels would be anticipated within 50 to 150 yards of the barges and from excavation and placement sites near or below mid-column depths. The clean, sandy soft bottom sediment that would be excavated is expected to quickly settle in the immediate area of the excavation and placement site. Any substrate sediment (turbidity) plume that would form would be relatively localized to the area near the breakwater and near the placement site and would dissipate within hours or a few days after work is completed. With the implementation of Best Management Practices (BMP) and water quality (WQ) environmental commitment that water quality monitoring for compliance purposes would occur during excavation work around the breakwater, to further avoid, reduce, and minimize impacts well below less than significant. Upon project construction completion, water quality would return to pre-project conditions. Based on the above, and with the implementation of BMP and WQ environmental commitments, the Proposed Action would not cause a substantial, long-term alteration of chemical properties and turbidity within the water column outside of a 500' buffer area around the project area. Impacts would be less than significant.

Marine sands do not contain high levels of pathogenic bacteria including total and fecal coliform. Surface layers of marine sands are generally well aerated and do not provide an environment suitable for the survival of pathogenic bacteria. Beaches nourished using marine sands do not show up on state monitoring lists as impacted by pathogenic bacteria, and breakwater rock repair work, excavation and placement activities would not result in beach closures or advisories. It should also be noted that the State and County health department, such as San Luis Obispo County standards for safe contact recreational exposure to total and fecal coliform, are levels of 10,000 MPN/100 ml and 400 MPN/100 ml, respectively. These coliform standards are orders of magnitude higher than are detected during monitoring for maintenance dredging operations that occur in Morro Bay Harbor in San Luis Obispo County, which are generally in units of approximately <2-130 MPN/100 ml (Merkel 2014, 2015, 2016, 2017). The sandy soft bottom sediment to be excavated would more than likely have smaller, reduced readings well below <2-130 MPN/100 ml of coliform, if any. With the implementation of BMPs and WQ environmental commitment that water quality monitoring for compliance purposes would occur during excavation work around the breakwater, this would further avoid, reduce, and minimize impacts well below less than significant. Upon project construction completion, water quality would return to pre-project conditions. Based on the above, and with the implementation of BMPs and WQ environmental commitments, the Proposed Action would not cause release of pathogenic bacteria that would be deleterious to human, mammal, fish, or plant life. Impacts would be less than significant.

Temporary, minor impacts to water quality would occur during excavation and placement operations that may result in temporary reductions in dissolved oxygen and temporary increases in turbidity within and immediately adjacent to the work area. A WQ environmental commitment would be incorporated monitoring turbidity, dissolved oxygen, light transmittance, pH, salinity, and temperature during sediment excavation and placement activities minimizing impacts. If turbidity and/or dissolved oxygen exceeds water quality criteria during excavation and placement activities, a WQ environmental commitment would be implemented, to evaluate conditions and make modifications to operations to get turbidity and/or dissolved oxygen back into compliance. Upon project completion, water quality would return to pre-project conditions. Impacts would be less than significant.

Transportation of construction materials, barged to the site, may involve minor leakage of fuel and other fluids into the harbor. Such minor leakage, however, would not add significantly to that produced by other vessels utilizing the harbor. The Proposed Action would not cause a substantial release of contaminants that would be deleterious to human, mammal, fish, or plant life. With the implementation of BMPs and WQ environmental commitments (i.e., the Contractor shall stay within the boundaries of the identified construction zones; there would be no dumping of fill or material outside of the project area or within any adjacent aquatic community; construction vehicles would be continuously examined for leaking fluids; litter, petroleum products, cleaning agents, wash down waters, and other toxic or oxidizable materials would be prevented from entering marine waters), these would further avoid, reduce and minimize impacts well below less than significant. Based on the above, and with the implementation of BMPs and WQ environmental commitments, the Proposed Action would not cause a substantial release of contaminants that would be deleterious to human, mammal, fish, or plant life. Impacts would be less than significant.

**No Action Alternative**

The "no action" alternative would have no immediate impact on water quality. However, continued structural degradation and rising sea levels would impact harbor operations as the function of the breakwater is compromised, resulting in the need for emergency repairs. This emergency work may require more extensive construction and may take longer to complete, thereby extending the duration of construction and area of impact in the future. Impacts to water quality would be less than significant.

## 4.2 MARINE RESOURCES

### 4.2.1 Affected Environment

***Characteristic Habitats***

PSL Harbor is located within the open bay system of San Luis Obispo Bay. PSL Harbor is influenced primarily by marine waters, tides, and currents, and to a lesser degree by surface freshwater drainages and groundwater (approximately one mile east of the harbor is San Luis Obispo Creek). The marine biotic communities within the scope of analysis are represented by a variety of plants, algae, and wildlife. Species diversity and density are high due to the area's transitional zone or overlap of warm and cold-water masses created by the California Current System, with warm water currents from the south mixing with cold water currents from the north. Biological productivity is enhanced in this zone due to upwelling (Walter *et al* 2018).

A variety of marine habitats occur in the San Luis Obispo Bay area. Habitats characteristic of the PSL breakwater area consist of subtidal and rocky intertidal habitats off the breakwater, rock revetment, seagrass habitat (surfgrass and eelgrass), sandy bottom habitat, kelp habitat and deeper water marine ecosystems of the Pacific Ocean adjacent to the outer breakwater. These habitats support ecological communities comprised of marine algae, invertebrates, plankton, fish, marine mammals, and avian species. There are no wetlands, beach areas, coastal strand or other terrestrial vegetation, and no dune or estuary areas within the project area.

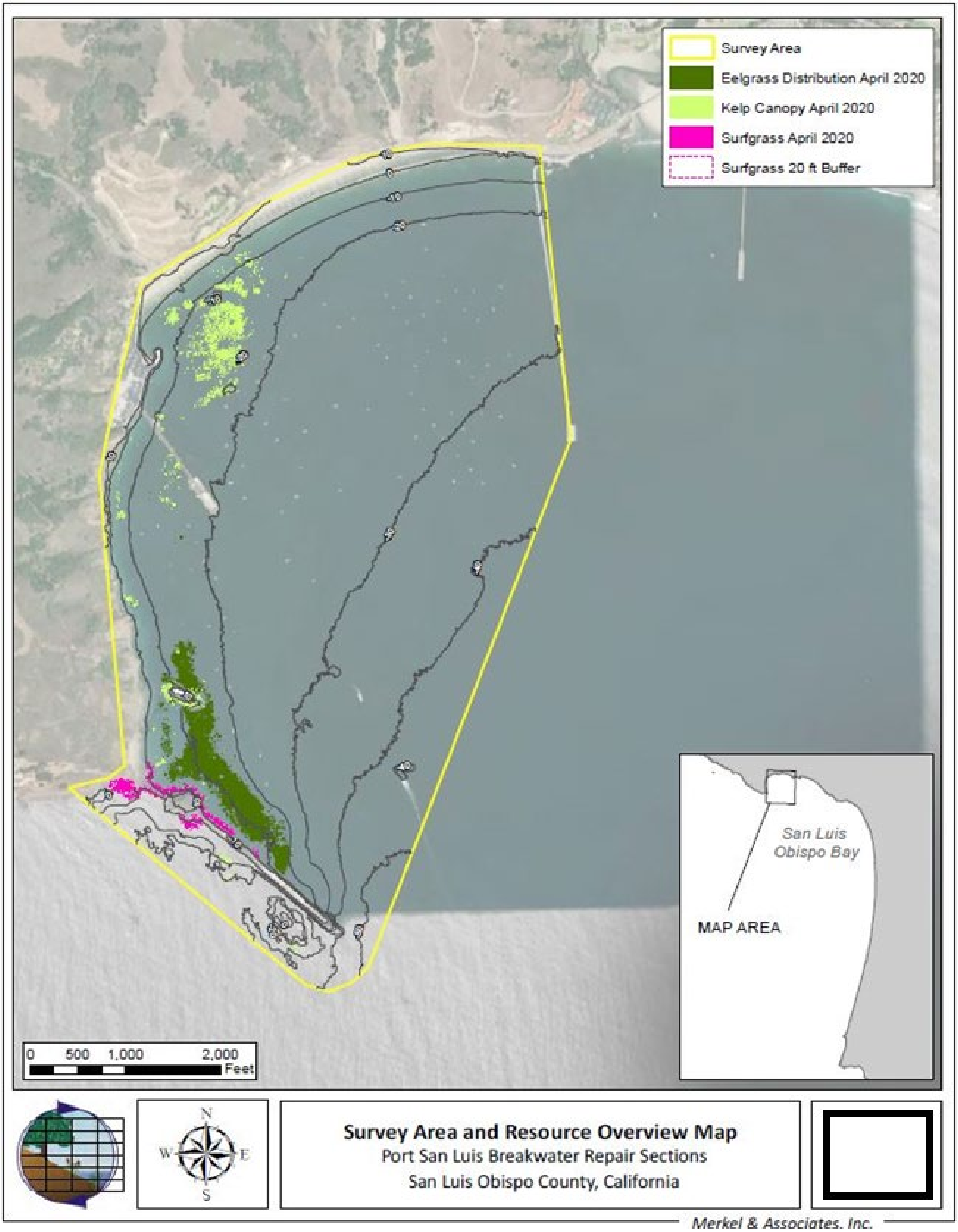
***Marine Habitats and Vegetation***

Marine habitats in the project area include natural open water and sandy bottom benthic habitats, eelgrass, as well as artificial rocky intertidal and subtidal habitats created by the breakwater.

Marine vegetation on the PSL breakwater consists of several species of green, brown and red algae (seaweeds), and surfgrass. The native rocky substrate of Point San Luis and Whaler's Island are Franciscan Formation, volcanic, and metavolcanic rock formations. Whaler's Island and the native bedrock extending into the sea from Point San Luis was incorporated into the design and construction of the PSL breakwater. Sub- and intertidal habitats consist of those associated with the ocean floor and the breakwater side slopes. The distribution, abundance and community structure of these zones are influenced largely by depth, turbidity, seasonal water temperatures, salinity concentration, and substrate composition and movement. Rocky habitats of the breakwater provide interstitial surface areas for attachment of algae and marine invertebrates. The seaward side of the breakwater from Whaler's Island extending out to sea (Station 0+00 to 18+00) is characterized by a diverse microhabitat community structure including non-coralline algal crusts, coralline algal crusts, articulated coralline, turf algae. On the leeward east facing portion of the breakwater extending out to sea from Whaler's Rock the rock structure is similar to that on the seaward side but is less impacted by wave energy. As a result, the breakwater supports a differing algal and invertebrate community with a more restricted tidal zone at the upper margins of the rock due to reduced wave, swell, and spray influence. The leeward side of the breakwater from Whaler's Island extending out to sea (Station 0+00 to 18+00) is characterized by a microhabitat community structure differing from the seaward side in that it has less coralline algal crusts (almost none) and supports more macroalgae (Merkel & Associates 2019).

The following is a summary excerpt from the May 2019 Biological Investigations of the PSL Breakwater Report and March 2021 PSL Eelgrass Mitigation and Monitoring Plan, see appendix B for full reports and figures (Merkel & Associates 2019 & 2021). Within PSL Harbor, three Habitat Areas of Particular Concern (HAPC) components are present: eelgrass, surfgrass, and canopy kelp. Within PSL Harbor, eelgrass surveys were completed within the approximately 700-acre sheltered embayment between the PSL breakwater and the Cal Poly Pier in April-May 2020. The surveys revealed the presence of 15.16 acres of Pacific eelgrass (*Zostera pacifica*). In June 2018 Pacific eelgrass within the immediate proximity of the breakwater between Smith Island and the lee of the breakwater was surveyed and determined to total 14.19 acres. In February 2019, the same survey extent supported 13.90 acres with approximately 2 percent difference in total area between the surveys and 92 percent of the bed being stable between the survey intervals (Merkel & Associates 2019). Similar stability from spring 2018 through spring 2020 has been observed for this bed segment. Notably, approximately 94 percent of the entirety of the eelgrass present within the PSL area occurs between Smith Island and the breakwater with well over 99 percent of the eelgrass occurring at the western margin of the bay with only a handful of scattered small plants extending from the consolidated larger beds eastward towards Harford Pier. Extensive Torrey's surfgrass (*Phyllospadix torreyi*) was found to occur extensively on the native bedrock of Point San Luis and Whaler's Island, and to a much lesser degree on the low-lying boulder rock on the leeward side of the breakwater. Although *P. torreyi* was specifically observed, Scouler's surfgrass (*P. scouleri*) is also present in the area with records existing from Diablo Canyon and Pismo Beach, and it would not be unexpected for both species to be represented in the project area (Merkel & Associates 2019). On the seaward side of the breakwater, surfgrass is found only within the partially sheltered areas near Point San Luis. On the lee side of the breakwater, surfgrass was most abundant on small areas of bedrock outcrops extending above the sand or adjacent to the breakwater boulder. However, surfgrass was also found on the lower intertidal imported boulder rubble that extended outward from the breakwater. The canopy kelp in PSL is dominated by giant kelp (*Macrocystis pyrifera*) which is present within scattered beds on rocky bottom habitats within PSL. Historically, beds have been found both inside the breakwater protection and outside of the breakwater. Over at least the past couple of years during which time surveys have been completed for this breakwater repair project, little to no kelp has been noted outside of the breakwater within the project area. In June-July 2018 no kelp was noted on the breakwater. Additional kelp surveys were conducted in January-February 2019 and kelp was not noted within the project area at this time. Because of the absence of kelp in 2018 and the absence of kelp in winter 2019, a kelp frequency analysis was undertaken to identify how often kelp occurred in the project area and along the breakwater using data from California Department of Fish and Wildlife (CDFW) kelp canopy surveys. This analysis revealed kelp at a low frequency of occurrence (14 percent of the surveys) with presence of narrow fringes of kelp being observed, principally on the lee of the breakwater. The distribution showed kelp at the tip of the breakwater and, erroneously, on intertidal and very shallow subtidal rock not suited to supporting giant kelp or bull kelp (*Nereocystis luetkeana*). Rather it is believed that the CDFW mapping likely included the understory feather boa kelp (*Egregia menzieii*) that is present in these areas. In spring 2020, kelp was more expansive in PSL Harbor, but canopy kelp remained absent from the inside margin of the breakwater. A small amount of kelp canopy was present in small stands near the toe of the outer seaward portions of the breakwater and was fairly extensive in the harbor but remained absent from the project area. Based on the frequency distribution analyses of CDFW data and observations from 2018-2020, canopy kelp is not believed to be a significant habitat resource within the work area. See Figure 5 below for April 2020 mapping of all three HAPC components present within PSL Harbor: eelgrass, surfgrass, and canopy kelp.

**Figure 5. PSL Harbor April 2020 Seagrass and Canopy Kelp Surveys (Merkel & Assoc. 2021).**



***Invertebrates***

Marine invertebrates which commonly occur on or near the breakwater include various species of crabs, lobster, clams, sea urchins, barnacles, mollusks, mussels, anemones, limpets, chitons, snails, annelid worms, polychaetes, sponges, hydroides, sea stars, and micro-invertebrates (US Army Corps of Engineers, 1986; 1991; 2004). The breakwater from Whaler's Island extending out to sea (Station 0+00 to 18+00) is characterized by barnacles, tube worms, tube snails, anemones, sea urchins, encrusting invertebrates, and sea stars (Merkel & Associates 2019). A wide diversity of invertebrates occupy the sandy benthic and eelgrass habitat in the lee of the breakwater.

***Fish and Essential Fish Habitat***

Bays and eelgrass beds provide important nursery, rearing areas, and habitat for a wide diversity of marine organisms. A wide diversity of fish species, including several game and commercial species, are found within San Luis Obispo Bay and the surrounding offshore ocean waters. Some of the common fish species include: jacksmelt (*Atherinopsis californiensis*), shiner surf perch (*Cymatogaster aggregata*), walleye surfperch (*Hyperprosopon argenteum*), California scorpionfish (*Scorpaena guttata*), California halibut (*Paralichthys californicus*), Pacific Dover sole (*Microstomus pacificus*), English sole (*Parophrys vetulus*), bass (*Paralabrax* spp.), albacore (*Thunnus alalunga*), rockfish (*Sebastes* spp.), salmon (*Oncorhynchus* spp.), white seabass (*Atractoscion nobilis*), lingcod (*Ophiodon elongatus*), northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasii*), Pacific jack mackerel (*Trachurus symmetricus*), sablefish (*Anoplopoma fimbria*), California grunion (*Leuresthes tennis*), and sanddab (*Citharichthys* spp.) (Corps of Engineers 1986; Analytic Planning Services 1985).

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801, *et seq*.) set forth a number of mandates for the National Marine Fisheries Service (NMFS), regional fishery management councils, and other federal agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NMFS, are required to delineate "essential fish habitat" (EFH) for all managed species. The Act defines EFH as " ... those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Magnuson-Stevens Act identifies discrete subsets of EFH referred to as Habitat Areas of Particular Concern (HAPC) that are defined as exhibiting one or more of the following traits: rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to anthropogenic (or human impact) degradation. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding the potential effects of their actions on EFH, and respond in writing to the NMFS's recommendations.

Within PSL Harbor three HAPC components are present: eelgrass, surfgrass, and canopy kelp. See above Section 4.2.1 *Marine Habitats and Vegetation* for detailed inventory of the HAPCs within PSL Harbor.

For the Pacific region, EFH has been identified for a total of over 119 species covered by four fishery management plans (FMPs) under the auspices of the Pacific Fishery Management

Council; Coastal Pelagic Species FMP, Pacific Coast Groundfish FMP, Pacific Coast Salmon FMP, and Highly Migratory Species FMP. The EFH for these are to include all marine and estuarine waters from the shoreline to 200 nautical miles offshore (i.e., the Exclusive Economic Zone [EEZ]). Species managed under all four of the FMPs have the potential to occur within PSL Harbor. Several of the species managed under the Pacific Coast Groundfish FMP and Coastal Pelagic Species FMP are known to occur commonly within PSL Harbor, (e.g., Northern anchovy, Pacific sardine, Pacific mackerel, jack mackerel, Dover sole, Pacific sanddab, rockfish species, California scorpionfish, and English sole). In addition, many species identified as Ecosystem Component Species under the Pacific Groundfish Management Plan are present in the PSL Harbor (e.g., skate species, silversides, and smelts). Furthermore, many other native marine fish in the project area undoubtedly serve as prey for many of the managed species.

***Avian Species***

Numerous bird species utilize the PSL Harbor area. The bay is used as a major wintering and/or stopover area for migratory waterfowl and shorebirds. The open water is utilized for foraging by many avian species. The breakwater is used extensively as a roosting area by California brown pelicans (*Pelicanus occidentalis*), cormorants (*Phalacrocorax* spp.), terns (*Sternula* spp.), and gulls (*Larus* spp.) when sea state conditions allow (Corps of Engineers, 1986; 1991; 2004). Western gulls, black oyster-catchers, and pigeon guilemonts have historically nested and may currently nest in the cliffs of both Whaler's Island (which is part of the breakwater) and nearby Smith Island (Carter et al. 1990). For a list of avian species observed during the Summer 2018 and Winter 2019 biological surveys see May 2019 Biological Investigations of the Port San Luis Breakwater Report in Appendix B.

***Marine Mammals***

The central California coast supports a great abundance and diversity of marine mammals. Three pinniped species are commonly present in PSL Harbor and will likely be present in the project area; California sea lion (*Zalophus californianus*), Steller sea lion (*Eumetopias jubatus*), and harbor seal (*Phoca vitulina richardii*). Often California sea lions haul out on the PSL breakwater and on buoys and work docks within PSL Harbor. Steller sea lions have been observed intermittently hauled out on the PSL breakwater and on buoys and docks within PSL Harbor. The presence of pinnipeds on the PSL breakwater is influenced by the season and day to day sea state conditions. Harbor seals have not been observed hauling out on the PSL breakwater or work docks within the San Luis Obispo Bay, however marine mammal surveys documented harbor seals hauled out on the low-lying bedrock benches of nearby Smith Island. The Southern sea otter (*Enhydra lutris nereis*) occupies kelp beds located within the PSL Harbor year-round. Infrequent occurrences, more transient in nature have been observed of solitary individuals within the vicinity of the project area. One mile east of the project area within PSL Harbor, in the kelp beds a raft(s) of Southern sea otters were consistently observed during marine mammal surveys conducted in 2018 and monthly throughout 2019. The LAD conducted monthly marine mammal surveys throughout 2019, for details regarding these surveys and the use of PSL Harbor by marine mammals see Appendix B (IHA Application).

Other marine mammal species that have the potential to occur within the waters surrounding San Luis Obispo County are the: Guadalupe fur seal (*Arctocephalus townsendi*), Northern elephant seal (*Mirounga angustirostris*), Humpback whale (*Megaptera novaeangliae*), Blue whale (*Balaenoptera musculus*), Fin whale (*Balaenoptera physalus*), Killer whale (*Orcinus orca*), Eastern North Pacific Gray whale (*Eschrichtius robustus*), Pacific whitesided dolphin (*Lagenorhynchus obliquidens*), Risso's dolphin (*Grampus griseus*), Northern right whale dolphin (*Lissodelphis borealis*), Long-beaked common dolphin (*Delphinus capensis*), Shortbeaked common dolphin (*Delphinus delphis*), Dall's porpoise (*Phocoenoides dalli*), and Bottlenose dolphin (*Tursiops truncatus*). Occurrences within the vicinity of the project area of the species listed above are considered uncommon and would be not be expected in the limited project area within the lee of the breakwater. Generally, these species would be observed seaward of the breakwater and within the open waters of San Luis Obispo Bay.

Marine mammals are protected by the Marine Mammal Protection Act (MMPA).

**Threatened and Endangered (T&E) Species**

Three species protected under the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq*.), have the potential to occur within or near the project area. These include the threatened Southern sea otter (*Enhydra lutris nereis*), the endangered California Least Tern (*Sterna antillarum browni*), and the endangered Black Abalone (*Haliotis cracherodii*) and its' designated critical habitat.

**Southern Sea Otter (*Enhydra lutris nereis*).** The Southern sea otter, listed as threatened, ranges from Half Moon Bay to Santa Barbara. The 2019 census of Southern sea otters, which combined counts from the mainland range and San Nicolas Island was 2,962, a decline of 166 individuals from the 2018 survey (Hatfield *et al* 2019). The 2019 census survey found that the population of sea otters was largest in the central part of the species' range, just north of San Luis Obispo Bay between Seaside and Cayucos. Sea otters inhabit the intertidal and shallow subtidal areas, generally within one-half mile of shore. Sea otters prefer hard-bottom, kelp bed communities and rarely occur in sandy bottom areas.

Kelp near the breakwater is minimal, and data from the 2016 annual California sea otter census performed by U.S. Geological Survey (USGS) showed low densities of sea otter (See Figure 8) in the vicinity of the breakwater, with a 3-year average number of sea otters counted per square km equaling between 1 and 3 (Tinker 2016). Larger kelp beds occur near the Harford pier, Cal Poly pier, Fossil Point/Smugglers Cave, and Sunset Palisades, where otter densities are over 2 to 3. Based on historic data, only a few non-breeding males (10-20) were known to occur in the immediate vicinity of PSL; however a small group of breeding females had been observed south of Morro Bay between Pt. Buchan and PSL (Estes and Jameson 1983).

The federally threatened Southern sea otter has the potential to infrequently occur within the project area. Infrequent occurrences, more transient in nature have been observed of solitary individuals within the vicinity of the project area. One mile east of the project area within San Luis Obispo Bay, in the kelp beds a raft(s) of Southern sea otters were consistently observed during marine mammal surveys conducted in 2018 and monthly throughout 2019.

**California Least Tern (*Sterna antillarum browni*).** The California least tern, listed as endangered, migrates into coastal south-central California to breed, from Mexico and Central and South America. Breeding usually occurs between mid-April and mid-August, with post-breeding groups still present into September (United States Fish and Wildlife Service 1980). Least terns are known to forage in shallow waters of bays, lagoons, estuaries, tidal marshes, river mouths, ponds, and lakes. A significant amount of foraging also occurs offshore in deep-water habitats (Keane and Smith 2016). Least tern forage in fresh and saltwater on small prey fish such as anchovy and smelt. Birds typically nest in small colonies and place nests in the open expanse of lightly colored sand, dirt or dried mud next to lagoons, estuaries or on open sandy beaches. Nests generally consist of a small, subtle depression or scrape in the soil or sand lined with pebbles or seashell fragments.

The California least tern may use the project area for foraging as birds are known to nest at the Oceano Dunes State Vehicular Recreation Area (SVRA), approximately 7.5 miles from the project area (Frost 2015). However, previous studies have indicated that most foraging occurs within four miles of a nest site (Keane and Smith 2016). PSL is not a recognized nesting area, and is not considered a critical foraging area due to its distance from the nearest nesting colony.

**Black Abalone (*Haliotis cracherodii*).** The black abalone, listed as endangered, is a prosobranch gastropod mollusk that ranges from Point Arena in northern California to southern Baja California, Mexico, including offshore islands. A black abalone is identifiable and distinguishable from other abalone species by the smooth dark shell and five to nine round, flat shell holes. Maximum size is about 200 millimeters (mm) and maximum life span is thought to be about 20 to 30 years. Black abalone populate suitable rocky substrate from the high intertidal zone to the subtidal zone, approximately six meters (m) deep, but are more commonly found in the mid to low intertidal. They typically occur in habitats with complex surfaces and deep crevices that provide shelter for juveniles and adults. Suitable habitat is in part characterized by bare rock and crustose coralline algae. Juvenile black abalone graze on crustose coralline algae and micro flora, while adult abalone feed on drift algae. Furthermore, crustose coralline plays a role in prompting settlement and metamorphosis of abalone larvae by the release of chemical cues (Miner et al. 2006). Black abalone populations have declined dramatically since the 1970s from overfishing and a bacterial disease known as withering syndrome, significant declines in abundance and have led to local extinction in most locations south of Point Conception, CA.

PSL Harbor is located within the federally endangered black abalone's historic habitat range. Designated critical habitat (Specific Area 10) for black abalone encompasses PSL Harbor and the project area. The LAD conducted two focused surveys of the proposed PSL breakwater repair area in June/July 2018 and January/February 2019 in accordance with the NMFS's black abalone habitat assessment/survey requirements. While no black abalone were discovered within the proposed breakwater repair area, black abalone have been observed within the vicinity of PSL Harbor. During the 2018 and 2019 focused black abalone surveys it was noted the structural rock formations within the PSL breakwater area provide a possibility for suitable habitat to support juvenile and adult black abalone.

### 4.2.2 Environmental Consequences

**Significance Criteria**

An impact to Marine Resources will be considered significant if the alternative would:

- Degrade habitat for, or reduce, the population size of a federally threatened, endangered, or candidate species such that the local population size or capacity is permanently reduced, or its designated critical habitat is permanently adversely modified;
- Cause a permanent net loss in value of a sensitive biological habitat including a marine mammal haul out site or breeding area, seabird rookery, or Area of Special Biological Significance (ASBS);
- Impede the movement or migration of fish;
- Cause a substantial loss in the population or habitat of any native fish, wildlife, or vegetation (a substantial loss is defined as any change in a population which is detectable over natural variability for a period of 5 years or longer).

**<u>Preferred Alternative</u>**

***Marine Habitats and Vegetation***

Breakwater repair activities may result in direct and indirect impacts to algae attached to existing rock within and immediately adjacent to the repair area. Algae in the repair area may be crushed or smothered due to rock placement activities. Algae in other portions of the breakwater that are not under repair would remain intact, but may experience some loss due to small amounts of turbidity in the immediate vicinity of the work. Because a rocky breakwater of the type proposed for repair is a complex structure, with extensive interstitial spaces created by the placement of boulders, there would be a net increase in available rocky surface area for marine biota after construction. Upon project completion, the breakwater repairs would provide new productive rocky subtidal and intertidal habitats for marine algae to recolonize.

Because the excavation material has been deemed suitable for nearshore placement, oxygen depletion, eutrophication, and resuspension of contaminants would not be likely to result in significant adverse biological impacts. Shoal excavation and sediment placement activities may result in direct and/or indirect impacts to marine algae. Water column effects would be largely limited to turbidity impacts. Turbidity can impact plankton populations by lowering the light available for phytoplankton photosynthesis and by clogging the filter feeding mechanisms of zooplankton. Turbidity would be expected to be limited to a smaller footprint and shorter temporal duration due to the sandy characterization of the sediments and would be mostly confined to the immediate excavation and placement areas. Because turbidity effects would be localized and short-term, with respect to ambient conditions, and the marine plankton are transitory in nature, impacts on phytoplankton and zooplankton would not be significant. Environmental effects from turbidity and sediment fallout would primarily impact intertidal and subtidal macroalgae within the immediate area. Prolonged light limitation negatively effects photosynthesis, growth, and recruitment of algal species. Any benthic flora within the immediate project area would be eliminated by the excavation activities because of site excavation and substrate removal. Given the depths of the placement site, minimal vegetation is expected to occur with the placement site footprint. Marine algae attached to the breakwater stones within the immediate area of the excavation site may experience indirect impacts due to turbidity. The excavation and placement activities' impacts are expected to be temporary and should not affect the overall growth and recruitment of algae. Marine algae would be expected to begin to recolonize the affected areas once construction is complete. Impacts to marine algae within the project area are considered adverse but not significant.

Sediments from the sandy bottom habitats in the lee of the breakwater would be excavated (within an approximately 1.8 acre area) and placed at the designated placement site to provide sufficient draft for repair equipment operating alongside the breakwater. Sediments were characterized as sand and are expected to settle quickly and locally.

Based on the frequency distribution analyses of CDFW data and observations from 2018-2020 canopy kelp surveys, canopy kelp is not believed to be a significant habitat resource within the project area or impacted by the Proposed Action. Pursuant to the environmental commitments, pre-construction and post-construction canopy kelp surveys will be performed.

For impacts to HAPC components, surfgrass and eelgrass, see section on Essential Fish Habitat.

As described in Section 4.1.2, impacts to water quality during breakwater repair, excavation and placement activities would be minimal, and environmental commitments will be implemented to further minimize or avoid the temporary impacts that could occur due to turbidity and presence of equipment. These measures would also minimize impacts to marine habitats and resources. Therefore, the proposed project will result in temporary adverse, but not significant impacts to marine habitats and vegetation.

***Invertebrates***

Breakwater repair activities would result in direct impacts to invertebrates especially sessile invertebrates occupying the repair area. Some invertebrates may suffer direct impacts of injury or mortality during rock movement and placement. Invertebrates on other portions of the breakwater that are not under repair would remain intact but may experience some loss due to turbidity in the immediate vicinity of the work. Localized alterations in life cycles from shading effects due to the presence of the barge may occur. Other portions of the breakwater that are not under repair would be available to motile invertebrates for the duration of the project. Upon project completion, the breakwater repairs would provide new rocky subtidal and intertidal habitats for invertebrates. Invertebrates are expected to recolonize the repair area once construction is complete, making the impact temporary in nature.

Shoal excavation and sediment placement activities in the lee of the breakwater would temporarily cause disturbance and redistribution of bottom sediments to the excavation template and placement site resulting in direct impacts to invertebrates. Temporary increases in turbidity and suspended solids may occur during excavation and placement activities which could decrease the amount of dissolved oxygen within the immediate area. Organisms may be exposed to suspended sediment concentrations during excavation activities and up to several hours later for a distance generally 100 to 300 feet. Benthic organisms are more susceptible to turbidity. Mechanical or abrasive action of suspended silt and detritus can negatively impact filter-feeding organisms by clogging their gills and impairing proper respiratory and excretory functioning and feeding activity, resulting in smothering to invertebrates in the immediate vicinity. Some invertebrates inhabiting the sandy ocean bottom may relocate if they are mobile, be relocated with the sediments, be smothered or crushed, become food for opportunistic birds, or survive at a new location. Invertebrates are expected to recolonize the excavated and placement area after construction is complete. Effects of a clamshell dredge project in San Diego Bay on epibenthic invertebrate, and benthic infaunal invertebrate communities have previously been studied. Data were analyzed with regards to biomass, density, species richness, community similarity, and infaunal community indices. Results indicated that benthic infauna recovered within 5 months relative to density and biomass, but examination of community indices indicated that full recovery of community structure may have taken 17 to 24 months. Epibenthic invertebrates recovered within 29 to 35 months in terms of density and biomass. However, the epibenthic invertebrate community composition was still changing or had achieved an alternate stable state near the end of the study (Merkel & Associates 2010). This area of PSL Harbor does not experience a rapid influx of sand and would not expect to require excavation for several years, thus allowing the area to recolonize and recover. Therefore, the proposed project will result in temporary adverse, but not significant impacts to invertebrates.

For impacts to the black abalone, see section on Threatened and Endangered Species.

***Fish and Essential Fish Habitat Assessment***

The Corps has determined that the Proposed Action may result in a substantial adverse impact to EFH, but would not result in a substantial adverse impact to any species managed under the four Fishery Management Plans identified for this region of the Pacific. Expanded Essential Fish Habitat Consultation pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) will be initiated with the NMFS, the agency responsible for managing EFH. The following is a discussion of potential effects to EFH:

Breakwater repair, shoal excavation and sediment placement activities would directly and indirectly impact fish species and resources. Breakwater repair activities would create increased noise and disturbance in the immediate vicinity of the repair area. Shoal excavation and placement activities would create increased noise, disturbance and turbidity within the project area and immediate vicinity. In addition, construction activities could result in temporary loss of habitat, foraging habitat, and prey items (invertebrate, plankton, marine plant, and algal) due to direct removal, smothering, burial, crushing of organisms, entrainment, temporary turbidity plumes and suspension of sediments, and/or temporary changes to dissolved oxygen levels. Increased turbidity may also indirectly impact fish resources. Upon project completion, the breakwater repairs would provide new rocky subtidal and intertidal habitats for marine invertebrates, algae, surfgrass, and fish; all are expected to recolonize the repair area once construction is complete, making the impact temporary in nature.

Local fishes would likely avoid disturbance areas, thus lethal effects of suspended sediment on fishes are not anticipated to be great. Fish may be exposed to suspended sediment concentrations during excavation and sediment placement activities and up to several hours later for a distance generally 100 to 300 ft. Dredging operations may cause clogging to gills, resulting in smothering to fish in the immediate vicinity. In addition, direct removal and/or burial of individuals, or entrainment of individuals could result in injury or mortality. As presented above, the project area supports soft bottom habitat and Pacific eelgrass habitat. Approximately 1.8 acres of sandy soft bottom habitat and Pacific eelgrass habitat in the lee of the breakwater would be impacted during excavation. Excavated sediments would be placed approximately 1,000 ft north of the breakwater and utilized to create an engineered eelgrass mitigation site. As construction occurs, it is expected that demersal and pelagic fishes would temporarily relocate to avoid potential water quality impacts (i.e., turbidity plumes). Recolonization of fishes may occur quickly in the excavated area by local fishes temporarily displaced due to construction activities. Effects of a clamshell dredge project in San Diego Bay on demersal fish communities has previously been studied. Data was analyzed with regards to biomass, density, species richness, community similarity, and infaunal community indices. Results indicated that the demersal fish community took between 14 and 22 months to fully recover (Merkel & Associates 2010). Although, the demersal fish community may not experience significant direct mortality due to excavation there is likely a dependent correlation between the recovery of the benthic infauna and epibenthic invertebrate community recovery rates and that of the fish communities. The benthic infauna and epibenthic invertebrate communities are prey items for foraging fish and provide other ecosystem services. It is important to note that the above mentioned study was in reference to the recovery of strictly a sandy bottom benthic habitat, while the excavation template in the lee of the PSL breakwater is a combination of sandy bottom benthic habitat and Pacific eelgrass habitat so recovery rates of the demersal fish community within the proposed project area may differ. It is expected that most fish would avoid the immediate repair and excavation area due to the increased turbidity, noise levels, and oxygen depletion.

For the Pacific region, EFH has been identified for a total of over 119 species covered by four FMPs under the auspices of the Pacific Fishery Management Council; Coastal Pelagic Species FMP, Pacific Coast Groundfish FMP, Pacific Coast Salmon FMP, and Highly Migratory Species FMP. Species managed under all four of the FMPs have the potential to occur within PSL Harbor. Several of the species managed under the Pacific Coast Groundfish FMP and Coastal Pelagic Species FMP are known to occur commonly within PSL Harbor, (e.g., Northern anchovy, Pacific sardine, Pacific mackerel, jack mackerel, Dover sole, Pacific sanddab, rockfish species, California scorpionfish, and English sole). In addition, many species identified as Ecosystem Component Species under the Pacific Groundfish Management Plan are present in the PSL Harbor (e.g., skate species, silversides, and smelts). Furthermore, many other native marine fish in the project area undoubtedly serve as prey for many of the managed species.

While California grunion are known to spawn on beaches in Avila Beach, grunion spawning activities are not expected to be impacted as no sandy beaches are present within the project area.

Within PSL Harbor three Habitat Areas of Particular Concern (HAPC) components are present: eelgrass, surfgrass, and canopy kelp. The Proposed Action will not have an impact to canopy kelp. The estimated direct impact to Pacific eelgrass (*Zostera pacifica*) due to shoal excavation is 1.8 acres. The estimated worst case potential direct and indirect impacts to Pacific eelgrass due to shoal excavation and breakwater repair construction activities within the entire work area is 4.39 acres. The estimated impact to surfgrass due to breakwater repair activities within the entire project area ranges from no impact (0 $m^2$) to 31 $m^2$. The LAD has a fully developed eelgrass and surfgrass mitigation plan that has been coordinated with the NMFS. The plan includes minimization measures to reduce eelgrass and surfgrass impacts and to mitigate the anticipated impacts to eelgrass in accordance with the CEMP at a 1.2:1 mitigation ratio. Pacific eelgrass is a woody, more robust, slower growing species than the common eelgrass, *Zostera marina,* found in harbors and marinas along the California coast. Due to the slower growth rates of Pacific eelgrass it is anticipated in combination with the mitigation efforts the ecosystem functions of the impacted Pacific eelgrass habitat would recover in five years (Keith Merkel, personal communication, March 25, 2021). Restoration of the Pacific eelgrass in anticipated to commence in the optimal time for transplantation of the 2021 growing season, one year ahead of construction, to reduce temporal effects and support an adaptive management restoration plan. For a complete analysis of impacts to seagrass species present within the project area, minimization measures, and detailed plan for mitigation see Appendix B, Eelgrass Mitigation and Monitoring Plan in Support of the Port San Luis Breakwater Repairs (Merkel & Associates Jan 2021).

The repair is expected to be beneficial in the long term by maintaining the harbor conditions that support a high density and diversity of marine life. The repair would place additional rock on the breakwater, which would increase rocky subtidal and intertidal habitat spaces to support fish habitat and prey item's habitat for fish species. In addition, the breakwater structure creates favorable conditions for the Pacific eelgrass bed in the lee of the PSL breakwater.

With the minimization measures outlined in the eelgrass mitigation plan and implementation of the mitigation and monitoring plan (see Appendix B) impacts to fish and EFH would be substantially adverse, but temporary and mitigable.

***Avian Species***

Breakwater repair activities may temporarily degrade water quality and increase ambient noise levels, which could cause disturbance to local and migratory birds. These disturbances may directly and/or indirectly impact avian resting, foraging, nesting, nest incubation, and rearing of chicks. Increased levels of construction activity in the repair area may decrease use of the breakwater by birds for roosting. Disturbance to avian species caused by the breakwater repair is expected to be short-term and minimal. Wildlife is expected to acclimate to the monotonous construction noises, and birds are expected to avoid perching on the breakwater within and adjacent to the construction site during operations. Approximately 75-100 feet linear feet of the breakwater would be repaired per week, therefore other portions of the breakwater not under repair would remain available for use by roosting birds. Work would be short term and localized on the breakwater, and birds are expected to vacate the immediate work area and find alternate foraging and roosting locations during construction activities.

The area to be excavated and sediment placement site is a small portion of the local habitat (less than 1% of San Luis Obispo Bay), thus the loss of foraging resources for avian populations is judged adverse, but not significant. Turbidity can also impact visually foraging piscivorous seabirds by making it difficult for them to see their prey. Thus, it is likely that visual feeders may avoid foraging near the immediate vicinity of the excavation and placement activities. As it is likely that forage fish would avoid direct disturbance areas, these species would be available for capture elsewhere. Birds would be expected to return after excavation and placement activities cease. A reduction in overall prey availability would be experienced in the excavation and placement area until recolonization and recovery of the community has occurred. The proposed project action would not cause a substantial loss in the population or habitat of avian species.

The small footprint of the project area accounts for only a small fraction (less than 1%) of the available foraging and roosting areas available to avian species within San Luis Obispo Bay. In addition, the proposed project would not result in a net loss in value of a seabird rookery. Adverse impacts to nesting, foraging and roosting birds would be minimal, temporary and confined to active work limits and immediately adjacent areas, and impacts would be considered less than significant.

For impacts to the California least tern, see section on Threatened and Endangered Species.

***Marine Mammals***

The LAD has requested an incidental take authorization under section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, for the take of marine mammals incidental to conducting repairs of the PSL breakwater. Because LAD's activities have the potential to cause Level B Take of marine mammals, the LAD has requested an Incidental Harassment Authorization from the National Oceanic and Atmospheric Administration (NOAA) Fisheries Office of Protected Resources. Three pinniped species may be present in the affected area during breakwater repair construction. Two species of pinnipeds were observed utilizing the PSL breakwater as a consistent haul-out site when weather permitted, the California sea lion and Steller sea lion. While harbor seals were not observed hauled out on the PSL breakwater, they were observed within the vicinity of the breakwater and have the potential to transit the waters near or within the project area. For a complete analysis of impacts to the marine mammal species present within the project area see Appendix for the submitted Incidental Harassment Authorization (IHA) Application for Operations and Maintenance (O&M) Port San Luis Harbor Breakwater Repairs (February 2021).

For impacts to the Southern sea otter (*Enhydra lutris nereis*), see section on Threatened and Endangered Species.

**Threatened and Endangered (T&E) Species**

**Southern Sea Otter (*Enhydra lutris nereis*).** The federally threatened Southern sea otter is known to use the kelp beds located both inside and outside the harbor. Use in the vicinity of the open water and rock structure of the breakwater by sea otters is low. Kelp near the breakwater is minimal, and data from the 2016 annual California sea otter census performed by USGS showed low densities of sea otter in the vicinity of the breakwater.

The Southern sea otter has the potential to infrequently occur within the project area. Infrequent occurrences, more transient in nature have been observed of solitary individuals within the vicinity of the project area. The project area was not observed to be commonly or frequently utilized as a foraging area by Southern sea otters, although it is possible that individuals may infrequently forage in the project area. The proposed action is not expected to have a consequential impact to foraging or feeding of Southern sea otters because the small footprint of the project area accounts for only a small fraction (less than 1%) of the available foraging area within San Luis Obispo Bay and this area has not been identified or observed as an area Southern sea otters are commonly or frequently present in. One mile east of the project area within Port San Luis Harbor, in the kelp beds a raft(s) of Southern sea otters were consistently observed during marine mammal surveys conducted in 2018 (Merkel & Associates) and monthly throughout 2019 (Corps Biologist).

Per the environmental commitments identified in Section 5:

- An on-site qualified marine mammal monitor would be on-site at all times during construction activities.
- A 50-meter safety zone for Southern sea otters would be established for this project. Should a sea otter come within 50 meters of the construction activities, operations would be halted until the sea otter leaves the designated safety zone.

It is expected that with the presence of active construction equipment and the associated noise, otters would avoid the immediate work area. With the implementation of avoidance and minimization measures, the Corps has determined the proposed project "may affect, not likely to adversely affect" the Southern sea otter. Informal consultation pursuant to Section 7 of the Endangered Species Act will be initiated with the USFWS, the agency responsible for managing Southern sea otters.

**California Least Tern (*Sterna antillarum browni*).** The California least tern may use the project area for foraging as birds are known to nest at the Oceano Dunes State Vehicular Recreation Area (SVRA), approximately 7.5 miles from the project area (Frost 2015). However, previous studies have indicated that most foraging occurs within four miles of a nest site (Keane and Smith 2016). PSL is not a recognized nesting area and is not considered a critical foraging area due to its distance from the nearest nesting colony.

Based on the small impact area (less than 1% of available foraging habitat within San Luis Obispo Bay) around the active construction site during breakwater repair construction activities, the water quality monitoring (including turbidity monitoring) that would occur, and the distance between the breakwater site and nearest nesting colony, least tern foraging is not expected to be impacted by the Proposed Action. The LAD has determined the Proposed Action would have "no effect" on California least tern.

**Black Abalone (*Haliotis cracherodii*).** No black abalone were present in the proposed repair area during the 2018 and 2019 focused black abalone surveys, but if undetected individuals are present, direct and/or indirect impacts to the species could occur. Indirect impacts due to the Proposed Action could be a temporary reduction in foraging resources (algal species and drift kelp) primarily due to direct removal of drift kelp and algae attached to the breakwater stones within the repair areas during breakwater repair activities, or a loss of algal species within the immediate area of the excavation template due to increased turbidity. Direct impacts due to the breakwater repair activities could be injury or mortality due to resetting and placement of new stones within the repair area should an individual be present in the area. Impacts to designated critical habitat for black abalone would be temporary, as it is anticipated the repair areas would begin to recolonize once construction is complete. Furthermore, the repairs to the breakwater would result in more complex interstitial spaces and crevices in the intertidal and subtidal zones providing potential suitable habitat for black abalone.

Due to the documented observations of black abalone within the San Luis Obispo County region, and the habitat assessment's conclusion that the PSL breakwater provides suitable habitat to support juvenile and adult black abalone., the LAD has determined there is potential for black abalone to occur within the project area. The LAD will implement the following avoidance and minimization measures;

- An additional black abalone survey would be conducted when adequate low tides and safe sea state conditions allow during 2021 or 2022 prior to breakwater repair construction commencing to confirm no black abalone are present.
- A qualified black abalone biologist would be on-site during construction to periodically survey the breakwater structure as new sections are repaired and core interstitial spaces are exposed to ensure no black abalone are present or are in harm's way. Approximately, one 75 – 100 ft section of breakwater would be repaired per week.
- Should black abalone be observed within the PSL breakwater repair area, work will cease in that immediate area and Section 7 consultation would be immediately initiated with the NMFS.

With the implementation of the avoidance and minimization measures, the Corps has determined the proposed project "may affect not likely adversely affect" the black abalone or its designated critical habitat. Informal consultation pursuant to Section 7 of the Endangered Species Act will be initiated with the NMFS, the agency responsible for managing black abalone.

As documented in the above analysis, the Proposed Action would not degrade habitat for, or reduce, the population size of a federally threatened, endangered, or candidate species such that the local population size or capacity is permanently reduced, or its designated critical habitat is permanently adversely modified; cause a permanent net loss in value of a sensitive biological habitat including a marine mammal haul out site or breeding area, seabird rookery, or Area of Special Biological Significance (ASBS); impede the movement or migration of fish; or cause a substantial loss in the population or habitat of any native fish, wildlife, or vegetation (a substantial loss is defined as any change in a population which is detectable over natural variability for a period of 5 years or longer). Therefore, effects to Biological Resources would be less than significant.

**No Action Alternative**

The "no action" alternative would have no immediate effect on marine resources. However, continued structural degradation and rising sea levels would impact harbor operations as the function of the breakwater is compromised, resulting in the need for emergency repairs. This emergency work may require more extensive construction and may take longer to complete, thereby extending the duration of construction and area of impact in the future.

## 4.3 AIR QUALITY AND GREENHOUSE GASES (GHG)

### 4.3.1 Affected Environment

**Air Quality**

The project area is located within the South Central Coast Air Basin (SCCAB) under the jurisdiction of the San Luis Obispo County Air Pollution Control District (SLOCAPCD) in the western portion of San Luis Obispo County in Port San Luis Harbor. The SLOCAPCD is a local government agency that works to project the people and the environment of San Luis Obispo County from harmful effects of air pollutants (SLOCAPCD, 2020a). The SLOCAPCD jurisdiction covers the entire county including the incorporated cities of Paso Robles, Atascadero, Morro Bay, San Luis Obispo, Pismo Beach, Arroyo Grande and Grover Beach. The project area is in western San Luis Obispo County.

Rocks would be procured from one of two quarries. One quarry (Pebbly Beach) at Santa Catalina Island (Catalina Island) is located within the Los Angeles County portion of the South Coast Air Basin (SCAB) under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). Rocks from this island (sea based) quarry would be transported (delivered/delivery) on the sea (Pacific Ocean) with barges by tug boats to the project site, covering two, different air basins (SCAB; SCCAB) and four, separate air districts [SCAQMD; Ventura County Air Pollution Control District (VCAPCD); Santa Barbara County Air Pollution Control District (SBCAPCD), and; San Luis Obispo County Air Pollution Control District (SLOCAPCD)]. Within the SCCAB, Ventura County emissions are under the jurisdiction of the VCACPD; Santa Barbara County emissions are under the jurisdiction of the SBCAPCD; and, San Luis Obispo County emissions are under the jurisdiction of the SLOCAPCD. The SLOCAPCD Threshold of Significance For Construction Operations Table is in Appendix C, Air Criteria Pollutants Emissions and GHG Emissions Analysis.

While it is less likely that a land-based quarry for stone would be utilized for O&M breakwater repair, this is a possibility. Previous Corps Los Angeles District (Corps) marine rock work projects have utilized stone sourced from an inland quarry, most recently stone was sourced from an inland quarry in Apple Valley/Victorville, San Bernardino County. At this time, it cannot be determined what specific inland quarry or port a contractor may utilize for the Port San Luis Breakwater Repair Project (should a different quarry be utilized additional analyses may be required). For the purposes of this analysis for this EA it has assumed the following in-land quarry and port would be utilized based on the geographic proximity to Port San Luis Harbor. Stone would be sourced from the Apple Valley/Victorville in-land quarry and delivered using large flatbed trailers or dump trucks on roadways, highways, and freeways to Port Hueneme, Ventura County, where the stone would be off-loaded directly onto a marine barge or offloaded into a designated land-based staging/storage area for transfer at a later time to a marine barge. The stone would then be delivered by sea vessels barge(s) and tug(s) from the Port of Hueneme going north along the California coast to the Port San Luis Harbor in San Luis Obispo County.

Should land-based staging/storage construction equipment areas (contractor laydown areas) be required at Port Hueneme they would be designated on land that has been developed (i.e., paved), and/or already designated for such purposes. Rocks delivered (a combination of trucks on roadways and sea vessel barge(s) and tug boat(s) on the sea) from the Apple Valley/Victorville inland quarry would cover three, different air basins (MDAB; SCAB; SCCAB) and three, separate air districts (MDAQMD; SCAQMD; VCAPCD). Rocks from San Bernardino County inland quarry likely would be delivered on roadways using trucks from the San Bernardino County's High Desert portion of the MDAB under the jurisdiction of the MDAQMD through the Los Angeles County portion of the SCAB under the jurisdiction of the SCAQMD to the Port of Hueneme (Ventura County), which is in the SCCAB under the jurisdiction of the Ventura County Air Pollution Control District (VCAPCD). Then the rock would be loaded on to sea vessel(s) rock barge(s) and tug boat(s) and delivered from the Port of Hueneme (Ventura County), in the SCCAB under the jurisdiction of the VCAPCD, passing through along the coast of Santa Barbara County, which is in the SCCAB under the jurisdiction of the SBCAPCD, and passing through along the coast of San Luis Obispo County, which is in the SCCAB under the jurisdiction of the SLOCAPCD, to the project site in Port San Luis Harbor (San Luis Obispo County).

**National Ambient Air Quality Standards**

The Clean Air Act (CAA) identified and established the National Ambient Air Quality Standards (NAAQS) for a number of air criteria pollutants in order to protect the public health and welfare. The air criteria pollutants include ozone (O3), carbon monoxide (CO), suspended particulate matter (PM), sulfur dioxide (SO2), nitrogen dioxide (NO2), and lead (Pb). PM emissions are regulated in two size classes: Particulates up to 10 microns in diameter (PM10) and particulates up to 2.5 microns in diameter (PM2.5).

A region is given the status of "attainment" or "unclassified" if the NAAQS have not been exceeded. A status of "nonattainment" for particular criteria pollutants is assigned if the NAAQS have been exceeded. Once designated as nonattainment, attainment status may be achieved after three years of data showing non-exceedance of the standard. When an area is reclassified from nonattainment to attainment, it is designated as a "maintenance area," indicating the requirement to establish and enforce a plan to maintain attainment of the standard.

**General Conformity Rule**. A conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates specified in 40 CFR 93.153(b)(1). Total of direct and indirect emissions means the sum of direct and indirect emissions increases and decreases caused by the Federal action; i.e., the "net" emissions considering all direct and indirect emissions. The portion of emissions which are exempt or presumed to conform under § 93.153 (c), (d), (e), or (f) are not included in the "total of direct and indirect emissions." The "total of direct and indirect emissions" includes emissions of criteria pollutants and emissions of precursors of criteria pollutants. The air criteria pollutants are typically quantified in Tons per Year (Tons/Year).

Direct emissions include construction emissions. Indirect emissions means those emissions of a criteria pollutant or its precursors:
1. That are caused or initiated by the Federal action and originate in the same nonattainment or maintenance area but occur at a different time or place as the action;
2. That are reasonably foreseeable;
3. That the agency can practically control; and
4. For which the agency has continuing program responsibility.
All emissions associated with the Proposed Action are direct emissions.

**Attainment Designations**. For the western portion of San Luis Obispo County, the SCCAB is in attainment for the federal 8-hour ozone (O3) but the eastern portion of San Luis Obispo County is in non-attainment for the federal O3 and is in marginal attainment. The SCCAB for San Luis Obispo County is in attainment for the remaining pollutants regulated under the NAAQS. For San Luis Obispo County, a federal action would conform to the State Implementation Plan (SIP) if its annual emissions remain below 100 tons of volatile organic compound (VOC), 100 tons of oxides of nitrogen (NOx), 100 tons of PM10 , 100 tons of PM2.5, 100 tons of CO, 100 tons of NO2, 100 tons of SO2, and 25 tons of Pb. The NAAQS attainment designation for MDAB (in the San Bernardino County High Desert emissions are governed by the MDAQMD), for SCAB (the portion in Los Angeles County emissions are governed by the SCAQMD), and the SCCAB (in Ventura County emissions are governed by the VCAPCD; in Santa Barbara County emissions are governed by the SBCAPCD; in San Luis Obispo County emissions are governed by the SLOCAPCD) are summarized in Table 4.3-1. The General Conformity Applicability Rates for the MDAB (the San Bernardino County High Desert emissions are governed by the MDAQMD), for the SCAB (the portion in Los Angeles County emissions are governed by the SCAQMD), for the SCCAB (in Ventura County emissions are governed by the VCAPCD; in Santa Barbara County emissions are governed by the SBCAPCD, and; in San Luis Obispo County emissions are governed by the SLOCAPCD) are summarized in Table 4.3-2.

**Table 4.3.1 NAAQS Attainment Designation**

| Air Basin | MDAB [1] | SCAB [2] | SCCAB [3] | SCCAB [4] | SCCAB [5] |
|---|---|---|---|---|---|
| Air District | MDAQMD [1] | SCAQMD [2] | VCAPCD [3] | SBCAPCD [4] | SLOCAPCD [5] |
| Pollutant | | | | | |
| $O_3$ [7] | Non-attainment (Severe [6]) | Non-Attainment (Extreme [6]) | Non-Attainment (Serious [6]) | Attainment | Attainment (Western San Luis Obispo County);<br><br>Non-Attainment [(Eastern San Luis Obispo County) - Marginal [6])] |

| | | | | | |
|---|---|---|---|---|---|
| CO | Attainment | Maintenance | Attainment | Attainment | Attainment |
| $NO_2$ | Attainment | Maintenance | Attainment | Attainment | Attainment |
| PM 10 | Non-Attainment (Moderate[6]) | Maintenance | Attainment | Attainment | Attainment |
| PM 2.5 | Attainment | Non-attainment (Serious [6]) | Attainment | Attainment | Attainment |
| $SO_2$ | Attainment | Attainment | Attainment | Attainment | Attainment |
| Lead (Pb) | Attainment | Non-attainment (Serious [6]) | Attainment | Attainment | Attainment |

Source: [1] https://www.mdaqmd.ca.gov/home/showpublisheddocument?id=1267, Accessed January 28, 2021

[2] https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf?sfvrsn=2 , accessed January 28, 2021, February 2-3, 2021

[3] http://www.vcapcd.org/air_quality_standards.htm , Accessed January 28, 2021

[4] https://www.ourair.org/air-quality-standards/#data-table, Accessed January 28, 2021

[5] https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/AttainmentStatus29January2019.pdf (Non-Attainment-Marginal, Eastern San Luis Obispo County; Attainment, Western CO. Accessed January 28, 2021

[6] https://www3.epa.gov/airquality/greenbook/ancl2.html; https://www3.epa.gov/airquality/greenbook/ancl3.html, accessed January 28, 2021, February 2-3, 2021

[7] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC.

Note: NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3)

**Table 4.3.2 General Conformity Applicability Rates (Tons/Year)** [1]

| Air Basin | MDAB | SCAB | SCCAB | SCCAB | SCCAB |
|---|---|---|---|---|---|
| Air District | MDAQMD | SCAQMD | VCAPCD | SBCAPCD | SLOCAPCD |
| Pollutant | | | | | |
| Ozone (O3) [3] | 25 | 10 | 50 | N/A[4] | 100 [2] |
| Volatile Organic Compound (VOC),O3 precursor [3] | 25 | 10 | 50 | N/A[4] | 100 |
| Nitrogen Oxide (NOx), | 25 | 10 | 50 | N/A[4] | 100 |

| | | | | | |
|---|---|---|---|---|---|
| O3 precursor [3] | | | | | |
| Carbon Monoxide (CO) | N/A[4] | 100 | N/A[4] | N/A[4] | N/A[4] |
| Nitrogen Dioxide (NO2) | N/A[4] | 100 | N/A[4] | N/A[4] | N/A[4] |
| Particulate Matter (PM10) | 100 | 100 | N/A[4] | N/A[4] | N/A[4] |
| Particulate Matter (PM2.5) | N/A[4] | 70 | N/A[4] | N/A[4] | N/A[4] |
| Sulfur Dioxide (SO2) | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] |
| Lead (Pb) | N/A[4] | 25 | N/A[4] | N/A[4] | N/A[4] |

Source: [1] 40 CFR 93.153(b)(1) and 40 CFR 93.153(b)(2); https://www.epa.gov/general-conformity/de-minimis-tables , accessed February 2 - 3, 2021

[2] Port San Luis Harbor is located in Western portion of San Luis Obispo County that is in attainment for Ozone (O3). The Eastern of San Luis Obispo County is in non-attainment (marginal) for O3.

[3] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC. The relation between O3, NOx and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Additionally, due to the variability in rates of ozone formation, EMFAC2007 does not provide estimates for ozone. Instead, the emission associated with ozone precursors (VOCs and NOx) are calculated and used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated.

[4] N/A (not applicable). Rates do not apply if the basin is in attainment.

**Greenhouse Gases (GHG)**

Gases that trap heat in the atmosphere are often called greenhouse gases (GHG). GHGs are emitted by natural processes and human activities. Examples of GHGs that are produced both by natural processes and industry include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O). Currently, there are no Federal standards for GHG emission, and no Federal regulations have been set at this time. GHG emissions are typically quantified in units of Metric Tons per year CO2 equivalent (MT/Year CO2eq). GHG emissions (MT/Year CO2eq) have been estimated using the Proposed Action (Tons/Year) emissions and inputting the Proposed Action emissions into the USEPA Greenhouse Gas Equivalencies Calculator (USEPA, 2020b).

**Emission Estimates Methodology.** Emissions were estimated using the California Air Resources Boards (CARB) on-road and off-road emission factors. With the exception of lead (Pb), estimate of emissions for all criteria pollutants were calculated. Estimates of lead emissions were not calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007 does not provide estimated emissions for lead. Furthermore, CARB on-road and off-road emission factors do not provide emission factors for lead. Little to no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Additionally, due to the variability in rates of ozone formation, EMFAC2007 does not provide estimates for ozone. Instead, the emission associated with ozone precursors (VOCs and NOx) are calculated and used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated.

### 4.3.2 Environmental Consequences

**Significance Criteria**

An impact to Air Quality will be considered significant if the alternative would:

- Exceed the General Conformity applicability rates specified in 40 CFR 93.153.

**<u>Preferred Alternative</u>**

Onsite emissions associated with the proposed breakwater O&M repair construction activities would come mainly from sea vessels including barge mounted crane, two barges, two tugboats, a crew boat, a scow, a work boat, and a skiff vessel. Proposed excavation around the breakwater would be initiated in the first phase of construction and would require use of a crane-equipped barge, a scow, two small craft support vessels, and two tugboats. Excavation and deposition of shoaled sediment at the eelgrass mitigation site could potentially occur during day and night hours (approximately 11 to 22 working hours a day), 6 days a week, for approximately 3 weeks (approximately 18 days) in total, although not necessarily consecutively. The second phase of construction will consist of the repair work to the breakwater structure. It is estimated that approximately 29,000 tons of existing stone on the breakwater would need to be reset and approximately 60,000 tons of new stone (individual stone size range is anticipated to be from 5 to 20 tons) would be placed to restore the most heavily damaged portion of the breakwater with O&M repairs occurring on the leeward side of the breakwaters. During breakwater repair construction a barge with an attached crane will be outfitted with lifting tongs to reset existing stone and retrieve stones from the storage barge, and then place those stones on damaged sections of the breakwater. A boat operator in a skiff, and spotter on the breakwater, would direct the operation of the crane in order to pick and place the stones. The picked stone must be able to match the dimensions of the voids along the breakwater. Approximately 30 to 35 stones can be picked and placed per day using this vessel, or roughly three to four stones per hour on average. Repair work will consist of resetting of existing stone and placement of new stone on the breakwater structure. Dropping of armor stone is not permitted, but it should be expected that some stones may be accidentally dropped during placement. Stones would be carefully placed and interlocked with existing stones to maximize stability and minimize the intensity of sound due to stone placement. O&M breakwater repair work construction activities would be limited to day light hours (approximately 11 hours a day), with a 6 day work week. The Proposed Action duration is anticipated to last approximately six to seven months, approximately 174 workdays, generally from April to October. It is anticipated approximately 12 sea crew would be needed for the construction work.

Rock would most likely be delivered by sea vessels barge(s) and tug(s) from Catalina Island in Los Angeles County moving north along the California coast up to Port San Luis Harbor located in San Luis Obispo County.  Sea rock delivery equipment would mainly be a rock barge, two tug boats, a crew boat, a crane-equipped barge, a small craft support vessel, a crew boat vessel, a work boat, a survey boat. A floating barge would serves as the stockpile of stone for repair work. The barge is typically towed in from an offsite quarry location (likely Pebbly Beach Quarry on Santa Catalina Island) and is then anchored next to the crane-equipped barge. The rock barge is expected to carry approximately 2,000 to 4,000 tons of stone per trip. Unused/awaiting barges will be stored within a designated area within Port San Luis Harbor. Sea vessels rock delivery duration is approximately 60 works days, with a 6 day work week, approximately 11 hours workday, and approximately 400 miles by sea from Catalina Island to Port San Luis Harbor, or approximately 800 miles round trip.

Alternatively, depending on the Contractor's preference, rock could be transported by trucks on roadways from an inland quarry, most likely one located in Apple Valley/Victorville in San Bernardino County, offloaded at another port location such as Port Hueneme/Port of Hueneme (Ventura County) and then loaded on to sea barge(s) and tug boat(s) to be transported by sea north along the California coast to Port San Luis Harbor (San Luis Obispo County). This delivery method would utilize a combination of haul trucks and sea vessels. Both delivery methods (fully sea-based and a combination of trucks and barges) have been analyzed in this EA. For purpose of analyzing air quality impacts from the truck/barge combination, it is assumed that material would be trucked from Apple Valley to the Port of Hueneme and then barged to Port San Luis.

Use of an inland quarry would require an estimated 26 trucks daily travelling approximately 180 miles one way on roads from Apple Valley/Victorville, San Bernardino County, to Port Hueneme/Port of Hueneme, Ventura County, or approximately 360 miles round trip. For truck-delivered rock use of a landside crane would be used to transfer rocks from the quarry into the trucks and move rock from the trucks onto a barge in Port Hueneme/Port of Hueneme; a crawler loader and a water truck would also used. Hauling of rock on roadways using trucks from the inland quarry to Port Hueneme/Port of Hueneme is anticipated to be accomplished within the approximate 174 workdays Proposed Action duration. It is anticipated approximately 29 laborers would be needed for the inland quarry rock truck haul delivery.

Air criteria pollutants [VOC; PM10; PM2.5; CO, NO2; SO2, NO2, and lead (Pb)] emissions (Tons/Year) and GHG emissions (MT/Year CO2eq) calculations and assumptions for the Proposed Action are provided in Appendix C. Results are provided in Tables 4.3.3a..- d., and 4.3.4a.-f. The Proposed Action estimated construction work air emissions displayed in Tables 4.3.3(d) and 4.3.4(f) include emissions from both the excavation and (plus) the breakwater O&M repair; the Proposed Action construction emissions are identified for San Luis Obispo County as the proposed project area is located in Port San Luis Harbor. The estimated rock delivery air emissions are also provided; sea vessels rock delivery (from Catalina Island in Los Angeles County to Port San Luis Harbor in Port San Luis Obispo County) are provided in Tables 4.3.3a.- d. A combination of truck rock delivery on roadways from an inland quarry located in Apple Valley/Victorville in San Bernardino County High Desert area transported on land to Port Hueneme/Port of Hueneme in Ventura County, and then off loaded onto marine sea vessels rock delivery from Port Hueneme/Port of Hueneme to Port San Luis Harbor in San Luis Obispo County are provided in Tables 4.3.4 a.-f. Estimated Proposed Action annual air emissions would not exceed the Clean Air Act (CAA) General Conformity de minimis applicability rates for criteria pollutants for either delivery method. Impacts would be temporary. No indirect impacts are anticipated. Upon project completion, air quality would return to pre-project conditions. Therefore, impacts would be less than significant.

A GHG analysis of potential GHG emissions and effects of climate change is commensurate with the extent of the effects of the Proposed Action. The Proposed Action GHG analysis focused on significant potential effects and conducted an analysis that is proportionate to the environmental consequences of the Proposed Action. Results are provided in Tables 4.3.3a..- d., and 4.3.4a.-f. It is anticipated there would be no indirect impacts. Upon project completion, GHG would return to pre-project conditions.

**Table 4.3.3a SCAB (Los Angeles County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Sea Vessels**

| **Pollutant** | **VOC** | **PM10** | **PM 2.5** | **CO** | **NO2** | **SO2** | **Pb** | **GHG** |
|---|---|---|---|---|---|---|---|---|
| Construction | No Construction (No Const.) | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. |
| Rock Delivery by Sea Vessels | 0.039 | 0.036 | 0.033 | 0.2459 | 1.2089 | 0.087 | not calculated | 68.471 |
| Total | 0.039 | 0.036 | 0.033 | 0.2459 | 1.2089 | 0.087 | not calculated | 68.471 |
| Applicable General Conformity Rates | 10 | 100 | 70 | 100 | 100 | N/A | 25 | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.3b SCCAB (Ventura County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Sea Vessels**

| Pollutant | VOC | PM10 | PM 2.5 | CO | NO2 | SO2 | Pb | GHG |
|---|---|---|---|---|---|---|---|---|
| Construction | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. |
| Rock Delivery by Sea Vessels | 0.04212 | 0.03888 | 0.03564 | 0.26568 | 1.30572 | 0.09396 | not calculated | 74.196 |
| Total | 0.04212 | 0.03888 | 0.03564 | 0.26568 | 1.30572 | 0. 09396 | not calculated | 74.196 |
| Applicable General Conformity Rates | 50 | N/A | N/A | N/A | N/A | N/A | N/A | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.3c SCCAB (Santa Barbara County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Sea Vessels**

| Pollutant | VOC | PM10 | PM 2.5 | CO | NO2 | SO2 | Pb | GHG |
|---|---|---|---|---|---|---|---|---|
| Construction | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. |
| Rock Delivery by Sea Vessels | 0.03042 | 0.02808 | 0.02574 | 0.19188 | 0.94302 | 0.06786 | not calculated | 53.586 |
| Total | 0. 03042 | 0.02808 | 0.02574 | 0. 19188 | 0. 94302 | 0.06786 | not calculated | 53.586 |
| Applicable General Conformity Rates | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.3d SCCAB (San Luis Obispo County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Sea Vessels**

| Pollutant | VOC | PM10 | PM 2.5 | CO | NO2 | SO2 | Pb | GHG |
|---|---|---|---|---|---|---|---|---|
| Construction | 0.46 | 0.42 | 0.40 | 2.92 | 14.26 | 1.01 | not calculated | 819.00 |
| Rock Delivery by Sea Vessels | 0.01859 | 0.01716 | 0.01573 | 0.11726 | 0.57629 | 0.04147 | not calculated | 32.80 |
| Total | 0.47859 | 0.43716 | 0.41573 | 3.03726 | 14.83629 | 1.05147 | not calculated | 851.80 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Applicable General Conformity Rates | 100 | N/A | N/A | N/A | N/A | N/A | N/A | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.4a MDAB (San Bernardino County High Desert portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Combination Trucks on Roadways (Land) and Sea Vessels**

| **Pollutant** | **VOC** | **PM10** | **PM 2.5** | **CO** | **NO2** | **SO2** | **Pb** | **GHG** |
|---|---|---|---|---|---|---|---|---|
| Construction | No Construction (No Const.) | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. |
| Rock Delivery by Trucks on Roadways | 0.433668 | 0.218859 | 0.17207 | 2.2456087 | 4.421555 | 0.0155 | not calculated | 1448.66667 |
| Total | 0.433668 | 0.218859 | 0.17207 | 2.2456087 | 4.421555 | 0.0155 | not calculated | 1448.66667 |
| Applicable General Conformity Rates | 25 | 100 | N/A | N/A | N/A | N/A | N/A | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.4b SCAB (Los Angeles County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Combination Trucks on Roadways (Land) and Sea Vessels**

| **Pollutant** | **VOC** | **PM10** | **PM 2.5** | **CO** | **NO2** | **SO2** | **Pb** | **GHG** |
|---|---|---|---|---|---|---|---|---|
| Construction | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. |
| Rock Delivery by Trucks on Roadways | 0.370205 | 0.1868 | 0.14689 | 1.91698 | 3.774498 | 0.013596 | not calculated | 1236.66667 |
| Total | 0.370205 | 0.1868 | 0.14689 | 1.91698 | 3.774498 | 0.013596 | not calculated | 1236.66667 |
| Applicable General Conformity Rates | 10 | 100 | 70 | 100 | 100 | N/A | 25 | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.4c SCCAB (Ventura County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Combination Trucks on Roadways (Land) and Sea Vessels (Tons/Year)**

| Pollutant | VOC | PM10 | PM 2.5 | CO | NO2 | SO2 | Pb | GHG |
|---|---|---|---|---|---|---|---|---|
| Construction | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. |
| Rock Delivery by Trucks on Roadways | 0.14808 | 0.0747 | 0.058756 | 0.76679 | 1.509799 | 0.0053 | not calculated | 494.666667 |
| Total | 0.14808 | 0.0747 | 0.058756 | 0.76679 | 1.509799 | 0.0053 | not calculated | 494.666667 |
| Applicable General Conformity Rates | 50 | N/A | N/A | N/A | N/A | N/A | N/A | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.4d SCCAB (Ventura County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Combination Trucks on Roadways (Land) and Sea Vessels (Tons/Year)**

| Pollutant | VOC | PM10 | PM 2.5 | CO | NO2 | SO2 | Pb | GHG |
|---|---|---|---|---|---|---|---|---|
| Construction | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. |
| Rock Delivery by Sea Vessels | 0.02106 | 0.01944 | 0.01782 | 0.13284 | 0.65286 | 0.04698 | not calculated | 37.098 |
| Total | 0.02106 | 0.01944 | 0.01782 | 0.13284 | 0.65286 | 0.04698 | not calculated | 37.098 |
| Applicable General Conformity Rates | 50 | N/A | N/A | N/A | N/A | N/A | N/A | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.4e SCCAB (Santa Barbara County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Combination Trucks on Roadways (Land) and Sea Vessels (Tons/Year)**

| Pollutant | VOC | PM10 | PM 2.5 | CO | NO2 | SO2 | Pb | GHG |
|---|---|---|---|---|---|---|---|---|
| Construction | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. | No Const. |
| Rock Delivery by Sea Vessels | 0.03042 | 0.02808 | 0.02574 | 0.19188 | 0.94302 | 0.06786 | not calculated | 53.586 |
| Total | 0.03042 | 0.02808 | 0.02574 | 0.19188 | 0.94302 | 0.06786 | not calculated | 53.586 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Applicable General Conformity Rates | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

**Table 4.3.4f SCCAB (San Luis Obispo County portion) Air Criteria Pollutant Emissions (Tons/Year) and GHG Emission (MT/Year CO2eq) Estimates for Rock Delivery by Combination Trucks on Roadways (Land) and Sea Vessels**

| Pollutant | VOC | PM10 | PM 2.5 | CO | NO2 | SO2 | Pb | GHG |
|---|---|---|---|---|---|---|---|---|
| Construction | 0.46 | 0.42 | 0.40 | 2.92 | 14.26 | 1.01 | not calculated | 819.00 |
| Rock Delivery by Sea Vessels | 0.01859 | 0.01716 | 0.01573 | 0.11726 | 0.57629 | 0.04147 | not calculated | 32.80 |
| Total | 0.47859 | 0.43716 | 0.41573 | 3.03726 | 14.83629 | 1.05147 | not calculated | 851.80 |
| Applicable General Conformity Rates | 100 | N/A | N/A | N/A | N/A | N/A | N/A | No Federal Standard |

Note: N/A (not applicable). Rates do not apply if the basin is in attainment.

Note that the estimated total emissions within the San Luis Obispo County portion of the SCCAB would be the same, whichever quarry is used. Impacts would be less than significant.

The Proposed Action estimated air pollutant emissions comparison to the SLOCAPCD threshold of significance for construction operation is in Appendix C, Air Criteria Pollutants Emissions and GHG Emissions Analysis.

**No Action Alternative**

Breakwater repair emissions associated with Proposed Action would not occur. However, if further harbor structure deterioration occurs, frequent emergency operations to repair the breakwater may be undertaken to maintain navigable conditions. If emergency repair work is foreseeably necessary, temporary increases in emissions from the construction equipment, ancillary vessels, and laborers' vehicles would be expected. This increase would be short term (temporary) and less than significant impacts.

## 4.4 NOISE

### 4.4.1 Affected Environment

In general, noise is defined as unwanted sound. The effects of noise on people range from annoyance to inconvenience to temporary or permanent hearing loss. Level of annoyance or impact produced by a sound depends on its loudness, duration, time of day, and land use. Sound measurements are usually expressed as decibels (dB) which equally weights all frequencies. However, the human ear is not equally sensitive to sounds at all frequencies. Therefore, the dBA scale which primarily weighs frequencies within the human range of hearing is used to assess the impact of noise on human hearing (USEPA, 1971, 1972b, 1974). A range of noise levels in dBA are shown in Table 4.4.1

**Table 4.4.1 Range of Noises**

| Noise level (dBA) | Examples of Noise | Human Response |
|---|---|---|
| 0 | recording studio | hearing threshold |
| 20 | rustling leaves | |
| 40 | conversational speech | Quiet |
| 60 | freeway at 50 feet | |
| 70 | freight train at 100 feet | moderately loud |
| 90 | heavy truck at 50 feet | |
| 110 | ambulance siren at 100 feet | very loud |
| 120 | jet engine at 200 feet | threshold of pain |

Source: USEPA 1971, 1972b, 1974.

There are no baseline noise levels available for a breakwater work since it is located within an open marine environment. The existing ambient noise level within this environment is associated with wind and surf break as well as noise from passing vessels.

The dB level decreases with distance from the source, usually by a rate of 6 dB for every doubling of distance. Automobiles, recreational boats and vehicles, and small commercial fishing boats are typically primary contributors to the ambient noise environment in Port San Luis Harbor and nearby beaches. Noise levels tend to increase during heavy summer recreational uses and activities.

Currently, there are no noise standards or restrictions for construction projects within PSL Harbor District facilities except the citation discussed in Chapter 18 (Health and Safety), Code Ordinance 18.140 (Miscellaneous Prohibited Acts) paragraph (4) that states “no such person, within a Harbor District, may Operate any noise-producing equipment whether or not electrically amplified, which disturbs other people, except in accordance with the terms and conditions of a permit therefore issued by the Port San Luis District (Port San Luis Harbor District 2017a).

### 4.4.2 Environmental Consequences

**Significance Criteria**

An impact to Noise will be considered significant if the alternative would:

- Create a new, permanent source of noise that would exceed existing noise standards in an area where sensitive receptors occur, or
- Result in long-term exceedance of noise standards due to construction in an area where sensitive receptors occur unless a permit or variance is obtained.

**Preferred Alternative**

Under the Proposed Action, the breakwater would be repaired using sea-based equipment. Most of the sea-based noise would come from crane setting the stone on the breakwater. Operational noise of a crane with a capacity for a bucket/clamshell on a barge or a clamshell dredge would typically be less than a hopper dredge that has noise source ranges from 85 to 108 dBA (Bowes 1990). Furthermore, noise levels are atmospherically attenuated by a factor of 6 dB per doubling of the distance, as discussed above. Potential noise levels at various distances are shown in Table 4.4.2 below.

**Table 4.4.2 Potential Noise Levels At Various Distances**

| Distance from Construction Activities (ft.) | Noise Levels (dBA) |
|---|---|
| 50 | 80 - 90 |
| 100 | 74 – 84 |
| 200 | 68 – 78 |
| 400 | 66 – 72 |
| 800 | 60 – 66 |

Source: USEPA 1971, 1972, 1974.

Ambient noise levels from the Proposed Action within the Harbor, including use of sea based equipment (barges, tug boats, crew boats, and a crane on barge) or land based equipment (such as flat bed dump trucks, a crawler loader, a crane, a water truck, and commuter vehicles) would not be a significant new or permanent noise source. The closest residential area (sensitive receptor) to the Proposed Action is approximately 1,300 ft away, and based on Tables 4.4.1 (Range of Noise Levels) Table 4.4.2 (Potential Noise Levels at Various Distances), the noise from the Proposed Action would likely be undetectable at that distance. Decibel levels from the Proposed Action would be highest at the breakwater. Noise would be generated from the crane mounted barge moving or setting rocks onto the breakwater. Crane brakes tend to squeak, and backup alarms sound on cranes could potentially create obstructive noises from the Proposed Action. As the closet residential area to the Proposed Action is approximately one quarter of a mile (approximately 1,300 ft) away from the project area, noise levels would be substantially reduced across that distance and could be approaching at ambient noise levels based on the table above. Moreover, the breakwater and buildings in the harbor act as a noise buffer, separating the breakwater repair work the activities occurring in PSL Harbor. Excavation work around the breakwater, approximately 3 weeks in duration, would be performed during daylight hours (11 hours a day) but could occur 22 hours a day (daylight and nighttime hours). O&M rock repair on the breakwater is not proposed to occur at night time hours due to safety concerns for crew/laborers working on the breakwater.

The following noise (AQN) environmental commitments and Best Management Practices (BMPs) shall be implemented to further avoid, reduce, and minimize any noise-related impacts:

- Trucks and construction equipment would be properly maintained and scheduled in order to minimize unsafe and nuisance noise effects to sensitive biological resources, residential areas, and the socio-economic environment

- Sensitive receptors along potential haul routes, such as residential areas, schools, hospitals, convalescent homes, and churches would be avoided whenever possible
- Crane brakes shall be maintained to reduce any loud and unnecessary noise
- Construction related vehicles and equipment shall meet State, county and local requirements regarding emissions, noise, and weight capacity
- If reasonable complaints are received from local residents, the contractor shall implement additional measures to reduce these impacts. Specific measures shall be identified in coordination with the Corp's Contracting Officer
- If double or triple-shifts are utilized, the contractor shall obtain any necessary permits or exemptions from the Port San Luis Harbor, City of Avila Beach, or San Luis Obispo County.

Construction-related noise impacts would be short term and temporary, and are not expected to create a significant disturbance or nuisance to local residents or other sensitive receptors. The Proposed Action would not create a new, permanent source of noise or result in a long-term exceedance of noise standards. Upon completion of construction, noise would return to pre-project conditions. Based on the above, impacts would be less than significant.

**No Action Alternative**

The No Action alternative would avoid all noise impacts associated with the Proposed Action. However, a "No Action" response may result in frequent emergency breakwater operations to relieve an unprotected harbor, shoreline and beaches, and dangerously navigation conditions in the harbor. Impacts would be less than significant.

## 4.5 LAND USE AND RECREATION

### 4.5.1 Affected Environment

The PSL District is the governing agency that provides public services and improvements for the PSL District and regulates the various commercial and recreational uses at the port. The Port’s Master Plan, May 2004, revised per Local Coastal Plan (LCP) update, 2007, sets forth the PSL Harbor District’s official public policy regarding the uses and development of the land, piers, and tidelands under its administration (Port San Luis Harbor District 2017b).

The PSL Harbor District Master Plan study area encompasses about 520 acres of water and approximately 125 acres of land, and is divided into seven planning sub-areas according to the LU category established in the LCP for the San Luis Bay Planning Area, as follows: 1) Open Water; 2) Harford Pier; 3) Harford Landing; 4) Harbor Terrace; 5) Beach and Bluffs; 6) Lightstation (Port San Luis Lighthouse), and; 7) Avila Beach, Pier and Parking Lot. The seven planning sub-areas listed above are summarized as follows:

1) Open Water: The approximate 520-acre harbor area, is mostly used for navigation and mooring purposes. The Open Water Area also includes the shoreline/beach from Point San Luis to Shell Beach, the areas around the three piers in the study area, and the area around the PSL breakwater.

2) Harford Pier: The “backbone” of PSL, Harford Pier is an historic working pier that serves commercial and recreation fishing and boating, and is a primary focus of PSL District activities.

3) Harford Landing: An approximate 8.7-acre site at the base of Harford Pier that provides supportive land area to coastal-dependent and coastal-related uses at the main harbor, as well as serves visitor needs on the waterfront. Harford Landing is comprised of parking, launching facilities, a boatyard, and several buildings.

4) Harbor Terrace: An approximately 30-acre hillside property overlooking San Luis Obispo Bay along Avila Beach Drive that is currently used as storage area for boat owners, fishermen, and the Harbor District. A trailer park (non-conforming use) currently sits on the southeastern portion of the site. Development of Harbor Terrace is a primary long-term objective of the Harbor District.

5) Beach and Bluffs: A linear strip of land seaward of the County right-of-way of Avila Beach Drive, which provides recreational opportunities including coastal access, beach-oriented activities, informal parking, and ocean views.

6) Lightstation: An approximate 25-acre site that includes the historic Point San Luis Lighthouse and several other buildings, served by a private road and trail with controlled public access. The PSL Harbor District owns and operates the Lighstation.

7) Avila Beach, Pier and Parking Lot: The Avila Beach and Pier make up the “front porch” of the Avila community and primarily support recreational water-oriented activities. The Avila Parking Lot is located one block north of the beach and serves the parking needs of beach and pier users.

Some of the specific LU and recreation that are part of the PSL Harbor District in relation to the project area and in, adjacent to, or near the project area as follows:

- Port San Luis Harbor. PSL Harbor provides important recreational resources for the regional and local area. The port also supports petroleum product handling facilities. The PSL District complex includes administration facilities, the marina center, floating fuel dock, fish market, restaurants, bait and tackle stores, parking areas (with 246 car capacity). The Port San Luis wharf, known as Harford Pier, is approximately 1,456 feet long and has 300 mooring spaces including approximately 50% recreational sailboats, 40% commercial fishing boats and 10% power pleasure boats.

  The PSL services vessels ranging from small craft to larger than fifty feet in length. Small boat traffic is heavy in the PSL. The area adjacent to the Proposed breakwater repair (on the port side) is primarily used for boat anchorages, and the area adjacent to the anchorage area is used as a mooring field. There is a floating salmon rearing facility located within the port that is used to imprint young hatchery raised fish to acclimate them to local water prior to release, resulting in the return of adult salmon to local waters. The local commercial fishing in the port and in this part of the central coast of California involves sardines, rock cod, and halibut.

In addition to the PSL Harbor District facilities, other terminal facilities in the port include: an oil spill clean-up boat for emergency response to central California oil spills; a 3,082-foot-long pier operated by Union Oil Company for loading petroleum and petroleum products on ships; a 1,463-foot –long state-owned, County operated recreational pier, and sport fishing party-boat services.

The Port San Luis Harbor District also owns and operates a lighthouse (e.g., Lightstation described in the above section) that is northwest of the proposed Port San Luis District breakwater O&M repair project. The lighthouse was previously maintained by the USCG.

- Avila Beach. Avila Beach, is situated on the shore of the PSL, northeast of the breakwater and port. Avila Beach, along with Pismo Beach and Shell Beach, are lightly populated areas clustered along the cost in the area around San Luis Bay. Avila Beach is in the vicinity of the proposed breakwater repair but is not adjacent to it.

- Pacific Gas and Electric (PG&E). The land bordering the Lightstation, which is in the vicinity of the proposed breakwater repair but is not adjacent to it, is owned by PG&E, which owns and operations the Diablo Canyon Power Plant (DCPP) generation facility. The PG&E DCPP nuclear power plant is located approximately five (5) miles northwest (nw) of the PSL and the project area. Public access is restricted within the PG&E DCPP area. The PG&E DCPP is a vital part of the electricity produced in and for California, generating power for more than three (3.0) million northern and central California homes, and is an integral part of the central coast's economy (PG&E, 2010).

- USCG. The USCG, under the Department of Homeland Security (DHS), has operations immediately to the north of PSL Harbor in Morro Bay Harbor, and also to the south in Santa Barbara Harbor, and regularly does surveillance in PSL Harbor. The USCG operations is vital to navigational safety on California's central coast and supports the Federal Department of Homeland Security (DHS) mission through patrols of critical infrastructure and enforcement of the Port Security zones (US Coast Guard 2007) including PG&E's DCPP, which is a nuclear power generation facility, located approximately five miles northwest of Port San Luis Harbor. The USCG, under the DHS, operates a USCG operation based in Santa Barbara Harbor. The USCG Cutter Blackfin, an 87-foot patrol boat that typically support a crew of twelve (12) onboard including 1 officer and 11 enlisted personnel, is stationed out of Santa Barbara Harbor. The USGC Cutter Blackfin patrols an area of over 60,000 square miles of ocean along southern California's coastline as far north as Morro Bay and as far south as Dana Point. Its primary missions include Drug and Migrant Interdiction; Search and Rescue; Ports, Waterways, and Coastal Security; Marine Environmental Protection; Enforcement of Laws and Treaties, and; Defense Readiness. The USCG Cutter Blackfin routinely works alongside Custom and Border Protection, Immigration and Customs Enforcement, CDFW, and the NOAA to complete its mission and build strong working relationships with its partner agencies.

Typical recreation activities in the PSL Harbor District study area include beach activities, boating and water sports, golf, kayaking, sport fishing, pier fishing, and surfing.

### 4.5.2 Environmental Consequences

**Significance Criteria**

An impact to Land Use and Recreation will be considered significant if the alternative would:

- Result in permanent changes that are incompatible with designated uses.

**Preferred Alternative**

Breakwater repair may temporarily interfere with water based and land based recreational activities within the immediate vicinity of the Proposed Action. These recreational and commercial uses include boating, fishing, and beach activities. The potential environmental impacts and disturbances to such activities are expected to be minimal. These activities will be able to continue outside of project work limits.

The utilization of sea-based heavy equipment to repair the breakwater would detract from recreational and commercial use (i.e., boating) in the harbor but would be a temporary and localized impact, as it would be limited to the immediate area surrounding the breakwater. Land-based parking for crew/laborers would be established in the PSL Harbor District parking lot, which would minimize impacts to other harbor and beach land use operations. Should land-based staging/storage construction equipment areas (contactor laydown areas) be required at Port Hueneme/Port of Hueneme, Ventura County, they would be designated on land that has been developed (i.e., paved), and/or already designated for such purposes. The Proposed Action would not introduce a new land use or change existing land uses.

Navigational impacts would be minimized by properly marking buoys so that boaters can safely avoid the immediate breakwater Proposed Action area. The Proposed Action would benefit navigation and harbor operation. A fully functioning breakwater reduces wave action and shoaling of sediment into the harbor by assisting its deposition into the sand trap area, and also protects the shoreline and local beaches. The construction barges and associated workboats would use minimal harbor space for a short time period. Disturbances to recreation-related activities from project construction or use of the crew/laborer parking are also expected to be negligible. The Proposed Action would not affect or conflict with any existing development within the PSL Harbor or surrounding area.

Impacts would be further reduced or avoided through implementation of the following LUR commitment:

- In-field coordination will occur between the Corps contractor, the U.S. Coast Guard District, and the local Harbor Patrol

Upon completion of construction, land use and recreation would return to pre-project conditions. Based on the above, the Proposed Action would not result in permanent changes that are incompatible with designated uses. Therefore, impacts would be less than significant.

**<u>No Action Alternative</u>**

The "no action" alternative would avoid temporary disturbance to water-related recreation. If the breakwater is not repaired, the potential for a structural failure could occur. The undermined condition of the breakwater poses a hazard to navigational safety.

## 4.6 AESTHETICS

### 4.6.1 Affected Environment

The aesthetic character of PSL and Avila Beach and the immediate vicinity is primarily comprised of public and commercial water oriented recreational facilities located in a largely natural setting.

PSL is located on a south-facing beach with the prevailing winds and swell from the north, and the harbor is in a sheltered cove along the central coast of California.

The majority of the surrounding hillsides nearby the PSL are open space and agriculture. The scenic and visual resources of the project area are dominated by the harbor, marina, beach, open hillsides and open water vistas.

There is a possibility that rock could be delivered by trucks on roadways to Port Hueneme/Port of Hueneme, and a land based laydown contractor's staging/storage area would be designated on land that has been developed (i.e., paved), and/or already designated for such purposes. Port Hueneme/Port of Hueneme features include a port, a harbor, shipyards, marina, beaches, and some agriculture.

### 4.6.2 Environmental Consequences

**Significance Criteria**

An impact to Aesthetics will be considered significant if the alternative would:

- Cause a substantial and permanent modification of the scenic vista.

**<u>Preferred Alternative</u>**

The presence of construction equipment and truck hauling activities would temporarily reduce the aesthetic quality in PSL Harbor and the Pacific Ocean during the length of the construction operation. The presence of sea-based equipment, such as barges, crew and tugboats, and a crane, within the Harbor would not permanently affect views of the harbor, marina, wharf, bay, beach, or the Pacific Ocean. Land based equipment would not have a long-term impact on aesthetics, as the roadways, crew/ laborers parking area(s), and contractor laydown (staging/storage areas) in the Port San Luis Harbor or Port Hueneme/Port of Hueneme Harbor historically through the present have been utilized for harbor construction projects and this project would not change or modify the views in the harbors. The Proposed Action would be for a limited duration, a of approximately one (1) year but could occur over a two (2) year duration, and the potential impacts from the Proposed Action would be short term, temporary, and localized. Upon completion of construction, aesthetics would return to pre-project conditions. The appearance of the breakwater itself would not substantially change, as the proposed repairs would return the project to its design condition. Based on the above, impacts would be less than significant impact.

**No Action Alternative**

The "no action" alternative would avoid temporary impacts to aesthetics. If the breakwater is not repaired, the potential for a structural failure could occur. The undermined condition of the breakwater poses a hazard to navigational safety. The aesthetics in the San Luis Bay and Harbor and in Port Hueneme/Port of Hueneme would not be permanently impacted. Impacts would be less than significant.

## 4.7 CULTURAL RESOURCES

### 4.7.1 Affected Environment

The culture history of San Luis Obispo County is commonly divided into a series of temporal periods. This construct emphasizes changes in adaptation over time and identifies particular temporal intervals and research issues that may be relevant to understanding archaeological resources in the project area. The Millingstone Period dates to approximately BC 8,000-3500 and is characterized by an abundance of handstones and millingslabs and a noticeable lack of hunting gear. The Early Period (approximately BC 3,500-600) shows the introduction of mortar-pestle technology, accompanied by an increase in projectile points. Expanding populations may have placed increasing reliance on acorns during this period, while increased storage seems to have allowed the establishment of sedentary villages. The Middle Period (BC 600-1000 AD) demonstrates changes in projectile point morphology and the growing importance of mortars and pestle grinding tools. Increased reliance on marine fish and sea mammals accompanied increased sedentism and population densities along the coast. Increasingly complex exchange networks suggest the beginning of high-level socio-political complexity. Sites from the Middle/Late Transition (1000-1300 AD) are rare but suggest a reversal in population densities along the San Luis Obispo coast, accompanied by disruptions in exchange networks. The Late Period (1300 AD – Present) shows the introduction of bow and arrow technology and heavy reliance on terrestrial food sources. (Brookshear et al 2018). [See Appendix E, Cultural Resources Appendix].

The project area was inhabited by Chumash language speakers at the time of Spanish contact. Local Chumash groups practiced a hunter-gatherer economy based on fish, birds, and mammals to augment gathered resources. Resource procurement activities were specific to gender. Marriages were the basis of interaction and exchange networks. Social-political organization was structured at the village level, with village headmen having an oversight role and enjoying privileged status. The population was reported to be sparsely distributed, and residential mobility was common based on natural resource availability. However, archaeological data suggest that the ethnographic information reported by early Spanish records may reflect an already reduced population. (Brookshear et al 2018)

PSL Harbor is a shallow arc lightly sheltered on the west by Point San Luis, and it provides one of the few naturally protected harbors capable of landing commercial vessels. Use of the harbor probably dates back at least to 1794, when limited marine commerce supported the Mission San Luis Obispo. A granary or warehouse was constructed on the beach near San Luis Obispo Creek as early as 1808. However, loading and unloading cargo depended on the use of dinghies to reach ships anchored in deep water, and landing in the surf was risky.

The harbor was the primary point of shipping for the central coast of California from the mid nineteenth century through the early twentieth century. The port was being used for commercial shipping as early as the 1855, when the first wharf was built. A competing wharf was built in 1868. A third wharf, which is the one still in use today for commercial and recreational vessels, was initially constructed in 1875. The port's importance continued to grow until the interstate railroad connection captured much of the commerce, although the port continued to serve as an important shipping point for oil through much of the twentieth century.

The Corps was authorized to study a possible breakwater by the 1878 River and Harbor Act, but the study found that the construction of a breakwater was not justified at that time. A subsequent study resulting from the 1881 River and Harbor Act also failed to justify a breakwater. A subsequent study in 1887 examined a different breakwater plan and concluded that building a smaller breakwater was justified. The project was approved in 1888, and construction began in 1889.

The breakwater was not completed until 1914. Uneven appropriations and construction issues made for irregular progress. Small appropriations limited the headway that was made each year. Annual contracts meant that much of each appropriation was spent on mobilization costs. Finding a supply of suitable quarry stone was challenging. Heavy swells required the breakwater to be raised six feet above high water, which further increased costs. Damage from heavy wave action occurred in 1893, 1895, and again 1900, requiring repairs the following year. The alignment of the breakwater was changed by 11 degrees in 1897 to allow the contractor to work behind the existing reef, which provided a buffer from the heavy swell. The original alignment was resumed in 1900 for unknown reasons, leading to a bow in the alignment (Tetra Tech 2017). In 1907, Congress finally awarded a long-term contract that led to the more efficient completion of the breakwater in 1914.

Segment A of the breakwater extends southeasterly from Point San Luis a distance of 336 feet, at which point it intersects and incorporates a stone outcrop named Whaler's Island and rises +6 ft above mean high water. Segment B extends another 1,820 ft from the other side of the Whaler's Island. In total, it measures approximately 2,400 ft long. It is reportedly built atop a natural reef. The breakwater was not constructed to the original design, although the reasons for this are unknown, and conflicting accounts of the original breakwater exist. Based on construction drawings, Segment A had compound side slopes on the ocean side inclined at about 6H:1V below-water and 2H:1V above-water, while the harbor side was sloped at 2H:1V with a crest height of +12 ft. The width and slope of Segment B varied substantially, but crest height continued generally at +12 ft. Actual measured slopes vary but average 2.5H:1V on the ocean side and 1.5H:1V on the harbor side. Crest width varies from 8 ft to 40 ft but averages 27 ft. It was constructed of large igneous stone (approximately 8-10 tons) quarried from Bishop's Peak and Morro Rock, although stone sourced from the surrounding bluffs was used the first year. (Brookshear et al 2018; Tetra Tech 2017)

Since completion, storms have repeatedly damaged the breakwater, and delays in repair have resulted in additional damage. 125 feet of damage incurred during a 1924 storm had grown to 200 ft by the time it was repaired in 1926-1927. This repair included installing a concrete cap atop the crest, but this cap was destroyed during the winter of 1931-32. Repairs in 1935 did not replace the cap, but may have increased the cross-section and increased the crest height to 13+ feet, and changed the side slopes to 1.5H:1V. Repairs were reportedly made to the entire length of the breakwater. Subsequent repairs were made in 1984, 1992, and 2005. Repairs have cumulatively been made to essentially the entire breakwater. Much of the repair work was done with larger stone, ranging between 13 and 17 tons. The stone was sourced from the Declezville Quarry and later from Pebbly Beach Quarry on Catalina Island. (Tetra Tech 2017)

JRP Historical Consulting, LLC (JRP) recorded the breakwater as a historic architectural resource and evaluated its eligibility for inclusion on the National Register of Historic Places (NRHP) in 2017 (Brookshear et al, 2018). JRP concluded that the breakwater retained integrity despite the multiple episodes of repair and use of larger stone because the repairs were all made in kind with the original construction. However, they recommended that the breakwater is not eligible to the NRHP. When evaluated in the context of breakwaters as a property type, this one lacks significance under all four criteria. The breakwater helped protect the harbor, but the trajectory of events that made PSL an important shipping hub began before the breakwater was constructed. The breakwater is not associated with any individuals who have played an important role in history. Its engineering design is a typical and unremarkable example of rubble mound breakwaters, which are the most common type of breakwaters in the U.S. It is neither particularly old, long, nor large. Finally, it is unlikely to yield information beyond the basic construction information that has already been documented. The Corps has determined the breakwater to be ineligible for inclusion on the NRHP, and the State Historic Preservation Officer (SHPO) concurred with that finding in a letter dated February 20, 2018.

### 4.7.2 Environmental Consequences

**Significance Criteria**

The impacts of Federal undertakings on cultural resources are formally assessed through a process mandated by the National Historic Preservation Act (NHPA) of 1966, as amended (54 U.S.C. Section 300101, et seq), and its implementing regulation, Protection of Historic Properties promulgated at36 CFR 800. For the purposes of this analysis, the NHPA "criteria of adverse effect" was identified as the significance threshold for NEPA. The criteria of adverse effects are defined in 36 CFR 800.5a as follows:

> *"An adverse effect is found when an action may alter the characteristics of a historic property that qualify it for inclusion in NRHP in a manner that would diminish the*

*integrity of the property's location, design, setting, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the action that may occur later in time, be farther removed in distance, or be cumulative".*

If the undertaking would result in an adverse effect on an historic property, there would be a significant impact under NEPA.

**Preferred Alternative**

The Corps conducted repairs to the breakwater in 1992. After completing a literature and records search, the Corps determined that there were no historic properties within the project area at that time. The SHPO concurred with that determination in a letter dated March 5, 1991. However, that previous evaluation did not recognize the historic nature of the breakwater itself. An updated records search was performed by Far Western Anthropological Research Group, Inc. in 2017 (Brookshear et al 2018). The results of that study confirm there are no known cultural resources within the project area, other than the breakwater. As discussed above, the study also recorded the breakwater, evaluated it, and recommended that the breakwater is not eligible for the NRHP. As a result, the Corps has determined the breakwater to be ineligible for inclusion in the NRHP, for which the SHPO concurred.

As described in the alternative description, the Proposed Action includes minor excavation adjacent to the breakwater to allow access with the barges. The recent records search further indicates that there are no known shipwrecks within the area of potential effect (APE). Similar excavations have taken place within the same area for previous repairs, and the original construction of the breakwater likely disturbed the same area. The sediment to be removed is recently accumulated, and it would be placed in the nearshore to create an engineered eelgrass mitigation area, which is a dynamic and rapidly moving soft bottom. These sediments are previously disturbed and are very unlikely to contain any intact cultural deposits.

Crew/laborers parking has been identified in paved parking area at the Port San Luis Harbor District. The surface of the pavement will not be disturbed within the parking area.

There are no known historic properties within the APE, either near the breakwater or within the parking area. The Corps has determined that no historic properties will be affected by the Proposed Action, and the SHPO concurred in a letter dated February 20, 2018. Since this consultation, the APE was expanded due to the addition of eel grass removal and replanting, as well as additional dredging along the breakwater. To account for the mitigation of eel grass and the resulting expansion of the APE, a second consultation with the SHPO, to include notification of tribes, was undertaken. On March 25, 2021 the Corps received concurrence from the SHPO that no historic properties would be affected by the Proposed Action.

**No Action Alternative**

There would be no ground disturbing activities as a result of the "no action" alternative, so no historic properties would be affected.

## 4.8 SEA VESSEL TRAFFIC AND SAFETY/LAND-BASED TRAFFIC AND TRANSPORTATION

### 4.8.1 Affected Environment

PSL Harbor is a popular-use recreational and small commercial harbor. PSL Harbor provides important recreational resources for the regional and local area. The PSL wharf, known as Harford Pier, is approximately 1,456 ft long and has 300 mooring spaces including approximately 50% recreational sailboats, 40% commercial fishing boats and 10% power pleasure boats (Port San Luis Harbor District 2017b). The port also supports petroleum product handling facilities. The PSL Harbor District complex includes administration facilities, the marina center, floating fuel dock, fish market, restaurants, bait and tackle stores, parking areas (with 246 car capacity). The PSL services sea vessels ranging from small craft to larger than fifty feet in length. Small boat traffic is heavy in the PSL. The area adjacent to the project area (on the port side) is primarily used for boat anchorages, and the area adjacent to the anchorage area is used as a mooring field. There is a floating salmon rearing facility located within the port that is used to imprint young hatchery raised fish to acclimate them to local water prior to release, resulting in the return of adult salmon to local waters. The local commercial fishing in the port and in this part of the central coast of California involves sardines, rock cod, and halibut. In addition to the PSL Harbor District facilities, other terminal facilities in the port include: an oil spill clean-up boat for emergency response to central California oil spills; a 3,082-foot-long pier operated by Union Oil Company for loading petroleum and petroleum products on ships; a 1,463-foot –long state-owned, County operated recreational pier, and sport fishing party-boat services.

PSL Harbor has a Harbor Patrol. It enforces laws, educate the public and provide emergency fire, medical and ocean response services to facilitate the safe and orderly use of the harbor; provides emergency response seven days a week, 24 hours a day within the harbor jurisdiction; provide security and law enforcement in the harbor by patrolling the ocean and land areas; enforce state and local laws; coordinate operations with USCG, and County Sheriff.

The USCG, under the DHS, operates a USCG operation based in Santa Barbara Harbor. The USCG Cutter Blackfin, an 87-foot patrol boat that typically support a crew of twelve (12) onboard including 1 officer and 11 enlisted personnel, is stationed out of Santa Barbara Harbor (Santa Barbara Navy League 2015). The USCG Cutter Blackfin patrols an area of over 60,000 square miles of ocean along southern California's coastline as far north as Morro Bay and as far south as Dana Point. Its primary missions include Drug and Migrant Interdiction; Search and Rescue; Ports, Waterways, and Coastal Security; Marine Environmental Protection; Enforcement of Laws and Treaties, and Defense Readiness. The USCG Cutter Blackfin routinely works alongside Custom and Border Protection, Immigration and Customs Enforcement, CDFW, and the NOAA to complete its mission and build strong working relationships with its partner agencies. The PSL Harbor strategic location along the coast of California and reliable sea-based activities are important to the USCG operations.

### 4.8.2 Environmental Consequences

**Significance Criteria**

An impact to Sea Vessel Traffic and Safety/Land-based Traffic and Safety will be considered significant if the alternative would:

- Cause a navigational hazard to boat traffic or interfere with any emergency response or evacuation plans.
- Substantially changes sea vessel traffic or patterns.
- Cause a substantial increase in AADTs of main arteries used to access the site.

**<u>Preferred Alternative</u>**

Construction would not impede access to any harbor channels or entranceways, and would therefore, not create a substantial reduction in sea vessel traffic, impact navigation safety, create a navigational hazard to sea vessel traffic or interfere with local emergency/excavation response plans. The Proposed Action would not change the number of slips. As a result, sea vessel traffic or patterns would remain unaffected.

Rock to repair the breakwater is expected to be procured from Pebbly Beach quarry (sea based_ at Catalina Island located within the Los Angeles County. Rocks from this island (sea based) quarry would be transported (delivered/delivery) on the sea (Pacific Ocean) with barges by tug boats to the project site, covering four California counties: Los Angeles; Ventura; Santa Barbara, and; San Luis Obispo. Sea vessels traffic for transporting (delivery) of rock to repair the breakwater would come mainly from barge mounted crane, two barges, two tugboats, a crew boat, a scow, a work boat, and a skiff vessel. Proposed excavation around the breakwater, for construction equipment access, would come mainly from a crane-equipped barge, a scow, two small craft support vessels, and two tugboats. The rock barge is expected to carry approximately 2,000 to 4,000 tons of stone per trip. Unused/awaiting barges will be stored within a designated area within Port San Luis Harbor. Sea vessels rock delivery duration is approximately 60 works days, with a 6 day work week, approximately 11 hours workday, and approximately 400 miles by sea from Catalina Island to Port San Luis Harbor, or approximately 800 miles round trip. The first phase of construction work would be eexcavation around the breakwater, for construction equipment access, would come mainly from a crane-equipped barge, a scow, two small craft support vessels, and two tugboats. The first phase of construction would be the excavation of shoaled sediment adjacent to the breakwater to allow for access of the equipment required to repair the breakwater. The minor excavation of shoaled sediment (approximately 15,000 cubic yards) adjacent to the leeward side of the breakwater would be necessary to create adequate depths for barges and other vessels to access the breakwater for the O&M repair. Excavation of shoaled sediment could potentially occur during day and night hours (approximately 11 to 22 working hours a day), 6 days a week, for approximately 3 weeks (approximately 18 days). The excavated material would then be relocated approximately 1,000 feet north of the breakwater to minimize additional impacts to the existing eelgrass bed in the lee of the breakwater. The excavated and relocated sediment has a beneficial reuse to be utilized to create an engineered eelgrass mitigation site. The second phase of construction will consist of the repair work to the breakwater structure. The proposed breakwater O&M repair would utilize barge mounted crane, two barges, two tugboats, a crew boat, a scow, a work boat, and a skiff sea vessel. It is estimated that approximately 29,000 tons of existing stone on the breakwater would need to be reset and approximately 60,000 tons of new stone (individual stone size range is anticipated to be from 5 to 20 tons) would be placed to restore the most heavily damaged portion of the breakwater with O&M repairs occurring on the leeward side of the breakwaters. Approximately 30 to 35 stones can be picked and placed per day using this vessel, or roughly three to four stones per hour on average. Repair work will consist of resetting of existing stone and placement of new stone on the breakwater structure. O&M breakwater repair work construction activities would be limited to day light hours (approximately 11 hours a day), with a 6 day work week. The Proposed Action duration is anticipated to last approximately six to seven months, approximately 174 workdays, generally from April to October. It is anticipated approximately 12 sea crew would be needed for the construction work.

The presence of construction equipment, materials, supplies and support vehicles, whether in an operation, boat slips, or in a storage area, would utilize space that would normally be available for navigation or other uses. Maneuvering of cranes, rock barges or scows to set or reset rock on the breakwater or to be used for excavation around the breakwater and placement of material (sediment) could create a hazard or obstacle that is not normally present. The immediate area adjacent to the breakwater where work is occurring would not be accessible to other sea vessel traffic during construction.

To ensure safe transit during barging of rock, excavation and breakwater construction activity, the following sea vessel traffic and transportation and safety land use and recreation (LUR) environmental commitments would be implemented:

- Coordination would be maintained with the Port San Luis Harbor Patrol and the USCG
- Information regarding O&M breakwater repair operations would be published in local notice to mariners, warning boat users about times, durations, and locations of construction activities.

The County of San Luis Obispo has established Level of Service (LOS) C as the acceptable condition for roadways in the Avila area (Port San Luis Harbor District 2004); however, circulation studies that consider anticipated growth and development in the Avila Community indicate that key areas of the roadway would experience substandard LOS conditions during summer weekends and holidays, i.e., peak visitor periods. An essential section of the road where capacity is limited is a reach of roadway lying between the intersection of San Luis Obispo Bay Drive and San Luis Street in Avila Beach.

The project area is accessible by roadways using US Highway 101, State Route (SR) 101, SR 001 (SR 1), and Avila Road, and these roadways are typically considered as main arteries. Other roadways in the project area are Diablo Canyon Road, San Luis Bay Drive, First Street, and Ontario Road, and these roadways are typically considered secondary arteries. The annual daily trips (AADTs) for the roadways in the vicinity of the project area of Avila Beach/Port San Luis are summarized in Table 4.8.1.

**Table 4.8.1 Annual Daily Trips (AADT) on Roadways, City of Avila Beach/Port San Luis**

| **Roadway** | **AADT** |
|---|---|
| SR 101, Description - PISMO BEACH, JCT. RTE. 1 SOUTH | 75,100[1] |
| SR 101, Description - NORTH SHELL BEACH | 74,500[1] |
| SR 101, Description - AVILA ROAD | 69,300[1] |
| SR 101, Description - NORTH AVILA ROAD | 76,800[1] |
| SR 1, Description - PISMO BEACH, VILLA CREEK | 11,200[1] |
| SR 1, Description - PISMO BEACH, SOUTH JCT. RTE. 101 | 11,000[1] |
| SR 1, Description SAN LUIS OBISPO, NORTH JCT. RTE. 101 | 29,500[1] |
| 3024 Avila Beach Dr, Nearest Cross Street - W of San Luis Bay Dr | 12,578[2] |
| 1 Avila Beach Dr, Nearest Cross Street - E of Diablo Canyon Rd | 4,973[2] |
| 5 Avila Beach Dr, W of Ontario Rd | 10,524[2] |
| 3 Avila Beach Dr, Nearest Cross Street - E of Ontario Rd | 12,061[2] |
| 2 Avila Beach Dr, Nearest Cross Street - E of First St | 9,576[2] |
| 4 Avila Beach Dr, Nearest Cross Street - W of First St | 7,030[2] |
| 3020 Avila Rd, Nearest Cross Street - W of San Luis Bay Dr | 12,876[2] |
| 3261 Diablo Canyon Entrance, Nearest Cross Street - N of Harford Dr | 1, 950[2] |
| 3263 Diablo Canyon Entrance, Nearest Cross Street - N of Harford Dr | 1,398[2] |
| 3260 Diablo Canyon Entrance, Nearest Cross Street - N of Avila Beach Dr | 3,501[2] |

| | |
|---|---|
| 3451 First St (Avila), Nearest Cross Street - S of Avila Beach Dr | 1,828[2] |
| 3450 First St (Avila), Nearest Cross Street – S of Avila Beach Dr | 2,867[2] |
| 7 First St (Avila), Nearest Cross Street - S of Avila Beach Dr | 5,312[2] |
| 3320 Ontario Rd, Nearest Cross Street - N of San Luis Bay Dr | 1,049[2] |
| 3370 Ontario Rd, Nearest Cross Street - S of San Luis Bay Dr | 1,151[2] |
| 5270 Ontario Rd, Nearest Cross Street - S of Higuera St | 1,299[2] |
| 12 Ontario Rd, Nearest Cross Street - N of Avila Beach Dr | 1,825[2] |

Source: Caltrans[1], 2017; [2]County of San Luis Obispo[2], 2019.

The access roads to the PSL District experience peak traffic conditions and congestion during the summer season, week-days during the salmon season, weekends and warm days. The PSL District is typically accessed by coastal US Highway 101, SR 101, or SR 1, and then by Avila Beach Drive, a narrow, two lane roadways maintained by the County of San Luis Obispo. Avila Beach Drive provides the only vehicular access to the Port. The roadway is shared by motorists, bicyclists and pedestrians. Vehicle access by land to the breakwater area could be via the Diablo Canyon Road, which intersects Avila Beach Drive, and then by the "Lighthouse Road", a narrow steep road that extends past the Port San Luis breakwater to the Lightstation. The Diablo Canyon Road, which is also a narrow and steep roadway, provides access to the PG&E DCPP facility, which is outside of the proposed Port San Luis O&M breakwater repair project area, and is restricted from public access. Due to these narrow and/or steep access roads, in and around the western portion of San Luis Obispo County of Avila Beach and Port San Luis, the Proposed Action land truck haul delivery of rock using roadways would more than likely not be viable, more than likely would not be feasible, and not practicable. However, there would be some land-based traffic pertaining to the Proposed Action, primarily from 12 laborer commuter vehicles and work material deliveries, or approximately 24 trips per day on roadways. The AADTs increase from the Proposed Action for the roadways in the vicinity of the project area of Avila Beach/Port San Luis compared to the baseline AADT are summarized in Table 4.8.2

**Table 4.8.2 Comparison of Baseline AADT to Proposed Action Traffic Increases, City of Avila Beach/Port San Luis**

| Roadway | AADT | Projected Increase in AADT | Percent Increase in Baseline AADT |
|---|---|---|---|
| SR 101, Description - PISMO BEACH, JCT. RTE. 1 SOUTH | 75,100[1] | 24 | 0.03% |

| | | | |
|---|---|---|---|
| SR 101, Description - NORTH SHELL BEACH | 74,500[1] | 24 | 0.03% |
| SR 101, Description - AVILA ROAD | 69,300[1] | 24 | 0.04% |
| SR 101, Description - NORTH AVILA ROAD | 76,800[1] | 24 | 0.03% |
| SR 1, Description - PISMO BEACH, VILLA CREEK | 11,200[1] | 24 | 0.22% |
| SR 1, Description - PISMO BEACH, SOUTH JCT. RTE. 101 | 11,000[1] | 24 | 0.21% |
| SR 1, Description SAN LUIS OBISPO, NORTH JCT. RTE. 101 | 29,500[1] | 24 | 0.81% |
| 3024 Avila Beach Dr, Nearest Cross Street - W of San Luis Bay Dr | 12,578[2] | 24 | 0.19% |
| 1 Avila Beach Dr, Nearest Cross Street - E of Diablo Canyon Rd | 4,973[2] | 24 | 0.48 % |
| 5 Avila Beach Dr, W of Ontario Rd | 10,524[2] | 24 | 0.23% |
| 3 Avila Beach Dr, Nearest Cross Street - E of Ontario Rd | 12,061[2] | 24 | 0.20% |
| 2 Avila Beach Dr, Nearest Cross Street - E of First St | 9,576[2] | 24 | 0.25% |
| 4 Avila Beach Dr, Nearest Cross Street - W of First St | 7,030[2] | 24 | 0.34% |
| 3020 Avila Rd, Nearest Cross Street - W of San Luis Bay Dr | 12,876[2] | 24 | 0.19% |
| 3261 Diablo Canyon Entrance, Nearest Cross Street - N of Harford Dr | 1,950[2] | 24 | 1.23% |
| 3263 Diablo Canyon Entrance, Nearest Cross Street - N of Harford Dr | 1,398[2] | 24 | 1.72% |
| 3260 Diablo Canyon Entrance, Nearest Cross Street - N of Avila Beach Dr | 3,501[2] | 24 | 0.68% |
| 3451 First St (Avila), Nearest Cross Street - S of Avila Beach Dr | 1,828[2] | 24 | 1.31% |

| | | | |
|---|---|---|---|
| 3450 First St (Avila), Nearest Cross Street – S of Avila Beach Dr | 2,867[2] | 24 | 0.84% |
| 7 First St (Avila), Nearest Cross Street - S of Avila Beach Dr | 5,312[2] | 24 | 0.45% |
| 3320 Ontario Rd, Nearest Cross Street - N of San Luis Bay Dr | 1,049[2] | 24 | 2.29% |
| 3370 Ontario Rd, Nearest Cross Street - S of San Luis Bay Dr | 1,151[2] | 24 | 2.08% |
| 5270 Ontario Rd, Nearest Cross Street - S of Higuera St | 1,299[2] | 24 | 1.85% |
| 12 Ontario Rd, Nearest Cross Street - N of Avila Beach Dr | 1,825[2] | 24 | 1.32% |

Source: Caltrans[1], 2017; [2]County of San Luis Obispo[2], 2019.

While it is less likely that a land-based (inland) quarry for stone would be utilized for O&M breakwater repair, this is a possibility. Previous Corps Los Angeles District (Corps) marine rock work projects have utilized stone sourced from an inland quarry, most recently stone was sourced from an inland quarry in Apple Valley/Victorville, San Bernardino County. Under the Proposed Action, stone could be procured from an inland quarry in Apple Valley/Victorville in San Bernardino County High Desert area and then loaded on to large big rig flat bed trailers or large dump trucks to be transported (delivered) on roadways, highways, and freeways to Port Hueneme/Port of Hueneme in Ventura County where the stone would be off-loaded directly onto a marine barge or offloaded into a designated land-based staging/storage area for transfer at a later time to a marine barge. The stone would then be delivered by sea vessels barge(s) and tug(s) from the Port Hueneme/Port of Hueneme going north along the California coast to the Port San Luis Harbor in San Luis Obispo County. Should land-based staging/storage construction equipment areas (contractor laydown areas) be required at Port Hueneme/Port of Hueneme they would be designated on land that has been developed (i.e., paved), and/or already designated for such purposes. At this time, it cannot be determined what specific inland quarry or port a contractor may utilize for the Port San Luis Breakwater Repair Project (should a different quarry be utilized additional analyses may be required). Table 4.8.3 shows the roadways and AADT that would more than likely be used to deliver rock using large trucks between Apple Valley/Victorville to Port Hueneme/Port of Hueneme.

**Table 4.8.3 Annual Daily Trips (AADT) Truck Haul Delivery on Roadways, Apple Valley/Victorville (San Bernardino County) to Port Hueneme/Port of Hueneme (Ventura County)**

| Roadway | AADT |
|---|---|
| Interstate 15 (Victorville, San Bernardino County), Junction (Jct.) State Route (Rte. 18 Southeast) | 69,000[1] |

| | |
|---|---|
| Interstate 15 (Ontario, San Bernardino County), Jct. Interstate 10 | 250,000[1] |
| Interstate 10 (Los Angeles), Jct. State Highway 101 | 211,000[1] |
| State Highway 101 (Oxnard, Ventura County), Santa Clara/Rice Avenue | 129,000[1] |
| Pleasant Valley Road/Rice Avenue (Oxnard), State Rte. 1 (Pacific Coast Highway) | 19,000[1] |
| State Route 1 (Pacific Coast Highway), Hueneme Road | 12,600[1] |

Source: Caltrans[1], 2017.

Stone could be sourced from the Apple Valley/Victorville in-land quarry and delivered using large flatbed trailers or dump trucks on roadways, highways, and freeways to Port Hueneme/Port of Hueneme, Ventura County, where the stone would be off-loaded directly onto a marine barge or offloaded into a designated land-based staging/storage area for transfer at a later time to a marine barge. The inland quarry hauling rock in trucks on roadways has estimated 26 trucks daily travelling approximately 180 miles one way on roads from Apple Valley/Victorville, San Bernardino County, to Port Hueneme/Port of Hueneme, Ventura County, or approximately 360 miles round trip. The stone would then be delivered by sea vessels barge(s) and tug(s) from Port Hueneme/Port of Hueneme going north along the California coast to the Port San Luis Harbor in San Luis Obispo County. Should land-based staging/storage construction equipment areas (contractor laydown areas) be required at the Port Hueneme/Port of Hueneme they would be designated on land that has been developed (i.e., paved), and/or already designated for such purposes. The land-based heavy equipment vehicles used to haul rock on roadways would include flatbed trailer big rig (or large dump trucks) carrying stone, a crawler loader, a crane, a water truck, and 29 laborer commuter vehicles, working 6 days a week, approximately 11 hours a day, over an approximate 7 month (approximately 174 days) project duration. For land transport, a weight haul capacity of approximately 14 tons for a flat bed big rig trailer (or a large dump truck) to carry and transport the stone on roadways, it has been estimated it would require approximately 26 trucks hauling rock per day, or approximately 52 round trips per day, to deliver approximately 60,000 tons of new stone Additionally, 3 support heavy duty equipment vehicles (a crawler loader, a crane) to load rock on to the flatbed big rig trailers or large dump trucks, and a water truck would be used for fugitive dust control, would be calculated at approximately 78 round trips per day. 29 laborers commuter vehicles would utilize roadways for the seven months duration of construction, or approximately 58 round trips daily would be required for the laborers commuter vehicles. Therefore, the estimated daily trips (AADT) for all vehicles on roadways between Apple Valley/Victorville in San Bernardino County to Port Hueneme/Port of Hueneme/ in Ventura County for the Proposed Action would be 188 daily truck trips. The increases in AADT associated with the Proposed Action Alternative compared to the baseline AADT is summarized in Table 4.8.4.

**Table 4.8.4 Comparison of Baseline AADT to Proposed Action Traffic Increases, Truck Haul Delivery on Roadways, Apple Valley/Victorville (San Bernardino County) to Port Hueneme/Port of Hueneme (Ventura County)**

| Roadway | AADT | Projected Increase in AADT | Percent Increase in Baseline AADT |
|---|---|---|---|
| Interstate 15 (Victorville, San Bernardino County), Junction (Jct.) State Route (Rte. 18 Southeast) | 69,000[1] | 188 | 0.27% |
| Interstate 15 (Ontario, San Bernardino County), Jct. Interstate 10 | 250,000[1] | 188 | 0.08% |
| Interstate 10 (Los Angeles), Jct. State Highway 101 | 211,000[1] | 188 | 0.09% |
| State Highway 101 (Oxnard, Ventura County), Santa Clara/Rice Avenue | 129,000[1] | 188 | 0.15% |
| Pleasant Valley Road/Rice Avenue (Oxnard), State Rte. 1 (Pacific Coast Highway) | 19,000[1] | 188 | 0.99% |
| State Route 1 (Pacific Coast Highway), Hueneme Road | 12,600[1] | 188 | 1.49% |

Source: Caltrans[1], 2017.

As shown in Table 4.8.3 and Table 4.8.4, there would be a minor increase in AADT on roadways from the Proposed Action. LUR environmental commitments applicable land based traffic and transportation discussed in Section 5 of the EA include obtaining CALTRANS permit(s) required on State highways when transporting oversized-transport vehicles or heavy construction equipment, and heavy duty equipment carrying materials and equipment to avoid sensitive receptor areas to the extent practicable. The implementation of LUR environmental commitments and Best Management Practices (BMPs) discussed in Section 5 of the EA would avoid, reduce and minimize impacts. Therefore, impacts would be short term and temporary from land based traffic and transportation. Upon completion of construction, land based traffic and transportation would return to pre-project conditions. Based on the above, and with implementation of LUR environmental commitments, impacts would be less than significant.

The following LUR environmental commitments would be implemented to further minimize the temporary impacts caused by the Proposed Action:

- As applicable, the Construction contractor would obtain CALTRANS permit(s) required on State highways when transporting oversized-transport vehicles or heavy construction equipment
- Heavy duty equipment carrying materials and equipment would avoid sensitive receptor areas to the extent practicable.

**No Action Alternative**

There would be no O&M repair of the breakwater under the No Action Alternative. However, continued deterioration of the breakwater structure would prevent a protected harbor and shoreline and beaches, and safe navigation through the harbor. Furthermore, any reduced ability for PSL Harbor Patrol or USCG vessels to transit the harbor could compromise emergency response and evacuation plans. It is likely that a limited and localized emergency repair would be undertaken in the event that continued exposure of the sub-standard breakwater would leave portions of the harbor, shoreline and beaches unprotected and threaten navigational safety. Any vessel and traffic impacts would be temporary and short term, and land-based traffic impacts would *de minimis* and short-term. Impacts would be less than significant.

### 4.9 GROWTH INDUCEMENT

The proposed project is located in Port San Luis Bay in San Luis Obispo County. The proposed project is a routine maintenance O&M repair program plan, repairing an attached breakwater for continued safe operation and protection of harbor facilities being the objective purpose. The proposed project is not in support of planned infrastructure improvements that would result in additional growth. The proposed project would not require additional employees other than temporary contractor employees to perform the O&M rock repair breakwater work and excavation around the breakwater construction operations. The proposed project would not induce growth within the project area.

### 4.10 CUMLATIVE IMPACTS

Currently, a major planned development Port San Luis Harbor project is the Harford Pier Redevelopment (new piles, decking, stringers, reconstruction of lease sites on the Pier) – final completion 2026 or beyond (estimate).

The Port San Luis Harbor District has a Clean Water Act (CWA) 404 permit issued from the Corps of Engineer for dredging and disposal authorizing the Harbor District to remove up to 250,000 cubic yards (CY) of sand annually within a 32-acre site surrounding two boat-launching facilities. The California Coastal Commission has limited the scope of the most recent Coastal Development Permit (CDP) to 75,000 cubic yards (cy) annually and 3 acres until a larger project has been identified. When a port-wide dredge project has been identified and funded, the Port San Luis Harbor District intends to amend its current CDP or reapply to encompass the expanded scope for the entire 250,000 cy. Material from the current dredge operation may be disposed of within 3 near-shore disposal sites: West Bluff Beach, Fisherman's Beach, and Olde Port Beach. With exception of the CDP, permits allow any of the following dredging methods: hydraulic suction, crane with clamshell, crane with dragline bucket, excavator-type machines with bucket or scoop, and/or other heavy equipment as appropriate and approved by the USACE. For the current project and CDP, the Port San Luis Harbor District will use a land-based crane and submersible dredge pump to remove sand and pump it through a pipeline to West Bluff Beach or Fisherman's Beach disposal sites. The Port San Luis Harbor District may pursue extending the disposal pipe to Olde Port Beach via booster pump to decrease the amount of dredging needed on an annual basis. The intent of the Port San Luis Harbor District dredge operations plan is to satisfy pre-dredge permit conditions.

The Proposed Action would not induce a permanent, incremental impact on the environment. Impacts would be localized, and temporary (short term). Upon project completion, the Port San Luis Harbor/Bay would return to pre-project conditions. Impacts would be less than significant.

## 5.0 ENVIRONMENTAL COMMITMENTS

Based on the information available to the Corps LAD and recommendations of public agencies, the following environmental commitments have been identified to minimize potential environmental impacts. Applicable commitments would be incorporated into the project plans and contract specifications.

Water Quality (WQ)

WQ-1: The Contractor shall stay within the boundaries of the identified construction zones.

WQ-2 There would be no dumping of fill or material outside of the project area or within any adjacent aquatic community.

WQ-3: Construction vehicles would be continuously examined for leaking fluids.

WQ-4: Litter, petroleum products, cleaning agents, wash down waters, and other toxic or oxidizable materials would be prevented from entering marine waters.

WQ-5:Water quality monitoring for compliance purposes would occur during sediment excavation and sediment placement activities.

WQ-6: Turbidity, dissolved oxygen, light transmittance, pH, salinity, and temperature would be monitored during sediment excavation and sediment placement activities.

WQ-7: If turbidity and/or dissolved oxygen exceed water quality criteria during excavation and placement activities, conditions would be evaluated, and modifications would be made to operations to get turbidity and/or dissolved oxygen back into compliance.

Biological Resources

BR-1: The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with and disturbance to fish and wildlife.

BR-2: Stockpiling of construction materials on shore shall be confined to authorized staging/storage area(s). Staging and stockpile areas shall be restored to their original condition after construction is complete.

BR-3: Any kelp beds in the vicinity of breakwater repairs shall be avoided.

BR-4: An on-site qualified marine mammal monitor will be on-site at all times during construction activities. A 50-meter safety zone for Southern sea otters will be established for this project. Should a sea otter come within 50 meters of the construction activities, operations will be halted until the sea otter leaves the designated safety zone.

BR-5: Operators of construction equipment shall not harass any marine mammal, bird, or fish in the project area.

BR-6: In the unlikely event of an interaction with a marine mammal, the Contractor shall cease all operations and immediately contact the Corps biologist and the National Marine Fisheries Service (NMFS) Stranding Coordinator, Mr. Justin Viezbicke at 562-980-3230 Justin.Viezbicke@noaa.gov or Mr. Justin Greenman at 562-980-3264 Justin.Greenman@noaa.gov before proceeding with repair work.

BR-7: Minimization and avoidance measures to reduce impacts to eelgrass and surfgrass proposed in the Eelgrass Mitigation and Monitoring Plan in Support of The Port San Luis Breakwater Repairs (Merkel & Associates 2021) will be implemented.

BR-8: The Corps will conduct pre- and post-construction eelgrass surveys in accordance with the CEMP, surfgrass surveys, and canopy kelp surveys.

BR-9: The Corps will mitigate the impacts to eelgrass in accordance with the CEMP at a 1.2:1 mitigation ratio, mitigation plan details can be found in the Eelgrass Mitigation and Monitoring Plan in Support of the Port San Luis Breakwater Repairs, Appendix B.

BR-10: The Corps will implement the Pilot Surfgrass Translocation detailed in the Eelgrass Mitigation and Monitoring Plan in Support of The Port San Luis Breakwater Repairs (Merkel & Associates 2021).

BR-11: All conditions of the Incidental Harassment Authorization issued to the Corps for the PSL Breakwater Repair Project by the NMFS Office of Protected Resources Division will be followed.

BR-12: The following black abalone minimization and avoidance measures will be implemented:

- An additional black abalone survey would be conducted when adequate low tides and safe sea state conditions allow during 2021 or 2022 prior to breakwater repair construction commencing to confirm no black abalone are present.
- A qualified black abalone biologist would be on-site during construction to periodically survey the breakwater structure as new sections are repaired and core interstitial spaces are exposed to ensure no black abalone are present or are in harm’s way. Approximately, one 75 – 100 ft section of breakwater would be repaired per week.
- Should black abalone be observed within the PSL breakwater repair area, work will cease in that immediate area and Section 7 consultation would be immediately initiated with the NMFS.

Air Quality and Noise (AQN)

AQN-1: Trucks and construction equipment would be properly maintained in order to minimize release of diesel and hydrocarbon effluent into the atmosphere. The Contractor would comply with all air quality standards, including those regarding emissions, fuel use and fuel consumption. Appropriate measures would be taken to reduce fugitive dust caused by operations. Vehicle speed of all land transport equipment within the staging area would be kept at a minimum to avoid the formation of dust clouds and to ensure safety for the public.

AQN-2: The Contractor would be required to follow all applicable requirements of the Port San Luis Harbor District air permit issued from the SLOCAPCD. Otherwise, the contractor must obtain a separate air permit from the SLOCAPCD or the California Air Resources Board (CARB)prior to commencement of work, pay all associated fees, and follow all permit requirements.

AQN-3: Activities and operations on unpaved areas should be minimized to the extent feasible during high wind events to minimize fugitive dust.

AQN-4: Noise levels of the rockwork operation shall not exceed the limits established by the Port San Luis's Harbor, City of Avila Beach, or San Luis Obispo County noise ordinance(s). If, for any reason, double or triple-shifts are utilized, the contractor shall obtain any necessary permits or exemptions from the Port San Luis Harbor, City of Avila Beach, or San Luis Obispo County.

AQN-5: Trucks and construction equipment would be properly maintained and scheduled in order to minimize unsafe and nuisance noise effects to sensitive biological resources, residential areas, and the socio-economic environment.

AQN-6: Sensitive receptors along potential haul routes, such as residential areas, schools, hospitals, convalescent homes, and churches would be avoided whenever possible.

AQN-7: Crane brakes shall be maintained to reduce any loud and unnecessary noise.

AQN- 8: Construction related vehicles and equipment shall continue to meet State, county and local requirements regarding emissions, noise, and weight capacity.

AQN-9: If reasonable complaints are received from local residents, the contractor shall implement additional measures to reduce these impacts. Specific measures shall be identified in coordination with the Corp's Contracting Officer.

AQN-10: If double or triple-shifts are utilized, the contractor shall obtain any necessary permits or exemptions from the Port San Luis Harbor, City of Avila Beach, or San Luis Obispo County.

Land Use and Recreation (LUR)

LUR-1: The Corps contractor shall provide maximum public access to roads, streets and highways that might be utilized for hauling and construction. If possible, large-scale truck trips would be limited to off-peak commute periods. The contractor would be responsible for obtaining the necessary permits from and/or creating a transportation management plan for the CALTRANS prior to commencement of work, pay all associated fees, and follow all permit requirements.

LUR-2: Transport of oversized or over weight vehicles on State highways would need a CALTRANS Transportation Permit.

LUR-3: The Corps contractor would to the extent possible limit large scale truck trips of materials and equipment to off peak commute periods and avoid sensitive receptor areas, schools, hospitals, convalescent homes, residential areas, and churches.

LUR-4: Sea-based equipment must be marked in accordance with USCG and local Harbor Patrol provisions. Corps contractor shall notify the Commander, USCG District, at least 2 weeks before the start of activity or 30 days before if buoys are to be placed. This notification shall include the following:

a. The size and type of equipment that would be performing the work.

b. Name and radio call sign for working boats.

c. Telephone number for on-site contract with project engineer.

d. The schedule for completing the project.

Furthermore, the USCG and local Harbor Patrol shall be notified by the Corps contractor of any hazards to navigation.

LUR-5: The Corps contractor shall move equipment upon request by Coast Guard and Harbor Patrol law enforcement and rescue personnel.

LUR-6: Should land-based staging/storage construction equipment areas (contractor laydown areas) be required at Port Hueneme/Port of Hueneme, Ventura County, they would be designated on land that has been developed (i.e., paved), and/or already designated for such purposes.

LUR-7: In-field coordination will occur between the Corps contractor, the U.S. Coast Guard District, and the local Harbor Patrol

Cultural Resources (CR)

CR-1: Some of the original stone was quarried from Morro Rock, which is considered sacred by the Chumash Indians. All existing stone shall be treated in a respectful manner that minimizes breakage, and all stone material, both broken and whole, shall be retained on or adjacent to the breakwater.

CR-2: In the event that previously unknown cultural resources, including human beings, are encountered during the project, all ground disturbing activities within 100 feet of the discovery shall cease immediately and a Corps archaeologist notified. Work shall not resume in the area surrounding the discovery until the Corps has met the requirements of 36 CFR 800.13 and re-authorizes project construction.

## 6.0 COORDINATION

The principal agencies with which this project has been, and would continue to be coordinated include: USFWS, NMFS, CCC, CDFW, California State Resources Agency, State Lands Commission, California Regional Water Quality Control Board (Central Coast Regional Water Quality Control Board), CALTRANS (California Department of Transportation), California Department of Parks and Recreation (State Parks), San Luis Obispo County Air Pollution Control District (SLOCAPCD), the County of San Luis Obispo, the PSL Harbor District, and the Southern California Dredge Material Management Team (SC-DMMT). Coordination with the SHPO and the Native American Heritage Commission (NAHC) have also occurred. A distribution list for the EA is included in Appendix G.

# 7.0 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

National Environmental Policy Act of 1969 (NEPA)

This EA was prepared to evaluate impacts associated with the Proposed Action.. If it is determined after public review that the Proposed Action will not have a significant impact upon the quality of the human environment, then a Finding of No Significant Impact will be prepared and preparation of an environmental impact statement would not be required.

Clean Water Act

**Section 404**

Section 404 of the CWA (33 U.S.C. 1344) governs the discharge of dredged or fill material into waters of the U.S. Although the Corps does not process and issue permits for its own activities, the Corps authorizes its own discharges of dredged or fill material by applying all applicable substantive and procedural legal requirements, including public notice, opportunity for public hearing, and application of the section 404(b)(1) guidelines. The Corps' draft 404(b)(1) analysis is included in Appendix A.

**Section 401 Water Quality Certification**

On February 5, 2021, the Central Coast Regional Water Quality Control Board (Water Board) acknowledged receipt of the draft 401 application sent by the Corps on February 1, 2021, and the Water Board assigned it a Certification WDID number 34021WQ04. A pre-application filing meeting between the Corps and with Water Board occurred on February 17, 2021 to discuss the 401 application. The Corps applied for a Section 401 Water Quality Certification from the Water Board on March 31, 2021. A water quality certification pursuant to section 401 of the Clean Water Act will be obtained from the Water Board prior to construction. Relevant conditions of the water quality certification will be implemented in order to minimize adverse impacts to water quality.

**Section 402**

Section 402 of the CWA prohibits the discharge of pollutants into the "waters of the United States" from any point source unless the discharge is in compliance with the National Pollution Discharge Elimination System (NPDES) Permit. Section 402 requires a NPDES Permit for the discharge of stormwater from municipal separate storm sewer system (MS4) serving urban areas with a population greater 100,000; construction sites that disturb one acre or more; and industrial facilities. The Central Coast Regional Water Quality Control Board (Water Board) administers these permits with oversight provided by the U. S Environmental Protection Agency (USEPA), Region IX. Prior to construction, the construction contractor will prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) of the NPDES program.

Coastal Zone Management Act of 1972 and California Coastal Act of 1976

Section 307 of the CZMA states that federal activities within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs. The California Coastal Act is this state's approved coastal management program applicable to the federal action. Two previous CDs, CD-35-83 and CD-85-91, and a Negative Determination (ND), ND-050-04, have been prepared for earlier repairs to the Port San Luis Harbor breakwater, and the CCC concurred on these previous CDs and ND. The Corps has evaluated the Proposed Action and has determined it is consistent to the maximum extent practicable with the enforceable policies of the California Coastal Management Program pursuant to section 307(c) of the Coastal Zone Management Act of 1972, as amended. On February 26, 2021, the Corps informally coordinated a Consistency Determination (CD) on the Proposed Action with the California Coastal Commission (CCC), and on March 2, 2021, the Corps formally submitted the CD to the CCC. The Proposed Action CD is on the April 2021 CCC Hearing Board agenda. A CCC Staff Report has assigned CD-0002-21 to the CD for Port San Luis Harbor breakwater repair project. With concurrence by the CCC, the Proposed Action will be in compliance with the Act.

Endangered Species Act of 1973

Under ESA Section 7(a)(2), each federal agency must ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of the species' designated critical habitat (16 U.S.C. § 1536(a)(2)). If an agency determines that its actions "may affect" a listed species or its critical habitat, the agency must conduct informal or formal consultation, as appropriate, with either the USFWS or the NMFS, depending on the species at issue (50 C.F.R. §§402.01, 402.14(a)– (b)). If, however, the action agency independently determines that the action would have "no effect" on listed species or critical habitat, the agency has no further obligations under the ESA. The Corps has determined that the Proposed Action would have "no effect" on the California least tern. The Corps has determined that the Proposed Action "may affect, not likely to adversely affect" the Southern sea otter. Informal consultation pursuant to Section 7 of the Endangered Species Act will be initiated with the US Fish and Wildlife Service, the agency responsible for managing Southern sea otters. The Corps has determined the proposed project "may affect, likely to adversely affect" the black abalone and black abalone designated critical habitat. Informal consultation pursuant to Section 7 of the Endangered Species Act will be initiated with the National Marine Fisheries Service, the agency responsible for managing black abalone.

National Historic Preservation Act of 1966, as amended

Section 106 of the NHPA requires Federal agencies to take into account the effects of undertakings they carry out, assist, fund, or permit on historic properties and to provide the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Federal agencies meet this requirement by completing the Section 106 process set forth in the implementing regulations, "Protection of Historic Properties," 36 C.F.R. Part 800. The goal of the Section 106 process is to identify and to consider historic properties that might be affected by an undertaking and to attempt to resolve any adverse effects through consultation. Based on a records search, evaluation of the breakwater, and consultation with SHPO, no historic properties would be affected by the proposed project. To comply with Section 106 of the National Historic Preservation Act (NHPA), the Corps consulted with the SHPO and on February 20, 2018, received concurrence that no historic properties would be affected. Following the addition of eel grass mitigation site and expanded dredging, the Corps consulted a second time with the SHPO, receiving concurrence on March 25, 2021 that no historic properties would be affected. The proposed project is therefore in compliance with the NHPA.

Fish and Wildlife Coordination Act

In response to the requirements of this Act, the Corps has and would continue to maintain continuous coordination with the USFWS, the NMFS, and the CDFW during phases of the planning and construction process. The proposed project is in compliance with the Act.

Magnuson-Stevens Fishery Conservation and Management Act, as amended

This EA includes an Essential Fish Habitat (EFH) Assessment as required by the Act. The Corps has determined that the proposed project may result in a substantial adverse impact to EFH, but would not result in a substantial adverse impact to any species managed under the four FMPs identified for this region of the Pacific. Expanded EFH consultation pursuant to the Act will be initiated with the NMFS, the agency responsible for managing EFH.

Clean Air Act (CAA)

Emissions generated by this project are expected to be temporary and short term impact. Furthermore, the contractor must obtain a permit from the San Luis Obispo County Air Pollution Control District (SLOCAPCD) or the State California Air Resources Board (CARB) permit requirements prior to commencement of work. A conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the applicability rates specified in 40 CFR 93.153(b)(1). Based on the analysis in Section 4, the total direct and indirect emissions associated with the federal action are not expected to equal or exceed the applicability rates, applicable in each air basin. A conformity determination is not required. The Proposed Project is in compliance with the CAA.

Migratory Bird Treaty Act (MBTA) as amended

The proposed Port San Luis O&M breakwater repair project area was coordinated with the USFWS and CDFW. The proposed project would not entail the taking, killing or possession of any migratory birds and is therefore in compliance with the Act. The Proposed Action also complies with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. The Proposed Action is in compliance with the Act.

Executive Order 12898, Environmental Justice in Minority and Low-Income Populations

Executive Order (E.O.) 12898 focuses Federal attention on the environment and human health conditions of minority and low-income communities and calls on agencies to achieve environmental justice as part of its mission. The order requires the USEPA and all other Federal agencies (as well as state agencies receiving Federal funds) to develop strategies to address this issue as part of the NEPA process. The agencies are required to identify and address, as appropriate, any disproportionately high and adverse human health or environmental impacts of their programs, policies, and activities on minority and low-income populations. The order makes clear that its provisions apply fully to programs involving Native Americans. The Council of Environmental Quality (CEQ) has oversight responsibility for the Federal government's compliance with E.O. 12898 and NEPA. The CEQ, in consultation with the USEPA and other agencies, has developed guidance to assist Federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. According to the CEQ's Environmental Justice Guidance under the National Environmental Policy Act, agencies should consider the composition of the affected area to determine whether minority populations or low-income populations are present in the area affected by the proposed action, and if so whether there may be disproportionately high and adverse human health or environmental impacts (CEQ 1997).

Demographic data from the USEPA's EJSCREEN, an online environmental justice screening and mapping tool, served as the source data for evaluation. Maps and data from EJSCREEN are found in Appendix F. EJSCREEN incorporates demographic data from the U.S. Census Bureau (USEPA EJ SCREEN, 2020a). An analysis of demographic data was conducted to derive information on the approximate locations of low-income and minority populations in the community of concern. Since the analysis considers disproportionate impacts, two areas must be defined to facilitate comparison between the area actually affected and a larger regional area that serves as a basis for comparison and includes the area actually affected. The larger regional area is defined as the smallest political unit that includes the affected area and is called the community of comparison. For purposes of this analysis, the affected area is a three-mile radius around the project area, and the San Luis Obispo City as the community of comparison.

Minority populations. EO 12898 defines a minority as an individual belonging to one of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population, for the purposes of this environmental justice analysis, is identified when the minority population of the potentially affected area is greater than 50% or the minority population is meaningfully greater than the general population or other appropriate unit of geographic analysis. USEPA's EJSCREEN 2020 tool was used to obtain the study area demographics (USEPA, 2020a). Table 7.1.1 below provides a summary of the study area minority population demographics.

Low-Income Population**.** The EO does not provide criteria to determine if an affected area consists of a low-income population. For purposes of this assessment, the CEQ criterion for defining low-income population has been adapted to identify whether or not the population in an affected area constitutes a low-income population. An affected geographic area is considered to consist of a low-income population (i.e., below the poverty level, for purposes of this analysis) where the percentage of low-income persons: 1) is greater than 50%, or 2) is meaningfully greater than the low-income population percentage in the general population or other appropriate unit of geographic analysis. The United States Census Bureau poverty assessment weighs income before taxes and excludes capital gains and non-cash benefits (such as public housing, Medicaid, and food stamps). USEPA's EJScreen tool was used to obtain the study area low-income population for the affected area (USEPA, 2020a). Table 7.1.1 provides a summary of the low-income population percentages.

**Table 7.1.1 Environmental Justice Study Area Demographics**

| Demographic Indicators | Affected Area | State of California | San Luis Obispo City |
|---|---|---|---|
| **Minority Population** | 16% | 62% | 30.1% [1] |
| **Low-Income Population** | 7% | 33% | 30.4% [1] |

Source: [1] U.S. Census Bureau 2019.

As summarized in Table 7.1.1 Environmental Justice Study Area Demographics, the aggregate minority population in the affected area is 16% (USEPA, 2020a). The aggregate population percentage in the affected area does not exceed 50%. In addition, the affected area minority population percentage is not greater than the minority population percentage in the state of California as a whole that is approximately 62% (USEPA, 2020a), or the City of San Luis Obispo (U.S. Census Bureau, 2019) that is approximately 30.1%. Therefore, the affected area does not contain a high concentration of minority population.

As outlined in Table 7.1.1 Environmental Justice Study Area Demographics. 7% of the individuals in the affected area are considered low-income (below the poverty level) population (USEPA, 2020a). This percentage in the affected area does not exceed 50%. In addition, the affected area low-income population percentage is not greater than the low-income population in the state of California as a whole that is approximately 33% (USEPA, 2020a), or the city of San Luis Obispo that is approximately 30.4% (U.S. Census Bureau, 2019). Therefore, the affected area does not contain a high concentration of low-income population.

The project area does not constitute an EJ community. Therefore, there would be no impacts resulting from the Proposed Action that would result in disproportionately high and adverse impacts to minority and low-income communities.

## 8.0 LIST OF PREPARERS AND REVIEWERS

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## 9.0 REFERENCES


Bowes, S.M and Corn M. (1990). Noise exposure reduction aboard an oceangoing hopper dredge. Journal of the American Industrial Hygiene Association. Website accessed on October 8, 2015.
http://www.ncbi.nlm.nih.gov/pubmed/2220564

Brookshear, C., Larson, B., and Whitaker, A. 2018. Port San Luis Breakwater Repair Project, San Luis Obispo County, California. Cultural Resources Report.

California Air Resources Board (CARB). 2017a. Area Designations for Ambient Air Quality Standards (State and Federal) Attainment Statuses. Website accessed on October 31, 2017
https://www.arb.ca.gov/desig/adm/adm.htm

California Air Resources Board (CARB). 2017b. Greenhouse Gases (GHG) Regulations. Website accessed on October 26, 2017
https://www.arb.ca.gov/cc/reporting/ghg-rep/regulation/mrr-regulation.htm

California Air Resources Board (CARB), 2017c. Revised 2017 Climate Change Scoping Plan. E-mail dated October 30, 2017.

California Air Resources Board (CARB), 2017d. South Central Coast Air Basin (SCCAB). Website accessed on October 30, 2017
https://www.arb.ca.gov/pm/pmmeasures/pmch05/socenc05.pdf

California Air Resources Board (CARB), 2017e. Ambient Air Quality Standards (California Air Resources Board (5/4/16). Website accessed on October 31, 2017
https://www.arb.ca.gov/research/aaqs/aaqs2.pdf

California Air Resources Board (CARB). 2018 Federal Area Designations.
https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations ,
Accessed February 4, 2021

California Department of Fish and Wildlife (CDFW) - Marine Region, Sandoval & Associates, LLC. 2016. Kelp2016. Digital Map.

California Department of Transportation (CALTRANS). 2017. Traffic Volumes - 2017. Website accessed on November 10, 2020; accessed on March 23, 2021.
https://dot.ca.gov/programs/traffic-operations/census/traffic-volumes/2017

California State Water Resources Control Board. 2020. Impaired Water Bodies. Final 2014/2016 California Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) Website accessed on December 1, 2020.
https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml

Carter, H.R., D.L. Jaques, G.J. McChessney, C.S. Strong, M.W. Parker, and J.E. Takekawa. 1990. Breeding population of seabirds on the Northern and Central California coast in 1989-1990. Report prepared for Minerals Management Service, Pacific Outer Continental Shelf Region, under Inter-agency agreement with U.S. Fish & Wildlife Service (I.A. No. 12-12-001-30456.)

Central Coast Regional Water Quality Control Board,2010. 303(d) List of Impaired Waterbodies. http://www.waterboards.ca.gov/centralcoast/water_issues/programs/tmdl/303d_list.shtml

City of San Luis Obispo/County of San Luis Obispo, 2003. Watershed Management Plan. San Luis Obispo Creek Watershed. Website accessed on November 22, 2017 https://www.slocountywater.org/site/Flood%20Control%20and%20Water%20Conservation%20District%20Zones/ZONE%209/pdf/wmp.pdf

Council on Environmental Quality (CEQ), 1997. Definition of minority groups.

Estes, J.A. and R.J. Jameson. 1983. Summary of available population information on California sea otters. Report prepared for Minerals Management Service, Pacific Outer Continental Shelf Region, under Inter-agency agreement with U.S. Fish and Wildlife Service. (I.A. No. 14-12-001-20023; POCS Technical Paper No. 83-11.)

Executive Order (EO) 12898. 1994. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

Friedman, C.S., M. Thomson, and C. Chun. 1998. Withering syndrome of the black abalone, *Haliotis cracherodii* (leach): Water temperature, food availability, and parasites as possible causes. Oceanographic Literature Review 45.

Frost, N. 2015. California least tern breeding survey, 2015 season. California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program Report, 2016-01. Sacramento, CA. 24 pp + Appendices

Hatfield, B.B., Yee, J.L., Kenner, M.C., and Tomoleoni, J.A., 2019, California sea otter (*Enhydra lutris nereis*) census results, spring 2019: U.S. Geological Survey Data Series 1118, 12 p., https://doi.org/10.3133/ds1118.

Havis, R. N., 1988. Sediment Resuspension by Selected Dredges, Environmental Effects of Dredging Technical Note EEDP-09-2, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Herbich, J.B. and S.B. Brahme, 1983. Literature Review and Technical Evaluation of Sediment Resuspension During Dredging, U.S. Army Engineers Waterways Experiment Station CDS Report No. 266.

Intergovernmental Panel on Global Climate Change (IPCC). 2007. Impacts, Adaption, Vulnerability, Assessment Report.

Keane, K. and Smith, L.J. (2016) California Least Tern Foraging Ecology in Southern California: A Review of Foraging Behavior Relative to Proposed Dredging Locations. U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC) Dredging Operations and Environmental Research Program. ERDC/EL CR-16-3. May.

LaSalle, M. W., Homziak, J., Lunz, J. D., and Fredette, T. J., 1991. A Framework for Assessing the Need for Seasonal Restrictions on Dredging and Disposal Operations, Dredging Operations Technical Support Program, Technical Report D-91-1, U.S. Army Corps of Engineers, Washington, D.C.

McCauley, J.E., R.A. Parr and D.R. Hancock, 1977. Benthic Infauna and Maintenance Dredging: A Case Study, Water Resources II:233-242.

McLellan, T. N., Havis, R. N., Hayes, D. F., and Raymond, G. L., 1989. Field Studies of Sediment Resuspension Characteristics of Selected Dredges, Improvement of Operations and Maintenance Techniques Research Program, Technical Report HL-89-9, U.S. Army Corps of Engineers (Corps), Washington, D.C.

Merkel & Associates, Inc. 2010. *Demersal Fisheries Response to the 2004 Channel Deepening Project in San Diego Bay*. Prepared for Port of San Diego, Port of Los Angeles, Port of Long Beach, NOAA Fisheries and Naval Facilities Engineering Command Southwest, California, January 2010.

Merkel and Associates. 2014, 2015, 2016, 2017. Water quality monitoring during annual maintenance dredging (Corps owned Yaquina Hopper Dredge) of Morro Bay Harbor.

National Research Council (NRC). 1987. Responding To Changes In Sea Level: Engineering Implications.

O'Connor, J.M., D.A. Neumann, and J.A. Sheik, Jr., 1977. Sublethal Effects of Suspended Sediment on Estuarine Fish, Technical Paper U.S. Army Corps of Engineers (Corps) Coastal Engineering Research Center (No. 77-3):90pp.

Oliver, J.S., P.N. Slattery, L.W. Hulberg and J.W. Nybakken, 1977. Patterns of Succession in Benthic Infaunal Communities Following Dredging and Dredged Material Disposal in Monterey Bay, U.S. Army Waterways Experiment Station Technical Report D-77-27: 186pp.

Pacific Gas and Electric (PG&E). 2010. Diablo Canyon Power Plant (DCPP). http://www.pge.com/mybusiness/edusafety/systemworks/diablocanyon/

Port San Luis Harbor District, 2015. Port San Luis Harbor Terrace Plan. Final Environmental Impact Report (EIR), State Clearing House (SCH) No. 2014031024. Accessed weblink

on November 17, 2017
https://www.portsanluis.com/DocumentCenter/Home/View/310

Port San Luis Harbor District, 2017a. Code of Ordinances. Chapter 18 – Health and Safety Regulations, Section 18.140 Miscellaneous Prohibited Acts.. Accessed Weblink on October 25, 2017
http://www.portsanluis.com/DocumentCenter/Home/View/36

Port San Luis Harbor District, 2017b. Master Plan. Accessed Weblink on October 25, 2017
http://www.portsanluis.com/2149/Master-Plan

Port San Luis Harbor District, 2017c. 2017-18 Port San Luis Harbor District Budget (June 27, 2017). Accessed Weblink on October 26, 2017
http://www.portsanluis.com/DocumentCenter/Home/View/2777

Riedman, M.L. 1987. Summary of information on the biology of the sea otter: Technical Support Document 1. In. Vol II. Technical Support Documents for the Final Environmental Impact Statement for Translocation of Sea Otters. Prepared by U.S. Fish and Wildlife Service Institute of Marine Sciences – U.C. Santa Cruz.

San Luis Obispo Council Of Governments (SLOCOG), 2017. About SLOCOG. Website accessed on November 14, 2017 https://www.slocog.org/about

San Luis Obispo Council Of Governments (SLOCOG), 2011. San Luis Obispo County 2040 Population, Housing and Economic Forecast Final Report. Website accessed on November 14, 2017
https://www.slocog.org/sites/default/files/San%20Luis%20Obispo%20County%202040%20Population%20Housing%20Employment%20Forecast.PDF

San Luis Obispo County Air Pollution Control District (SLOCAPCD), 2010. Global Climate Change.
http://www.slocleanair.org/programs/climatechange_general.php

San Luis Obispo County Air Pollution Control District (SLOCAPCD), 2017. California Environmental Air Quality (CEQA) Handbook (April 2012). Website accessed on October 24, 2017
shttp://www.slocleanair.org/images/cms/upload/files/CEQA_Handbook_2012_v2%20%28Updated%20Sept%202015%29.pdf

San Luis Obispo County Air Pollution Control District (SLOCAPCD) 2020a. APCD Board of Directors. Accessed December 8, 2020 https://www.slocleanair.org/who/board.php

San Luis Obispo County Air Pollution Control District (SLOCAPCD) 2020b. SLOCAPCD November 2017 Clarification Memo for information related to section. CEQA_Handbook_2012_v2(Updated Map2019)_LinkedwithMemo.pdf

San Luis Obispo County. 2019. Traffic Count Data, Current Volumes – 2019. An electronic pdf.file with a file name Traffic-Count-Data 2019/pdf of CURRENT Volumes -2019 with a date of 11/11/2020 via a email dated 11/11/2020 from County of San Luis Obispo Public Works.

San Luis Obispo County Public Works. Traffic Counts. 2017. Website accessed on October 25, 2017 http://www.slocounty.ca.gov/Departments/Public-Works/Forms-Documents/Plans-Reports/Transportation/Traffic-Count-Data.aspx

South Coast Air Quality Management District (SCAQMD). 2020a. SCAQMD Air Quality Significance Thresholds (SCAQMD/SCAB CEQA Handbook, 1993, with updates through 2020). Website accessed on December 7, 2020 http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2

Tinker, M.T., and Hatfield, B.B. 2016. California sea otter (Enhydra lutris nereis) census results, spring 2016: U.S. Geological Survey Data Series 1018, 10 p.

University of California Santa Barbara (UCSB), 2007. 2007 Economic Outlook for San Luis Obispo County Topic of UC Santa Barbara Seminar. http://www.ia.ucsb.edu/pa/display.aspx?pkey=1515

Unified Facilities Criteria [(UFC: U.S. Army Corps of Engineers; Naval Facilities Engineering Command (Preparing Activity); Air Force Civil Engineer Support Agency], 2001. Maintenance and Operation: Maintenance of Waterfront Facilities.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 1976. Final Environmental Statement, Port San Luis, San Luis Obispo County, California.

U.S. Army Corps of Engineers (Corps), Office of the Chief of Engineers, 1979. Effects of Dredging and Disposal on Aquatic Organisms.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 1986. Supplemental Environmental Assessment for Geotechnical Drilling of the Port San Luis Breakwater, Port San Luis, San Luis Obispo County, California.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 1988. Engineering Study on Port San Luis.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 1990. Final Environmental Assessment for Maintenance Dredging Los Angeles River Estuary, Long Beach, California.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 1991. Site Field Observations (January 10), Port San Luis Harbor and Breakwater Environments, San Luis Obispo County, California.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 1992. Final Environmental Assessment (FEA): Repairs To The Port San Luis Breakwater.

U.S. Army Corps of Engineers (Corps), 1993a. Final Environmental Assessment: Santa Barbara Harbor Maintenance Dredging, Santa Barbara County, California.

U.S. Army Corps of Engineers (Corps), 1994. Final Environmental Assessment: Ventura Harbor Maintenance Dredging, Ventura County, California.

U. S. Army Corps of Engineers (Corps), 1998. Final Environmental Assessment: Ventura Harbor Six-Year Maintenance Dredging Program, Ventura County, California.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 2004. Final Environmental Assessment (FEA): Repairs To The Port San Luis Breakwater.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 2009. Incorporating Sea Level Change Considerations in Civil Works projects. Engineering Circular (EC) 1165-2-211.

U.S. Army Corps of Engineers (Corps), Los Angeles District (LAD), 2017. Comprehensive Condition Survey Port San Luis Breakwater. Final Report.

U.S. Coast Guard (USCG), 2007. Coast Guard Station Morro Bay (Sector Los Angeles – Long Beach).
http://www.uscg.mil/d11/sectorlalb/MB/index.htm

U.S. Census Bureau, 2010. U.S. Census Interactive search. Accessed on November 14, 2017. Weblink accessed on November 14, 2017.
https://www.census.gov/2010census/popmap/ipmtext.php?fl=06:0603330

U.S. Census Bureau, 2015. Demographics for Avila Beach and San Luis Obispo County, 2011-2015. Website accessed on October 26, 2017.
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_15_5YR_DP03&prodType=table
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table

U.S. Census Bureau, 2019. San Luis Obispo city, California. QuickFacts, People. Weblink accessed on April 2, 2021
https://www.census.gov/quickfacts/fact/table/sanluisobispocitycalifornia/PST045219

U.S. Environmental Protection Agency (USEPA), 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. Accessed website on October 8, 2015. http://nepis.epa.gov/Exe/ZyNET.exe/9101NN3I.TXT

U.S Environmental Protection Agency (USEPA), 1972a, with updates from1985 through 2017. Compilation of Air Pollutant Emission Factors (AP-42). Website accessed on October 30, 2017. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission factors https://www.epa.gov/air-emissions-factors-and-quantification

U.S. Environmental Protection Agency (USEPA), 1972b. Noise Control Act. Website accessed on October 8, 2015. http://www2.epa.gov/laws-regulations/summary-noise-control-act

U.S. Environmental Protection Agency (USEPA), 1974. Protective Noise Levels. Accessed on October 8, 2015. http://nepis.epa.gov/Exe/ZyNET.exe/20012HG5.TXT

U.S Environmental Protection Agency (USEPA). 1994. Federal Register (FR): 59 FR 49361. Proposed Rules: Approval and Promulgation of Implementation Plans and Designation of Areas for Air Quality Planning Purposes; State of California; Approval of the Maintenance Plan for the San Francisco Bay Area and Redesignation of the San Francisco Bay Area Ozone Nonattainment Area to Attainment; Approval of Emissions Inventory; Approval of NOx RACT Exemption Petition (Green Book). Website Accessed on October 30, 2017 https://www3.epa.gov/airquality/greenbook/frn/5949361.html

U.S Environmental Protection Agency (USEPA). 2017. General Conformity De Minimis and Tables. Website Accessed on October 31, 2017 https://www.epa.gov/general-conformity/de-minimis-tables

U.S. Environmental Protection Agency (USEPA). 2020a. EJScreen. https://ejscreen.epa.gov/mapper/ , Accessed March 8, 2021

U.S. Environmental Protection Agency (USEPA). 2020b. Greenhouse Gas Equivalencies Calculator. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator ; Accessed March 16 – 17, 24, 2021.

U.S Environmental Protection Agency (US EPA). 2021a Green Book. National Area and County-Level Multi-Pollutant Information. California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants https://www3.epa.gov/airquality/greenbook/anayo_ca.html

U.S Environmental Protection Agency (USEPA), 2021b. De Minimis Tables. General Conformity. https://www.epa.gov/general-conformity/de-minimis-tables , Accessed February 4, 2021.

U.S. Fish and Wildlife Service. 1982. Pacific coast recovery plan for the American peregrine falcon. 86 pp.

Walter, R.K. et al (2018), Coastal upwelling seasonality and variability of temperature and chlorophyll in a R.K. small coastal embayment, Continental Shelf Research, 154, 9-18.

# FIGURES

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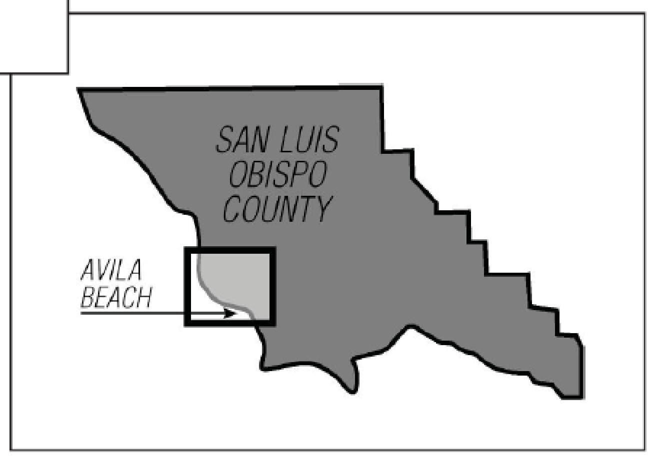
**Figure 1 Regional Vicinity Map and Figure 2 Local Vicinity Map**


Figure 1 Regional Vicinity Map

Figure 2 Local Vicinity Map

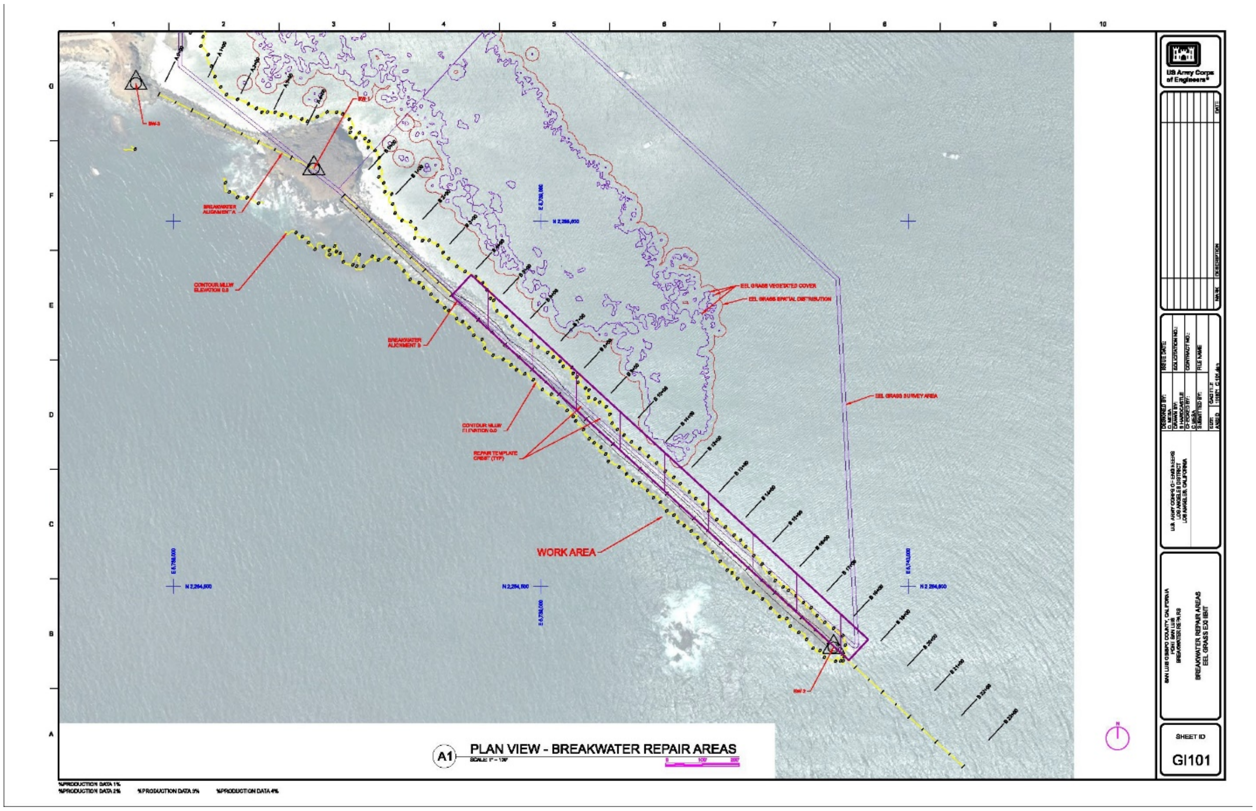



**Reference: Port San Luis Harbor District, 2004**

**Figure 3 Port San Luis Harbor Site Map**


**Reference: Port San Luis Harbor District, 2004**

**Figure 4 Proposed Project Area Map Port San Luis Breakwater**

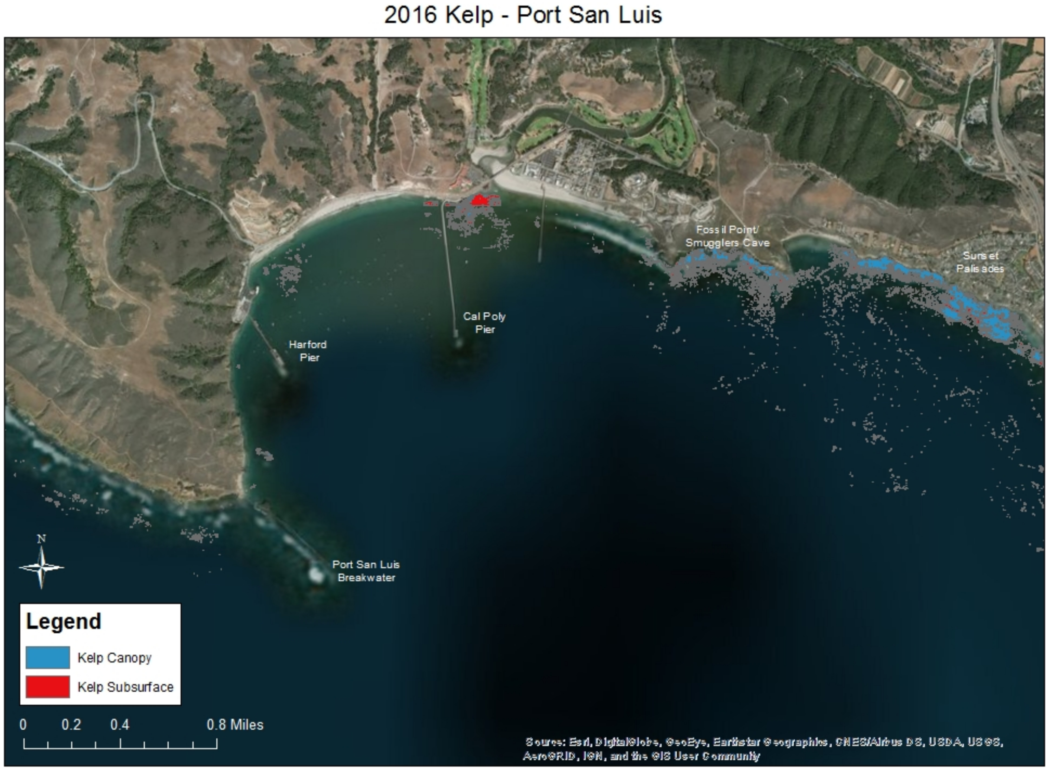



**Reference: Corps**

**Figure 6 2016 Kelp Survey, In Vicinity of Port San Luis Breakwater**

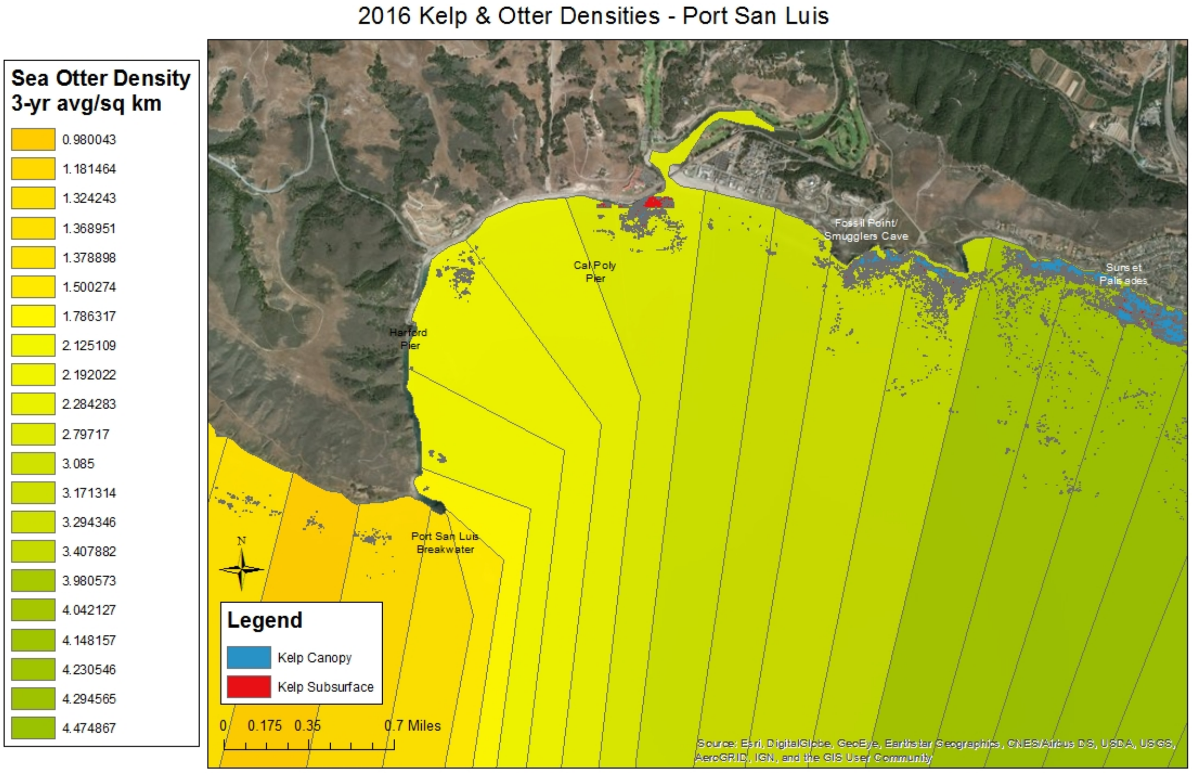

**Source: CDFW, 2016**
**Note: Kelp was mapped approximately 1,000 feet west/southwest of the breakwater, and approximately 300 feet northwest of Whaler's Island, near the terminus of the inner breakwater on the land**

**Figure 7 2016 Kelp Survey, in Port San Luis Harbor**




**Source: CDFW, 2016.**

**Figure 8 2016 Kelp and Otter Densities – Port San Luis Harbor**




**Source: CDFW, 2016.**

# APPENDICES

**APPENDIX A  Section 404(b)(1) Water Quality Evaluation**

**APPENDIX B  Biological Resources**

**APPENDIX C  Air Criteria Pollutants Emissions and Greenhouse Gases (GHG) Emissions Analysis**

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# APPENDIX A

**Section 404(b)(1) Water Quality Evaluation**
**Port San Luis Harbor O&M Breakwater Repair**
**Port San Luis County, California**

**2021**

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**THE EVALUATION OF THE EFFECTS OF THE DISCHARGE OF DREDGED OR FILL MATERIAL INTO THE WATERS OF THE UNITED STATES IN SUPPORT OF THE ENVIRONMENTAL ASSESSMENT FOR THE OPERATION & MAINTENANCE BREAKWATER REPAIR PROJECT PORT SAN LUIS HARBOR LOCATED IN SAN LUIS OBISPO COUNTY, CALIFORNIA**

**INTRODUCTION.** The following evaluation is provided in accordance with Section 404(b)(1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) as amended by the Clean Water Act of 1977 (Public Law 95-217). Its intent is to succinctly state and evaluate information regarding the effects of discharge of dredged or fill material into the waters of the U.S. As such, it is not meant to stand alone and relies heavily upon information provided in the environmental document to which it is attached. Citation in brackets [] refer to expanded discussion found in the Environmental Assessment (EA), to which the reader should refer for details.

I. Project Description [1.0; 2.0-2.4]

a. Location: The proposed project area is the Federal Breakwater, Port San Luis Harbor, San Luis Obispo County, California.

b. General Description: The Los Angeles District of the U. S. Army Corps of Engineers, as part of its Operations and Maintenance (O&M) Program, is proposing to perform repairs to the Port San Luis breakwater. The Proposed Action also includes minor excavation of shoaled, clean sandy sediment (approximately 15,000 cubic yards) adjacent to the leeward side of the breakwater to create adequate depths for barges and other vessels to access the repair area. The excavated sediment would be used to create an engineered eelgrass mitigation site about 1,000 feet north of the leeward side of the breakwater, as the repair work and excavation would impact some eelgrass located adjacent to portions of the breakwater. The proposed excavation would occur to depths of approximately -12 ft MLLW with a 2-foot allowable overdepth. Excavation of sandy sea bottom sediment and construction of an eelgrass mitigation site would be typically performed using a crane-equipped barge (a barge with an attached crane). This equipment could be utilized for excavation of shoaled sediment adjacent to the breakwater, and for the breakwater repair work. During excavation of shoaled sediment, the crane will typically be outfitted with a clamshell bucket. During excavation the clamshell bucket will be lowered by the crane operator to the sea floor to excavate sediment. The crane will pivot around and place the excavated sediment onto a storage barge or into a specialized storage barge called a scow to be taken to the eelgrass mitigation site, and deposited there. No dredging, maintenance dredging, or trenching work would be performed elsewhere in the harbor as part of the proposed breakwater repair project.

The breakwater extends southeasterly from Point San Luis into the harbor. The footprint of the breakwater is approximately 2,400 feet in length. The project area is approximately 20 acres. It is estimated that approximately 29,000 tons of existing stone would need to be reset and 60,000 tons of new stone would be placed to restore the most heavily damaged portion of the breakwater to its original design. Repair work elevations on the seaward side of the breakwater are anticipated to extend down to approximately +4 ft MLLW and to approximately 0 ft MLLW on the leeward side of the breakwater. The footprint of the breakwater would not be changed, but the crest elevation would be raised from +13 feet Mean Lower Low Water (MLLW) to +16 feet MLLW as a consequence of the armor stone size required for hydraulic stability and the breakwater prism.

The area of sediment proposed for minor, sandy sea bottom excavation is similar in kind to previous excavation performed adjacent to the Port San Luis Harbor federal breakwater. In 2005, approximately 10,000 cy of clean sandy sea bottom sediment was excavated and then side cast adjacent to the breakwater to allow for temporary construction access for barges and work boats to repair the breakwater. In 1992, approximately 10,000 cy of clean sandy sea bottom sediment adjacent to the breakwater was also excavated but was placed in a surf zone/nearshore within the harbor.

c. Basic and Overall Project Purpose: The basic project purpose is navigation. The overall project purpose is to repair the breakwater to authorized design to support safe commercial and recreational navigation operations in Port San Luis Harbor.

d. General Description of Dredged or Fill Material: [1992 Corps Final EA on repair of Federal breakwater; 2013 Port San Luis Harbor District's Sediment Sampling and Analysis Report]

(1) General Characteristics of Material (grain size, soil type):

Sediment testing completed in 2013 to support PSL Harbor District's maintenance dredging, showed on two composite (PSL-1; PSL-2) sediment samples collected from the Port San Luis Harbor dredge area and the two samples (DSP-1, Fisherman's Beach; DSP-2, West Beach) collected from the disposal sites (Fishermen's Beach; West Bluff Beach) indicated all of the samples characterized as coarse to medium grained sand. The percentage of fines in the four samples (material of a grain size small enough to pass through a #200 US Standard Sieve) ranged from 1.4 to 4.1 percent. Dredge area composite sample PSL-1 had 94.9 percent sand with 1.0 percent gravel and 4.1 percent silt and clay, and dredge area composite sample PSL-2 had 96.7 percent sand with 0.0 percent gravel and 3.3 percent silt and clay. In comparison, the disposal site sample DSP-1 Fisherman's Beach had 98.0 percent sand with 0.0 percent gravel and 2.0 percent silt and clay, and the disposal site sample DSP-2 West Bluff Beach had 92.6 percent sand with 6.0 percent gravel and 1.4 percent silt and clay.

The Eelgrass Mitigation And Monitoring Plan In Support Of The Port San Luis Breakwater Repairs, Port San Luis, San Luis Obispo County, California (July 2020), performed by Corps contractor Merkel and Associates [Appendix B of EA] included a discussion of sampling and test results of 12 grab surface grab samples taken during the April-May 2020 eelgrass surveys. Surface sediment grab samples were collected at 12 locations spread across multiple transects extending through a depth gradient ranging from -7.4 feet MLLW to -26.7 feet MLLW (Figure 5). Seven of the 12 samples were collected from within eelgrass beds and the remaining five samples were derived from outside of eelgrass. Samples were analyzed for grain size distribution following American Standard Test Method (ASTM). Following analysis, the sediment grain size distribution curves were plotted and the median particle diameter (D50) was estimated (Figure 6). The results of the analysis indicate that fine sand dominates all portions of the study area with the range across samples being 69.4 percent sand in an unvegetated site at -23.2 feet MLLW to 96.7 percent at a site supporting eelgrass in -7.9 feet MLLW. The percent sand and D50 declined with increasing depth. Eelgrass was found in sediment with a D50 ranging between 0.10 and 0.17 mm, although all samples shallower than - 18.5 feet MLLW had D50 values within this same range, irrespective of support of eelgrass. The percent sand and D50 both increased with increasing energy exposure. The results of the sediment size analysis suggest that sediment characteristics are not likely to limit the restoration potential for eelgrass at this location. The observations also suggest that sediment grain size is a likely function of the energetics of the specific areas sampled. The 12 surface sample grain size data collected could not calculate a grain size weighted average however the data could be used to perform a ***discount*** weighted average grain size analysis that would help get at this question. To make use of the surface grab data to estimate the weighted sand percentage it is necessary to consider the energetics of the environment as part of the accumulation process and note that the sand content at depth will be lower than that at the surface of the dredge area. This is because the surface sediments in shallower water are exposed to greater swell and overtopping wave energy than would be the case if the site were deeper. Since the site was deeper and has filled with sand over time, it is expected that grain size and percent sand has risen with accumulation. To develop a volume based average sand content, averaged the surface percent sand for the three samples taken within the dredge footprint (PSL 08, 10, and 11 = 95.83%), and then averaged the westerly sample PSL-12 (-14.65 ft) and the easterly PSL-05 (-14.33 ft) deeper samples as surrogates of what the percent sand may look like at the bottom of the cut (87.71%). This is expected to be a low percent sand estimate for two reasons. First both samples were taken deeper than the design cut and second, PSL-05 is much more protected and within eelgrass that would retain fines than would be the case in the proposed dredge footprint. This results in an estimated (91.77%) for volume weighting [Appendix B of EA].

Five to twenty ton amour stone will be sourced from a quarry and placed on the PSL breakwater to repair the structure.

(2) Quantity of Material: Approximately 15,000 cy of sandy, clean sea bottom sediment would be excavated adjacent to the breakwater. This same 15,000 cy of sand would be used as fill material to create the eelgrass mitigation site. Approximately 60,000 tons of 5-20 ton armour stones will be used for the breakwater repair.

(3) Source Material: Sandy, clean sea bottom sediment adjacent to the leeward side of the breakwater. It will be the contractor's responsibility to locate sufficient quantity and quality of stone from California quarries. The USACE cannot direct the contractor in making this selection, but can only specify size, type, and quality of stone. The Santa

Catalina Island is considered to be the most likely source due to known quantities on hand to start work with and the use of barges to transport stone to the placement site. However, the use of other quarries cannot be ruled out.

e. Description of the Proposed Discharge Site:

(1) Clean, sandy sea bottom excavated sediment would be excavated from the lee of the PSL breakwater and placed to create an engineered eelgrass mitigation site about 1,000 feet north of the leeward side of the breakwater. The characteristic habitat of the excavation site is a combination of sandy bottom benthic habitat and eelgrass habitat. The characteristic habitat type placement site is open-coast sandy benthic habitat. The PSL breakwater structure repair areas receiving new stone are characterized by the side slopes of the structure that create intertidal and subtidal rocky habitat.

(2) Size (acres): Shoaled sediment will be excavated from an approximate 1.8 acre excavation template. The suitable excavated sediment would be placed in an approximate 1.05 acre engineered eelgrass mitigation site. The breakwater repair area is approximately 0.7 acres.

(3) Type of Site (confined, unconfined, open water): Unconfined, open water.

f. Description of Disposal Method: Placement of excavated sediment would typically be performed using a crane-equipped barge, to excavate shoaled clean sandy bottom sediment adjacent to the breakwater, which would be used to create an engineered eelgrass mitigation site, approximately 1,000 feet north of the leeward side of the breakwater. The crane would pivot around and place the excavated sediment onto a storage barge or a specialized storage barge called a scow and then transported and placed into the placement site to create the engineered eelgrass mitigation site.

During breakwater repair construction a crane equipped barge will be outfitted with lifting tongs to reset existing stone and retrieve stones from the storage barge, and then place those stones on damaged sections of the breakwater. A boat operator in a skiff, and spotter on the breakwater, would direct the operation of the crane in order to pick and place the stones.

**II.** Factual Determinations**.**

a. Physical Substrate Determinations:

(1) Substrate Elevation and Slope:

The sandy sea bottom area is relatively flat. The proposed excavation template area depths range from approximately -5 to -10 ft MLLW, sediment will be excavated to a depth of -12 ft MLLW with a 2-foot allowable overdepth. The sediment placement site is currently at approximately -22 ft MLLW, and will be brought to approximately -12 ft MLLW to create the engineered eelgrass mitigation site. The breakwater repair area elevations range from 0 ft MLLW to the crest elevation +16 ft MLLW, with a slope of 1.5H:1V.

(2) Sediment Type.

Prior sediment sampling and characterization efforts indicate the sediment in the excavation area and eelgrass mitigation site consists primarily of medium to fine grain sand. Suitable sediments for nearshore placement. The excavation material is considered compatible with the eelgrass mitigation site.

(3) Dredged Material Movement.

Sandy, sea bottom excavated sediment adjacent to the breakwater would be used to create an engineered eelgrass mitigation site about 1000 feet north of the leeward side of the breakwater. While some movement is expected to occur as material is redistributed by waves and currents, most of the material is expected to remain within the mitigation site as it would be planted with eelgrass.

(4) Physical Effects on Benthos (burial, changes in sediment type,etc.).

Temporary, short-term adverse impacts would occur. Placement of new stone will result in the crushing of invertebrate and algal organisms within the repair area, although organisms will begin to recolonize the area once repair activities are complete. The slope of the breakwater structure will be remain consistent with the design criteria. Excavation of sediments would result in a temporary depth elevation change (less than 10 ft), over time the currents and littoral transport will naturally accumulate sediments to the area. Excavation will bury, crush, smother and/or displace organisms and directly impact eelgrass growing within the excavation template. Excavation of shoaled clean, sandy sea bottom sediment placed in an engineered eelgrass mitigation site would raise the sea floor depth approximately 10 feet, bury benthic organisms, although it would also provide habitat as the organisms re-establish within the deposition area post-construction. Minor turbidity levels may exist in the immediate vicinity of the excavation and placement operations that may result in minor, temporary reductions in dissolved oxygen. Turbidity, dissolved oxygen, light transmittance, pH, salinity, and temperature would be monitored during sediment excavation and placement activities minimizing impacts. Recolonization would be expected to occur once placement activities cease. Species abundance and productivity would be expected to fully recover within one to five years. No long-term adverse effects are expected.

(5) Other Effects. N/A

(6) Actions Taken to Minimize Impacts (Subpart H).

Needed: X YES _____NO

No measures can be taken to minimize direct impacts to benthic organisms from burial. Monitoring of water quality to control turbidity during excavation and disposal would occur. If turbidity exceeds water quality criteria, excavation and disposal would be evaluated and modifications made to get back into compliance.

If needed, Taken:____X YES______NO

In accordance with the construction specifications, a water quality monitoring plan would be part of the construction contract to be approved by the Corps' Biologist and/or the Corps' Environmental Coordinator.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water (refer to 40 CFR sections 230.11(b), 230.22 Water, and 230.25 Salinity Gradients; testing specified in Subpart G may be required). Consider effects on salinity, water chemistry, clarity, odor, taste, dissolved gas levels, nutrients, eutrophication, others.

Excavation and placement of clean, sandy sea bottom excavated sediment to create an engineered eelgrass mitigation site approximately 1,000 feet north of the leeward side of the breakwater is not expected to significantly affect water circulation, fluctuation, salinity, water chemistry, clarity, odor, taste, dissolved gas levels, nutrients, and/or eutrophication. Only clean, compatible sands from the project would be utilized for placement operations in the engineered eelgrass mitigation site. These sands are not a source of contaminants. Minor turbidity levels may exist in the immediate vicinity of the placement operations that may result in minor, temporary reductions in dissolved oxygen. Sands would not be a source of nutrients, thus eutrophication is not expected to result. Water used to entrain sands would be sea water as is water in the engineered eelgrass mitigation site; thus there would be no effect on salinity levels. Placement of amour stone may result in minimal localized increases in turbidity from soil or dust adhered to the stones surface resulting in minor temporary decreases in clarity. The turbidity would be minimal, localized, and dissipate quickly. No other impacts to water circulation, fluctuation, salinity, water chemistry, odor, taste, dissolved gas levels, nutrients, and/or eutrophication are expected.

(2) Current Patterns and Circulation (consider items in sections 230.11(b), and 230.23), Current Flow, and Water Circulation.

The placement of new armour stone, excavation of sediment and placement of excavated sediment would not significantly affect current patterns and circulation, current flow, and/or water circulation. Excavated sediment would be placed at sufficient depth within the engineered eelgrass mitigation site that it would not significantly affect circulation or current patterns. The currents are not expected to change in magnitude or direction.

(3) Normal Water Level Fluctuations (tides, river stage, etc.) (consider items in sections 230.11(b) and 230.24)

The placement of new armour stone, excavation of sediment, and placement of clean, sandy sea bottom excavated sediment in the engineered eelgrass mitigation site is not expected to have a significant impact on normal water level fluctuations. There would no change to tidal elevations, which is determined by access to the open ocean, which would not be changed.

(4) Salinity Gradients (consider items in sections 230.11(b) and 230.25)

The placement of new armour stone, excavation of sediment, and placement of clean, sandy sea bottom excavated sediment in the engineered eelgrass mitigation site is not expected to have any impact on normal water salinity nor is it expected to create salinity gradients. Sands and water used to entrain sands would be sea water as is water in the engineered eelgrass mitigation site; thus there would be no creation of salinity gradients.

(5) Actions That Will Be Taken to Minimize Impacts (refer to Subpart H)

Needed: X_____YES _NO
If needed, Taken: X____YES___ NO

Sediment excavation and placement operations would be monitored for effects on water quality, including turbidity, dissolved oxygen, light transmittance, pH, salinity, and temperature. If turbidity and/or dissolved oxygen exceeds water quality criteria, a Best Management Practice (BMP) would be implemented during placement activities to evaluate such exceedances and make modifications to placement activities to reduce and minimize impacts and to get back into compliance, in accordance with the construction contract specifications.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site (consider items in sections 230.11(c) and 230.21)

Excavation and placement of excavated clean, sandy soft bottom sediment to create an engineered eelgrass mitigation site would cause a temporary increase in suspended sediments and turbidity. The impact is expected to be highly localized within the immediate vicinity of the excavation and placement sites. The areas are expected to return to background levels within one to several hours after excavation and placement activities cease. Water quality monitoring during placement activities will allow USACE to modify operations (such as by slowing rate of discharge) until any water quality problems abate. Placement of amour stone may result in minimal localized increases in turbidity from soil or dust adhered to the stones surface resulting in minor temporary decreases in clarity. The turbidity would be minimal, localized, and dissipate quickly.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column (consider environmental values in section 230.21, as appropriate)

Only clean, sandy sediment would be excavated and placed in the engineered eelgrass mitigation site. Minor turbidity levels may exist in the immediate vicinity of the placement operations that may result in minor, temporary reductions in dissolved oxygen. Only clean, quarry stones for breakwater repairs would be used to construct the project. These rocks are not a source of contaminants. Minor increased turbidity levels may exist in the immediate vicinity of the stone placement operations. The turbidity would be minimal, localized, and dissipate quickly thus it is unlikely reductions in dissolved oxygen would occur.

(3) Effects on Biota (consider environmental values in sections 230.21, as appropriate).

Biota disturbed during stone placement, sediment excavation or buried during sediment placement operations are expected to recolonize and re-establish productivity rates within one to five years. Impacts will be adverse, but temporary and not significant.

(4) Actions taken to Minimize Impacts (Subpart H)

Needed: X YES _ NO
If needed, Taken: _X___YES__ NO

Monitoring of water quality to control turbidity will occur. If turbidity exceeds water quality criteria, excavation and disposal would be evaluated and modifications made to get back into compliance.

In accordance with the construction contract specifications, a water quality monitoring plan would be part of the construction contract to be approved by the Corps' Biologist and/or the Corps' Environmental Coordinator.

d. Contaminant Determinations (consider requirements in section 230.11(d)): The following information has been considered in evaluating the biological availability of possible contaminants in excavated or placement sediments. (Check only those appropriate.)

(1) Physical characteristics _X_

(2) Hydrography in relation to known or anticipated sources of contaminants _X_

(3) Results from previous testing of the material or similar material in the vicinity of the proposed project _X_

(4) Known, significant sources of contaminants (e.g. pesticides) from land runoff or

percolation ______

(5) Spill records for petroleum products or designated (Section 311 of the CWA) hazardous substances ______

(6) Other public records of significant introduction of contaminants from industries, municipalities, or other sources ________

(7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man- induced discharge activities

______

(8) Other sources (specify) _X____

The 2013 PSL Harbor sediment chemistry concentrations appear to be low to non-detect for most constituents performed on the two dredge area composites (PSL-1; PSL-2). Of the metals that were detected, the concentrations present were well below the effects range-low (ERL) levels. No poly aromatic hydrocarbons (PAH's) were detected in any of the samples. The samples were also free of sulfides. No organo-pesticides were detected in any of the samples. The test for organo-pesticides (EPA 8081) was performed several days after the normal hold time after the laboratory contracted to perform the test (Babcock Laboratories) initially performed the wrong test (EPA 8082) on a portion of the sample. Neither FGL Laboratories nor Babcock Laboratories believe that this delay affected the outcome of the test. Also, no organo-pesticides were detected in the previous Port San Luis Harbor District's sediments collected and tested in 2003 or 2009. Non-polar and total oil and grease were tested using the EPA method 9071B recommended for sediments and solids that measures all oil and grease including that occurring naturally in animal and plant tissues; non-polar and total oil and grease were detected. Based on the 2013 results, the sediments should be compatible for excavation and placement, and contaminant's levels should represent minimal threat to the marine benthic environment. The Eelgrass Mitigation And Monitoring Plan In Support Of The Port San Luis Breakwater Repairs, Port San Luis, San Luis Obispo County, California (March 2021), performed by Corps contractor Merkel and Associates [Appendix B of Draft EA] included sampling and test results of 12 grab surface grab samples taken during the April-May 2020 eelgrass surveys. The results, when coupled with all other factors of littoral sediment source, lack of contaminant sources in the area, a general knowledge of the driver of accumulation being the breakwater, and the planned immediate area reuse, support a Tier 1.

e. Aquatic Ecosystem and Organism Determinations (use evaluation and testing procedures in Subpart G, as appropriate).

(1) Plankton, Benthos and Nekton

Stone placement, sediment excavation and placement operations would result in short-term turbidity impacts that would affect plankton in the area. Organisms could stifle in the immediate vicinity as these small organisms are impacted by turbidity. However, these effects would be small in both area and time and the plankton would be expected to recover quickly once excavation and placement is completed. Benthic organisms would be crushed, buried, smothered, and/or displaced by sediment excavation and placement activities, but the areas would be minor in comparision to total benthic habitat available in San Luis Obispo Bay (project area would be less than 1% of benthic habitat) and would recolonize and re-establish productivity rates within one to five years. Larger organisms in the nekton would be expected to avoid placement operations and would not be impacted.

(2) Food Web

Impacts to the bottom of the food chain (plankton and nekton) due to stone placement, sediment excavation and sediment placement would be short term and occur in a small area. Recovery would be quick once excavation and placement operations are concluded.

(3) Special Aquatic Sites

The estimated direct impact to Pacific eelgrass (*Zostera pacifica*) due to shoal excavation is 1.8 acres. The estimated worst case potential direct and indirect impacts to Pacific eelgrass due to shoal excavation and breakwater repair construction activities within the entire work area is 4.39 acres. The estimated impact to surfgrass due to breakwater repair activities within the entire project area ranges from no impact (0 $m^2$) to 31 $m^2$. The Corps has a fully developed eelgrass and surfgrass mitigation plan to address minimization measures to reduce eelgrass and surfgrass impacts and to mitigate the anticipated impacts to eelgrass in accordance with the California Eelgrass Mitigation Policy (CEMP) at a 1.2:1 mitigation ratio. Pacific eelgrass is a woody, more robust, slower growing species than the common eelgrass, *Zostera marina,* found in harbors and marinas along the California coast. Due to the slower growth rates of Pacific eelgrass it is anticipated in combination with the mitigation efforts the ecosystem functions of the impacted Pacific eelgrass habitat would recover in five years (Keith Merkel, personal communication, March 25, 2021). Restoration of the Pacific eelgrass in anticipated to commence in the optimal time for transplantation of the 2021 growing season, one year ahead of construction, to reduce temporal effects and support an adaptive management restoration plan. For a complete analysis of impacts to seagrass species present within the project area, minimization measures, and detailed plan for mitigation see Appendix B, Eelgrass Mitigation and Monitoring Plan in Support Of The Port San Luis Breakwater Repairs (Merkel & Associates Jan 2021).

No impacts to special aquatic sites are anticipated due to sediment placement activities.

(4) Threatened & Endangered Species

Federally listed species and critical habitat are present in the vicinity of the breakwater, including federally threatened Southern Sea Otter (*Enhydra lutris nereis*), federally endangered California least tern (*Sterna antillarum browni*), federally endangered black abalone (*Haliotis cracherodii*), and black abalone designated critical habitat.

**Southern Sea Otter.** It is expected that with the presence of active construction equipment and the associated noise during the stone placement, sediment excavation and sediment placement, otters will avoid the immediate work area. The proposed actions are not expected to have a consequential impact to foraging or feeding of Southern sea otters because the small footprint of the total project area accounts for only a small fraction (less than 1%) of the available foraging area within San Luis Obispo Bay and this area has not been identified or observed as an area Southern sea otters are commonly or frequently present in. With the implementation of avoidance and minimization measures, the Corps has determined the proposed project "may affect, but would not likely adversely affect" the Southern sea otter. Informal consultation pursuant to Section 7 of the Endangered Species Act will be initiated with the US Fish and Wildlife, the agency responsible for managing Southern sea otters.

**California least tern.** Based on the small impact area (less than 1% of available foraging habitat within San Luis Obispo Bay) around the active construction site during breakwater repair construction activities, the water quality monitoring (including turbidity monitoring) that would occur, and the distance between the breakwater site and nearest nesting colony, least tern foraging is not expected to be impacted by the proposed project. The Corps has determined the proposed project would have "no effect" on California least tern.

**Black Abalone and its Designated Critical Habitat.** Due to the documented observations of black abalone within the San Luis Obispo County region, and the habitat assessment's conclusion that the PSL breakwater provides suitable habitat to support juvenile and adult black abalone, the Corps has determined there is potential for black abalone to occur within the project area. Impacts to designated critical habitat for black abalone due to stone placement and shoal excavation activities would be temporary, as it is anticipated the repair areas would retain characteristics required to support black abalone once construction is complete. The Corps will implement the following avoidance and minimization measures;

- An additional black abalone survey will be conducted when adequate low tides and safe sea state conditions allow during 2021 or 2022 prior to breakwater repair construction commencing to confirm no black abalone are present.
- A qualified black abalone biologist will be on-site during construction to periodically survey the breakwater structure as new sections are repaired and core interstitial spaces are exposed to ensure no black abalone are present or are in harm's way. Approximately, one 75 – 100 ft section of breakwater will be repaired per week.

- Should black abalone be observed within the PSL breakwater repair area, work will cease in that immediate area and initiation of Section 7 consultation would be immediately initiated with the National Marine Fisheries Service.

With the implementation of the avoidance and minimization measures, the Corps has determined the proposed project "may affect but would not likely adversely affect" the black abalone and black abalone designated critical habitat. Informal consultation pursuant to Section 7 of the Endangered Species Act will be initiated with the National Marine Fisheries Service, the agency responsible for managing black abalone.

(5) Other fish and wildlife:

Birds would generally avoid the breakwater repair site, excavation site and placement site due to visual and auditory disturbances. Although placement operations could attract birds to the benthic organisms coming out of the clamshell, bucket, or storage barge/scow, as an alternate food source. Fish species are also expected to avoid the immediate areas during these activities due to auditory and turbidity disturbances.

Marine mammals are present on the breakwater and may be affected by the stone placement, excavation and placement activities that would occur immediately adjacent to this haul out area. The Corps has requested an incidental take authorization under section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, for the take of marine mammals incidental to conducting repairs of the PSL breakwater. Because the Corps activities have the potential to cause Level B Take of marine mammals, the Corps has requested an Incidental Harassment Authorization from the National Oceanic and Atmospheric Administration (NOAA) Fisheries Office of Protected Resources. Three pinniped species may be present in the affected area during breakwater repair construction. Two species of pinnipeds were observed utilizing the PSL breakwater as a consistent haul-out site when weather permitted, the California sea lion and Steller sea lion. While harbor seals were not observed hauled out on the PSL breakwater, they were observed within the vicinity of the breakwater and have the potential to transit the waters near or within the project area. For a complete analysis of impacts to the marine mammal species present within the project area see Appendix for the submitted Incidental Harassment Authorization (IHA) Application for Operations and Maintenance (O&M) Port San Luis Harbor Breakwater Repairs (February 2021).

(6) Actions to Minimize Impacts (refer to Subpart H)

Needed: X YES NO

Minimization and avoidance measures are needed to minimize impacts to marine resources, minimization and avoidance measures are noted in previous sections.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination (consider factors in section 230.11(f)(2))

Is the mixing zone for each disposal (placement) site confined to the smallest practicable zone?
__X_ YES_NO

Sediments do not require a mixing zone in order to remain in compliance with water quality standards. As such, the mixing zone is considered to be the smallest practicable.

(2) Determination of Compliance with Applicable Water Quality Standards (present the standards and rationale for compliance or non-compliance with each standard)

The project will be in compliance with state water quality standards. Excavation of and placement of clean, sandy sea bottom sediment would result in short-term elevated turbidity levels and suspended sediment concentrations, but no appreciable long-term changes in other water quality parameters, including dissolved oxygen, pH, nutrients, or chemical contaminants. Factors considered in this assessment include the relatively localized nature of the expected turbidity plumes for the majority of the disposal/placement period and rapid diluting capacity of the receiving environment. Water quality monitoring would be required during sediment excavation and sediment placement activities. If monitoring indicates that suspended particulate concentrations outside the zone of initial dilution exceeds permissible limits, placement operations would be modified to reduce turbidity to permissible levels. Therefore, impacts to water quality from placement of sediment at the receiver site would not violate water quality objectives or compromise beneficial uses listed in the Basin Plan. USACE will continue to coordinate with the Central Coast Regional Water Quality Control Board during construction to minimize impacts to water quality.

(3) Potential Effects on Human Use Characteristic

a) Municipal and Private Water Supply (refer to section 230.50)

There are no municipal or private water supply resources (i.e. aquifers, pipelines) in the project area. The project would have no effect on municipal or private water supplies or water conservation.

b) Recreational and Commercial Fisheries (refer to section 230.51)

The breakwater repair area, sediment excavation and placement areas are not subject to commercial fishing. Recreational fishing would move to avoid the breakwater repair area, sediment excavation and placement activities and to allow fish out of these areas.

c) Water Related Recreation (refer to section 230.52)

Construction equipment would be required to maintain ocean access outside of the immediate, designated construction limits for all uses. During the project, proper advanced notice to mariners would occur and navigational traffic would not be allowed within the project area. The displacement of recreational boating and kayaking would be temporary and short-term. The currents are not expected to change in magnitude or direction. Therefore, stone placement, sediment excavation and placement activities are not expected to measurably change currents or change surfing in any discernible way. To minimize navigation impacts and threats to vessel safety, all barges, scows and tugboats would be equipped with markings and lightings in accordance with the U.S. Coast Guard regulations. The location and schedule of the work would be published in the U.S. Coast Guard Local Notice to Mariners.

d) Aesthetics (refer to section 230.53)

Minor, short term effects during stone placement, sediment excavation and placement activities are anticipated. During stone placement, sediment excavation and placement activities, the visual character of the site would be affected by the dredge/crane barge and tugboats; however, these activties are temporary in duration, and as such, would not result in permanent effects to the visual character of the site.

e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves (refer to section 230.54)

The discharge of dredged and fill material into waters of the US associated with the Proposed Action would not have any effect on national and historic monuments, national seashores, wild and scenic rivers, wilderness areas or research sites.

f) Determination of Cumulative Effects on the Aquatic Ecosystem (consider requirements in section 230.11(g))

No other past, present or reasonably foreseeable future projects are ongoing or anticipated within the Proposed Action's area of potential effects that would result in residual or additional cumulative effects to the aquatic ecosystem.

g) Determination of Secondary Effects on the Aquatic Ecosystem (consider requirements in section 230.11(h))

Secondary effects of the discharge of sediment within the excavation site and at the placement site would be negligible. Areas outside the direct impact areas would have only negligible turbidity effects to marine resources, with the exception of eelgrass immediately adjacent to the excavation template which may suffer some losses due to turbidity. Water quality monitoring conducted during excavation and placement activities will ensure turbidity is controlled and confined to the immediate area, minimizing secondary effects to marine resources within the vicinity.

Secondary effects from breakwater repair could include minor loss of eelgrass associated with shading from barges, anchoring and maneuvering within adjacent eelgrass beds. These effects would be minimized through implementation of controls on work limits and methodologies. Post-construction eelgrass surveys would document any losses to eelgrass beds and ensure that the restoration provided by the eelgrass mitigation plan are sufficient to offset those impacts.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(l) Guidelines to this Evaluation

No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem:

Alternative placement sites would have similar impacts on the Aquatic Ecosystem as the proposed placement site. Alternative sites were not considered practicable alternatives due to the increased cost the project would incur to place sediments at sites further distances from the Port San Luis Harbor breakwater given the limited operations and maintenance funding available. Alternative sites would also not provide the opportunity to support creation of the eelgrass mitigation site, which has specific location requirements based on parameters such as depth and limited wave action.

Impacts of the No Action alternative have been evaluated in the EA, but this would not meet the project's purpose and need. In the absence of breakwater repair, the breakwater would become increasingly susceptible to erosion and structural failure, which would jeopardize safety. Continued disrepair of the structure would eventually require emergency work to avoid public safety hazards, and/or closure of the harbor. Additional damages would also incur additional costs to restore the breakwater with emergency repairs.

c. Compliance with Applicable State Water Quality Standards.

The proposed project meets State of California water quality standards.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act.

No toxic materials/wastes are expected to be produced or introduced into the environment by proposed discharges of dredged or fill material into waters of the US.

e. Compliance with Endangered Species Act of 1973.

As discussed above, the Corps has determined that the proposed discharges of dredged or fill material into waters of the US will not have an adverse effect on any species Federally-listed as threatened or endangered nor on designated critical habitat. Informal consultation will occur with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to obtain their concurrence with the Corps' determination that the proposed project may affect but would not likely adversely affect Southern Sea Otters, Black Abalone and Black Abalone critical habitat.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972.

No sanctuaries as designated by the Marine Protection, Research and Sanctuaries Act of 1972 will be affected by proposed discharges of dredged or fill material into waters of the US.

g. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects on Human Health and Welfare

(a) Municipal and Private Water Supplies

Placement activities will have no effect on municipal and private water supplies.

(b) Recreational and Commercial Fisheries

The proposed project would have minor, short-term impacts, but no significant adverse effects on recreational fisheries. The project area is not subject to commercial fishing. Recreational fishing would move to avoid the project area and to allow fish out of these areas. To minimize navigation impacts and threats to vessel safety, all barges, scows and tug vessels would be equipped with markings and lightings in accordance with the U.S. Coast Guard regulations. The location and schedule of the work would be published in the U.S. Coast Guard Local Notice to Mariners.

(c) Plankton

Placement operations would result in short-term turbidity impacts that would affect plankton in the area. Organisms could stifle in the immediate vicinity as these small organisms are impacted by turbidity. However, these effects would be small in both area and time and the plankton would be expected to recover quickly once placement is completed.

(d) Fish

Larger organisms in the nekton would be expected to avoid excavation, placement operations, and rock placement operations, and would not be impacted.

(e) Shellfish

Benthic organisms, including shellfish, would be buried by excavation and sediment/rock placement activities, but the areas would be minor in area and recolonization would begin once placement activities are complete, re-establishing productivity rates within one to five years.

(f) Wildlife

Birds would generally avoid the placement site, although placement activities could attract birds to the benthic organisms coming out of the clamshell, bucket, barge/scow, as an alternate food source. Marine mammals would avoid the excavation and sediment/rock placement activities, see Appendix B of EA for full analysis of impacts to marine mammals.

(g) Special Aquatic Sites

The estimated direct impact to Pacific eelgrass (*Zostera pacifica*) due to shoal excavation is 1.8 acres. The estimated worst case potential direct and indirect impacts to Pacific eelgrass due to shoal excavation and breakwater repair construction activities within the entire work area is 4.39 acres. The estimated impact to surfgrass due to breakwater repair activities within the entire project area ranges from no impact (0 $m^2$) to 31 $m^2$. The Corps has a fully developed eelgrass and surfgrass mitigation plan to address minimization measures to reduce eelgrass and surfgrass impacts and to mitigate the anticipated impacts to eelgrass in accordance with the California Eelgrass Mitigation Policy (CEMP) at a 1.2:1 mitigation ratio. Pacific eelgrass is a woody, more robust, slower growing species than the common eelgrass, *Zostera marina,* found in harbors and marinas along the California coast. Due to the slower growth rates of Pacific eelgrass it is anticipated in combination with the mitigation efforts the ecosystem functions of the impacted Pacific eelgrass habitat would recover in five years (Keith Merkel, personal communication, March 25, 2021). Restoration of the Pacific eelgrass in anticipated to commence in the optimal time for transplantation of the 2021 growing season, one year ahead of construction, to reduce temporal effects and support an adaptive management restoration plan. For a complete analysis of impacts to seagrass species present within the project area, minimization measures, and detailed plan for mitigation see Appendix B, Eelgrass Mitigation and Monitoring Plan in Support Of The Port San Luis Breakwater Repairs (Merkel & Associates Jan 2021).

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems: Any adverse effects would be short-term and insignificant. Refer to 4.2 in the EA.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity and Stability: Any adverse effects would be short-term and less than significant. Refer to Sections 4.2 of the EA.

(4) Significant Adverse Effects on Recreational, Aesthetic, and Economic Values: Any adverse effects would be short-term and less than significant. Refer to sections 4.5 and 4.6 of the EA.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

   Specific environmental commitments are outlined in the analysis above and in the attached EA. All appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharges on the aquatic ecosystem.

i. On the Basis of the Guidelines, the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material (specify which) is:

**The final 404(b)(1) evaluation and Findings of Compliance will be included with the final EA.**

Prepared by: __Kirk Brus ___________ Date: ______27 MARCH 2021_______

# APPENDIX B

Biological Resources

**DEPARTMENT OF THE ARMY**
**U.S. ARMY CORPS OF ENGINEERS, LOS ANGELES DISTRICT**
**915 WILSHIRE BOULEVARD, SUITE 930**
**LOS ANGELES, CALIFORNIA 90017-3489**

March 13, 2020

Jolie Harrison
Division Chief,
Permits and Conservation Division
Office of Protected Resources
1315 East-West Highway, F/PR1 Room 13805
Silver Spring, Maryland 20910

Dear Ms. Harrison:

Please find the attached request for an incidental take authorization under section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, for the take of marine mammals incidental to conducting breakwater repairs by the U.S. Army Corps of Engineers, Los Angeles District.

The U.S. Army Corps of Engineers plans to conduct breakwater repairs in Port San Luis, San Luis Obispo County, CA from April 2021-November 2021. Because the USACE activities have the potential to cause Level B Take of marine mammals, we are requesting an Incidental Harassment Authorization.

We look forward to working with you and your staff to answer any questions you may have about this application. Please feel free to contact Mrs. Natalie Martinez-Takeshita at 213-452-3306 or via email at Natalie.M.Martinez-Takeshita@usace.army.mil with additional questions.

Sincerely,

Eduardo T. De Mesa
Chief, Planning Division

**US Army Corps of Engineers**

**INCIDENTAL HARASSMENT AUTHORIZATION (IHA) APPLICATION FOR**

**OPERATIONS AND MAINTENANCE (O&M)**
**PORT SAN LUIS HARBOR BREAKWATER REPAIRS**

**SAN LUIS OBISPO COUNTY, CALIFORNIA**


**Submitted by:**
**U.S. Army Corps of Engineers**
**South Pacific Division**
**Los Angeles District**
**915 Wilshire Blvd.**
**Los Angeles, California 90017**


**Submitted to:**

**National Oceanic and Atmospheric Administration (NOAA) Fisheries**
**Permits and Conservation Division, Office of Protected Resources**
**1315 East-West Highway, F/PR1 Room 13805**
**Silver Spring, MD 20910**

**February 2021**

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Incidental Harassment Authorization Application Sections



## APPENDIX

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## *I.* Description of Specified Activity: *A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.*

The Los Angeles District (LAD) of the U.S. Army Corps of Engineers (Corps), as part of its Operations and Maintenance (O&M) program, is proposing to perform O&M repairs to the Port San Luis Breakwater, Port San Luis Harbor, San Luis Obispo County, to maintain the breakwater's integrity. Port San Luis Harbor is located within San Luis Obispo Bay. The proposed project would perform O&M repair on the breakwater by resetting and replacing stone along the approximately 2,400 foot long and 20 foot wide breakwater. O&M repair work would focus on the most heavily damaged 1,420 feet of the structure located on the distal end between Stations 4+00 and 18+20 (Figure 4). O&M repair work would be conducted from the leeward side of the breakwater, due to the nature of the repairs and safety constraints due to adverse open ocean sea state conditions on the seaward side of the breakwater. The footprint of the breakwater would not be changed, but the crest elevation would be raised from +13 feet Mean Lower Low Water (MLLW) to +16 feet MLLW as a consequence of the armor stone size required for hydraulic stability and the breakwater prism. It is estimated that approximately 29,000 tons of existing stone would need to be reset, and 60,000 tons of new stone (individual stone sizes range from 5 to 20 tons) would be placed to restore the most heavily damaged portion of the breakwater to its original design. Repair work elevation changes could potentially extent to the seabed to ensure a stable slope is maintained ensuring structure stability. Repair work construction activities would be limited to day light hours (approximately 11 hours a day). Minor excavation of shoaled sediment (approximately 15,000 cubic yards) adjacent to the leeward side of the breakwater would be necessary to create adequate depths for barges and other vessels to access the breakwater for the O&M repair. The excavated material will be relocated approximately 1,000 feet north of the breakwater to minimize additional impacts to the existing eelgrass bed in the lee of the breakwater. The excavated and relocated sediment will be utilized to create an engineered eelgrass mitigation site in shallow waters. Mitigation to minimize resuspension and movement of these relocated sediments will minimize disturbance to marine mammals and their prey. Excavation of shoaled sediment could potentially occur during day and night hours (approximately 22 hours a day). In the event of adverse weather, the contractor will relocate the equipment from the lee of the breakwater and seek shelter, mooring within the established Port San Luis Harbor District designated anchorage or within Morro Bay Harbor. The proposed project is required to protect Port San Luis Harbor and maintain safe navigability within the port.

Construction would be sea-based, conducted by a crane-equipped barge (1), barges carrying rock (2), tug boats (3), and small craft support vessels (3), possibly a clamshell dredge (1), and possibly a scow (1); quantities of equipment are worst case estimates and may differ slightly depending on the individual contractor awarded the construction contract. The first phase of construction will be the excavation of shoaled sediment adjacent to the breakwater to allow for access of the equipment required to repair the breakwater. The excavation of shoaled sediment will require a crane-equipped barge (possibly the same crane-equipped barge utilized for the repair work) or a clamshell dredge, possibly a scow, tugboats, and small craft support vessels. While it is anticipated the excavation of the entire shoaled area requiring excavation by the contractor for repair equipment access will take place prior to the repair rock work commencing, additional excavation throughout the duration of the construction may be required to maintain adequate working depths if unforeseen shoaling of the excavated area occurs. The second phase of construction will consist of the repair work to the breakwater structure, requiring a crane-equipped barge, barges carrying rock, tugboats, and small craft support vessels. Repair work will consist of resetting of existing stone and placement of new stone on the breakwater structure. Dropping of armor stone is not permitted, but it should be expected that some stones may be accidentally dropped during placement. Stones would be carefully placed and interlocked with existing stones to maximize stability and minimize the intensity of sound due to stone placement. The crane-equipped barge and attached storage barge will pull approximately a couple hundred feet away from the breakwater at the end of the work day for overnight mooring for safety purposes and pull back into working position in the morning, unless adverse weather is expected. Construction activities are expected to take no more than 174 work days.

The following is a description of each type of equipment and how it will be utilized.
**Crane-equipped Barge(s).** The crane-equipped barge (estimated to be as large as 260 ft by 80 ft) is a barge with an attached crane that will be utilized for the breakwater repair work (Figure 8) and may be utilized for the excavation of shoaled sediment. Should the crane-equipped barge be utilized for the excavation of shoaled sediment the crane will be outfitted with a clamshell bucket. The contractor may opt to utilize a separate clamshell dredge (a crane-equipped barge outfitted with a clamshell bucket, estimated to be approximately 120 ft by 60 ft) to excavate the shoaled sediment. During excavation the clamshell bucket will be lowered by the crane operator to the sea floor to excavate sediment. The crane will place material on an adjacent storage barge or into a scow for placement at a designated placement site within the vicinity. During breakwater repair construction a barge with an attached crane will be outfitted with lifting tongs to reset existing stone and retrieve stones from an adjacent storage barge tied up to the crane-equipped barge, and then place those stones on damaged sections of the jetties. A boat operator in a skiff, and spotter on the jetty, would direct the operation of the crane in order to pick and place the stones. The picked stone must be able to match the dimensions of the voids along the jetty. Approximately 30 to 35 stones can be picked and placed per day using this vessel (Roughly three to four stones per hour on average). On average the crane-equipped barge and attached storage barge would move once a week along the breakwater, approximately repairing 75-100 ft linear feet per week. The movement of the barges along the breakwater would take approximately 30 minutes to 6 hours dependent on whether the main anchors require resetting. The crane-equipped barge and attached storage barge will pull approximately a couple hundred feet away from the breakwater at the end of the work day for overnight mooring for safety purposes and pull back into working position in the morning, unless adverse weather is expected. The movement of the barges at night to pull away from the breakwater will not require the main anchors to be reset, taking approximately 30 minutes.

**Support Vessels.** Self-propelled vessels that serve as tenders, tugs, and spotting craft. The main purpose of a support vessel is to assist the crane operator as well as to ferry equipment and crew back and forth from the shore, jetties, staging areas, and the crane and storage barges. On average every two to three weeks new stone will be brought to the site on a storage barge to be exchanged with the empty storage barge; when this occurs the maximum anticipated number of support vessels on site is six. During the majority of the construction duration the daily norm would be two support vessels on site, one skiff and one tug. The complement of these vessels is usually just one operator unless ferrying other crew.

**Storage/Rock Barge.** Another floating barge which serves as the stockpile of stone for repair work will be utilized. This barge is typically towed in from an offsite quarry location (likely Pebbly Beach Quarry on Santa Catalina Island) and is then tied up to the crane-equipped barge. The complement of this vessel is usually a spotter/oiler who works with the crane operator to select stones. The rock barge is expected to carry approximately 2,000 to 4,000 tons of stone per trip. On average every two to three weeks new stone will be brought on a storage barge to be exchanged with the existing empty storage barge, the exchange of storage barges will take approximately two to three hours each time. The unused/awaiting barges will be stored within a designated existing mooring within the established Port San Luis Harbor District designated anchorage or within Morro Bay Harbor.

The Corps is seeking an IHA for the O&M Port San Luis (PSL) Breakwater Repair project, components of the project may result in Level B harassment take of pinnipeds that are hauled-out on the breakwater structure or in the water nearby. Level B harassment may also occur due to visual disturbance during the excavation of shoaled sediment adjacent to the breakwater and in transit to the mitigation area. Level B harassment will likely occur due to visual and auditory disturbances during the repair work of the breakwater that will consist of resetting existing stone and setting new stone.

On 25 Feb 2019 a team of researchers from the U.S. Army Corps of Engineers Los Angeles District and Engineer Research and Development Center traveled to the Breakwater Repair Project at the Port of Long Beach, CA to collect representative sound files. Maintenance activities on the Long Beach, CA breakwater provided near identical conditions to the proposed work activities of the PSL breakwater repair. The sound files were collected based on guidance documents set in NMFS 2011 a/b and NOAA OPR-55. The sound files were analyzed to determine whether the anthropogenic noise exceeded the thresholds for underwater acoustic activities set by the National Oceanic and Atmospheric Administration. On 27 Feb 2019 ambient sound files were collected at San Luis Obispo, CA near the breakwater to be used as a baseline measurement for proposed repair work. The complete hydroacoustic and acoustic summary report can be found in the appendix.

Table 1. Hydroacoustic Data from LS-1 Recorder during Rock Resetting at the USACE 2019 O&M Port of Los Angeles and Port of Long Beach Breakwater Repair Project analyzed for a 60 second window.

| | Low F. | Mid F. | High F. | Pinniped F. | Otariddae F. |
|---|---|---|---|---|---|
| Weighted Broadband Source Levels (dB re 1 μPa/m) | 132.09 | 122.57 | 119.67 | 129.53 | 129.63 |
| Unweighted Broadband RMS source level (dB re 1 μPa/m) at 100% of energy | 140.35 | | | | |

Table 2. Hydroacoustic Data from Snap recorder for ambient noise in Port San Luis, CA.

| | Low F. | Mid F. | High F. | Pinniped F. | Otariddae F. |
|---|---|---|---|---|---|
| Weighted Broadband Source Levels (dB re 1 µPa/m) | 107.39 | 94.13 | 91.90 | 100.98 | 100.98 |
| Unweighted Broadband RMS source level (dB re 1 µPa/m) | 131.55 | | | | |

Table 3. Acoustic Data from Galaxy CM-170 Sound Pressure Meter (dB Peak).

| | Port of Long Beach, CA | Port San Luis, CA |
|---|---|---|
| Maximum decibels during Crane Operation | 82.9* | n/a |
| Average decibels over 8-minute recording | 66.7* | 62.6** |

*Data was recorded at a 30-meter standoff from the crane during construction activities.

**The average ambient noise level from the breakwater at Port San Luis was due to heavy wave action on the breakwater structure.

## *II.* Dates, Duration, and Specified Geographic Region: *The date(s) and duration of such activity and the specified geographical region where it will occur.*

Port San Luis is located on the central California Coast, approximately midway between Los Angeles and San Francisco, in San Luis Obispo County (Figures 1 & 2). Breakwater repairs are tentatively scheduled to occur from April 2022 to October 2022, thus the Corps requests the IHA issuance by May 2021 in order to secure contracts and IHA effective dates to be April 1, 2022 to March 31, 2023. O&M PSL breakwater proposed repair schedule is time dependent on weather conditions, equipment availability, working performance of the equipment, contractual commitments, and availability of funds. Due to the location of the PSL breakwater, the contractor would be fully or partially exposed to open ocean wave conditions. Adverse wave and inclement winter weather conditions at PSL preclude safe working conditions during the months of November to March when PSL experiences consistently high and/or rough sea conditions. Therefore, the work season *generally* extends from April through October, with extensions, contractions, and additional work windows outside of the summer season varying by weather patterns.

The breakwater structure is an approximately 2,400-foot long large armor stone revetment that extends from the rocky headlands of Point San Luis towards the southeast. The breakwater has approximately 2,700 feet (ft) of shoreline on each side of the breakwater due to bulges in the shoreline along the breakwater resulting from native terraces of Point San Luis and Whaler's Island that are integrated into the breakwater. Water depths along the leeward and seaward interfaces of the seafloor and the PSL breakwater structure range from approximately 0 ft MLLW to -40 ft MLLW, reaching the deepest depths at the head of the breakwater. Water depths within 1,000 feet of the immediate area surrounding the leeward and seaward sides of the PSL breakwater range from 0 ft MLLW to -50 ft MLLW. Water depths are deepest at the centerline of the head section of the structure dropping off into deeper waters, reaching -50 ft MLLW approximately 350 ft from the terminal end of the head section.

The following is summary excerpt from the May 2019 Biological Investigations of the Port San Luis Breakwater Report and January 2021 PSL Eelgrass Mitigation and Monitoring Plan (Merkel & Associates 2019 & 2021). On the leeward east facing portion of the breakwater extending out to sea from Whaler's Rock the rock structure is similar to that on the seaward side but is less impacted by wave energy. As a result, the breakwater supports a differing algal and invertebrate community with a more restricted tidal zone at the upper margins of the rock due to reduced wave, swell, and spray influence. In February 2019, eelgrass (*Zostera pacifica*) was mapped as a continuous bed extending for approximately half a mile along the protected shore in the lee of the breakwater. The bed extends southeasterly along the breakwater out to just short of Station 12+00 (Figure 10). Along the shoreline the bed extends past Smith Island where the bed diminishes. Torrey's surfgrass (*Phyllospadix torreyi*) was found to occur extensively on the native bedrock of Point San Luis and Whaler's Island, and to a much lesser degree on the low-lying boulder rock on the leeward side of the breakwater (Figure 10). Although *P. torreyi* was specifically observed, Scouler's surfgrass (*P. scouleri*) is also present in the area with records existing from Diablo Canyon and Pismo Beach, and it would not be unexpected for both species to be represented in the study area. On the seaward side of the breakwater, surfgrass is found only within the partially sheltered areas near Point San Luis. On the lee side of the breakwater, surfgrass was most abundant on small areas of bedrock outcrops extending above the sand or adjacent to the breakwater boulder. However, surfgrass was also found on the lower intertidal imported boulder rubble that extended outward from the breakwater. The canopy kelp in Port San Luis is dominated by giant kelp (*Macrocystis pyrifera*) which is present within scattered beds on rocky bottom habitats within Port San Luis. Historically, beds have been found both inside the breakwater protection and outside of the breakwater. Over at least the past couple of years during which time surveys have been completed for the breakwater repairs project, little to no kelp has been noted outside of the breakwater within the project study area (Figure 10). In June-July 2018 no kelp was noted on the breakwater. Additional kelp surveys were conducted in January-February 2019 and kelp was not noted at this time. Because of the absence of kelp in 2018 and the absence of kelp in winter 2019, a kelp frequency analysis was undertaken to identify how often kelp occurred in the project area and along the breakwater using data from CDFW kelp canopy surveys. This analyses revealed kelp at a low frequency of occurrence (14 percent of the surveys) with presence of narrow fringes of kelp being observed, principally on the lee of the breakwater. The distribution showed kelp at the tip of the breakwater and, erroneously, on intertidal and very shallow subtidal rock not suited to supporting giant kelp or bull kelp (*Nereocystis luetkeana*). Rather it is believed that the CDFW mapping likely included the understory feather boa kelp (*Egregia menzieii*) that is present in these areas. In spring 2020, kelp was more expansive in the project study area, but canopy kelp remained absent from the inside margin of the breakwater. A small amount of kelp canopy was present in small stands near the toe of the outer portions of the breakwater and was fairly extensive in the harbor (Figure 10). Based on the frequency distribution analyses of CDFW data and observations from 2018-2020, canopy kelp is not believed to be a significant habitat resource within the work area.

Table 4. Breakwater Repair Area Stationing Coordinates.

| Breakwater Repair Stationing | Latitude | Longitude |
|---|---|---|
| Station 4+00 | 35° 09' 30.96" N | 120° 45' 12.39" W |
| Station 18 +00 | 35° 09' 21.43" N | 120° 44' 59.06" W |

Table 5. Tentative Construction Schedule.

| Construction Activity | Duration (days)* | Frequency (hours/day) | Dates (2022) |
|---|---|---|---|
| Excavation of Shoaled Sediment | 6 to 18 | 11 to 22 | April |
| Breakwater Repair | 156 | 11 | April - October |

*Assumes a 6 day work week.

***III.*** **Species and Numbers of Marine Mammals:** *The species and numbers of marine mammals likely to be found within the activity area.*

Breakwater repair activities will be limited to the immediate area surrounding the PSL breakwater (extending approximately 300 feet into the leeward waters immediately adjacent to the breakwater) and the eelgrass mitigation area. Three pinniped species (seals and sea lions) may be present in the area impacted by the construction. Table 6 summarizes the population status and abundance of each of these species.

Other marine mammal species that have the potential to occur within the waters surrounding San Luis Obispo County are the: Guadalupe fur seal (*Arctocephalus townsendi*), Northern elephant seal (*Mirounga angustirostris*), Humpback whale (*Megaptera novaeangliae*), Blue whale (*Balaenoptera musculus*), Fin whale (*Balaenoptera physalus*), Killer whale (*Orcinus orca*), Eastern North Pacific Gray whale (*Eschrichtius robustus*), Pacific whitesided dolphin (*Lagenorhynchus obliquidens*), Risso's dolphin (*Grampus griseus*), Northern right whale dolphin (*Lissodelphis borealis*), Long-beaked common dolphin (*Delphinus capensis*), Short-beaked common dolphin (*Delphinus delphis*), Dall's porpoise (*Phocoenoides dalli*), and Bottlenose dolphin (*Tursiops truncatus*). Occurrences within the vicinity of the project area of the species listed above are considered uncommon and would be not be expected in the limited project area within the lee of the breakwater. Generally, these species would be observed seaward of the breakwater and within the open waters of Port San Luis Bay and at a distance from the work area where thresholds for the onset of temporary threshold shifts in marine mammal hearing would not be triggered. The above listed species do not have the potential to be harassed thus the Corps is not requesting take for these species and the species have been excluded from subsequent analysis and will not be considered further in this application.

The federally threatened Southern sea otter (*Enhydra lutris nereis*) has the potential to infrequently occur within the project area. Infrequent occurrences, more transient in nature have been observed of solitary individuals within the vicinity of the project area. One mile east of the project area within Port San Luis Bay, in the kelp beds a raft(s) of Southern sea otters were consistently observed during marine mammal surveys conducted in 2018 and monthly throughout 2019. An on-site marine mammal monitor will implement a shutdown of work should any Southern sea otters be observed within an area that would pose risk to the animal. Pursuant to Section 7 of the Endangered Species Act the Corps will initiate informal consultation for the Southern sea otter with the US Fish and Wildlife, the agency responsible for managing Southern sea otters.

Table 6. Marine Mammal Stock Assessment.

| Species | Stock | ESA Status | MMPA Status | Stock Abundance ($N^{MIN}$) | PBR | Annual M/SI |
|---|---|---|---|---|---|---|
| California Sea Lion (*Zalophus californianus*)[1] | U.S. | Not Listed | Non-depleted | 257,606 | 14,011 | ≥321 |
| Steller Sea Lion (*Eumetopias jubatus*)[2] | Eastern U.S. | Delisted (2013) | Non-strategic | 43,201 | 2,592 | 112 |
| Harbor Seal (*Phoca vitulina richardii*)[3] | California | Not Listed | Non-depleted | 27,348 | 1,641 | 42.8 |

[1] NMFS Marine Mammal Stock Assessment Report: CA Sea Lion, revised 3/18/2019
[2] NMFS Marine Mammal Stock Assessment Report: Steller Sea Lion, revised 12/30/2019
[3] NMFS Marine Mammal Stock Assessment Report: Harbor Seal, revised 7/31/2015

## *IV.* Affected Species Status and Distribution: *A description of the status and distribution, including seasonal distribution (when applicable), of the affected species or stocks of marine mammals likely to be affected by such activities.*

The following three pinniped species may be present in the affected area during breakwater repair construction. Two species of pinnipeds were observed utilizing the PSL breakwater as a consistent haul-out site when weather permitted, the California sea lion and Steller sea lion. PSL abundance estimates reported below are from monthly marine mammal surveys conducted by the US Army Corps of Engineers Biologist in 2019, survey efforts on average were two hours per survey event (Table 8).

Surveys conducted by the Corps Biologist and Merkel and Associates (M&A) (see appendix for M&A Biological Marine Mammals Survey Report) between 2018 and 2019 observed the general distribution of marine mammals along the PSL breakwater is influenced by direct wave energy against exposed breakwater segments. An offshore rock formation on the seaward side of the breakwater's southern end absorbs direct wave energy and reduces the intensity of waves reaching the breakwater. This allows for manageable haul out locations on both the seaward and leeward sides of the breakwater in proximity to this rock. As Figure 5 shows, the most densely populated haul out areas for California sea lions and Steller sea lions occur on the leeward side of the south eastern end of the breakwater and spread around the revetment stone to the protected segment of the seaward side of the breakwater. Pinniped density increased at the south eastern end of the breakwater, reaching highest densities at the head section of the breakwater. The head section will refer to station 17+00 to 18+20 for the purposes of this document. Pinniped haul out utilization of the breakwater extended from station 9+00 to 18+20 of the breakwater. Pinniped density remained consistently concentrated at the head section, with over half of the pinnipeds present on any given survey occupying the south eastern end of the breakwater. Decreased pinniped density was documented as one moved away from the head section towards station 9+00. Breakwater repair construction would be sequenced to commence at the farthest station (station 4+00) from the head section of the breakwater, work would progress slowly (approximately 75-100 feet per week), thus at times work would be 1,000 feet from the head section of the breakwater most commonly utilized by the pinnipeds. As the breakwater repair work progresses the barges will move slowly along the breakwater towards the head section, at times overlapping with the sections of the breakwater utilized as a haul-out by both pinniped species, resulting in the displacement of pinnipeds from these sections while work is being conducted. Therefore, it is anticipated that pinnipeds may not be impacted throughout the entire duration of the construction period as animals become habituated to the presence and noise of the barges and vessels.

California Sea Lion (*Zalophus californianus*)

California sea lions (CSL) range along the west coast of North America from British Columbia to Baja California and throughout the Gulf of California. Breeding occurs on islands along the coast of western Baja California, Gulf of California, and southern California (Channel Islands) (Barlow et al. 1995). Pupping season in Southern California is generally recognized as May through August, although some pupping has been observed outside of these months. There are three recognized CSL stocks (U.S. stock, Western Baja stock, and the Gulf of California stock) with the U.S. stock ranging from the U.S./Mexico border into Canada. CSLs in the U.S. are not listed as "endangered" or "threatened" under the Endangered Species Act or as "depleted" under the MMPA. The stock is estimated to be approximately 40% above its maximum net productivity level (MNPL = 183,481 animals), and is considered within the range of its optimum sustainable population (OSP) size (Laake *et al*. 2018).

El Niño events are known to negatively influence pup production, although pup counts have generally increased since the mid-1970s (NOAA 2014). Current contributors of CSL mortality include gill netting, trawl fisheries and related entanglement. Other mortality threats include boat and car collisions, shootings, entanglement and ingestion of marine debris, toxic algal blooms, predation control, and entrainment in power plants (NOAA 2014). Increasing sea-surface temperatures in the California Current negatively impact prey species availability and reduce survival rates of CSLs (DeLong *et al*. 2017, Laake *et al*. 2018, Lowry *et al*. 1991, Melin *et al*. 2008, 2010). Thus, increasing ocean temperatures may continue to limit the population size of the CSL stock within the California Current (Cavole *et al*. 2016, DeLong *et al*. 2017, Laake *et al*. 2018).

California sea lions are common in PSL year round where they are often hauled out on the PSL breakwater structure and within San Luis Obispo Bay on buoys and work docks (Figures 7 & 9). The general distribution of CSLs along the breakwater is influenced by direct wave energy against exposed breakwater segments. The distribution of CSLs on the breakwater is greatly influenced by the season and day to day sea state conditions. Four dead young pup carcasses were observed on the breakwater during the June 2018 survey conducted by M&A, no very young live pups were noted during either the on-water surveys or within the aerial survey photographs. During the contractor’s marine mammal surveys (Table 9) and the Corps’ monthly 2019 marine mammal surveys (Table 8) there was no observed nursing occurring by any of the CSLs in PSL and the majority of the animals in the pup-yearling size class (Table 9) were in the higher end of the size class, suggesting the smaller live pup-yearlings observed on the PSL breakwater may have been born elsewhere and not on the breakwater. It is believed based on observations that the pupping activities on the breakwater rock are not highly successful due to large voids between rocks that allow young pups to fall and become trapped inside the breakwater (per communication with M&A, see appendix). The PSL breakwater site is not as suitable of a pupping area as the natural rock formations found in the natural pupping grounds off the Channel Islands. Generally, the breakwater is utilized by CSLs beginning in April extending through December, with greater densities observed hauled out at the south eastern end of the breakwater, and the greatest densities consistently observed at the head section of the breakwater. In addition, greater densities were observed on the leeward side as opposed to the seaward side. Based on the Corps' 2019 surveys the abundance of pinnipeds on the PSL breakwater was highest June through November (Table 8). Although surveys were conducted monthly by the Corps biologist in 2019, adverse open ocean sea state conditions prevented surveys of the seaward side of the breakwater every month, but CSLs are not expected to haul out there during these high sea state conditions. For the purposes of the analyses for pinniped abundance estimates, the months with the highest abundance and where complete surveys of the leeward and seaward sides of the breakwater were conducted (June, July and September 2018) were used to be conservative. The monthly surveys by the Army Corps biologist could not distinguish between pinniped species. Therefore, pinniped species ratios were calculated from the more detailed M&A June 2018 surveys to estimate the ratio of CSLs to SSLs. This ratio was applied to other survey months to estimate the numbers of each species present at other times. Merkel & Associates June 2018 survey identified pinnipeds to species level (CSL and SSL); approximately 94% of pinnipeds hauled out on the breakwater were CSLs and 6% SSLs. This ratios of CSL:SSL were used to calculate the average abundance of CSLs and SSLs (Table 7) hauled out on the PSL breakwater from the calculated averaged abundance of pinnipeds hauled out on the PSL breakwater during the June, July, and September 2019 USACE surveys. As a result we estimate approximately 302 individual CSLs per day are on the breakwater. Age class and sex classifications from the M&A June 2018 survey are summarized in Table 9.

Due to adverse wave and inclement winter weather conditions at PSL it is generally not possible to safely work outside of CSL pupping season (May to August) or outside of the months the breakwater is utilized by CSLs. Therefore, breakwater repair activities will likely affect hauling out behavior, and may affect nursing behaviors due to visual and auditory disturbance. The acoustic data collected on similar breakwater repair activities did not exceed the NOAA acoustic thresholds established for the CSL (Table 3). The hydroacoustic data (Table 1) slightly exceeds the NOAA acoustic thresholds established for the CSL at 10 meters from the noise source, although it is not anticipated that CSLs would be within a minimum 20 meter radius of equipment and personnel due to the visual disturbance caused by the presence of the equipment, personnel, and construction activities.

Steller Sea Lion (*Eumetopias jubatus*)

Steller sea lions (SSL) range along the North Pacific Rim from northern Japan to central California (Loughlin et al. 1984), with regions of abundance and distribution in the Gulf of Alaska and Aleutian Islands. Individual SSLs travel extensive distances outside of the breeding season (late May to early July), likely correlating to locations of seasonally important prey resources. Based on distribution, population dynamics, and genotypic data, the species occurring in United States waters has been divided into two stocks, the eastern U.S. stock (east of Cape Suckling, AK) and the western U.S. stock (west of Cape Sucking, AK) (Loughlin 1997). The eastern stock rookeries occur in Alaska, British Columbia, Oregon, and California. Pitcher et al. (2007) documented a northward shift in the overall breeding distribution has occurred, with a contraction of the range in southern California and new rookeries established in Southeast Alaska. The Eastern U.S. stock of SSLs was delisted under the ESA in 2013 and is not considered depleted (classified as a non-strategic stock) under the MMPA. The counts of eastern SSLs have steadily increased over a 30+ year period, the Eastern U.S. stock is likely within its Optimum Sustainable Population (OSP); however, no determination of its status relative to OSP has been made (NMFS Marine Mammal Stock Assessment Report: Steller Sea Lion, revised 12/30/2016).

The Eastern U.S. stock has experienced a sustained increase throughout its breeding range. Although, in the southern end of its range (Channel Islands in southern California), it has declined considerably since the late 1930s and several rookeries and haulouts south of Año Nuevo Island have been abandoned (NMFS Marine Mammal Stock Assessment Report: Steller Sea Lion, revised 12/30/2016). Changes in the ocean environment, particularly warmer temperatures, may be factors that have favored CSLs over SSLs in the southern portion of the SSL's range (NMFS 2008). The risk of oil spills to this stock may increase in the next several decades due to increased shipping, including tanker traffic, from ports in British Columbia and possibly Washington State (COSEWIC 2013, NMFS 2013, Wiles 2014) and LNG facility and pipeline construction (COSEWIC 2013).

Steller sea lions have been observed intermittently hauling out on the PSL breakwater and work docks within San Luis Obispo Bay. Like the CSLs, the general distribution of SSLs when present along the breakwater is influenced by direct wave energy against exposed breakwater segments, the season, and day to day sea state conditions. Greater densities of SSLs were observed at the south eastern end of the breakwater (especially concentrated at the head section of the breakwater) during a June 2018 survey performed by Merkel & Associates (2019). Data has not been collected to support a fine scale analysis investigating frequencies at which SSLs are present on the PSL breakwater, however, surveys did confirm SSLs were not utilizing the breakwater as a haul-out site in the months of December, and January through April (Table 8). Based on the Corps' 2019 surveys the abundance of pinnipeds on the PSL breakwater was highest June through November (Table 8). Although surveys were conducted monthly by the Corps biologist in 2019, adverse open ocean sea state conditions prevented surveys of the seaward side of the breakwater every month, but SSLs are not likely to be hauled out during rough conditions. The pinniped species ratios calculated from the M&A June 2018 surveys were used to determine the average abundance of SSLs on the PSL breakwater; the result was approximately 19 individual SSLs per day. Age class and sex classifications from the M&A June 2018 survey are summarized in table 9. This estimate is based on peak season survey data, although, based on observational data it is believed that SSLs are not present every day, thus this is likely an over estimation of SSL abundance per day on the PSL breakwater.

Breakwater repair activities will likely affect hauling out behavior, due to visual and auditory disturbance. The acoustic data collected on similar breakwater repair activities did not exceed the NOAA acoustic thresholds established for the SSL (Table 3). The hydroacoustic data (Table 1) slightly exceeds the NOAA acoustic thresholds established for the SSL at 10 meters from the noise source, although it is not anticipated that SSLs would be within a minimum 20 meter radius of equipment and personnel due to the visual disturbance caused by the presence of the equipment, personnel, and construction activities.

Harbor Seal (*Phoca vitulina richardii*)

Harbor seals (*Phoca vitulina*) are widely distributed along coastal areas of the North Atlantic and North Pacific. Two subspecies exist in the Pacific: *P. v. stejnegeri* in the western North Pacific, near Japan, and *P. v. richardii* in the eastern North Pacific. *P. v. richardii* inhabits coastal and estuarine areas from Mexico to Alaska. While these seals do not make extensive pelagic migrations, they do travel 300-500 km to find food or suitable breeding areas (Herder 1986; Harvey and Goley 2011). In California, approximately 400-600 harbor seal haulout sites are widely distributed along the mainland and on offshore islands, including intertidal sandbars, rocky shores and beaches (Hanan 1996; Lowry *et al*. 2008). Harbor seals breed and pup throughout their range.

A review of harbor seal dynamics through 1991 concluded that their status relative to OSP could not be determined with certainty (Hanan 1996). The California stock of harbor seals are not listed as "endangered" or "threatened" under the Endangered Species Act nor designated as "depleted" under the MMPA. (NMFS Marine Mammal Stock Assessment Report: Harbor Seal, revised 7/31/2015)

Since statewide censuses were first conducted in the 1980s, population size has increased, peaking in 2004. Although, subsequent counts in 2009 and 2012 have been lower. Expanding pinniped populations in general have resulted in increased human-caused serious injury and mortality, due to shootings, entrainment in power plants, interactions with recreational hook and line fisheries, separation of mothers and pups due to human disturbance, dog bites, and vessel and vehicle strikes (Carretta et al. 2014). All west-coast harbor seals that have been tested for morbilliviruses were found to be seronegative, indicating that this disease is not endemic in the population and that this population is extremely susceptible to an epidemic of this disease (Ham-Lammé *et al*. 1999).

Harbor seals have not been observed hauling out on the PSL breakwater or work docks within the San Luis Obispo Bay. However, 2019 monthly marine mammal surveys documented harbor seals hauled out on the low lying bedrock benches of nearby Smith Island (Figure 3) from January to May and again in December. The greatest number of individuals observed on a day was 25, observed during the December 2019 survey. During the Corps' monthly 2019 surveys only one individual was observed swimming within the immediate vicinity of the breakwater, 15 feet off the head of the breakwater (March 2019 survey). Merkel & Associates (during June 2018 invertebrate surveys) observed harbor seals swimming in proximity to the breakwater in low abundance and intermittently, less than a dozen observations of likely fewer individuals. The distance between the nearest work area (station 4+00) and Smith Island is approximately

1,300 feet (Figure 3). The greatest density of harbor seals was observed on low lying bedrock benches located near Cal Poly Pier, approximately 1.5 miles from the PSL breakwater. During the 2019 surveys low numbers of individuals (no more than eight on any given survey, not clustered together in one area) were observed foraging and resting in various small patch kelp beds throughout the inner harbor, ranging from 0.5 to 1.5 miles from the breakwater.

While harbor seals were not observed hauled out on the PSL breakwater during the Corps' 2019 monthly marine mammal surveys, they were observed hauled out at the low lying rocky benches of Smith Island (approximately 1,300 feet from the nearest repair area (Station 4+00) (Table 10). The potential for the harbor seals to transit the waters near or within the project area exists. The average abundance for harbor seals within the project area (Table 7) was calculated using the Corps' monthly 2019 marine mammal survey data, for the purposes of the analysis the surveys with the highest abundances within the potential work window period were used to be conservative, note all three observation locations were included (swimming near breakwater, hauled out at Smith Island and swimming near Smith Island). The average abundance, which was approximately 10 SSLs per day, was calculated as to capture any individuals that may swim within the vicinity of the repair area during construction while transiting to and from the open sea to Smith Island. The calculated take estimates took a conservative approach, likely these take estimates are an overestimation given that harbor seals were not present throughout the year, infrequently observed swimming within the immediate vicinity of the breakwater, Smith Island is located at a distance that one would not anticipate impacts to harbor seals from the breakwater repair activities, the open lay out of Port San Luis gives harbor seals adequate area to transit in and out of PSL without requiring them to transit through the project area, and harbor seals would likely avoid the project area due to the visual disturbance of the construction associated equipment and personnel.

Breakwater repair activities are not expected to affect hauling out behavior, due to the distance from the construction activities. Auditory disturbance is also not expected due to the distances of haul out and foraging areas from the noise sources. The work footprint is confined to a small area and it is not anticipated that harbor seals would be within a minimum 20 meter radius of the crane mounted barge due to the visual disturbance caused by the presence of the equipment, personnel, and construction activities. Port San Luis is an open bay and the small work footprint would not limit the movements of harbor seals in the area or exclude/prevent them from accessing established harbor seal haul out or foraging sites.

## *V.* **Type of Incidental Taking Authorization Requested:** *The type of incidental taking authorization that is being requested (i.e., takes by harassment only; takes by harassment, injury, and/or death) and the method of incidental taking.*

In this application, the Corps requests an IHA for the take of marine mammals incidental to the proposed action, the PSL breakwater repair construction activities, effective April 1, 2022 to March 31, 2023. The term "take" as defined in Section 3 [16 U.S.C. § 1362 (13)] of the MMPA means, "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." "Harassment" was further defined in the 1994 amendments to the MMPA, which provided two levels of harassment: Level A— potential injury, and Level B— potential behavioral disruption.

Under the MMPA, NMFS has defined levels of harassment for marine mammals. Level B harassment is defined as, "Any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering." The Incidental Take Authorization requested herein is for the authorization of Level B harassment to marine mammals protected under the MMPA that are identified in Chapter 6 as a result of visual and auditory disturbances associated with the breakwater repair construction activities. Incidental take would be a temporary and localized disturbance of animals from elevated sound levels, construction and barge traffic, and visual stimulus from construction activities on the breakwater.

Therefore, the Corps requests the issuance of an IHA pursuant to Section 101(a)(5) of the MMPA for incidental take of three pinniped species listed in Section 4 by Level B harassment during the PSL breakwater repair construction activities.

## *VI.* Take Estimates for Marine Mammals: *By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in Section 5, and the number of times such takings by each type of taking are likely to occur.*

This section provides an estimate of the number of incidental takes proposed for authorization through this IHA, which will inform both NMFS' consideration of "small numbers" and the negligible impact determination. Authorized takes would be by Level B harassment, as use of the acoustic source (i.e., rock laying) and construction has the potential to result in disruption of behavioral patterns for individual marine mammals.

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

*Level B Harassment for non-explosive sources* – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.,* 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 microPascal (μPa) (root mean square (rms)) for continuous (*e.g.,* vibratory pile-driving) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, impact pile driving, or rock setting) sources.

Based on the sound source measurement study discussed above, underwater sound levels are not expected to exceed the Level B harassment acoustic thresholds underwater outside of the required 10 m shutdown zone for all construction equipment and vessels (see above).
*Airborne Acoustic Effects* - Pinnipeds that occur near the project site could be exposed to airborne sounds associated with rock setting that have the potential to cause behavioral harassment, depending on their distance from rock setting activities. Cetaceans are not expected to be exposed to airborne sounds that would result in harassment as defined under the MMPA. For in-air sounds, NMFS has established Level B harassment acoustic thresholds that harbor seals exposed above received levels of 90 dB re 20 μPa (rms) will be behaviorally harassed, and other pinnipeds will be harassed when exposed above 100 dB re 20 μPa (rms). Based on the sound source measurement study discussed above, airborne sound levels are expected to exceed the Level B harassment acoustic thresholds for a distance no-greater than 100 m for rock setting activities (Dr. Shane Guan, NMFS, personal communication).

The construction activity and movement of the barges is expected to cause visual disturbance to hauled-out pinnipeds on the breakwater, especially as the construction work moves toward the head of the breakwater where the most pinnipeds haul out. It is expected that the visual disturbance of the construction equipment and personnel will result in the take of hauled out pinnipeds within the immediate work area, based on observational data from similar construction activities pinnipeds maintained a minimum approximate 150 foot distance from construction equipment and personnel once flushed from the area (personal communication with Marine Construction Contractors and Merkel & Associates). Based on discussions with our consultant and contractors we decided it was reasonable to assume animals within 300 feet of the immediate work area would be disturbed (due to visual disturbance) and possibly flushed from the area each day. Therefore, the anticipated area of take would be 300 feet extending from each direction of the crane-equipped barge and the barge itself (approximately 100 ft), for a total of 700 feet, rather than the entire length of the breakwater daily. The repair area is approximately 1,420 feet, therefore approximately half of the repair area would be considered an area of take on any given day.

While our baseline studies discussed above indicate most pinnipeds are hauled out at the head of the breakwater and may not be disturbed during the early phases of work when the activity is focused on the base end of the breakwater, and the project is likely to occur at least partly during times of the year when less pinnipeds may be present, we conservatively request take for our estimate of daily pinniped presence during the most abundant season for all days of project work. The summary presented in Table 7 indicates the total number of calculated Level B take estimates that may result from the Proposed Action at the PSL Breakwater. Level B take request estimates for marine mammals were based on the estimated abundance of animals per day on the PSL breakwater and in waters within a 300 foot radius of the breakwater. Construction duration was estimated to be 174 days (based on a seven month construction duration and 6 day work week). It is assumed that the majority of the animals taken each day will likely be the same individuals taken throughout the duration of the construction period, thus the take estimate is reflecting a high frequency of takes of a smaller number of individuals (Estimated Density in Table 7) taken multiple times throughout the duration of the construction period.

The calculated Level B take estimates that may result from the Proposed Action at the PSL Breakwater in Table 7 are conservative take estimates and reflect a worst case scenario of take, assuming that every animal is flushed and displaced from the entire PSL breakwater everyday throughout the duration of the construction period. It is expected that an initial startle response will be elicited from the pinniped species present when equipment is mobilized to the project area. Once equipment and personnel are present it is expected that the pinnipeds within the vicinity of PSL breakwater will become habituated to the construction activities, and presence of equipment and personnel. The nature of breakwater repair construction is a very slow progression, approximately 75 to 100 feet of the breakwater would be repaired per week. The slow progression of the work would further allow for habituation to the construction equipment, personnel, and activities by the pinniped species hauled out on the PSL breakwater. Furthermore the construction would be sequenced to begin at station 4+00 to minimize disturbance to the pinnipeds at the south eastern end of the breakwater, where the greatest densities and utilization of the breakwater occur.  Thus, one could estimate that the actual take could potentially be half or less than that of the take estimated in Table 7. However, due to the unpredictable nature of animals in the wild, the Corps took the most conservative approach when calculating the Level B take estimates that may result from the PSL breakwater repair construction activities, assuming that every animal is flushed and displaced from the entire PSL breakwater everyday throughout the duration of the construction period.

Table 7. Level B Take Estimates requested by species at the PSL Breakwater Project Area.

| Species | Averaged Daily Abundance* | Level B Harassment Per Day | Total Take** | Stock Abundance ($N^{MIN}$) | % of Stock (take/abundance * 100) |
|---|---|---|---|---|---|
| California Sea Lion (*Z. californianus*) | 302.05 | 302.05 | 52,557 | 257,606 | 20.4% |
| Steller Sea Lion (*E. jubatus*) | 19.28 | 19.28 | 3,355 | 43,201 | 7.8% |
| Harbor Seal (*P. vitulina richardii*) | 10.33 | 10.33 | 1,797 | 27,348 | 6.6% |

*Average abundance of pinnipeds present on the PSL Breakwater and in waters within a 300 ft radius of the breakwater per day.
**Total Take estimation based on seven month construction period (6 working days/week) = 174 total days.

Table 8. USACE 2019 PSL Breakwater Pinniped Survey Data.

| Survey Date | Leeward | Seaward | Total |
|---|---|---|---|
| 1/30/2019 | 0 | 0 | 0 |
| 1/31/2019 | 0 | 0 | 0 |
| 2/1/2019 | 0 | 0 | 0 |
| 3/1/2019 | 0 | * | 0* |
| 3/24/2019 | 0 | * | 0* |
| 3/30/2019 | 0 | * | 0* |
| 3/31/2019 | 0 | * | 0* |
| 4/1/2019 | 0 | * | 0* |
| 5/1/2019 | 0 | + | 18+ |
| 5/28/2019 | 188 | * | 188 |
| **6/3/2019** | **182** | **115** | **297** |
| **7/29/2019** | **166** | **25** | **191** |
| 8/27/2019 | 0 | 1 | 1 |
| **9/25/2019** | **326** | **150** | **476** |
| 11/6/2019 | 398 | * | 398* |
| 12/5/2019 | 113 | * | 113* |
| 12/28/2019 | 0 | 0 | 0** |

*Seaward side of breakwater not surveyed because of sea state conditions, no pinnipeds expected to be hauled out during these times.
**No pinnipeds hauled out on breakwater, 3 observed swimming near head of breakwater.
+Pinnipeds distributed at head section along centerline to seaward side of the breakwater structure.
**Bold** indicates months survey data was used to calculate the average abundance of pinnipeds on the PSL Breakwater per day.

Table 9. PSL Breakwater Marine Mammal Survey, June 30, 2018, Merkel & Associates.

| | | |
|---|---|---|
| **CA Sea Lion** | Adult female | 30 |
| | Adult Male | 31 |
| | Pup-yearling* | 57 |
| | Sub-adult-juvenile | 164 |
| **CA Sea Lion Total** | | **282** |
| **Steller Sea Lion** | Adult Female | 5 |
| | Adult Male | 5 |
| | Sub-adult-juvenile | 9 |
| **Steller Sea Lion Total** | | **19** |
| **Pinniped Total** | | **301** |

*Pup-yearling age class defined as birth to 1 year old, note the majority of the individuals in this age class were at the higher end of the size class.

Table 10. USACE 2019 PSL Breakwater and Smith Island Harbor Seal Survey Data.

| Survey Date | Swimming Near PSL Breakwater (Leeward Side) | Hauled Out at Smith Is. | Swimming near Smith Is. |
|---|---|---|---|
| 1/30/19-2/1/19 | 0 | 13 | Several |
| 3/1/2019 | 0 | 15 | 0 |
| **3/24/2019** | **1 Individual, 15 ft off head** | **14** | **3** |
| **5/1/2019** | **0** | **10** | **0** |
| **5/28/2019** | **0** | **2** | **1** |
| 6/3/2019 | 0 | 0 | 0 |
| 7/29/2019 | 0 | 0 | 0 |
| 8/27/2019 | 0 | 0 | 0 |
| 9/25/2019 | 0 | 0 | 0 |
| 11/6/2019 | 0 | 0 | 0 |
| 12/5/2019 | 0 | 25 | 0 |
| 12/28/2019 | 0 | 1 | 1 |

**Bold** indicates months survey data was used to calculate the average abundance of pinnipeds on the PSL Breakwater per day.

## *VII.* Anticipated Impact of the Activity: *The anticipated impact of the activity to the species or stock of marine mammal.*

Due to adverse wave and inclement winter weather conditions at PSL it is generally not possible to safely work outside of CSL pupping season (May to August) or outside of the months the breakwater is utilized by CSLs. Therefore, breakwater repair and shoal excavation activities will likely effect hauling out behavior, and may affect pupping and nursing behaviors due to visual and auditory disturbances. It is anticipated that individuals will utilize other areas of the breakwater or possibly relocate to a haul out site other than the PSL breakwater, such as the buoys, work docks, or jetties at neighboring harbors/bays. The proposed action is not expected to have a consequential impact to foraging or feeding of California sea lions because the small footprint of the project area accounts for only a small fraction (less than 1%) of the available foraging area within San Luis Obispo Bay.

Breakwater repair and shoal excavation activities will likely effect hauling out behaviors of SSLs due to visual and auditory disturbances. It is anticipated that individuals will utilize other areas of the breakwater or relocate to a haul out site other than the PSL breakwater, such as the buoys, work docks, or jetties at neighboring harbors/bays. The proposed action is not expected to have a consequential impact to foraging or feeding of Steller sea lions because the small footprint of the project area accounts for only a small fraction (less than 1%) of the available foraging area within San Luis Obispo Bay. The proposed action is not expected to impact the reproduction of Steller sea lions.

The open lay out of PSL gives harbor seals adequate area to transit in and out of PSL without requiring them to transit through the project area, and harbor seals would likely avoid the project area due to the visual disturbance of the construction associated equipment and personnel. The conservative take estimate requested by the corps represents a worst case scenario for Level B take, accounting for 6.6% of the California stock (based on the minimum population estimate). Although, one should take into consideration that this would not imply 6.6% of the California stock would be impacted, as this number likely accounts for a majority of the same individuals being taken multiple times throughout the duration of construction. The proposed action is not expected to have a consequential impact to foraging or feeding of Pacific harbor seal because the small footprint of the project area accounts for only a small fraction (less than 1%) of the available foraging area within San Luis Obispo Bay. The proposed action is not expected to impact hauling out behaviors or the reproduction of harbor seals.

Behavioral responses to audio and visual disturbance can be highly variable and context-specific. A number of factors may influence an animal's response to noise, including its previous experience, its auditory sensitivity, its biological and social status (including age and sex), and its behavioral state and activity at the time of exposure. Behavioral state or differences in individual tolerance levels may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing noise levels than animals that are highly motivated to remain in an area for feeding (Richardson et al., 1995; National Research Council, 2003; Wartzok et al., 2004). Indicators of disturbance may include sudden changes in the animal's behavior or avoidance of the affected area. A marine mammal may show signs that it is startled by the noise or visual disturbance and/or it may swim away from the sound source and avoid the area. Types of responses during the shoal excavation and breakwater repair activities may range from; no response, avoidance of the project area, NOAA's three-point pinniped disturbance scale responses (alert, movement, flushing), reduced haul-out time on the PSL breakwater, to relocation from the PSL breakwater to another area for the duration of construction.

Based on communication with a contractor and their experience at Redondo Harbor many years ago where the head section of the breakwater there was utilized as a haul-out and common knowledge of behavior of pinnipeds due to visual disturbance, the response of CSLs to the proposed rock placement may include alert behavior, approaches to the water, and flushes into the water. The contractor observed animals often relocated and hauled out on nearby trunk sections of the breakwater where construction activities were not taking place. These potential disturbances could be caused by the visual disturbance caused by the presence or movement of construction equipment and/or the noise produced by the equipment. Behaviorally, pinnipeds may respond to rock placement and shoal excavation activities by vacating the surrounding area. Some may redistribute themselves along portions of the breakwater away from construction activities and potentially to other haul out sites within PSL Harbor or along the coast to the south and north.

Based on past responses to similar activities, it is likely that pinniped exposure to rock placement and shoal excavation activities would change their use of the PSL breakwater and the amount of time they would otherwise spend hauled out in the immediate vicinity of the work areas on the PSL breakwater. The changes in pinniped use of the breakwater may potentially be nominal should the pinnipeds become habituated to the presence of the construction equipment and personnel. Repetitive, short-term displacement is likely to cause repetitive, short-term disruptions in their normal behavioral patterns at the PSL breakwater. Disruption from visual or auditory disturbance would be limited to working hours during the predicted construction season. In addition, the background acoustic levels at the breakwater are likely elevated at times given the strong tides, high winds, and breaking surf conditions.

The anticipated impact upon the CSLs and SSLs includes temporary disturbance (alert and flushing behaviors) and temporary displacement of animals to other parts of the breakwater or other nearby haul out sites until work is discontinued. Other limited and likely less desirable haul out availability for pinnipeds exists throughout other parts of the breakwater and within the PSL inner harbor regions. Potential alternative haul out sites exist to the north and south of PSL, although, it is not known whether pinnipeds would relocate to these areas. Observations on a past breakwater repair project in Redondo Harbor, California by the construction contractor (Connolly-Pacific) observed that pinnipeds that were flushed from the breakwater repair areas did not leave the surrounding area but rather relocated and hauled out on other sections of the breakwater. Animals that flush from the breakwater would be expected to move to other parts of the breakwater, likely resulting in increased haul out densities in some areas. It is not expected that there would be a reduction in prey resources as a result of the Proposed Action.

There are no current threats to the species that are either part of the environmental baseline or cumulative effects in the action area that are anticipated to affect pinnipeds in addition to the activities of the Proposed Action described above. Effects of the action are not anticipated to appreciably reduce the species' ability to survive and recover.

## *VIII.* **Anticipated Impacts on Subsistence Uses:** *The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses.*

Not applicable, project site is located in California. Project activities are not in or near a subsistence hunting area and will not affect the availability of a species or stock of marine mammal for subsistence uses. There are no relevant subsistence uses of marine mammals implicated by this action.

## *IX.* **Anticipated Impacts on Habitat:** *The anticipated impact of the activity upon the habitat of the marine mammal populations and the likelihood of restoration of the affected habitat.*

The Proposed Action would not result in in-water acoustic sound that would cause significant injury or mortality to prey species and would not create barriers to movement of marine mammals or prey. Behavioral disturbance caused by in-air acoustic impacts (Table 3) may result in marine mammals temporarily moving away from or avoiding the exposure area but are not expected to have long term permanent impacts.

Impacts to habitat from the Proposed Action are expected to include increased human activity and noise levels, minimal impacts to water quality, and negligible changes in prey availability near the individual project site.

The Corps does not anticipate any measureable long-term impact to the marine mammal habitat. Repairing the PSL breakwater by resetting and adding additional stone would not reduce the availability, quality, or accessibility of habitat for pinniped species. Pinnipeds haul out on the existing breakwater structure, and are easily able to climb up several vertical feet. They use sections of the breakwater composed of angular breakwater stone in areas of differing slope and commonly use side slopes and the top of the breakwater. They have excellent climbing abilities on breakwater stone and therefore are expected to easily make use of the repaired breakwater. In addition, repair of the breakwater will minimize large voids that exist in the current breakwater structure that young CSL pups are thought to be falling into and becoming trapped inside the breakwater.

Transport of stone via barges would nominally increase vessel traffic along major navigation routes in existing harbors and navigation channels during the project duration, but impacts are not likely to be permanent. The number of additional barge trips per year attributable to the Proposed Action is expected to be approximately 40 trips. This is small (< 1%) annual percentage increase relative to the current number of other commercial and recreational vessels already using any of these potential routes. Additional noise could be generated by barge-mounted equipment, such as cranes and generators, but this noise would typically not exceed existing background underwater noise levels. Impacts to marine mammals from these noise sources are expected to be negligible.

Some degree of localized reduction in water quality would occur as a result of in-water construction activities. Most of this effect would occur during the excavation of shoaled sediment adjacent to the breakwater. Any effects to turbidity are expected to be short-term and minimal. Turbidity would return to normal levels within a short time after completion of the Proposed Action.

Chemical properties such as dissolved oxygen (DO), temperature, pH, salinity, and nutrients are not expected to be substantially altered by the excavation of shoaled sediment; water quality monitoring would be conducted during the excavation of shoaled sediment to ensure these chemical properties are not substantially altered outside of the immediate work area and 500' buffer zone, and that any alteration due to the project is temporary. Excavation of organically enriched or anaerobic sediments and suspension of these sediments could cause direct temporary impacts to DO. Excavation and discharge activities would also cause direct temporary water quality impacts due to turbidity and reduced light transmissivity. Increases in turbidity detectable above background levels are usually confined from 100 to 500 feet from the crane- equipped barge depending on sediment character and tidal current conditions. Sediment adjacent to the PSL breakwater is expected to be characterized as sands, which fall out of the water column quicker decreasing the turbidity plume. A clamshell bucket has impacts across the entire water column as sediments are carried up to the surface in the clamshell. It is expected that plumes would remain in the harbor area and not migrate into the open ocean environment. The duration of the plume is expected to be short; suspended solid concentrations would likely return to background levels within an hour to 24 hours after excavation ceases, dependent on sediment character and tidal current conditions. Monitoring would be conducted during excavation of sediment for salinity, pH, temperature, DO, turbidity and light transmissivity. Excavation of sediments would be controlled to keep turbidity impacts to acceptable levels.

It is not anticipated that the environment within the vicinity of the breakwater would be significantly affected by sediments being stirred up into the water column due to construction involving the resetting and placement of new stones. Dropping of armor stone is not permitted, but it should be expected that some stones may be accidentally dropped during placement. Stones would be carefully placed and interlocked with existing stones to maximize stability, the careful placement should minimize stirring up of sediment. Small amounts of soil adhering to the stone may become temporarily suspended in the water column, causing a slight increase in turbidity. Due to the small amounts of turbidity involved, the project will not cause water quality conditions to change. Impacts are expected to be less than significant in terms of increased turbidity. No direct effects to marine mammals are expected from turbidity impacts.

Direct impacts (habitat loss/degradation or reduction in population size) to marine resources would be extremely limited due to resetting and placement of stone on the breakwater. Resetting and placement of stone could smother and/or crush sessile organisms currently attached to the currently exposed rock. However, following their replacement, these rocks would be recolonized, making any impact temporary in nature.

Excavation of shoaled sediment adjacent to the breakwater will directly affect approximately 3.6 acres of the benthic community. Extensive Pacific eelgrass (*Zostera pacifica*) beds are located throughout PSL, some degree of impact is expected and will be addressed through the Essential Fish Habitat (EFH) consultation process with the NMFS, Long Beach office. Direct estimated impacts to Pacific eelgrass due to the shoal excavation are 1.8 acres. A worst case full area of potential effects estimate to Pacific eelgrass is 4.39 acres. To minimize additional impacts to the eelgrass beds the excavated material will be relocated approximately 1,000 ft north of the breakwater, where it will be utilized to create an engineered eelgrass mitigation site. Mobile species are expected to relocate out of the area until dredging activities are finished. Some marine populations, particularly benthic organisms, would be destroyed by the excavation of sediment, but are expected to recolonize the area once excavation of sediment has ceased. Effects of a clamshell dredge project in San Diego Bay on demersal fish, epibenthic invertebrate, and benthic infaunal invertebrate communities have previously been studied. Results indicated that demersal fish took between 14 and 22 months to recover. Benthic infauna recovered within 5 months relative to density and biomass, but examination of community indices indicated that full recovery of community structure may have taken 17 to 24 months. Epibenthic invertebrates recovered within 29 to 35 months in terms of density and biomass. However, the epibenthic invertebrate community composition was still changing or had achieved an alternate stable state near the end of the study (Merkel & Associates 2010).

Recovery rates of some of the PSL benthic communities may be decreased in relation to the Merkel & Associates 2010 study of San Diego Bay due to the shallow excavation of sediment and small area of excavation compared to the San Diego Bay study. Turbidity caused by the excavation of sediment can impact plankton populations by lowering the light available for phytoplankton photosynthesis and by clogging the filter feeding mechanisms of zooplankton. Turbidity would be expected to be mostly confined to the local disturbance area. Because turbidity effects would be localized and short-term, with respect to ambient conditions, and the marine plankton are transitory in nature, impacts on phytoplankton and zooplankton would not be significant. Environmental effects from turbidity and sediment fallout would primarily impact intertidal and subtidal macroalgae and directly and potentially indirectly impact eelgrass species. Prolonged light limitation negatively effects photosynthesis, growth, and recruitment of algal and eelgrass species. Any benthic flora within the immediate project area would be eliminated by the sediment excavation activities because of site excavation and substrate removal. The most direct impact of sediment excavation would be the elimination of benthic organisms from the immediate area. A secondary impact would be the redisposition of suspended sediments on adjacent areas. Benthic organisms are more susceptible to turbidity. Mechanical or abrasive action of suspended silt and detritus can negatively impact filter-feeding organisms by clogging their gills and impairing proper respiratory and excretory functioning and feeding activity. After excavation terminates, the affected area would be recolonized. Field studies indicate that recolonization initiates immediately and lost productivity rates are re-established in 2 to 3 years. Local fishes would likely avoid disturbance areas, thus lethal effects of suspended sediment on fishes are not anticipated to be great. Turbidity would likely be localized in time and space. As construction occurs, it is expected that demersal and pelagic fishes would temporarily relocate to avoid potential water quality impacts (i.e., turbidity plumes). While colonization of fishes may occur quickly in the excavated areas by local fishes temporarily displaced due to construction activities, complete recovery of the demersal fish community could take 1 to 2 years. Although, the demersal fish community may not experience significant direct mortality due to dredging there is likely a dependent correlation between the recovery of the benthic infauna and epibenthic invertebrate community recovery rates and that of the fish communities. Adverse impacts to EFH are expected to occur in the area requiring excavation of shoaled sediment, although, this area is small (less than 1%) relative to the available benthic, sandy bottom habitat in PSL harbor and excavation of shoaled sediments will be short term (possibly less than one week, maximum three weeks).

No permanent adverse effects are anticipated for critical habitat of prey species for marine mammals. Prey resources in the vicinity are not expected to be reduced.

***X.*** **Anticipated Effects of Habitat Impacts on Marine Mammals:** *The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.*

The Corps does not anticipate repairs to the PSL breakwater would result in any measurable loss or habitat modification affecting marine mammal populations. The Corps does not expect loss of marine mammal prey or foraging resources. Temporary, seasonal disturbance at the PSL breakwater haul out site during breakwater repair construction activities is not expected to reduce post-construction use of the area by the pinnipeds species. The PSL breakwater is not designated critical habitat under the ESA for any listed marine mammal.

***XI.*** **Mitigation Measures to Protect Marine Mammals and Their Habitat:** *The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.*

Provided below is a summary of the avoidance and minimization measures and best management practices (BMPs) that will be implemented.

- A marine mammal monitor (a trained biologist with experience identifying and monitoring marine mammal species expected to be present in PSL) pre-approved by the Corps and NMFS will monitor for marine mammals 30 minutes prior to the start of construction activities (including prior to construction related vessels and barges mobilizing/starting up for the day), during construction activities, and 30 minutes after the completion of construction activities. A monitoring plan will be implemented as described in Section 13. This plan includes specific procedures in the event a mammal is encountered and reporting requirements.

- The Corps will conduct Marine Mammal Training for all construction personnel and the marine mammal monitors that will cover the following: marine mammal identification, clear explanation of responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.
- The Corps will implement a soft-start procedure at the beginning of the work day. The objective of a soft-start is to provide a warning and/or give animals in close proximity to construction activities a chance to leave the area prior to operating at full capacity thereby, exposing fewer animals to visual disturbances, and underwater and airborne sounds that may elicit a startle response. A soft start procedure will be used at the beginning of each day, crews will slowly approach the work site creating a visual disturbance allowing animals in close proximity to construction activities a chance to leave the area prior to stone resetting or new stone placement.
- The marine mammal monitor will scan the waters for 30 minutes before and during all construction activities. If any species for which take is not authorized are observed within the immediate work area during or 30 minutes before work commences, the observer(s) will immediately notify the on-site supervisor, and require that work either not initiate or temporarily cease until the animals have moved outside of the area of potential effect (breakwater area immediately adjacent to crane-equipped barge and buffer area 300 feet along breakwater on either side of the crane-equipped barge).
- Direct physical interaction with marine mammals will be avoided during construction activities. If a marine mammal comes within 10 meters of such activity, operations must cease and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions, as necessary to avoid direct physical interaction.
- If rock setting is delayed or halted due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily exited and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal.
- Breakwater construction associated equipment and vessels will not travel at speeds greater than 8 knots within PSL Harbor.
- A Water Quality Protection and Monitoring Plan will be implemented in coordination with the California Regional Water Quality Control Board per Clean Water Act conditions during the excavation of shoaled sediment.
- A spill prevention and response plan will also be developed and kept onsite with appropriate supplies.
- An Environmental Protection Plan will be developed and implemented prior to the commencement of any construction activities. The plan will identify biological resources within the project vicinity and outline avoidance and minimization measures and BMPs to be implemented throughout the project duration. The plan also identifies construction elements and recognizes spill sources at the site. The plan outlines BMPs, response actions in the event of a spill or release, and notification and reporting procedures. The plan also outlines contractor management elements such as personnel responsibilities,

project site security, site inspections, and training.

- No petroleum products, chemicals, or other toxic or harmful materials will be allowed to enter surface waters.
- Equipment that enters surface waters will be maintained to prevent any visible sheen from petroleum products.
- No oil, fuels, or chemicals will be discharged to surface waters, or onto land where there is a potential for re-entry into surface waters to occur. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. will be checked regularly for leaks and will be maintained and stored properly to prevent spills.
- No cleaning solvents or chemicals used for tools or equipment cleaning will be discharged to ground or surface waters.

***XII.*** **Mitigation Measures to Protect Subsistence Uses:** *Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, you must submit either a plan of cooperation (POC) or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses.*

There are no relevant subsistence uses of marine mammals impacted by this action, see Section VIII. There will be no impact on subsistence uses because the project activities will not take place in or near Arctic subsistence hunting areas, nor will they affect the availability of species or stocks for subsistence uses.

***XIII.*** **Monitoring and Reporting:** *The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding.*

- The Corps will designate a NMFs-approved biologically trained on-site marine mammal monitor to carry out the monitoring and reporting. The Corps will include the following minimum qualifications for marine mammal monitors:
    - Advanced education in biological science, wildlife management, mammalogy or related fields (Bachelor’s degree or higher is preferred).
    - Visual acuity in both eyes (correction is permissible) sufficient to discern moving targets at the water's surface with ability to estimate target size and distance. Use of binoculars or spotting scope may be necessary to correctly identify the target.
    - Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
    - Experience or training in the field identification of marine mammal species

expected to occur in PSL and identification of behaviors.
  - Writing skills sufficient to prepare a report of observations. Reports should include such information as number, type, and location of marine mammals observed; their behavior in the area of potential sound effects during construction; dates and times when observations and in-water construction activities were conducted; dates and times when in-water construction activities were suspended because of marine mammals, etc.
  - Ability to communicate orally, by radio, or in-person with project personnel to provide real time information on marine mammals observed in the area, as needed.
- A marine mammal monitor will be placed at the best vantage points practicable (from the construction barges, breakwater, or independent monitoring vessel).
- The Corps will conduct one pinniped monitoring survey, and any other observed marine mammal species (by species and age class if possible) present on the PSL breakwater and immediate surrounding area within 1 week prior to commencing work (including mobilization activities) at the PSL breakwater (see below for minimum requirements and data to be collected during survey and monitoring efforts).
- During construction the marine mammal monitor will scan the waters for 30 minutes prior, during, and 30 minutes after construction activities (excavation of sediment, stone resetting and placement of new stone) have completed.
- If weather or sea conditions restrict the marine mammal monitor's ability to observe, or become unsafe for monitoring, construction will cease until conditions allow for monitoring to resume.
- Stone resetting and new stone placement will only occur during daylight hours from sunrise to sunset when it is possible to visually monitor marine mammals.
- If the Corps or its contractors discover an injured or dead marine mammal species in the action area, regardless of known cause:
  - The Corps will immediate report the incident to the Office of Protected Resources (OPR) (PR.ITP.MonitoringReports@noaa.gov), NMFS and to the NMFS West Coast California Regional Stranding Network (Justin Viezbicke/Justin Greenman) as soon as feasible. If the death or injury was clearly caused by the specified activity, the Corps must immediately cease the specified activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of this IHA. The Corps must not resume their activities until notified by NMFS.
  - Reporting of the incident must include the following:
    - Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable)
    - Species identification (if known) or description of the animal(s) involved
    - Condition of the animal(s) (including carcass condition if the animal is dead)
    - Observed behaviors of the animal(s), if alive
    - If available, photographs or video footage of the animal(s)
    - General circumstances under which the animal was discovered
- If any species for which take is not authorized are observed within the area of potential effects during or 30 minutes prior to excavation of sediment, stone resetting, or new stone placement, the marine mammal monitor will immediately notify the on-site supervisor,

and require that these construction activities either not initiate or temporarily cease until the animals for which take is not authorized have moved outside of the area of potential effect.

- The marine mammal monitor will monitor for marine mammals and have the authority to implement shutdown/delay procedures when applicable (in the unlikely and unexpected event an animal is in a location that would result in a Level A take, or a species not covered for Level B incidental take under this IHA is present within the vicinity that could result in take).
- During construction at the PSL breakwater, a final report will be provided to the NMFS.
    - These reports will provide dates, time, tidal height, maximum number of pinnipeds on the breakwater and any observed disturbances (detailing marine mammal species and behavior(s)). The Corps also will provide a description of construction activities at the time of observation, any mitigation actions that were implemented, and an assessment of the implementation and effectiveness of the mitigation measures.
- At a minimum, the following information will be collected on the marine mammal monitor's observation forms during all survey and monitoring events.
    - Monitor's name performing the survey/monitoring
    - Date and time that survey and construction activities begin and end.
    - Construction activities occurring during each observation period.
    - Weather parameters (e.g., percent cover, visibility).
    - Sea state/tidal conditions [e.g., sea state, tidal state (incoming, outgoing, slack, low, and high)].
    - Upon observation of a marine mammal the following information will be recorded:
        - Monitor who sighted animal and monitor's location
        - Activity at time of sighting
        - Time of sighting
        - Identification of the animal (e.g., genus/species, lowest possible taxonomic level, or unidentified), monitor's confidence in identification, and the composition of the group if there is a mix of species
        - Distance and bearing of each marine mammal observed to the construction activity for each sighting
        - Estimated number of animals (min/max/best)
        - Estimated number of animals by cohort (adults, juveniles, neonates, group composition, etc.)
        - Animal's closest point of approach and estimated time spent within the harassment zone
        - Description of any marine mammal behavioral observations (e.g., observed behaviors such as feeding or traveling), including an assessment of behavioral responses to the activity (e.g., no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching)
        - Disturbance must be recorded according to NMFS' three-point pinniped disturbance scale

- Note other human activity in the area not associated with the project activities.
- Note in behavioral observations, to the extent practicable, if an animal has remained in the area during construction activities. Therefore, it may be possible to identify if the same animal or different individuals are being taken.
- Monitor will note observation of tagged animals and pertinent information regarding species, age class, and sex to the maximum extent possible.

- Collected data will be compiled following the completion of construction and submitted to the NMFS within 90 days of completion of construction at the PSL breakwater.
- Post-construction surveys will document the pinniped use of the PSL breakwater.

***XIV.*** **Suggested Means of Coordination:** *Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.*

Besides NMFS, the USFW and CDFW, will be apprised of the Corps work and results of the monitoring efforts. The data will be made publicly available, will be made available upon request, and will be provided to the local citizen science and non-profit marine mammal groups within San Luis Obispo and Morro Bay.

## Literature Cited

Barlow, J., R.L. Brownell, Jr., D.P. DeMaster, K.A. Forney, M.S. Lowry, S. Osmek, T.J. Ragen, R.R, Reeves, and R.J. Small. 1995. U.S. Pacific marine mammal stock assessments: 1995. NOAA Technical Memorandum NMFS-SWFSC-219: 162.

Carretta, J.V., L. Enriquez, and C. Villafana. 2014. Marine mammal, sea turtle, and seabird bycatch in California gillnet fisheries in 2012. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-526. 16p.Carretta, J.V., S.M. Wilkin, M.M. Muto, K. Wilkinson, and J. Rusin. 2014b. Sources of human-related injury and mortality for U.S. Pacific west coast marine mammal stock assessments, 2008-2012. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-533. 110 p.

Cavole, L.M., Demko, A.M., Diner, R.E., Giddings, A., Koester, I., Pagniello, C.M., Paulsen, M.L., Ramirez-Valdez, A., Schwenck, S.M., Yen, N.K. and Zill, M.E., 2016. Biological impacts of the 2013–2015 warm-water anomaly in the Northeast Pacific: Winners, losers, and the future. Oceanography, 29(2), pp.273-285.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2013. COSEWIC assessment and status report on the Steller sea lion *Eumetopias jubatus* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Canada. xi + 54 p. Available online: www.registrelep-sararegistry.gc.ca/species/default_e.cfm. Accessed December 2016.

DeLong, R.L., S.R. Melin, J.L. Laake, P. Morris, A.J. Orr and J.D. Harris. 2017. Age- and sex-specific survival of California sea lions (*Zalophus californianus*) at San Miguel Island, California. Marine Mammal Science 33(4): 1097–1125.

Ham-Lammé, K. D., D. P. King, B. C. Taylor, C. House, D. A. Jessup, S. Jeffries, P. K Yochem, F. M. D. Gulland, D. A. Ferrick, and J. L. Stott. 1999. The application of immuno-assays for serological detection of morbillivirus exposure in free ranging harbor seals (*Phoca vitulina*) and sea otters (*Enhydra lutris*) from the western coast of the United States. Mar. Mamm. Sci. 15(2):601-608.

Hanan, D. A. 1996. <u>Dynamics of Abundance and Distribution for Pacific Harbor Seal, *Phoca vitulina richardsi*, on the Coast of California.</u> Ph.D. Dissertation, University of California, Los Angeles. 158pp.

Harvey, J.T. and D. Goley. 2011. Determining a correction factor for aerial surveys of harbor seals in California. Marine Mammal Science 27(4):719-735.

Herder, M. J. 1986. Seasonal movements and hauling site fidelity of harbor seals, *Phoca vitulina richardsi*, tagged at the Russian River, California. MS Thesis. Humbolt State Univ. 52 pages.

Laake, J.L., M.S. Lowry, R.L. DeLong, S.R. Melin, and J.V. Carretta. 2018. Population growth and status of California sea lions. The Journal of Wildlife Management, DOI: 10.1002/jwmg.21405.

Loughlin, T. R., D. J. Rugh, and C. H. Fiscus. 1984. Northern sea lion distribution and abundance: 1956-1980. J. Wildl. Manage. 48:729-740.

Loughlin, T. R. 1997. Using the phylogeographic method to identify Steller sea lion stocks. Pp. 329-341 In A. Dizon, S. J. Chivers, and W. Perrin (eds), Molecular genetics of marine mammals, incorporating the proceedings of a workshop on the analysis of genetic data to address problems of stock identity as related to management of marine mammals. Society of Marine Mammals, Spec. Rep. No. 3.

Lowry, M.S., B.S. Stewart, C.B. Heath, P. K. Yochem and J.M. Francis. 1991. Seasonal and annual variability in the diet of California sea lions *Zalophus californianus* at San Nicolas Island, California, 1981–86. Fishery Bulletin 89:331–336.

Lowry, M. S., J. V. Carretta and K. A. Forney. 2008. Pacific harbor seal census in California during May-July 2002 and 2004. California Fish and Game: 94:180-193.

Melin, S. R., R. L. DeLong and D. B. Siniff. 2008. The effects of El Niño on the foraging behavior of lactating California sea lions (*Zalophus californianus californianus*) during the nonbreeding season. Canadian Journal of Zoology 86:192–206.

Melin, S.R., A.J. Orr, J.D. Harris, J.L. Laake, R.L. DeLong, F.M.D. Gulland and S. Stoudt. 2010. Unprecedented mortality of California sea lion pups associated with anomalous oceanographic conditions along the central California coast in 2009. California Cooperative Ocean and Fisheries Investigations Reports 51:182–194.

Merkel & Associates, Inc. 2010. *Demersal Fisheries Response to the 2004 Channel Deepening Project in San Diego Bay*. Prepared for Port of San Diego, Port of Los Angeles, Port of Long Beach, NOAA Fisheries and Naval Facilities Engineering Command Southwest, California, January 2010.

National Marine Fisheries Service (NMFS). 2008. Recovery plan for the Steller sea lion (*Eumetopias jubatus*). Revision. National Marine Fisheries Service, Silver Spring, MD. 325p.

National Marine Fisheries Service (NMFS). 2013. Status review of the eastern Distinct Population Segment of Steller sea lion (*Eumetopias jubatus*). 144 p. + appendices. Protected Resources Division, Alaska Region, NMFS, 709 West 9th Street, Juneau, AK 99802.

National Research Council. (2003). Ocean noise and marine mammals. Washington, DC: National Research Council Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals; The National Academies Press.

NOAA. 2014. NOAA Technical Memorandum NMFS. U.S. Pacific Marine Mammal Stock Assessments, 2013. J.V. Carretta, and others. NOAA-TM-NMFS-SWFSC-532. Southwest Fisheries Science Center.

Pitcher, K. W., P. F. Olesiuk, R. F. Brown, M. S. Lowry, S. J. Jeffries, J. L. Sease, W. L. Perryman, C. E. Stinchcomb, and L. F. Lowry. 2007. Abundance and distribution of the eastern North Pacific Steller sea lion (*Eumetopias jubatus*) population. Fish. Bull., U.S. 105(1):102-115.

Richardson, W. J., Greene, C. R., Jr., Malme, C. I., and Thomson, D. H. (1995). Marine mammals and noise. San Diego, CA: Academic Press.

Wartzok, D., Popper, A. N., Gordon, J., and Merrill, J. (2004). Factors affecting the responses of marine mammals to acoustic disturbance. Marine Technology Society Journal, 37(4), 6–15.

Wiles, G. J. 2014. Draft Washington State periodic status review for the Steller sea lion. Washington Department of Fish and Wildlife, Olympia, WA. 35 p.

**Figure 1. Regional Vicinity Map & Figure 2. Local Vicinity Map**


Figure 1 Regional Vicinity Map

Figure 2 Local Vicinity Map

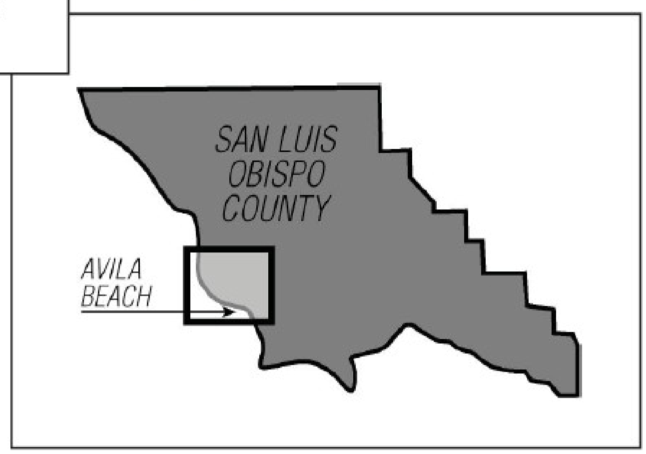


**Figure 3. Port San Luis Harbor Site Map**

**Figure 4. Breakwater Repair Areas**

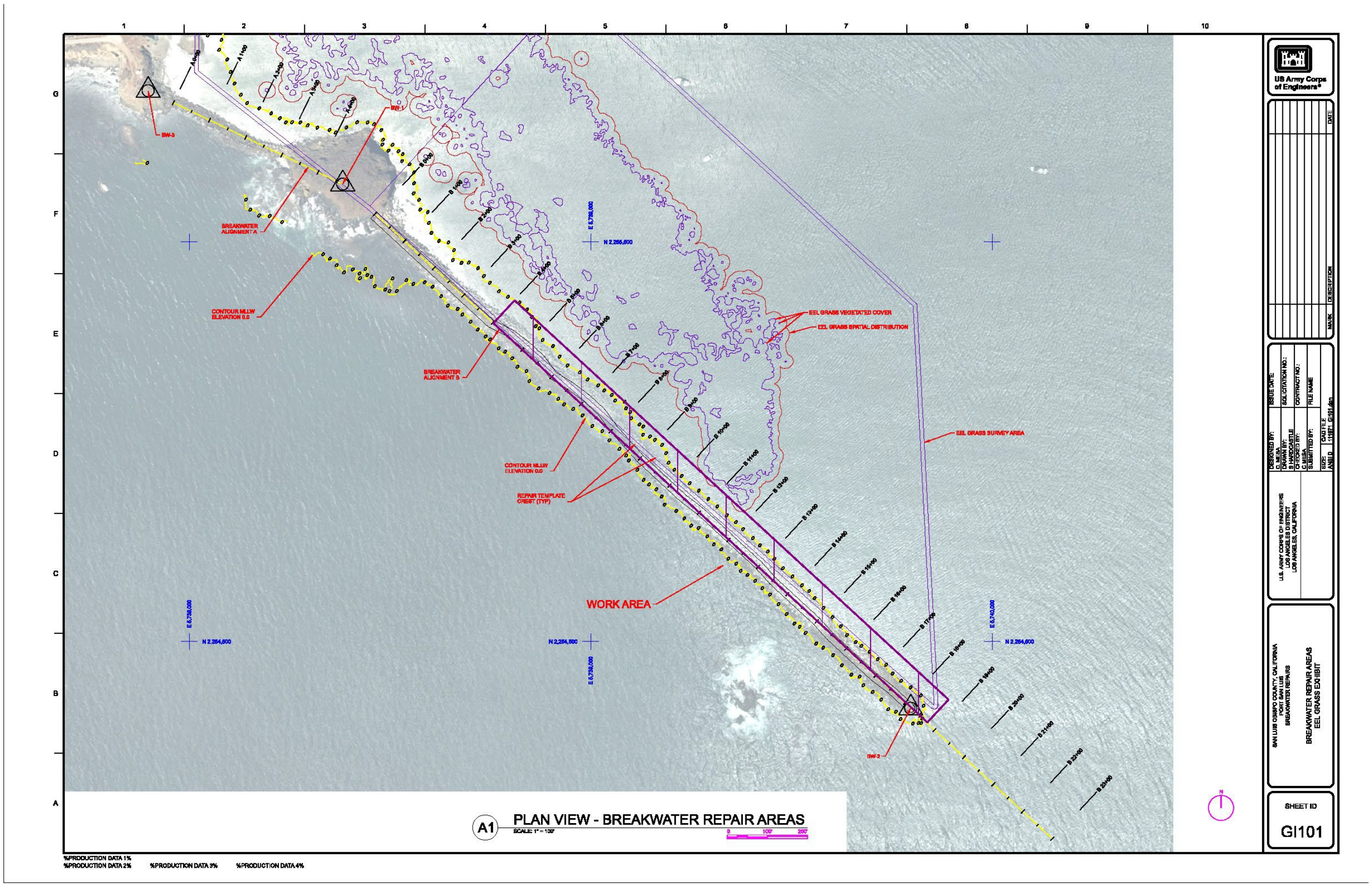


**Figure 5. Breakwater Pinniped Haul Out Site June 2018 Merkel & Associates**

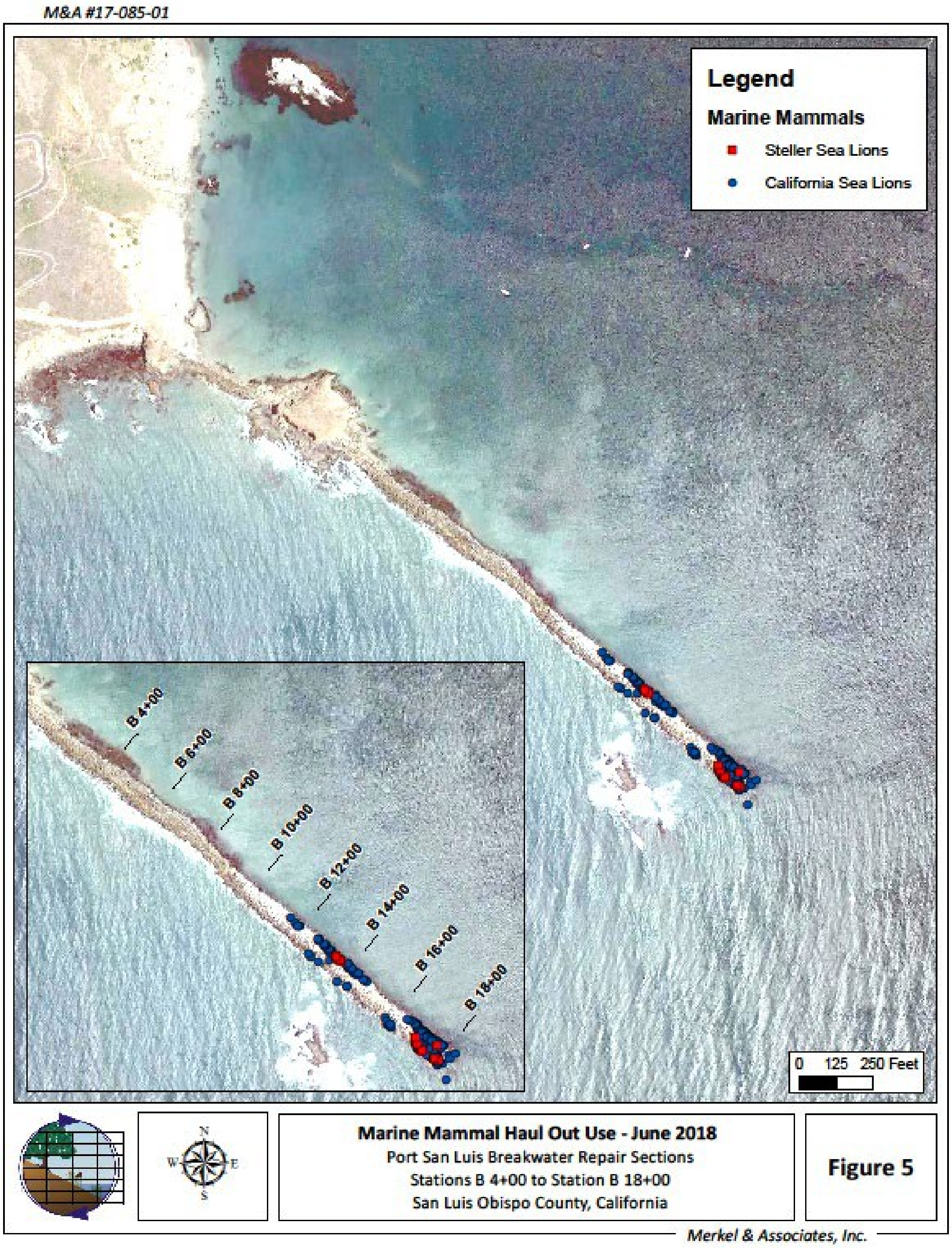


**Figure 6. Breakwater Pinniped Haul Out Site & Project Footprint**

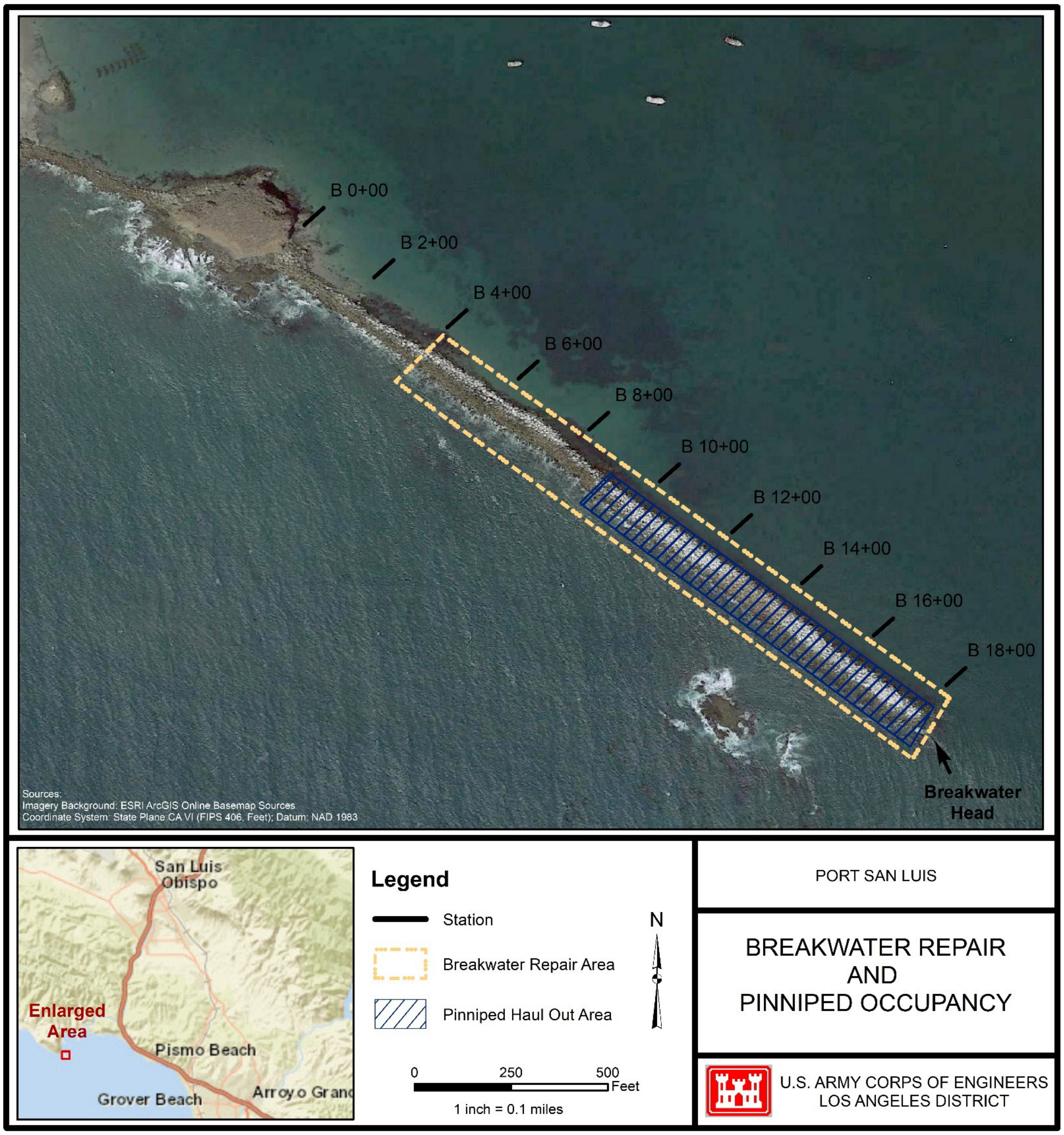


**Figure 7. Pinniped Breakwater Images**

PSL Breakwater: Head Section, Leeward. 6NOV2019

PSL Breakwater: South Eastern Section looking north towards Whaler's Rock, Leeward. 6NOV2019

PSL Breakwater: South Eastern Section, Seaward. 3JUNE2019

**Figure 8. Crane-equipped Barge & Rock Barge at LA/LB Harbor Breakwater Repair Site**

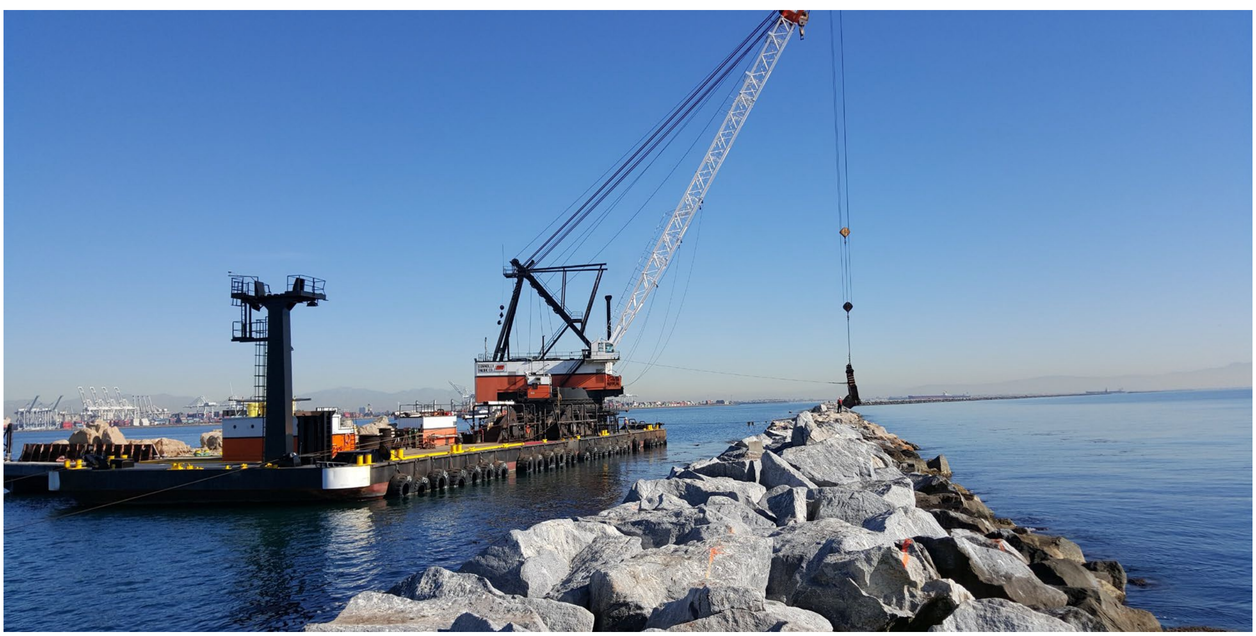
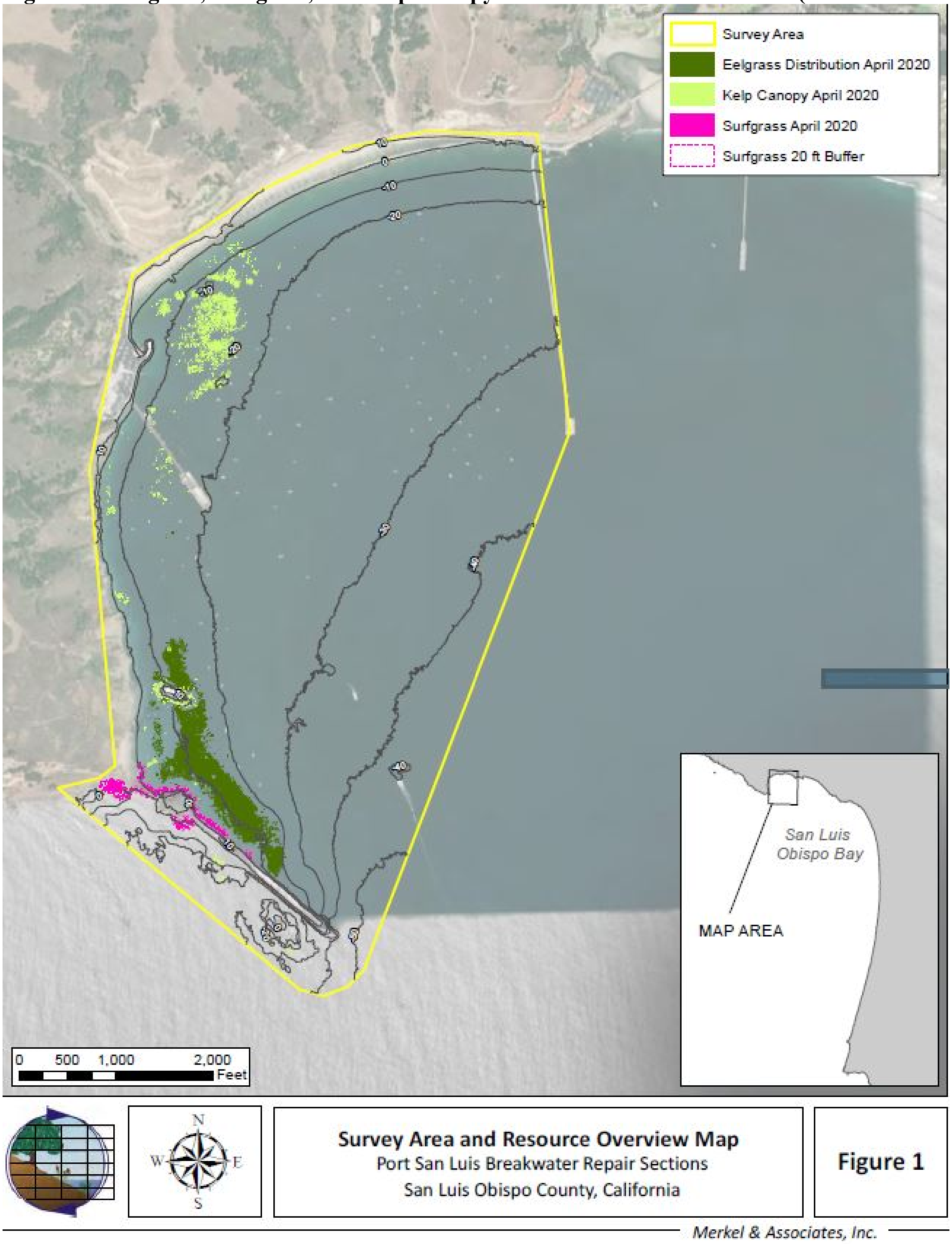


Image Source: Connolly-Pacific Co.

**Figure 9. PSL Work Dock along Harford Pier (0.75 miles from the PSL Breakwater).**

**Figure 10. Eelgrass, Surfgrass, and Kelp Canopy Distribution in Port San Luis (Merkel & Associates)**



## APPENDIX

# USACE Hydroacoustic & Acoustic Summary Report

On 25Feb2019 a team of researchers from the U.S. Army Corps of Engineers Los Angeles District and Engineer Research and Development Center traveled to the Breakwater Repair Project at the Port of Long Beach, CA to collect representative sound files. The sound files were collected based on guidance documents set in NMFS 2011 a/b and NOAA OPR-55. The sound files were analyzed to determine whether the anthropogenic noise exceeded the thresholds for underwater acoustic activities set by the National Oceanic and Atmospheric Administration. 27Feb2019 ambient sound files were collected at San Luis Obispo, CA near the breakwater to be used as a baseline measurement for proposed repair work.

## Site Selection & Hydrophone Placement

Maintenance activities on the Long Beach, CA breakwater provided near identical conditions to the proposed work activities of the Port San Luis breakwater repair. Sound files were collected during rock placement and scraping. Sound measurements occurred at 10, 50, 100, and 250 meters from the rock placement site. Distance was measured from the placement of the rock to the location of the hydrophone. Hydrophones were placed at 25% and 75% of the water column height from the seafloor. The project was conducted in shallow water with sound energy coming from the surface reflection path, bottom directed path, and direct path (Richardson *et al.* 1995). All terminology used for reporting are defined in NMFS-OPR-55. Terrestrial measurements were made by personnel standing on the breakwater and recording at 50, 75, 100, and 150 meters.

## Temporal Consideration

Sounds were recorded at each distance/depth for 30 minutes. The lifting, moving, and placing of the material was treated as one sample period. Non-construction activities in the vicinity, such as shipping traffic and recreational boat noise, were excluded from the dataset. Samples that captured construction equipment failure or an anomalous placement event (e.g., rock falls out of the grapple when the crane is moving) were also excluded. Rocks were only placed on the surface of the breakwater while we were onsite.

## Equipment Selection

A Loggerhead LS-1 and SNAP data logger equipped with a HTI-96-min hydrophone were moored to an anchor. The HTI-96-MIN 3V/ LED hydrophones were connected with a Seacon MCIL3M & MCDLSF connector. The hydrophones were calibrated by a NIST approved ISO 9001 compliant third party lab, as required by USACE regulations. The hydrophone sensitivities were -169.5 and -170 dBV re: 1 µPa, respectively. Sampling rates were set to 44.1 kHZ. Data were recorded in uncompressed .WAV file format. A copy of all data is available in uncompressed WAV format for independent analysis. Recording equipment was selected based on criteria in NMFS 2011a,b. A Galaxy Audio CM-170 type 2 SPL meter was used to measure in air sound pressure levels. The galaxy meter sound files were set to record in dBA at a slow time weighting.

## Mooring Design

A concrete anchor was used. Nylon rope connected the rubber buoy to the anchor with no metal to eliminate possible sound contamination. Recording equipment was fastened to the rope with a zip tie and allowed to suspend from the bailer connector perpendicular to the sea floor. Flow shields were not placed around the hydrophone due to low wave activity (> 1.5m/s) present at the field site. The data was collected inside the breakwater with a direct noise path to the barge to represent the worst case scenario.

Project Information

The contractor Connolly-Pacific Co. used a 350 ton crane to move approximately 16-ton stones from a staging barge to the damaged section of the breakwater structure. Boulders were placed above the surface of the water and fully came to rest before the clamp could be released from the boulder.

Results

*Underwater acoustics*

The data files selected represented the most intense activities of the crane. The crane was "resetting" the rocks that were being placed by actively picking up individual rocks on the breakwater and quickly placing them back on the structure. This created a sound file with the largest signature due to the crane being fully throttled to lift the rocks in quick succession (<30 seconds). A 60 second sub-file was pulled from each recording device and used as the dataset. The recorded files were collected at the same time. The snap logger was deployed at 25% depth and the LS-1 logger was deployed at 75% depth from surface. Data were first filtered in Audacity to remove clicks/ distortion in the .wav file using high pass/ low pass filters. Data was then checked for clipping and anomalies that were not representative of the signal generated by the rock placement event. The data was then analyzed for individual events (impulse- i.e. rock placement) or broadband acoustic. The noise generated by the crane masked the sound of the rock placement therefore broadband event calculations were used. Broad band acoustic noise measurements were made using the equations set by OPR-55. All python script is available upon request.

Los Angeles Breakwater Repair Bioacoustic Monitoring

Table 1. Calculation variables for the Field sites are listed below:

| | Long Beach, CA | San Luis Obispo, CA |
|---|---|---|
| Temperature (C) | 13.2 | 12.4 |
| Salinity (ppt) | 33.51 | 31.19 |
| pH | 7.89 | 7.84 |
| Distance from source (m) | 15 | n/a |
| Depth of source (m) | 0 | n/a |
| Number of source events per 24 hours | 480 | n/a |
| Duration of event (minutes) | 60 | n/a |
| Transmission loss coefficient | Near shore | Near shore |

Table 2. Data from LS-1 Recorder during Rock Resetting analyzed for a 60 second window.

| | Low F. | Mid F. | High F. | Pinniped F. | Otariddae F. |
|---|---|---|---|---|---|
| Distance to Permanent Threshold Shift (m) | 10 | 10 | 10 | 10 | 10 |
| Distance to Temporary Threshold Shift (m) | 10 | 10 | 10 | 10 | 10 |
| Weighted Broadband Source Levels (dB re 1 µPa/m) | 132.09 | 122.57 | 119.67 | 129.53 | 129.63 |
| Unweighted Broadband RMS source level (dB re 1 µPa/m) | 140.35 | | | | |

Table 3. Data from Snap recorder for ambient noise in Port San Luis Obispo, CA.

| | Low F. | Mid F. | High F. | Pinniped F. | Otariddae F. |
|---|---|---|---|---|---|
| Distance to Permanent Threshold Shift (m) | 10 | 10 | 10 | 10 | 10 |
| Distance to Temporary Threshold Shift (m) | 10 | 10 | 10 | 10 | 10 |
| Weighted Broadband Source Levels (dB re 1 μPa/m) | 107.39 | 94.13 | 91.90 | 100.98 | 100.98 |
| Unweighted Broadband RMS source level (dB re 1 μPa/m) | 131.55 | | | | |

Data show no significant effect on 24-hour weighted duration Sound exposure level measurement. The number of source events per 24 hours were considered 480 based on an 8-hour work day. This is not a true reflection based on crew breaks and equipment repair, representing a maximum level of exposure.

Los Angeles Breakwater Repair Bioacoustic Monitoring

Table 4. Data from Galaxy CM-170 Sound Pressure Meter

| | Long Beach, CA | San Luis Obispo, CA |
|---|---|---|
| Maximum decibels during Crane Operation | 82.9 | n/a |
| Average decibels over 8-minute recording | 66.7 | 62.6 |

The data was recorded at a 30-meter standoff from the crane during construction activities. The average noise from the breakwater at San Luis Obispo was due to heavy wave action on the breakwater structure.

## References

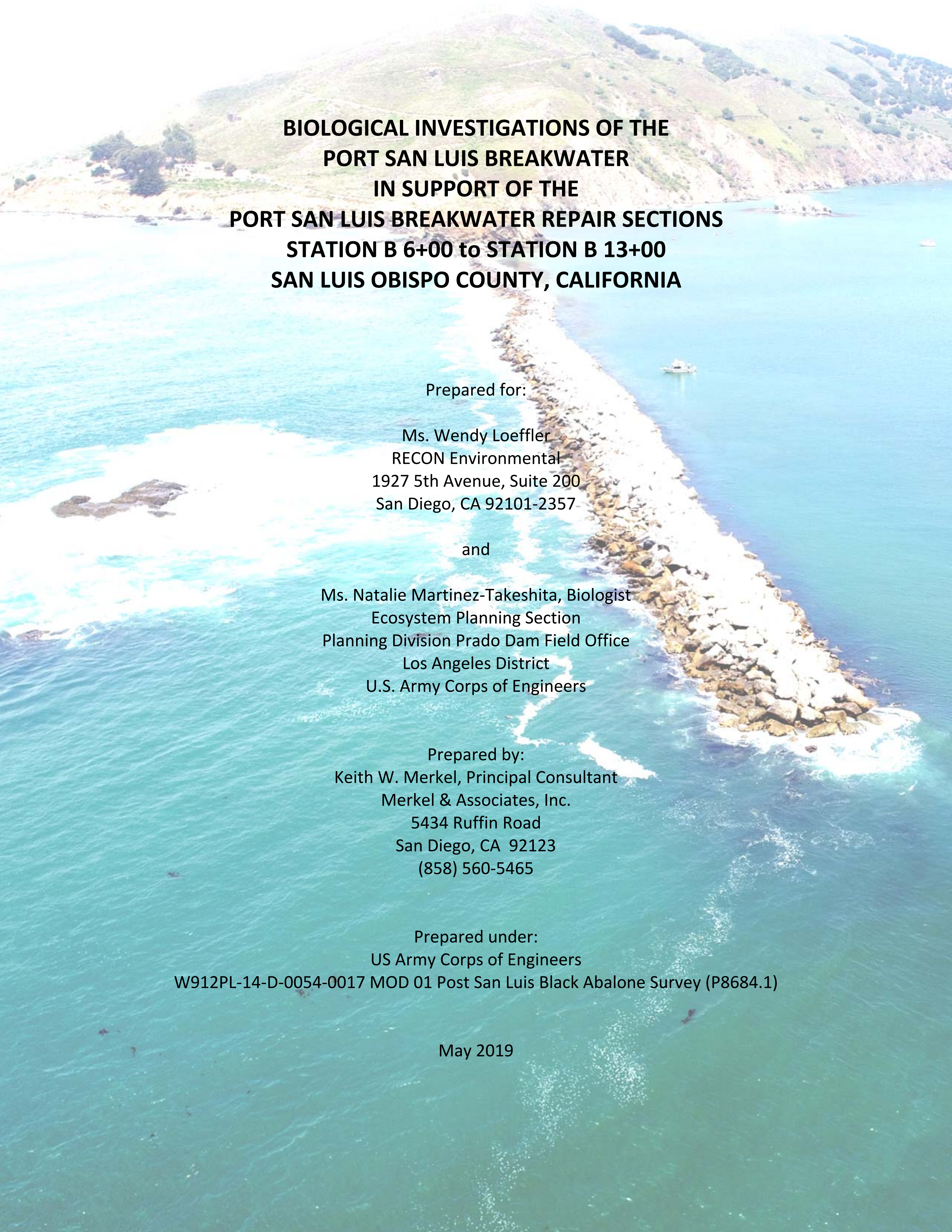
NMFS. 2011a. Guidance Document: Data Collection Methods to Characterize Underwater Background Sound Relevant to Marine Mammals in Coastal Nearshore Waters and Rivers of Washington and Oregon. Memorandum from NMFS Northwest Region and Northwest Fisheries Science Center to Interested Parties.

NMFS. 2011b. Guidance Document: Data Collection Methods to Characterize Impact and Vibratory Pile Driving Source Levels Relevant to Marine Mammals. Memorandum from NMFS Northwest Region and Northwest Fisheries Science Center to Interested Parties.

Richardson, J. W., C. R. Greene, C. I. Malme, and D. H. Thomson. 1995. Marine Mammals and Noise. Academic Press, San Diego, CA.

## APPENDIX

## Merkel & Associates May 2019 Biological Investigations of the Port San Luis Breakwater Report: Marine Mammals Survey



# BIOLOGICAL INVESTIGATIONS OF THE PORT SAN LUIS BREAKWATER IN SUPPORT OF THE PORT SAN LUIS BREAKWATER REPAIR SECTIONS STATION B 6+00 to STATION B 13+00 SAN LUIS OBISPO COUNTY, CALIFORNIA

Prepared for:

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and

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Ecosystem Planning Section
Planning Division Prado Dam Field Office
Los Angeles District
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Prepared by:
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Prepared under:
US Army Corps of Engineers
W912PL-14-D-0054-0017 MOD 01 Post San Luis Black Abalone Survey (P8684.1)


May 2019

## 3.5 Marine Mammals Survey

### 3.5.1 Methods

Marine mammal surveys were conducted in order to identify hauled out mammals along the Port San Luis breakwater and in proximity to the breakwater. Investigations were completed by two methods. The first was visual surveys conducted from a vessel navigated slowly along the breakwater and adjacent rocks to identify marine mammals hauled out. In addition, anecdotal observations were made of marine mammal in the project area during completion of various biological investigations in June-July 2018 and January-February 2019.

The second method of survey was a quantitative assessment of marine mammals on the breakwater and adjacent rock islands completed by completion of multiple UAV overflights. The marine mammal surveys were conducted during two different seasons with varying weather, sea state, and environmental conditions. Surveys were completed on June 30, 2018 and again on January 30 during high and low tides, January 31 during low tide, and February 1, 2019 during high tide and low tides. Aerial flights were conducted at elevations of 250 meters with true vertical overflights and offset oblique photographs of the breakwater and nearby rock islands. Using the collected photographs, marine mammals were identified, counted, and mapped on the breakwater using ESRI ArcGIS spatial mapping software.

The first surveys conducted by M&A biologists for the Port San Luis breakwater repair were completed between June 29–July 1, 2018 and were ancillary to focused surveys for black abalone. During the first survey, biologists noted the presence of marine mammals in the water and on the breakwater, as well as within the protected waters of Port San Luis. During the surveys a UAV was flown over the breakwater to produce an orthomosaic image of the survey area. The field observations and the photomosaic were subsequently used to inventory mammals on the breakwater. During the survey period, the cloud cover was typically overcast in the morning and approximately 20 percent cover in the afternoon. Winds were 0-1 Beaufort Scale (BS), and calm sea state with waves in the range of 1-2 feet on the lee of the breakwater and 3-6 feet on the windward side of the breakwater.

The second set of marine mammal surveys was conducted between January 29 and February 1, 2019. During this time, the Port of San Luis area was experiencing several days of stormy weather conditions and high surf just prior to the commencement of the survey. The weather was generally misty or rainy during the period. The conditions were wet and windy with surf between 4 and 6 feet outside of the breakwater. Breaks in the weather allowed the completion of all necessary aerial survey flights. Conditions during the surveys were between 53 ˚F to 63˚F. Cloud cover ranged from 100 to 30 percent, winds ranged between 0 and 3 BS. Surveys were initially intended to be completed twice, one day apart, but due to an absence of any marine mammals hauled out on the breakwater on the first day, January 29, surveys were conducted on all three days.

*Sea lions photographed in June 2018 using high resolution low altitude UAV aerial photography. Overflights provided an opportunity to map individual animals hauled out by species, gender, and age class.*

*January-February 2019 visual surveys and UAV surveys of the breakwater did not identify any marine mammals. However, during this period Smith's Island supported hauled out Pacific harbor seals.*

### 3.5.2 Results

There were four marine mammal species observed during both surveys*.* *Species present in the area included Steller sea lion (Eumetopias jubatus), California sea lion (Zalophus californianus*), Southern sea otter (*Enhydra lutris nereis*), and Pacific harbor seal (*Phoca vitulina*). Other marine mammals are known to be sighted within San Luis Obispo County, but are more transient and not likely to utilize the Port San Luis Breakwater repair sections project area as a substantial habitat area.

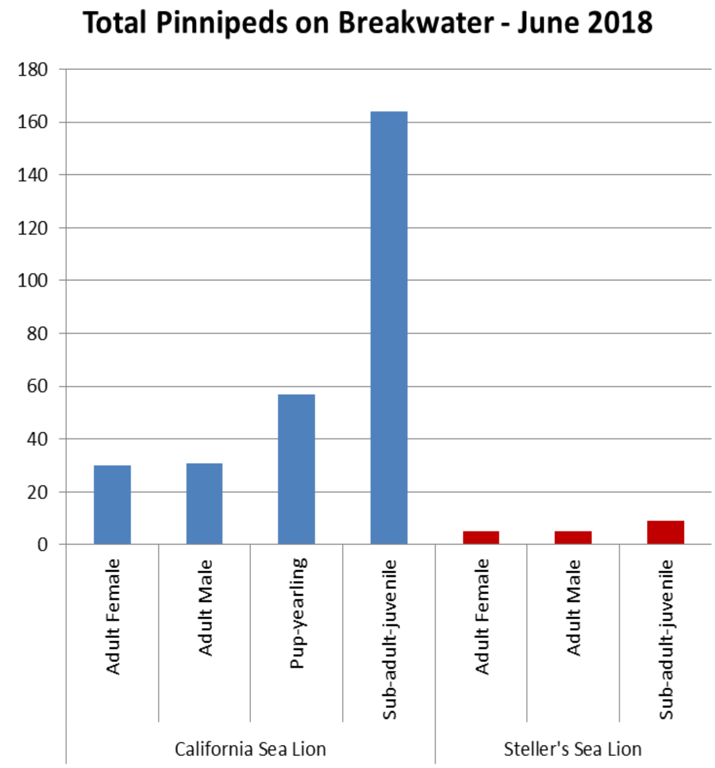
Mammals known in the San Luis Obispo County waters but not observed during the current surveys include: Guadalupe fur seal (*Arctocephalus townsendi*), Northern elephant seal (*Mirounga angustirostris*), Humpback whale (*Megaptera novaeangliae*), Blue whale (*Balaenoptera musculus*), Fin whale (*Balaenoptera physalus*), Killer whale (*Orcinus orca*), Eastern North Pacific Gray whale (*Eschrichtius robustus*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Risso's dolphin (*Grampus griseus*), Northern right whale dolphin (*Lissodelphis borealis*), Long-beaked common dolphin (*Delphinus capensis*), Short-beaked common dolphin (*Delphinus delphis*), Dall's porpoise (*Phocoenoides dalli*), and Bottlenose dolphin (*Tursiops truncatus*). While not observed during the present survey, whale vertebrae, probably from gray whale, were observed at multiple locations on the breakwater during both the 2018 and 2019 surveys.

*One of two whale vertebrae observed on breakwater June 30, 2018*

The marine mammal species observed within the project location during the 2018 survey include Southern sea otter, Pacific harbor seal, Steller sea lion. and California sea lion. During the 2018 black abalone survey work Southern sea otters and Pacific harbor seal were observed in proximity to the breakwater in low abundance and intermittently, and were more common within the inner harbor where they were observed foraging and resting in small patch kelp beds. During the course of the surveys, only two to three otters were observed and observations of seals were likely less than a dozen observations of likely fewer individuals. While not observed, it is believed that the otters were likely foraging on the breakwater as it appears that there are abundant crabs, shellfish, and octopus available on the subtidal and intertidal rocks. Also observed in abundance in the water along the breakwater were otariid pinnipeds including Steller sea lion and California sea lion. No attempt was made to count pinnipeds in the water during the surveys.

High resolution aerial imagery collected on June 30, 2018 allowed counting of hauled out pinnipeds on the breakwater. A total of 282 California sea lions and 19 Steller sea lions were observed occupying areas on the breakwater. The survey divided observed marine mammals first by species then by age class. The most abundant age class was the sub-adult-juvenile class followed by pup-yearling and leaving an almost equal amount of both the adult male and adult female classes in both California sea lion and Steller sea lion. Also notable during the surveys were four dead young pup carcasses on the breakwater rocks. No very young live pups were noted during either the on-water surveys or within the aerial survey photographs.

The general distribution of marine mammals along the breakwater is influenced by direct wave energy against exposed breakwater segments. An offshore rock formation on the seaward side of the breakwater's southern end absorbs direct wave energy and reduces the intensity of waves reaching the breakwater. This allows for manageable haul out locations on both the seaward and leeward sides of the breakwater in proximity to this rock. As Figure 7 shows, the most densely populated haul out areas occur on the leeward side of the south eastern end of the breakwater and spread around the revetment stone to the protected segment of the seaward side of the breakwater. In the open water, near the breakwater shoreline, sea lion were noted to be abundant, but it was not possible to count animals, or positively identify species or demographic metrics. As such, they were noted but not enumerated.



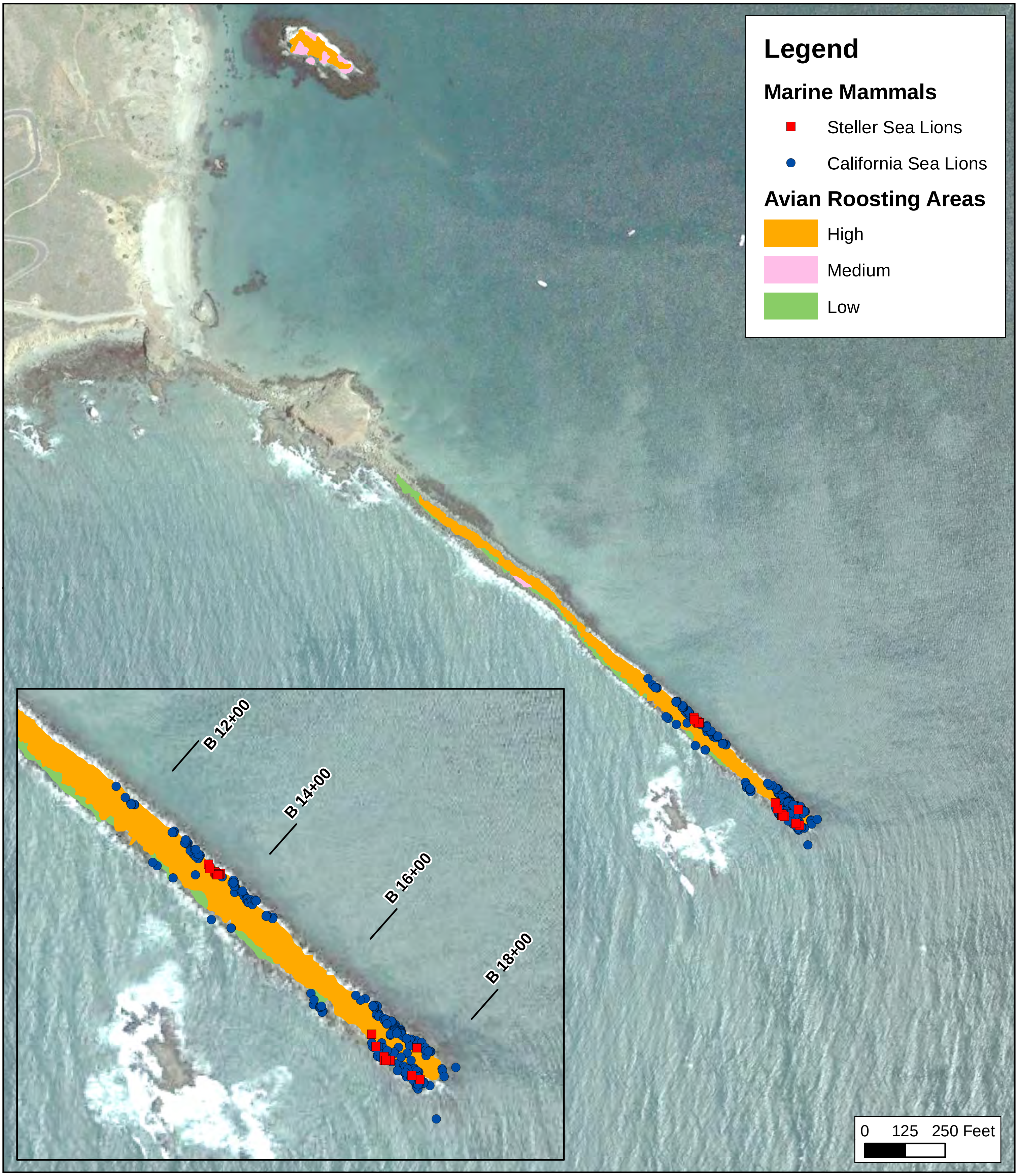

*Population demographics of sea lions hauled out on Port San Luis Breakwater June 30, 2018*

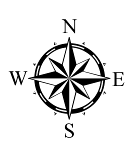
Further from the breakwater, California sea lions were also observed resting on a floating barge just east of the fishing pier. California sea lions, sea otters, and harbor seals were observed transiting / foraging and resting in the water around the fishing pier and boat moorings in the harbor and were even noted to enter the boat hoist launch basin.

During the January and February 2019 surveys, there were no marine mammals observed on the breakwater or within the immediate project area. A total of 13 Pacific harbor seal were found hauled out on and nearby Smith Island (Figure 8). As was the prior case with sea lions, several additional harbor seals were noted in the water around Smith Island, but were not counted. Smith Island has low lying bedrock benches that are better suited as haul-outs for seals than is the steep boulder rock of the breakwater. Noting that seals haul out on Smith Island, it would not be unexpected to see seals similarly haul out on the sand beach near Point San Luis in the lee of the breakwater, or under calm sea states, on the rocky terraces of Whaler's Island or Point San Luis on the seaward side of the breakwater.

While sea lions were notably absent from the breakwater during the winter months, a small number of California sea lions were noted hauled out on the purpose placed sea lion float near the fishing pier. Other sea lions as well as sea otters and harbor seals were noted in the protected waters of Port San Luis during transiting trips back and forth from moorings and launch facilities to the breakwater.

M&A #17-085-01

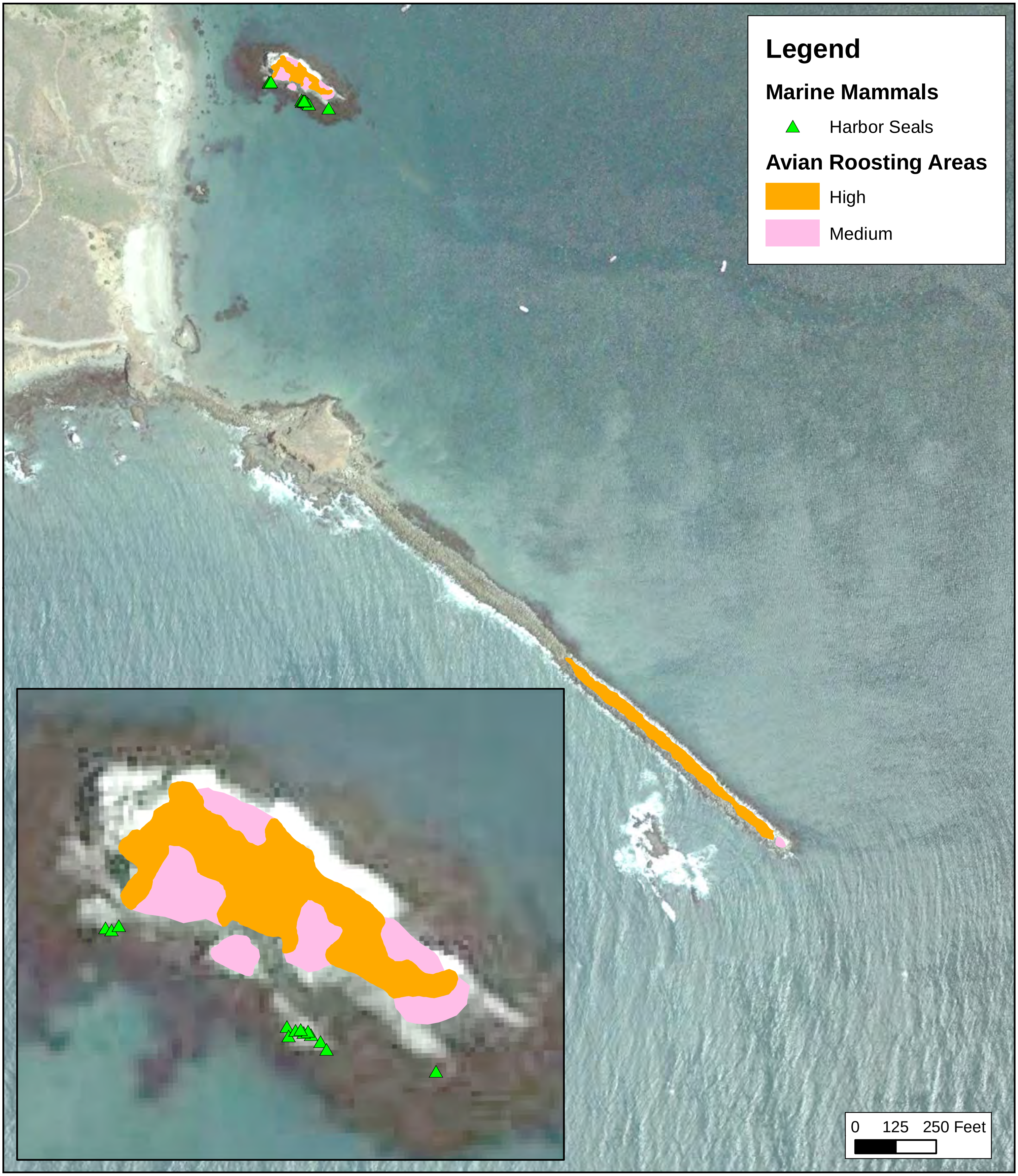


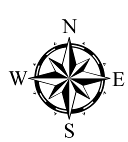




**Marine Mammal Haul Out Use/Avian Roosting - June 2018**
Port San Luis Breakwater Repair Sections
Stations B 6+00 to Station B 13+00
San Luis Obispo County, California

**Figure 7**

*Merkel & Associates, Inc.*




**Marine Mammal Haul Out Use/Avian Roosting - February 2019**
Port San Luis Breakwater Repair Sections
Stations B 6+00 to Station B 13+00
San Luis Obispo County, California

**Figure 8**

**From:** Keith Merkel
**To:** Martinez-Takeshita, Natalie M CIV USARMY CESPL (USA)
**Subject:** [Non-DoD Source] California sea lion pupping at Port San Luis Breakwater
**Date:** Monday, November 30, 2020 10:16:54 AM

---

Hi Natalie,
Thanks for your inquiry a week or so ago regarding the survey results of our June 2018 marine mammal surveys on the Port San Luis breakwater. You had asked about the breakdown of our pup-yearling classification for sea lions. Specifically, how many pups and how many yearlings There were no pup-yearlings of Steller sea lions and a total of 57 pup-yearlings of California sea lions observed.

We did not split this class to pups and yearlings due to the fact that there were many small yearlings that could be confused with young pups. However, we understand the context of the question to be whether the area is a pupping area or just a haul out. In our report (Merkel & Associates 2019. Biological Investigations of the Port San Luis Breakwater In Support of the Port San Luis Breakwater Repair Sections Station B 6+00 to Station B 13+00, San Luis Obispo County, California) we noted the following:

*"A total of 282 California sea lions and 19 Steller sea lions were observed occupying areas on the breakwater. The survey divided observed marine mammals first by species then by age class. The most abundant age class was the sub-adult-juvenile class followed by pup-yearling and leaving an almost equal amount of both the adult male and adult female classes in both California sea lion and Steller sea lion. Also notable during the surveys were four dead young pup carcasses on the breakwater rocks. No very young live pups were noted during either the on-water surveys or within the aerial survey photographs."*

Note that we opted not to consider the area a pupping site or rookery as we believe that pupping on the site has been incidental, if not accidental. The four dead pup carcasses were located on high rocks of the breakwater and the chances for these pups to make it to the water would have been extremely low given the large voids between breakwater rocks and the expectation that pups would fall into the interior of the breakwater rather than reaching the water. It is not a suitable pupping area and it is possible that the pups expired on the rocks rather than attempting to traverse the distance to the water. As noted, no very young live pups were noted. This suggests that smaller pup-yearlings may have been born elsewhere and not on the breakwater.

It should be noted that over the past decade shortages of food and crowding at established Channel Island rookeries have resulted an expansion of occurrence of births of sea lions on mainland habitual haul out sites. These have rarely ended well with high incidents of pup mortality. We believe the observed pupping at Port San Luis breakwater to be a similar condition and not evidence of a rookery or even early establishment of pupping location.

Please let me know if you need further clarification.

Thanks,
Keith

Keith Merkel
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5434 Ruffin Road, San Diego 92123
(858) 560-5465

*M&A # 05-024-42*

# EELGRASS MITIGATION AND MONITORING PLAN IN SUPPORT OF THE PORT SAN LUIS BREAKWATER REPAIRS PORT SAN LUIS, SAN LUIS OBISPO COUNTY, CALIFORNIA

Prepared for:

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**March 2021**

Keith Merkel, Principal Consultant

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***Eelgrass and Surfgrass Mitigation and Monitoring Plan in Support of the Port San Luis Breakwater Repairs Project Port San Luis, San Luis Obispo County, California***

## INTRODUCTION

The Port San Luis breakwater is a federally maintained structure providing wave protection to Port San Luis. The breakwater is maintained by the U.S. Army Corps of Engineers, Los Angeles District (Corps). The breakwater structure is an approximately 2,400-foot long large armor stone revetment that extends from the rocky headlands of Point San Luis towards the southeast. The breakwater has approximately 2,700 feet (ft) of shoreline on each side of the breakwater due to bulges in the shoreline along the breakwater resulting from native terraces of Point San Luis and Whaler's Island that is integrated into the breakwater. The breakwater is described in two alignment sections. Alignment A extends between Point San Luis and Whaler's Island, an approximately 2-acre natural rock island located approximately 300 ft offshore from Point San Luis. Alignment B extends from Whaler's Island to the southeast for a distance of approximately 1,850 ft. Portions of Alignment B, located 600 to 1,300 ft to the southeast of Whalers' Island, are in need of crest heightening. A loss in crest height is due to displacement of armor stone that has been toppled off the breakwater, which now principally resides on the leeward side of the breakwater.

As a result of the degradation of the breakwater, the Corps has initiated a project to repair the breakwater. The breakwater repairs in this section will be made by replacing crest height with the import of new armor stone, salvaging and reusing existing displaced armor stone or a combination of import and salvage reuse. Details of construction methods are not yet known. However, in order to commence environmental review and interagency coordination, the Corps has contracted for the completion of focused marine biological investigations within the project area. Merkel & Associates Inc. (M&A) was retained by the Corps to prepare a Pacific eelgrass (*Zostera pacifica*) mitigation plan in support of rock repairs to be conducted on the Port San Luis Breakwater at Port San Luis, California. In completing eelgrass impact analysis for this plan preparation, it was also noted that, in addition to eelgrass, the defined Area of Potential Effect (APE) supports a limited amount of Torrey's surfgrass (*Phyllospadix torreyi*). As such, some portion of the surfgrass may be impacted by the construction activities. For this reason, surfgrass has also been addressed within this plan. Kelp canopy is not expected to be significantly affected by the work and thus is not proposed for mitigation under this plan.

Enacting measures to avoid and minimize impacts to seagrass would lessen the compensatory mitigation area required to be met. For this reason, the mitigation plan includes recommended measures to avoid and minimize impacts during construction with the goal of lowering the area of the mitigation that must achieve success standards. However, it is not certain that all recommended measures can be implemented by the Corps and the selected contractor, and it is not guaranteed that the full implementation of measures will lead to fully predictable levels of reduction in overall impacts. For this reason, the mitigation plan proposed targets the maximum anticipated impacts to seagrass, and seeks to have the avoidance and minimization measures reduce the ultimate impact in a manner that reduces the area of mitigation required to be successful to compensate for unavoidable losses. This is different from assuming successful avoidance and minimization and thus curtailing the scale of the mitigation area, *a priori*.

## SPECIES CONSIDERED IN THIS PLAN

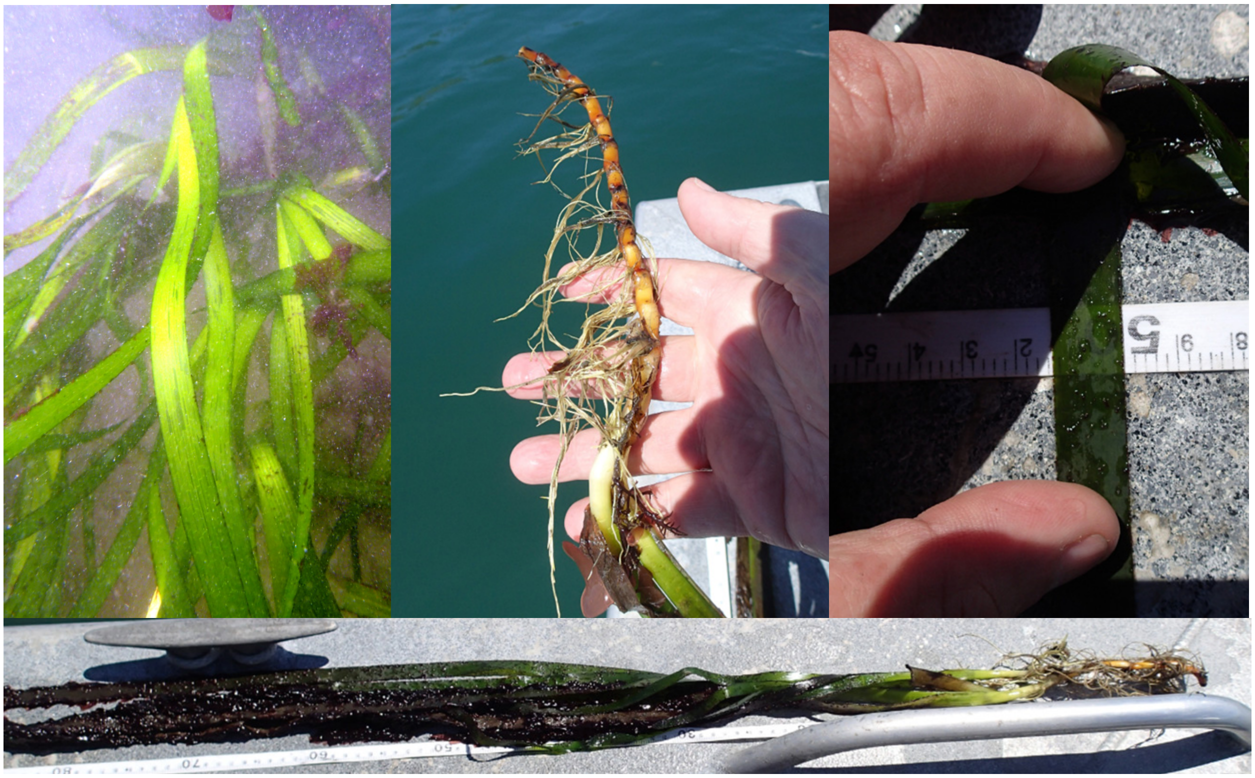
### Pacific Eelgrass

Eelgrass is an important habitat structuring organism found in shallow unconsolidated soft bottom, tidally influenced, protected waters of temperate latitudes. Eelgrass is recognized for its significant contributions to multiple, physical, chemical, and biological ecosystem functions. Eelgrass is a highly productive marine angiosperm (flowering plant) in the family Zosteraceae and is considered a "foundation" or habitat forming species.

Vegetated shallows, including eelgrass habitats are considered special aquatic sites under the 404(b)(1) guidelines of the Clean Water Act (40 C.F.R. § 230.43). Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) eelgrass is found within Essential Fish Habitat (EFH) and is designated as a Habitat Area of Particular Concern (HAPC) for various federally-managed fish species within the Pacific Coast Groundfish Fishery Management Plan (FMP) (PFMC 2008). An HAPC is a subset of EFH that is considered rare, particularly susceptible to human-induced degradation, especially ecologically important, and/or located in an environmentally stressed area. HAPC designations are used to identify areas where additional focus for conservation efforts is warranted.

Three species of eelgrass occur in California and occupy only about 15,000 acres statewide (Merkel & Associates 2017). Of this total, most of the known eelgrass in the state is comprised of common eelgrass (*Zostera marina*) that is widely distributed in the bays and estuaries of the northern hemisphere and is commonly encountered in fully tidal marine systems, and some partially muted systems in California. Also present in California are two other species for which abundance and distribution are dwarfed by that of *Z. marina*. In northern California, the introduced Japanese eelgrass (*Z. japonica*) occurs in scattered locales within principally a low intertidal range. This species likely occupies much less than a dozen acres within only a handful of locations. The second most abundant species is the rather rare Pacific eelgrass (*Zostera pacifica*), native to waters of southern and central California. It is likely that *Z. pacifica* occurs over less than a few hundred acres within California, but may be more common in northern Baja Mexico. The full extent of the known *Zostera pacifica* is estimated at under 300 acres; however, substantially less is known about the distribution of this species than its congener, *Z. marina*, and it may be one of the rarest marine habitats in California.

Pacific eelgrass is a robust eelgrass with broad leaves and thick, nearly woody rhizomes. The species is restricted to open coastal nearshore environments in southern and central California and extends into Baja Mexico. Pacific eelgrass is found in sheltered embayments in the lee of prominent points and capes on the Channel Islands and the mainland coast. The depth range occupied by *Z. pacifica* is typically substantially deeper than that of *Z. marina*. Further the depth range is typically broader than for common eelgrass. However, it is likely that the light requirements for *Z. pacifica* are not substantially different from those of *Z. marina.* Rather the broader and deeper range is reflective of the clearer water of open coastal environments and higher energy within the shallows such that the upper margin is restricted by energy levels rather than desiccation stress as is often the case for common eelgrass.

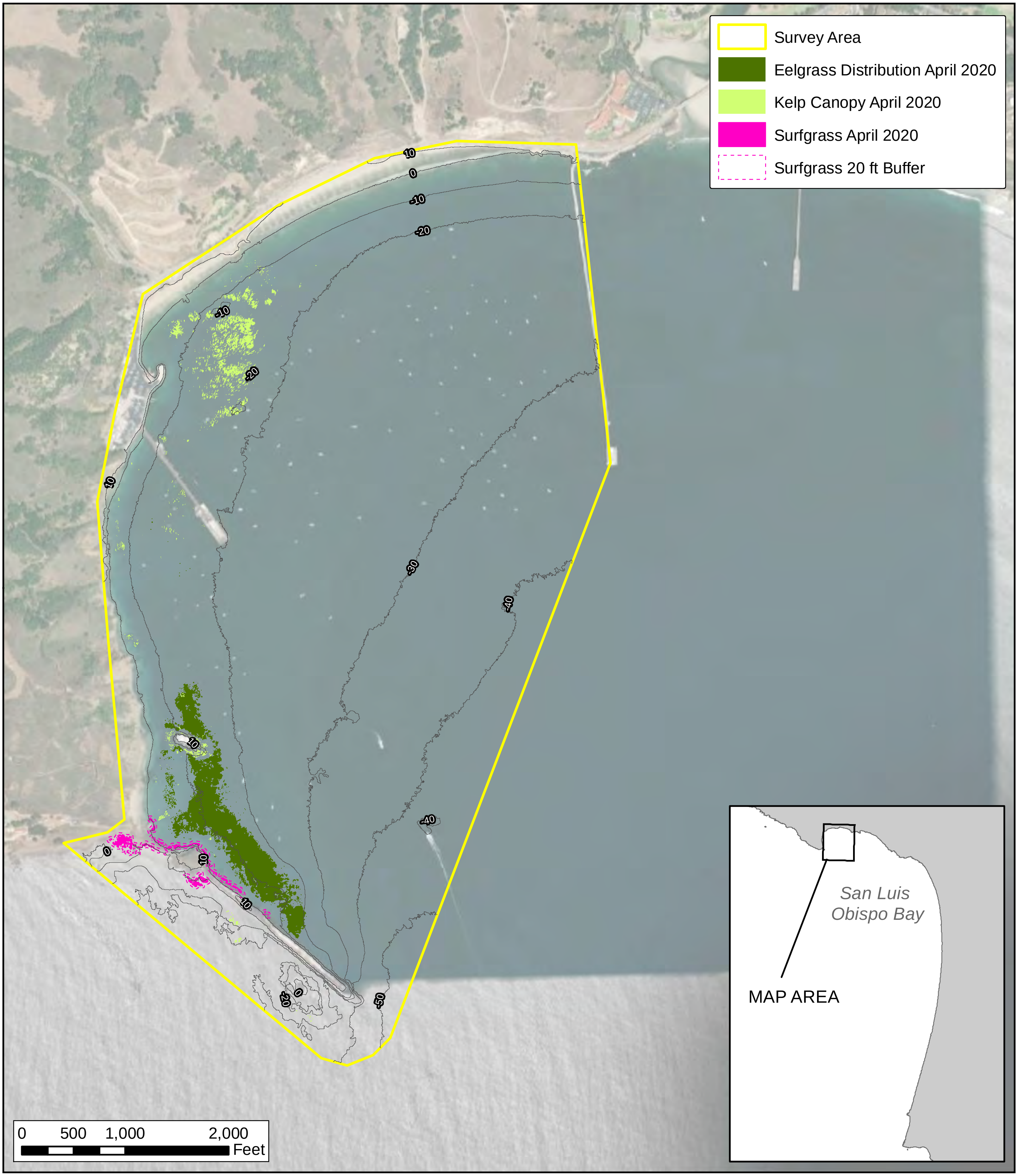


*Pacific eelgrass (*Zostera pacifica*) is a robust heavy bodied eelgrass with large nearly woody rhizomes, broad leaves, and a relatively open growth form. It occurs exclusively in sandy to small gravelly habitats with strong open marine influences and rarely extends into the mouths of enclosed bays and estuaries such as San Diego Bay, Mission Bay, and Newport Bay in southern California.*

Unlike common eelgrass, Pacific eelgrass grows in a nutrient-poor sediment environment of clean sands in open coastal waters. This means that unlike the fast growing common eelgrass, Pacific eelgrass is slow growing and invests greater energy in sustaining its more vigorous tissues than it does in plant expansion. It is not known how important seedling recruitment is to sustaining Pacific eelgrass beds, or how commonly beds are established by seeding. However, it is likely that predictable bed reestablishment by seed is rare following extirpation events. This is based on the limited distribution of the species, the rarity of suitable habitat to support the species, and a belief that flowering in *Z. pacifica* is fairly limited, based on observation, but no focused study.

Within Port San Luis, eelgrass surveys were completed within the approximately 700-acre sheltered embayment between the Port San Luis Breakwater and the Cal Poly Pier in April-May 2020 (Figure 1). The surveys revealed the presence of 15.16 acres of Pacific eelgrass. In June 2018 Pacific eelgrass within the immediate proximity of the breakwater between Smith Island and the lee of the breakwater was surveyed and determined to total 14.19 acres. In February 2019, the same survey extent supported 13.90 acres with approximately 2 percent difference in total area between the surveys and 92 percent of the bed being stable between the survey intervals (Merkel & Associates 2019). Similar stability from spring 2018 through spring 2020 has been observed for this bed segment. Notably, approximately 94 percent of the entirety of the eelgrass present within the Port San Luis area occurs between Smith Island and the breakwater with well over 99 percent of the eelgrass occurring at the western margin of the bay with only a handful of scattered small plants extending from the consolidated larger beds eastward towards Hartford Pier.

M&A #05-024-42




**Survey Area and Resource Overview Map**

Port San Luis Breakwater Repair Sections

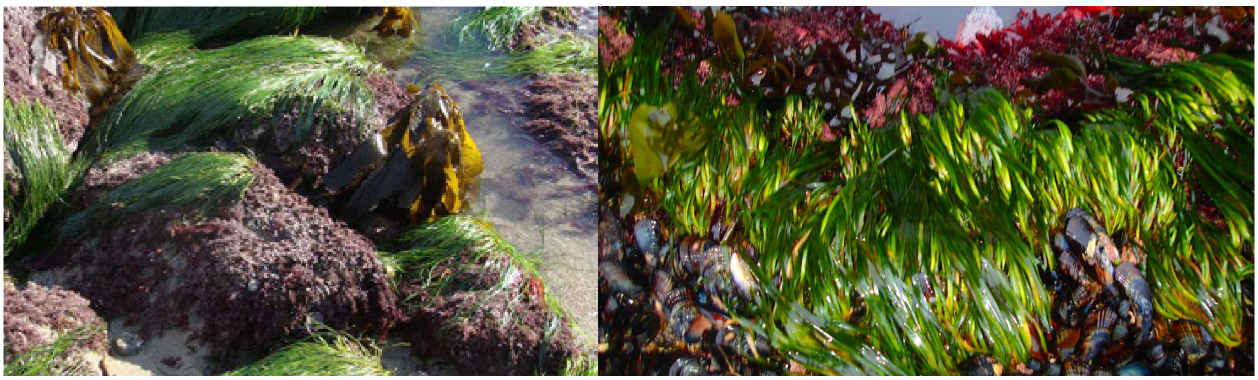
San Luis Obispo County, California

**Figure 1**

*Merkel & Associates, Inc.*

#### **SURFGRASS**

Surfgrasses are perennial dioecious marine plants in the family Zosteraceae. Torrey's surfgrass (*Phyllospadix torreyi*) and Scouler's surfgrass (*P. scouleri*) both occur at Port San Luis and both occur on the Port San Luis breakwater. Torrey's surfgrass ranges from Vancouver Island in British Columbia into Baja California. *P. torreyi* has wiry and long leaf blades that sometimes reach 3 meters in length. The leaves have a narrow round cross section that is typically less than 2 mm in diameter. It is typically found within environments subject to sand scour and intermittent sand burial. Scouler's surfgrass ranges from Sitka Sound, Alaska into Baja California. *P. scouleri* leaves are generally flat and wide (2-4 mm). The leaves are shorter than *P. torreyi*, typically reaching less than 1 meter in length. Both surfgrasses grow on rock making use of hypha-like rhizomes to anchor the plant and dense leaves arise from woody rhizomatous bundles near the plant base.



*Torrey's surfgrass (*Phyllospadix torreyi*) (left) and Scouler's surfgrass (*P. scouleri*) (right). Surfgrass is attached to the rock by holdfast like roots, but generally its colonization is facilitated by compact turf like algae.*

Surfgrass is susceptible to desiccation and heat stress and it is common to see plants that have been burned by exposure during daytime low tides. The plants are relatively robust and can recover fairly rapidly after leaf damage; however, when rhizomes are lost, the recovery may be extremely slow or non-existent. Surfgrass is resistant to sand scour and intermittent burial. Surfgrass is a climax species that recruits into areas that have already been colonized by other species. Typically, surfgrass recruitment is facilitated by turf algae that tends to effectively capture the hairy horned surfgrass seed that is adapted to catching in the tight algal turfs for establishment of new plants.

While surfgrass extends new leaves relatively rapidly when plants are damaged, the basal expansion is moderately slow and new plant establishment is similarly slow to occur. It is typical for the establishment and loss of surfgrass patches to go un-noticed and thus the general spatial dynamics of this seagrass are not well documented. However, in Morro Bay a focused effort to document marine communities in association with the Corps' annual maintenance excavating has allowed for a long-term annual tracking of the expansion of surfgrass on the breakwaters of Morro Bay. This monitoring has documented establishment of new surfgrass patches and expansion in coverage of established patches over many years since the first patch of surfgrass was detected on the north jetty in 2013. Over the subsequent 7 years surfgrass has expanded to both outer rock jetties and occurs in many tens of patches with some reaching multiple square meters in area. This recent observed spread on jetties that have been present since 1942-43 might suggest slow development of conditions suitable for surfgrass recruitment, recent extirpation and recolonization events, or relatively rapid localized recruitment of surfgrass following much less common colonization events.

*Aerial view of surfgrass on the lee side of the Port San Luis breakwater is principally found on the displaced rock that persists interspersed with sand at the lower intertidal margins of the breakwater.*

Surfgrass at Port San Luis has been documented both on the outside and inside of the breakwater. The majority of the surfgrass occurs on the natural rock of Point San Luis and Whaler's Island; however, additional surfgrass extends along the breakwater within area where the breakwater rock is exposed to sand scour and burial. It does not occur on the rock in cleaner water, where it likely is precluded by competition with macroalgae. As a result of its presence in areas that are influenced by sanding, the presence of surfgrass on the breakwater is predominantly focused on the inner portions of the breakwater where intertidal and shallow subtidal sand deposits occur. On the outer segment B of the breakwater where proposed repairs are to occur, surfgrass is most substantively found on the boulders that have been displaced from the breakwater and now persist on two low intertidal zone terraces comprised of a mosaic of displaced jetty rock and interstitial sand.

**GIANT KELP**

Giant kelp (*Macrocystis pyrifera*) is present within scattered beds on rocky bottom habitats within Port San Luis. Historically, beds have been found both inside the breakwater protection and outside of the breakwater. Over at least the past couple of years during which time surveys have been completed for the breakwater repairs project, little to no kelp has been noted outside of the breakwater within the project study area (Figure 1). In June-July 2018 no kelp was noted on the breakwater. Additional kelp surveys were conducted in January-February 2019 and kelp was not noted at this time. Because of the absence of kelp in 2018 and the absence of kelp in winter 2019, a kelp frequency analysis was undertaken to identify how often kelp occurred in the project area and along the breakwater using data from CDFW kelp canopy surveys (Merkel & Associates 2019). This analyses revealed kelp at a low frequency of occurrence (14 percent of the surveys) with presence of narrow fringes of kelp being observed, principally on the lee of the breakwater. The distribution showed kelp at the tip of the breakwater and, erroneously, on intertidal and very shallow subtidal rock not suited to supporting giant kelp or bull kelp (*Nereocystis luetkeana*). Rather it is believed that the CDFW mapping likely included the understory feather boa kelp (*Egregia menzieii*) that is present in these areas. In spring 2020, kelp was more expansive in the project study area, but canopy kelp remained absent from the inside margin of the breakwater. A small amount of kelp canopy was present in small stands near the toe of the outer portions of the breakwater and was fairly extensive in the harbor (Figure 1). Based on the frequency distribution analyses of CDFW data and observations from 2018-2020, canopy kelp is not believed to be a significant habitat resource within the work area and thus is not further addressed in this mitigation and monitoring plan.

## EELGRASS AND SURFGRASS IMPACTS

### PROJECT ACTIVITIES

The Corps is proposing to perform Operations and Maintenance (O&M) repairs to the Port San Luis breakwater to maintain the breakwater's integrity. The proposed work would involve repair of the breakwater by resetting and augmenting quarried jetty stone along the breakwater. The repair work would occur on the outer segment B of the breakwater that extends seaward from Whaler's Island. The repair is to be focused on the most heavily damaged 1,420 feet of the structure located between station 4+00 and the head of the breakwater at station 18+20. The footprint of the breakwater would not be changed, but the crest elevation would be raised from +13 feet Mean Lower Low Water (MLLW) to +16 feet MLLW for hydraulic stability, to accommodate larger armor stone, to meet design criteria, and to account for sea level rise. It is estimated that approximately 29,000 tons of existing stone would be required to be reset and 60,000 tons of new stone would be placed to restore the most heavily damaged portion of the breakwater.

Repair work would occur from the lee of the breakwater and would extend from a low elevation at 0 feet MLLW to the breakwater crest with no work being performed on the outside face of the breakwater. All work is anticipated to be from waterside equipment, including a large crane barge, one or more rock barges, a scow, tug boats, and small crew boats, survey boats and other support vessels. The work is anticipated to require a 6-month construction window focused on the lower wave climate summer and fall months of the year.

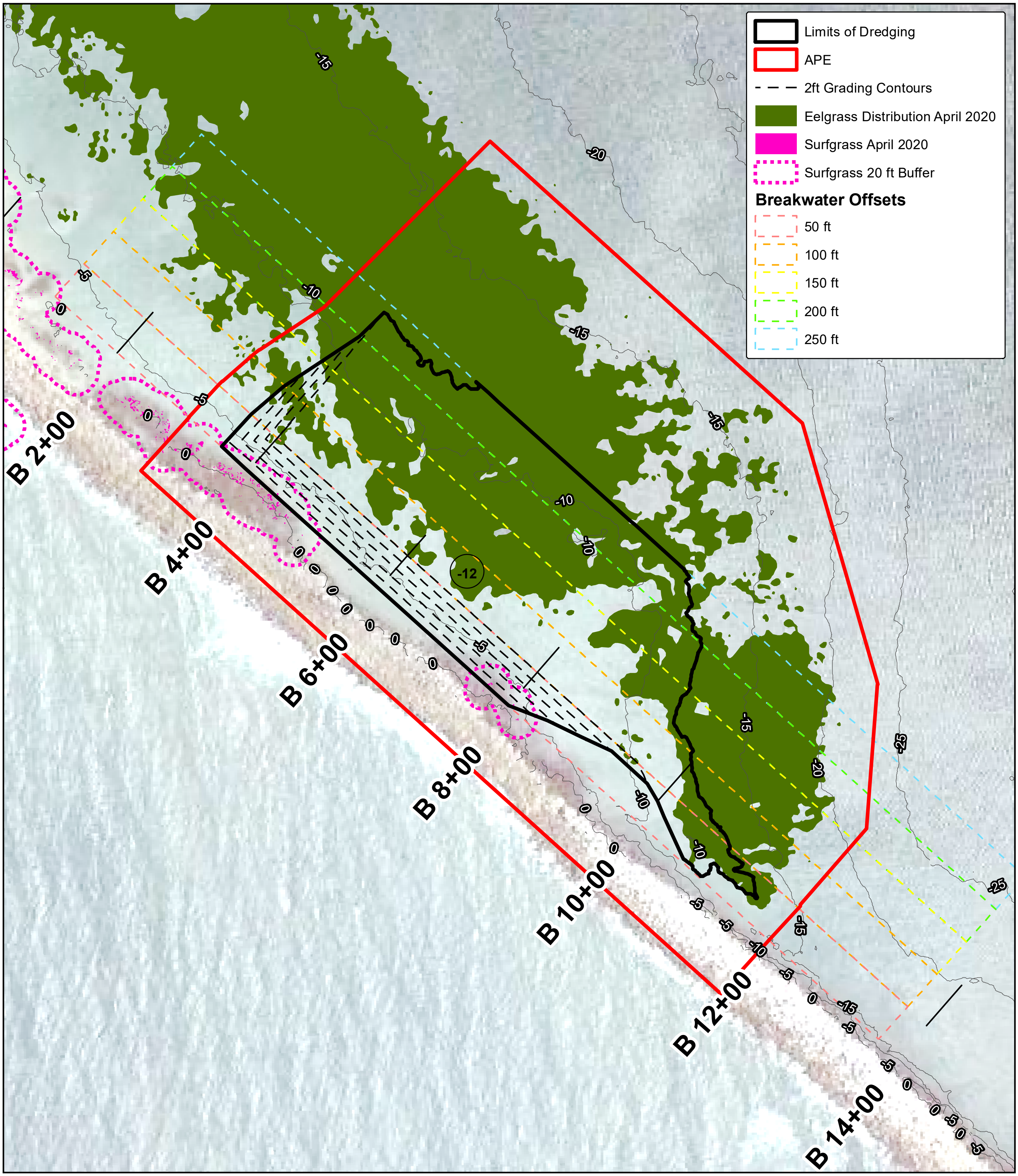
In order to perform the work, it is necessary for the crane barge and supporting rock barge to be positioned adjacent to the east side of the breakwater such that jetty stone may be individually grappled off the rock barge and placed on the breakwater. Vessel positioning will be maintained by using multi-point anchoring or spuds or a combination. The anchor spread would need to be repositioned as the equipment is moved along the work area. The drafts of the crane barge and loaded rock barges are generally 8-10 feet and a significant portion of the leeward side of the breakwater supports an accreted sand shoal that is shallower than that necessary to accommodate access. To accommodate equipment access without vessel grounding at low tide or during periods of heavy swell would require excavating of an access channel to -12 feet MLLW.

The side-by-side width of the crane barge and rock barge is approximately 150 feet. The width of the access channel, including required breakwater toe setbacks, channel slopes, and maneuvering and positioning area for the crane barge and rock barges are estimated to be approximately 250 feet. Excavation of the access channel for breakwater repair is considered the first phase of construction activities. During this phase of work, excavation of approximately 13,500 to 15,000 cubic yards of sand would occur to cut a channel adjacent to the east side of the breakwater from approximately Station 12+00 northward to approximately Station 4+00 (Figure 2). The subsequent second phase of work would involve repositioning unstable armor stone and placing new armor stone to restore the integrity of the breakwater.

### SEAGRASS IMPACTS

The excavating of the access channel is expected to result in direct impacts to eelgrass from excavating. In addition, secondary impacts around the excavating footprint may be expected to occur as a result of both controllable and uncontrollable factors. As such, quantification of potential impact extends beyond the direct footprint of work to define an Area of Potential Effect (APE) (Figure 2).

M&A #05-024-42




**Project Impact Area Seagrass**

Port San Luis Breakwater Repair Sections

San Luis Obispo County, California

**Figure 2**

Merkel & Associates, Inc.

Potential impacts to seagrasses from excavating of the access channel would occur to Pacific eelgrass. No direct excavating impacts to surfgrass are anticipated as a result of excavating. Outside of the excavation impacts, the impacts to eelgrass and surfgrass become less certain and may be substantively controlled by implementation of construction period best practices targeted at reducing potential for secondary impacts. The recommended measures to avoid and minimize secondary impacts are discussed later in this plan. However, for purposes of appropriately scaling the seagrass mitigation to avoid risks of shortfall it is best to assume a high estimate of potential impact and then work to both minimize the impact and plan mitigation for the higher level of effect.

The impacts to seagrasses that are anticipated from the project are identified in Table 1. Controllable impacts potentially occurring to eelgrass beyond the direct excavating may occur as a result of elevated turbidity from excavating, propeller thrust damage by tug boats, dragging tow lines or positioning anchor rode and spudding outside of the excavation channel, or positioning of equipment over eelgrass for a period of time resulting in shading impacts to eelgrass. Less controllable impacts may include cut bank relaxation near the upper end of the channel cut at Station 4+00 or elevated turbidity from post-excavating sediment stabilization and winnowing of fine sediments from the exposed cut areas. While the APE has been defined broadly to include proximate areas that may be affected by secondary damage, it is anticipated that little of this area will actually be impacted if construction controll measures are effectively implemented.

Surfgrass occurs within the APE, but not within the access channel excavation area. This resource is scattered in small patches right at and slightly below 0 feet MLLW and may be impacted by rock repositioning near the lower limit of work and may suffer from unplanned rock drops during work or disturbance of sediment and burial by sand as a result of changing sediment accretion patterns during the time equipment is positioned in the adjacent channel area. Conversely, the reduction of sand in the adjacent areas to the surfgrass may be expected to result in a migration of sand out of the boulder field area resulting in either a shifting of the boulders, or a reduction in sand scour and burial stress in surfgrass locations and a loss of surfgrass due to increased competitive advantage by macroalgae that is dominant to the exclusion of surfgrass within the areas of the breakwater that are not heavily influenced by sand. At present, it is anticipated that all impacts to surfgrass may be avoidable. However, potential for limited losses of this species within the APE cannot be ruled out given the very close proximity of heavy rock work and the relative unpredictability of how the rock on the sand shoals may shift in response to a combination of the adjacent excavating and the change in scouring hydrodynamics with the prolonged presence of the construction barges in close proximity. As such it is appropriate to assume some degree of impact to this resource may occur although it is very unlikely that it would be more than a small fraction of the total extent present in the APE.

**Table 1. Anticipated impact to seagrasses from Port San Luis breakwater repairs**

| Seagrass Habitat Impacted | Estimated Impact Excavation Area | Estimated Impact Full APE |
|---|---|---|
| Pacific Eelgrass | 7,286 $m^2$ (1.80 ac) | 17,758 $m^2$ (4.39 ac) |
| Surfgrass | 0 $m^2$ (0 ac) | 31 $m^2$ (0.008 ac) |

## EELGRASS MITIGATION

### EELGRASS MITIGATION REQUIREMENTS

Impacts to eelgrass are anticipated to range from 1.80 to 4.39 acres based on spring 2020 eelgrass surveys (Table 1). The actual impact requiring mitigation is to be determined based on pre-construction and post-construction surveys conducted under the guidance of the California Eelgrass Mitigation Policy (CEMP) (NMFS 2014). However, for purposes of mitigation planning, it has been assumed that impacts would occur to the higher 4.39 acres of Pacific eelgrass. Under the CEMP, eelgrass impacts are to be offset by restoration of eelgrass at a 1.2:1 ratio (mitigation to impact). The required initial restoration size is scaled by a regional success history factor that has been established in the CEMP and which is adjusted over time during policy review periods. At present, the minimum restoration sizing required for central California is equal to the ultimate success requirement (1.2:1) due to a 100 percent success rate for eelgrass restoration in the region. Based on the minimum requirements of the CEMP and the assumed maximum extent of impact within the APE, an eelgrass restoration project of 5.27 acres would be required to be implemented and 5.27 acres of the restoration would be required to be successful. However, it is important to note that this level of restoration success is not a good indicator for the present project in that it is based on only four projects all involving the restoration of *Zostera marina* within the protected waters of Morro Bay (NMFS 2014). Further, eelgrass restoration projects are almost never fully successful and some degree of shortage in eelgrass cover or density should be factored into the mitigation planning. In addition, the restoration of *Z. pacifica* in an open coastal system should be considered to be much less certain than restoration of *Z. marina* within a bay setting. The history of eelgrass restoration in *Z. pacifica* is much more limited with only a small handful of projects involving this species. Further, the restoration environment is more variable and unpredictable with respect to factors that may affect the restoration success such as wave environments, nutrient availability, and sediment stability.

As a result of the concerns relative to restoration of Pacific eelgrass, it is recommended that the risks in the mitigation be managed by a multipronged strategy as follows:

1) Plan mitigation needs based on an assumed high impact level;
2) Minimize impacts where practical based on construction period best practices environmental controls;
3) Aim high on the eelgrass restoration target to meet a lower mitigation requirement, and;
4) Diversify the mitigation approach to minimize the potential for a particular type of stressor impacting the mitigation areas resulting in catastrophic losses.

This approach to enhancing potential for successful mitigation has been taken within this plan.

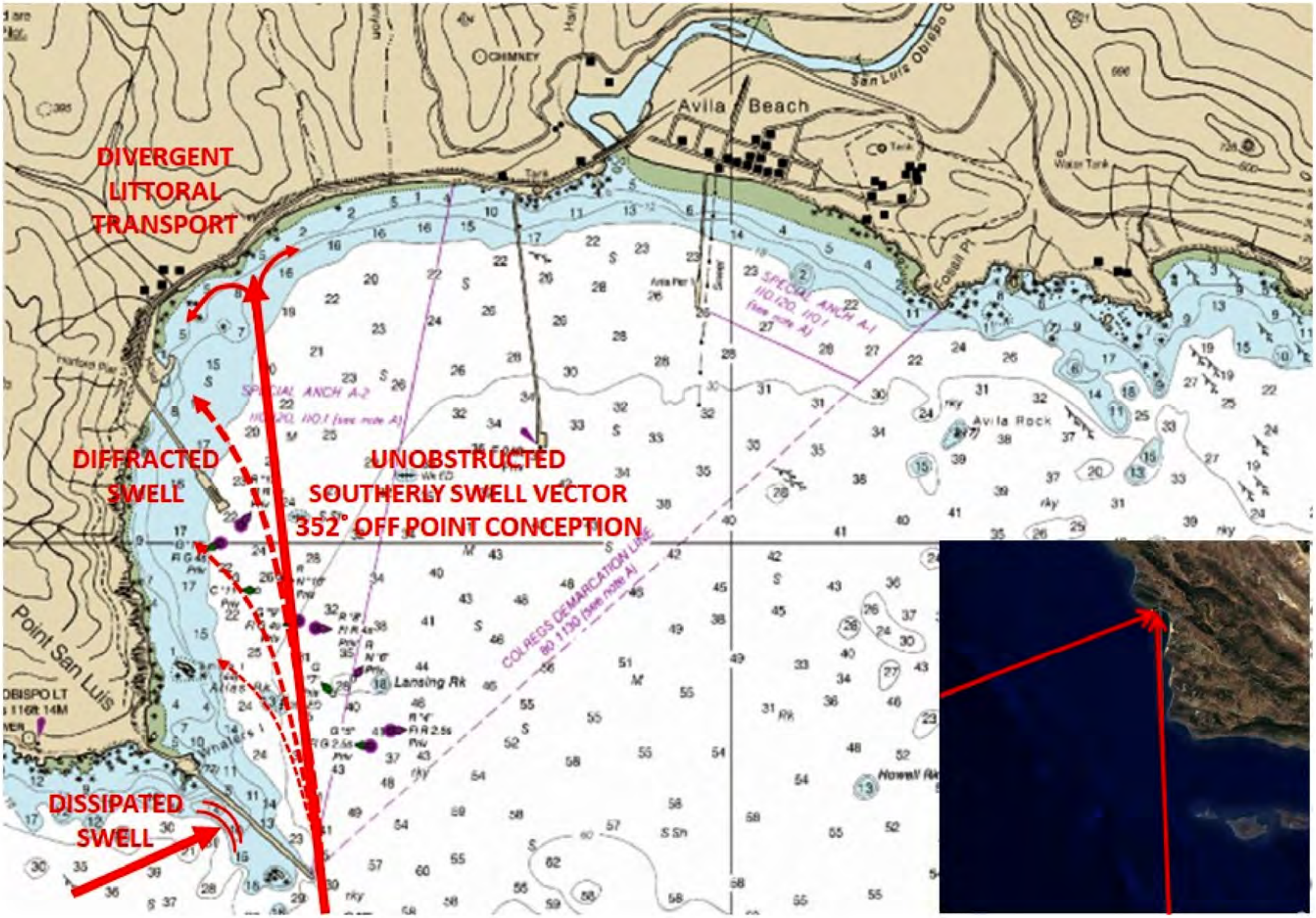
## EELGRASS HABITAT ENVIRONMENTAL DESIGN FACTORS

### Wave Climate

The wave climate of San Luis Obispo Bay and more specifically around Port San Luis has a considerable amount to do with the distribution of eelgrass within the bay. San Luis Obispo Bay is a typical hook shaped open coastal embayment defined by the up coast rocky headland of Point San Luis that provides a natural protection of the embayment from northerly swell (Figure 3). This protection is naturally augmented by the presence of Whaler's Island and smaller rocks further from the point that are elements of the continuing headland geology. With the construction of the Port San Luis breakwater along the natural headland rock formation axis of approximately 130˚ the wave sheltering effects within the harbor from northern and western swell conditions has been further expanded with westerly swell being dissipated on the breakwater rock and northerly swell being trained further to the south. Inner Port San Luis is exposed to wave penetration from southerly swell conditions; however the influence of the prominent Point Conception located 40 miles to the south, limits the fetch of waves approaching from the southeast, while waves approaching from the southwest are partially blocked by the Port San Luis breakwater such that the energy level in San Luis Obispo Bay diminishes to the northern and western extent of the bay towards the lee of the Port San Luis Breakwater and energy increases to the east and south within the bay towards Avila Beach with even greater exposure being seen at Pismo Beach. While the breakwater provides protection of the bay from northern and western swell, the alignment's prominent point and angle toward shore create a point of wave interference that results in diffraction of southerly swell such that a portion of the wave energy spreads to the protected waters behind the breakwater. This spread creates a moderate amount of wave energy within the waters that are otherwise protected from direct wave attack.

To better visualize the distribution of the wave climate within the project area relative to the existing distribution of eelgrass, the Coastal Storm Modeling System (CoSMoS) wave modeling developed by the United States Geological Survey (USGS) for predictions of coastal flooding was accessed and a 20-year storm scenario was run to obtain an output of significant wave height (USGS 2020). From this output, the existing eelgrass beds were used as a mask to extract a section of the model in order to determine the significant wave climate at a 20-year event within eelgrass habitat. The modeled wave climate within the eelgrass beds was then overlain on the overall wave climate plot to explore eelgrass distribution relative to the modeled wave environment (Figure 4).

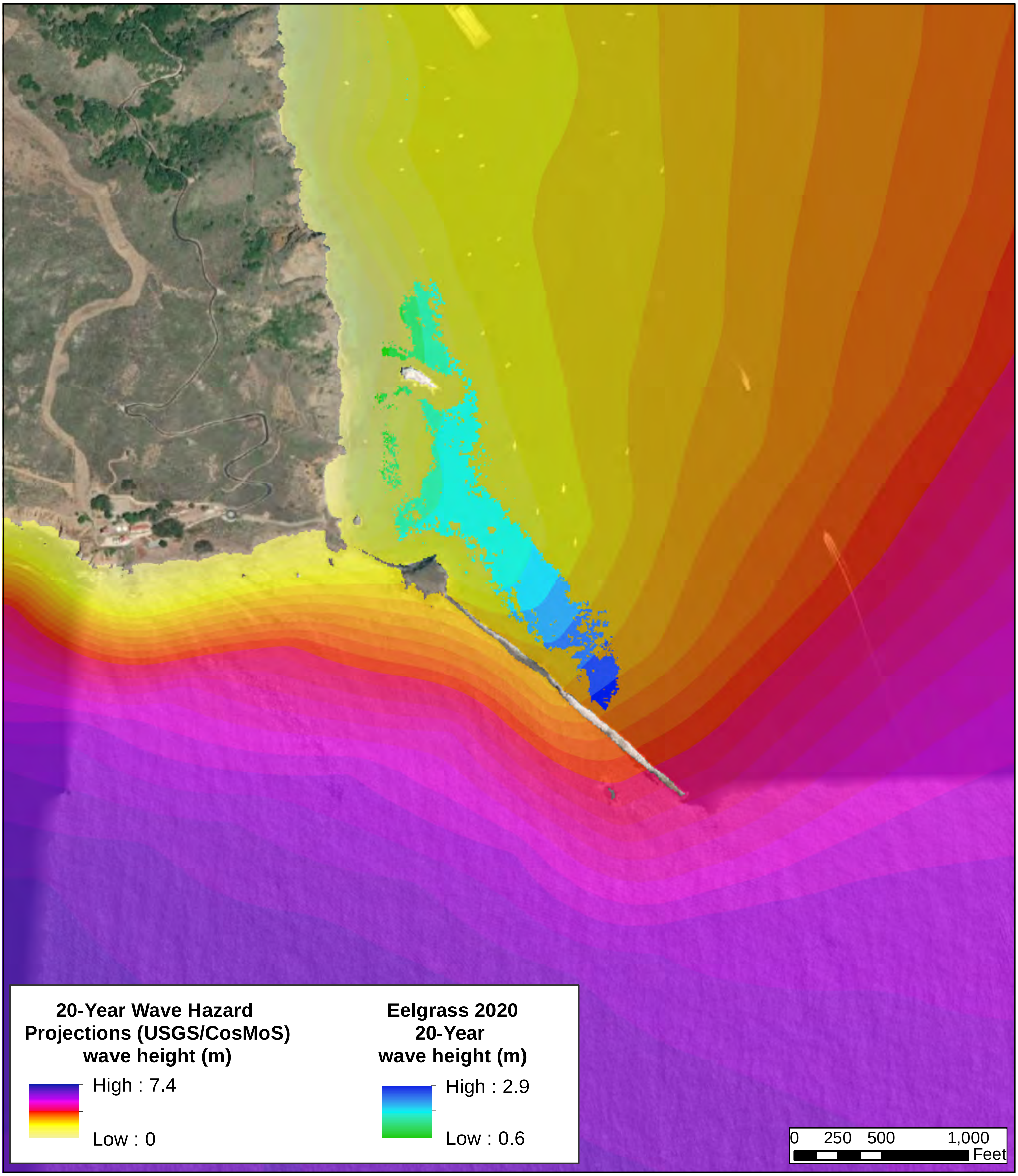
The output from the CoSMoS models appears to be somewhat coarse and suggests a wave environment on the lee of the southern end of the breakwater that seems anomalously high and not supportable by a solid breakwater. Despite the wave model predictions of significant wave heights as high as 2.9 meters in this location, most of the eelgrass is limited to a distribution within a wave climate of 1 meter or less and only deeper portions of the bed occur within higher wave climate areas. The model results are useful in explaining the relatively tight affinity eelgrass appears to have with the leeward side of the breakwater and why the beds so rapidly diminish towards the Hartford Pier to the north where the energy climate increases. However, the absolute values of significant wave height predictions and the subtleties of the model output should not be relied on as it is believed these are well beyond the model applications intended and any reasonable extension.




**Overview of Port San Luis Oceanic Wave Exposure and Influence of the Port San Luis Breakwater**

Port San Luis Breakwater Repair Sections
San Luis Obispo County, California

**Figure 3**




**Port San Luis 20-Year Maximum Wave Height**

Port San Luis Breakwater Repair Sections

San Luis Obispo County, California

**Figure 4**

One notable source of energy influencing eelgrass distribution cannot be explained by either the geometry of the site or the CoSMoS model and that is overtopping of the breakwater by westerly waves. It has been noted that the southerly end of the eelgrass beds have a large gap within otherwise similar elevations as occupied by dense eelgrass elsewhere (Figure 2 and 4). This gap was puzzling until the site was examined during a high seas state when it was noted that waves break in a concentrated form over the breakwater at this location (centered on Station 8+00) and impact heavily on the breakwater and waters on the leeward side of the breakwater. It is believed that the bottom disturbance from this overtopping may mobilize the sediment adequately in this location to prevent establishment of small eelgrass plants or larger storms may strip larger plants from the area on a recurrent basis. Because of the slow growing nature of *Z. pacifica* it is reasonable to assume that once cleared of plants it may take a considerable period for plants to recruit back to the site. While the observations made of a potential energy control are anecdotal in this instance, observations of significant damage to Pacific eelgrass beds due to storms have been made in the Malibu area where more frequent surveys were undertaken (K. Merkel, pers. obs.).

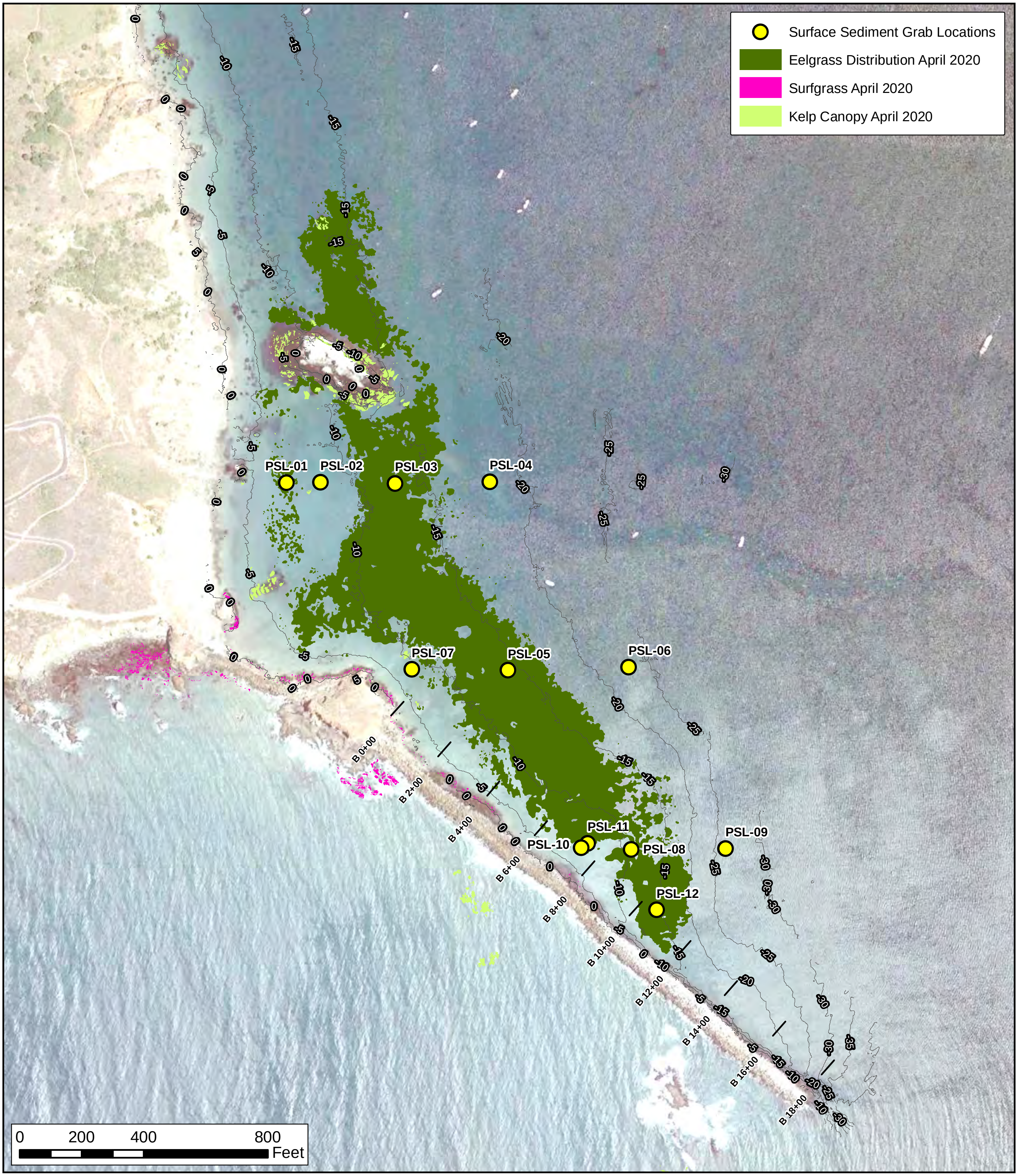
Based on the wave energy modeling, and observed distribution of eelgrass relative to the wave climate, it is believed that for Pacific eelgrass restoration to be successful it must be retained in close proximity to the present dense eelgrass beds. It is not considered feasible to restore eelgrass much further to the east from these beds.

**Sediment Grain Size**

As noted above, Pacific eelgrass is restricted in its distribution to sandy sediments that have limited concentrations of fine sediments. These sediments are from littoral sources rather than fluvial sources. In order to evaluate the characteristics of sediment and potential suitability of areas to receive eelgrass restoration by way of transplants, sediment grain size distribution was examined within both eelgrass supporting and non-eelgrass supporting habitat areas located in proximity to the existing beds. Surface sediment grab samples were collected at 12 locations spread across multiple transects extending through a depth gradient ranging from -7.4 feet MLLW to -26.7 feet MLLW (Figure 5). Seven of the 12 samples were collected from within eelgrass beds and the remaining five samples were derived from outside of eelgrass.

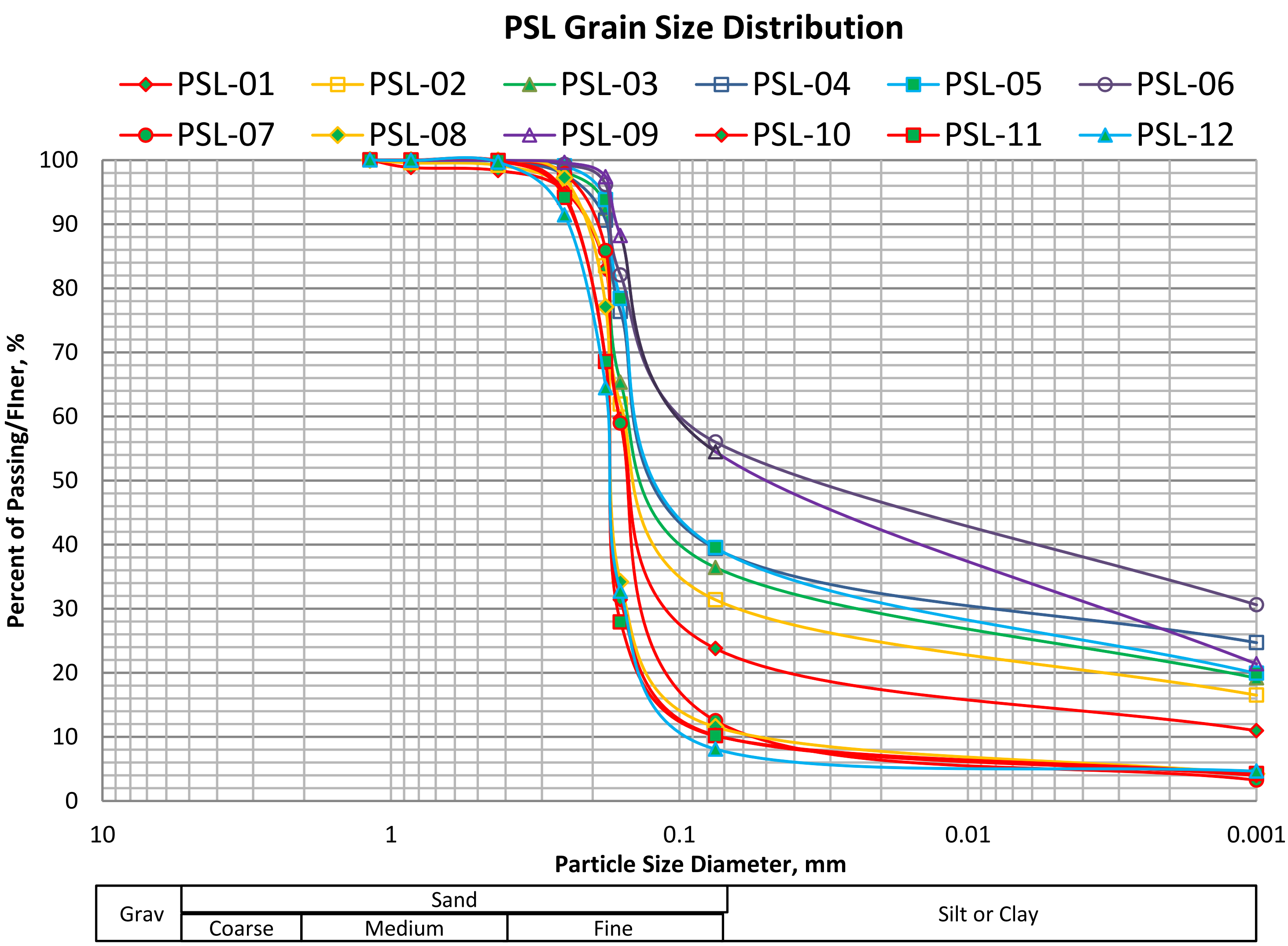
Samples were analyzed for grain size distribution following ASTM D 422 methods. Following analysis, the sediment grain size distribution curves were plotted and the median particle diameter (D50) was estimated (Figure 6). The results of the analyses indicate that fine sand dominates all portions of the study area with the range across samples being 69.4 percent sand in an unvegetated site at -23.2 feet MLLW to 96.7 percent at a site supporting eelgrass in -7.9 feet MLLW. The percent sand and D50 declined with increasing depth. Eelgrass was found in sediment with a D50 ranging between 0.10 and 0.17 mm, although all samples shallower than -18.5 feet MLLW had D50 values within this same range, irrespective of support of eelgrass. The percent sand and D50 both increased with increasing energy exposure.

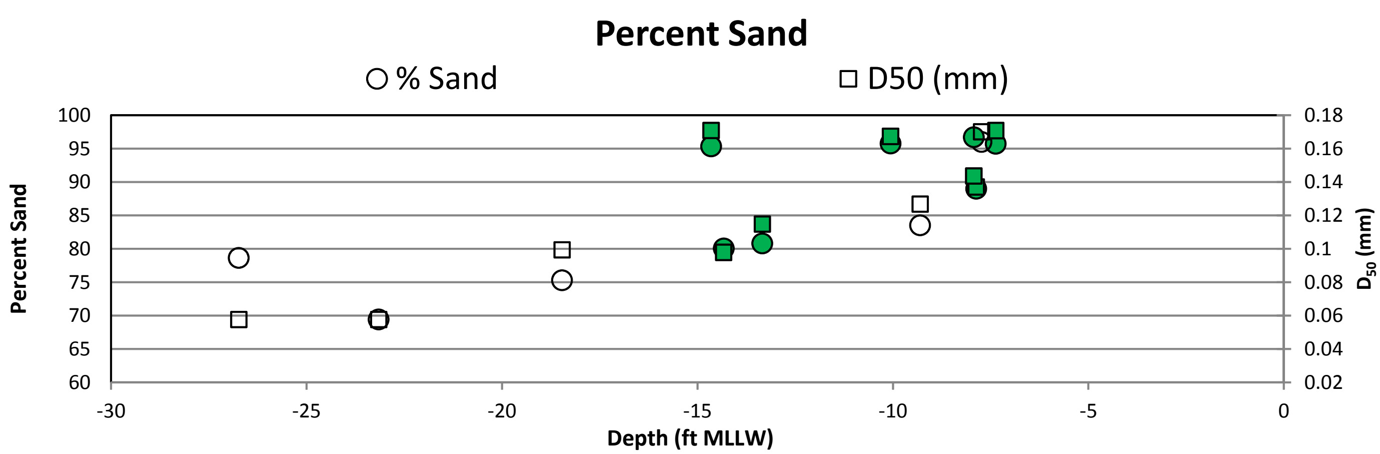
The results of the sediment grain size analysis do not provide any surprises and suggest that sediment characteristics are not likely to limit the restoration potential for eelgrass at this location. The observations also suggest that sediment grain size is a likely function of the energetics of the specific areas sampled.




**Surface Sediment Grab Locations**
Port San Luis Breakwater Repair Sections
San Luis Obispo County, California

**Figure 5**



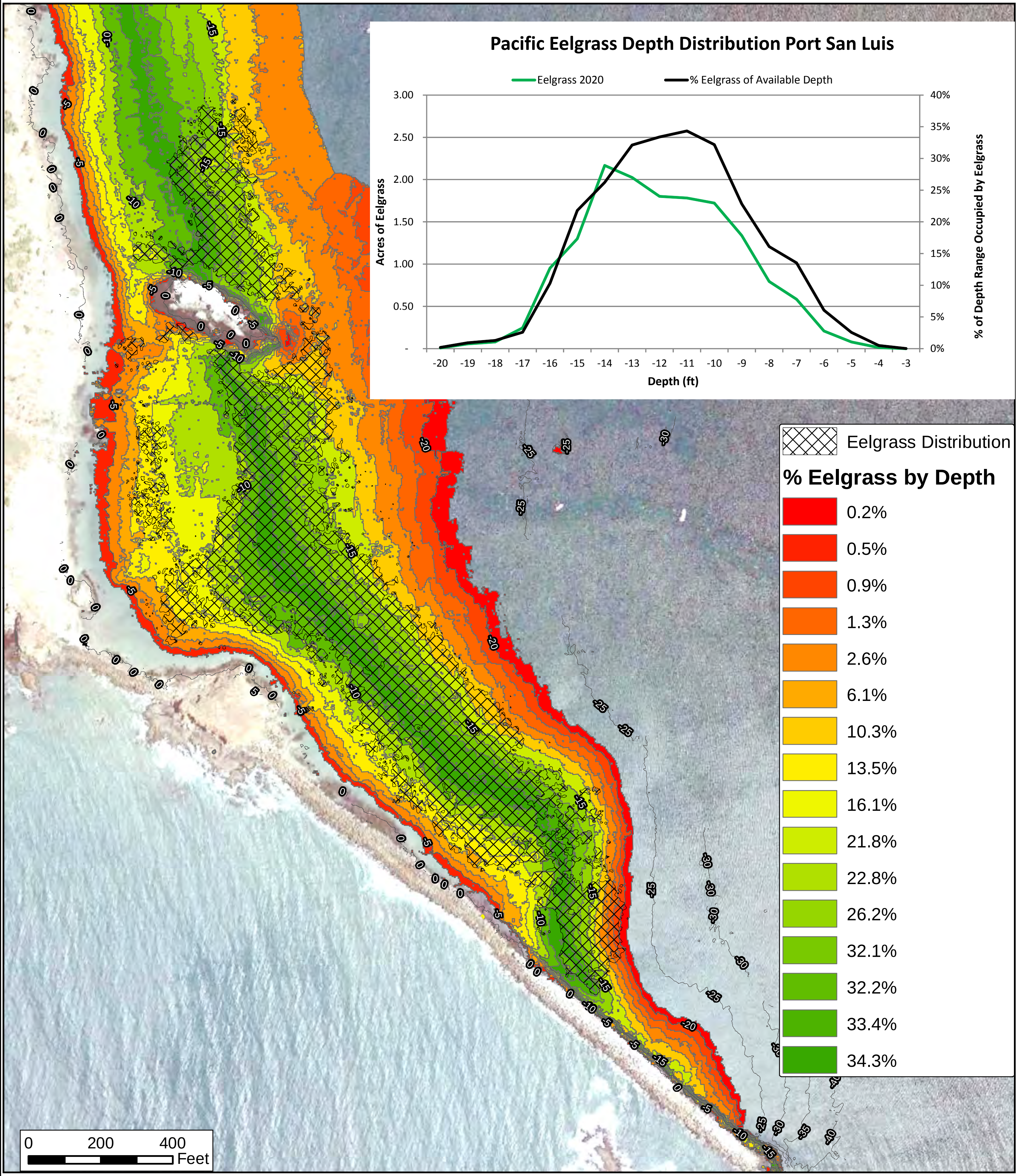

**Surface Sediment Grain Size Distribution and D50 at Port San Luis Breakwater**
Port San Luis Breakwater Repair Sections
San Luis Obispo County, California

**Figure 6**

**Eelgrass Depth Distribution**

An analysis of the vertical distribution of Pacific eelgrass was conducted within the project study area to determine the elevational ranges suited to supporting eelgrass at the site. This was conducted by extracting a bathymetric raster grid using the spring 2020 eelgrass distribution as a clipping mask. The elevations from the extracted bathymetry were then binned to 1 foot elevation steps and the extent of eelgrass within each depth bin was determined and the area of eelgrass present in each depth bin was calculated to create an unweighted depth distribution curve for eelgrass (Figure 7). To expand upon the analyses, the depth distribution curve was weighted by calculating the percent of eelgrass present within the depth bins based on the available area of the depth bins. In other words, this analysis divides the portion of the depth bin occupied by eelgrass by the total available habitat within the binned depth.

The results indicate that Pacific eelgrass within San Luis Obispo Bay has a depth range from -4 to -20 feet MLLW. A full 80 percent of all of the eelgrass present occurs within a much tighter range between -9 to -15 feet MLLW. When considering the availability of bottom area falling within each depth bin, a very even unimodal depth distribution emerges with depths from -10 to -14 feet MLLW all supporting an eelgrass coverage of greater than 25 percent. However, when the percent eelgrass cover by depth bin is used to produce a plot overlaying the existing eelgrass grid depicting bathymetry based on the percent occupation by eelgrass it is clear that depth alone does not account for eelgrass distribution. This is best illustrated by the non-random distribution of eelgrass within predicted high suitability depth ranges and the near absence of eelgrass from areas of apparently suitable depth located to the north of Smith Island and continuing toward Hartford Pier. However, combined with wave energy, the depth distribution of eelgrass at Port San Luis provides a good definition of eelgrass habitat potential and thus an envelope of opportunity for mitigation. It is believed from the analyses that Pacific eelgrass within San Luis Obispo Bay is limited at the upper margins and laterally along the shore by wave energy and is limited at the lower elevations by available light for photosynthesis. These constraints are considered to be fixed and thus mitigation opportunities must comport to these limitations.

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**Depth Suitability to Support Eelgrass**

Port San Luis Breakwater Repair Sections

San Luis Obispo County, California

**Figure 7**

## EELGRASS MITIGATION PLAN

### Mitigation Approach

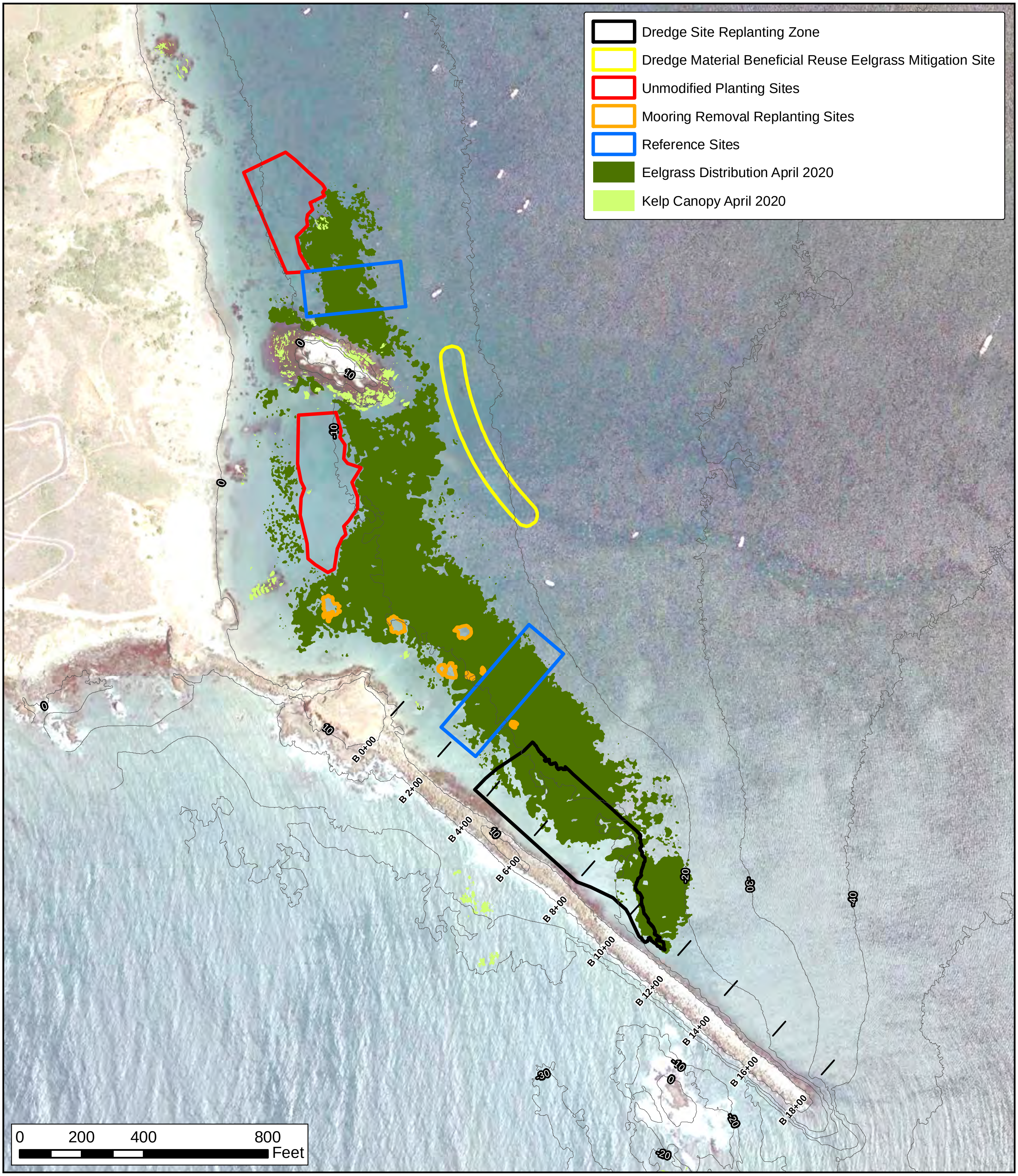
As noted above, the anticipated impacts to eelgrass range from 1.80 acres of direct impact to a maximum of 4.39 acres, including direct impacts and potential secondary impacts associated with construction activities and potential losses associated with less controllable factors including slope erosion at the head of the access channel cut, or temporary localized elevated turbidity following the excavating while fine sediments winnow out of the cut area.

Eelgrass impacts will be mitigated using a number of methodologies to be implemented at three stages of construction work to transplant eelgrass at multiple locations using multiple transplant methods. By spreading the restoration over time and planting areas and methods, it is intended that risk of failure can be controlled and later phases can be used in an adaptive approach to execute restoration activities in a manner that benefits from observed outcomes of early restoration and thus will provide a degree of opportunity to augment early plantings if appropriate. The restoration approach includes four types pf planting areas (Figure 8):

- **Unmodified Planting Sites** – This includes two plots located adjacent to existing eelgrass beds and mostly towards the shallower margin of the present eelgrass. The elevation range of these sandy sediment locations is from approximately -7 to -14 feet MLLW and is bounded within that occupied by the existing eelgrass and centered on the bathymetric range exhibiting the highest frequency of eelgrass presently (Figure7).

- **Mooring Removal Replanting Sites** – Within the inner beach margins of the eelgrass beds there are a number scars in the beds from single point moorings. Some mooring tackle remains on the bottom within some of these scars. The Corps has confirmed with Andrea Lueker, Harbor Manager, and Chris Munson, Facilities Manager, at the Port San Luis Harbor District that the moorings are not part of the permitted moorings and are not those of the District. It is not believed there are any authorized private moorings in these areas.

- **Excavation Material Beneficial Reuse Eelgrass Mitigation Site** – The excavation material reuse site is an area identified along the deeper margin of the existing eelgrass bed where excavated sand from the construction access channel may be placed to raise the bay bottom upward to an elevation suitable to support eelgrass. The material to be excavated is sand supporting dense eelgrass beds. The material would be excavated and transported by scow to the deeper waters outside of existing eelgrass where it would be bottom dumped to raise the seafloor from a deeper margin at -22 feet MLLW up to a crest elevation of -12 feet MLLW, an elevation centered nearly precisely within the depth range presently occupied by Pacific eelgrass at Port San Luis. The fill is to be set back somewhat from the higher subtidal elevations occupied by eelgrass to avoid any direct impacts from placement and to accommodate any storm driven migration of sand towards the existing beds in a manner that natural beds would not be threatened by sand overrun. The excavation and scow loading will be staged in such a manner that much of the eelgrass rhizome rich material will be placed in the upper sediment lifts of the site to facilitate mechanical excavating translocation of eelgrass.




**Pacific Eelgrass Mitigation Sites**
Port San Luis Breakwater Repair Sections
Stations B 6+00 to Station B 13+00
San Luis Obispo County, California

**Figure 8**

- **Excavation Site Replanting –** The access channel for construction work is to be cut to a floor depth of -12 feet MLLW to accommodate equipment. As a result of the sloping bathymetry away from the breakwater, the channel would not end up being a trench, but rather a terrace daylighting into eelgrass along the northeastern margin of the cut. Controlling the depth of channel cut to -12 feet allows the channel to be planted with eelgrass after rock work is completed without further manipulating the channel depths by backfilling or deepening the channel to target eelgrass habitat suitability. The channel would be planted with bare root planting units after breakwater work is completed. For this last phase of planting, it will not be possible to use a salvage approach for donor material as would be the case for earlier planting. As a result, harvested eelgrass would be derived from donor beds outside of reference and restoration sites.

- **Other APE Damage Replanting –** While not expected to be substantially impacted by the work, areas within the APE that are outside of the access channel excavation footprint may suffer some losses due to scour, shading, or cable drags. Areas supporting eelgrass that are damaged due to a transient impact are generally highly restorable by installation of planting units within the damaged areas. Often this takes the form of gap infilling around remaining eelgrass and thus it is necessary to define when gap infill will occur. Planting within the APE outside of the excavated site will occur when it is determined that the area has been damaged and eelgrass reduced from that occurring during the pre-construction surveys, when corrected for natural declines as determined using the natural reference sites. When the an impact has been determined to have occurred, any gaps that have developed between the pre- and post-construction surveys that are greater than 1 meter across will be planted with bareroot planting units at 1 meter centers.

### Mitigation Phasing

As indicated by the descriptions of the mitigation work to be performed, there is a phasing component in the work in order to capitalize on salvage of eelgrass material for translocation, spreading of planting periods over different time periods, and adaptive management in the final planting actions. To accommodate the phasing of work, a phasing plan is provided.

#### *Phase I (Prior to Access Channel Excavating):*

1) Salvage harvesting of eelgrass will be conducted at an unlimited harvest level from within the access channel excavating footprint.
2) Salvaged plant material will be used to plant two unmodified planting areas and six prior mooring scars that have remained unvegetated (Figure 8).
3) The planting within these areas would be performed by preparation and planting of anchored bareroot planting units on 1-meter planting centers.

#### *Phase II (Access Channel Excavating):*

1) The first construction action for breakwater repair is the excavation of the access channel as illustrated in Figures 2 and 8.
2) Excavated sand will be placed into the reuse eelgrass mitigation site.
3) The excavation, hauling, and placement of material will be staged to favor viable rhizome rich sediment being placed in the top layer of the fill.

***Phase III (Overall Construction):***

1) The minimization of avoidable secondary impacts to eelgrass is to be an important objective of the construction process. To achieve, this the following measures are to be required of the contractor:
   a) Environmental training related to operations in and around the eelgrass habitat. This training is anticipated to be merged into the overall environmental training for the project.
   b) Designated equipment staging and storage areas will be identified such that any equipment not being used in the construction access corridor will be required to be stored or staged outside of the beds in a storage area monumented by buoys.
   c) Buoys are to be placed along the eelgrass margin near the sediment reuse site to aid in protection of eelgrass while scows are positioned for site construction.
   d) Spudding, anchoring, or tugs used to position equipment will not be operated or placed on or over eelgrass habitat located outside of the designated APE..
   e) The contractor shall be required to submit an anchoring and positioning plan demonstrating the maximum avoidance of eelgrass that can be achieved in a safe and cost effective manner to include consideration of equipment orientation to minimize anchor rode seafloor contact in eelgrass areas, use of cable floats as may be appropriate, or other means to avoid physical damage to eelgrass habitat. Should initial planned measures to protect eelgrass be determined to be ineffective, these will be adaptively revised as needed during construction.
   f) To reduce the potential of shading losses of eelgrass, operations shall conducted in a manner that does not results in continuous daytime positioning of equipment over the same area of eelgrass for more than 14 consecutive days with an equivalent time period during which the equipment is not positioned over the eelgrass prior to returning to an area should additional work be required.
   g) Tug boat propeller wash scour will be avoided by operational procedures and tug operators will be specifically instructed on the need to protect the eelgrass against damage by grounding of equipment or propeller wash.
   h) Turbidity generation will be controlled throughout construction
2) Construction biological monitoring will be undertaken to ensure contractor compliance with environmental measures and to support completion of regulatory compliance obligations associated with the construction.

***Phase IV (Post Construction):***

1) The effectiveness of construction period impact control will be evaluated by completion of pre- and post-construction eelgrass bed distribution and density surveys in accordance with the standards of the CEMP. The surveys will provide a determination of the final impact area and that which is required to be mitigated. While it is expected that this will reduce the mitigation need, it is not anticipated that it would alter the initial restoration effort scaling.
2) Eelgrass is to be harvested from donor sites not including reference sites or transplant sites in order to support the replanting of the construction access channel.
3) During the post-construction survey, prior eelgrass transplant sites that were planted prior to start of work (approximately 6 months prior) would be reviewed and any significant gaps in the transplant coverage would be identified. These areas, including gaps within the

beneficial reuse site that were not colonized by eelgrass resprouting from the mechanical translocation, would be planted concurrently with the access channel.

**Transplant Area and Anticipated Yield**

The eelgrass impact area is expected to range from 1.80 to 4.39 acres depending on effectiveness of impact controls during construction and natural, uncontrollable or unpredictable factors. In order to mitigate the impact, a successful establishment of 2.16 to 5.27 acres of eelgrass would be required at a 1.2:1 mitigation ratio. This impact would be mitigated by eelgrass restoration totaling 5.89 to 8.48 acres to yield the required compensation area at a 1.2:1 ratio (Table 2). This initial planting restoration ratio ranges from 1.93:1 up to 3.27:1 based on comparing the high and low impact areas to the high and low restoration planting areas. As a result, the planting area exceeds the minimum planting area and the minimum successful mitigation area needs under the CEMP.

**Table 2. Anticipated impact to seagrasses from Port San Luis breakwater repairs**

| Mitigation Sites | Acres | Timing |
|---|---|---|
| Unmodified Planting | 2.84 | Before Access Channel Work |
| Mooring Removals | 0.20 | Before Access Channel Work |
| Sediment BU Reuse | 1.05 | During Access Channel Work |
| Excavation Replanting | 1.80 | After Breakwater Work |
| Other APE Damage | <2.59 | After Breakwater Work |
| **Total Area** | **5.89-8.48** | **Approx. 6-12 mo duration** |

**Adaptive Management Plan**

Pacific eelgrass impact mitigation poses risks and uncertainties that differ from the mitigation of impacts to common eelgrass impacts. First, there are few examples of restoration projects that have been undertaken with this species; and thus, it is likely that not all issues associated with restoration of the species have been encountered previously. Second, the species is slower growing than common eelgrass; and thus, rates of establishment can be expected to be slower than for common eelgrass. This means that escalating establishment milestones within the CEMP that require distinct coverage and density goals to be met at each annual milestone may be harder to achieve than for common eelgrass, where such milestones are generally easily met. Finally, stressors affecting *Z. pacifica* restoration tend to be episodic and random such as major storm damage; while stressors affecting *Z. marina* restoration tend to be more predictable. These factors may influence eelgrass mitigation success and are the reasons for implementing a diversified mitigation program that spreads the mitigation across multiple sites and depths, uses differing restoration approaches, and stretches the planting across differing timeframes both minimizing risks associated with a particular planting period and providing opportunities for adaptive management. While the plan as outlined is believed to adequately mitigate risk and provide a good potential for successful mitigation, the following adaptive management measures are to be undertaken:

- The status of each restoration element will be separately tracked to assist in identifying strong and weak performers in the mitigation program;
- Assessment of plant expansion rates will be undertaken to evaluate the likelihood of meeting interim establishment milestones;

- Check-in coordination with NMFS and CDFW will occur following each monitoring event to communicate status of the restoration and any adaptive management actions planned to be taken as corrective actions (e.g., augmentation of a restoration approach, expansion of a planting area, increase of plant density, or replanting areas in subsequent phases).

**Conflicts with Other Water Uses**

In developing the eelgrass mitigation plan, the proposed activities were coordinated with the Port San Luis Harbor District. During this coordination, issues and conflicts were identified in a few locations. The conflicts were discussed, and solutions were identified that are supportable by the Corps and Port San Luis Harbor District. These issues are discussed below:

***Excavation Material Beneficial Reuse Eelgrass Mitigation Site:***

The proposed sediment reuse plateau does not directly conflict with active Port San Luis Harbor District moorings; however, it would be expected to conflict with future installation of three approved moorings P2, Q2, and R2 in the Port San Luis Harbor District Mooring Chart (Figure 9). The solution proposed has been the relocation of these moorings into an alternative areas of the field away from eelgrass or kelp resources when the Port San Luis Harbor District updates moorings and any required permits and approvals. By use of a future relocation strategy, these 3 mooring sites will not be lost, but rather relocated, thus leaving the Harbor District mooring capacity intact.

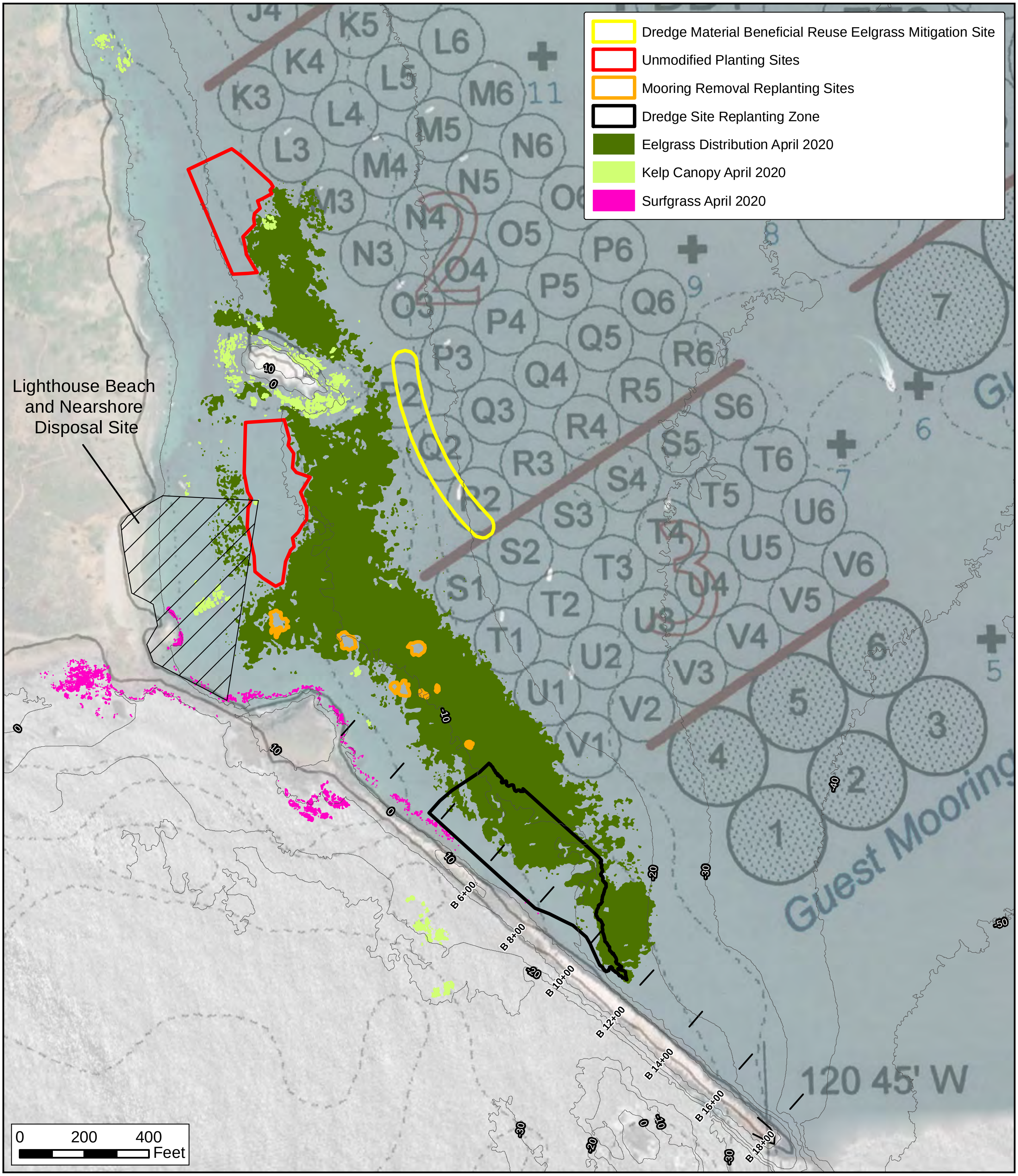
***Mooring Removal Replanting Sites:***

The Corps identified mooring scar replanting as part of the mitigation plan. The Harbor District noted that the scars are not on any of the Harbor District mooring maps and are not Harbor District moorings. There is no conflict with the Harbor District in removing these.

***Overall Eelgrass Mitigation Plan:***

The Harbor District has noted that the eelgrass mitigation and existing eelgrass beds are located adjacent to Lighthouse Beach, the small pocket beach on the leeward side of the breakwater. Lighthouse Beach and an adjacent nearshore disposal area off this beach comprise a 5-acre area designated as a receiver site for excavated sand from maintenance excavating under the Port San Luis Harbor District maintenance excavating permit (SPL-2014-00063) that runs through February 25, 2024. Under the permit, excavating is completed to maintain the harbor area from Hartford Pier to north of the Boat Hoist Launch Basin. To date, Lighthouse Beach has not been used as a disposal site under the permit. The presence of naturally occurring seagrass beds and one of the proposed unmodified planting sites in this plan would preclude future use of this beach as a disposal site without considerable planning effort. While the unsuitability of this area for maintenance sand disposal is not an impact of the breakwater repair project, it clearly should be avoided for maintenance material discharge under the present permit, and the disposal capacity of this beach should be shifted to an alternate location when the District commences work on the replacement permit for the present maintenance permit. No specific site is being identified for the alternate disposal location, but it is appropriate to contemplate this shift for a future permit cycle and to confirm the Harbor District’s knowledge of the significant resource conflict so that material is not placed in the site under the current permit and that an alternate site is added by the Harbor District at the appropriate permit renewal stage. No known unresolved issues remain with the Port San Luis Harbor District.

M&A #05-024-42




**Eelgrass Mitigation Sites and Existing Eelgrass Beds with Port San Luis Moorings**

Port San Luis Breakwater Repair Sections

San Luis Obispo County, California

**Figure 9**

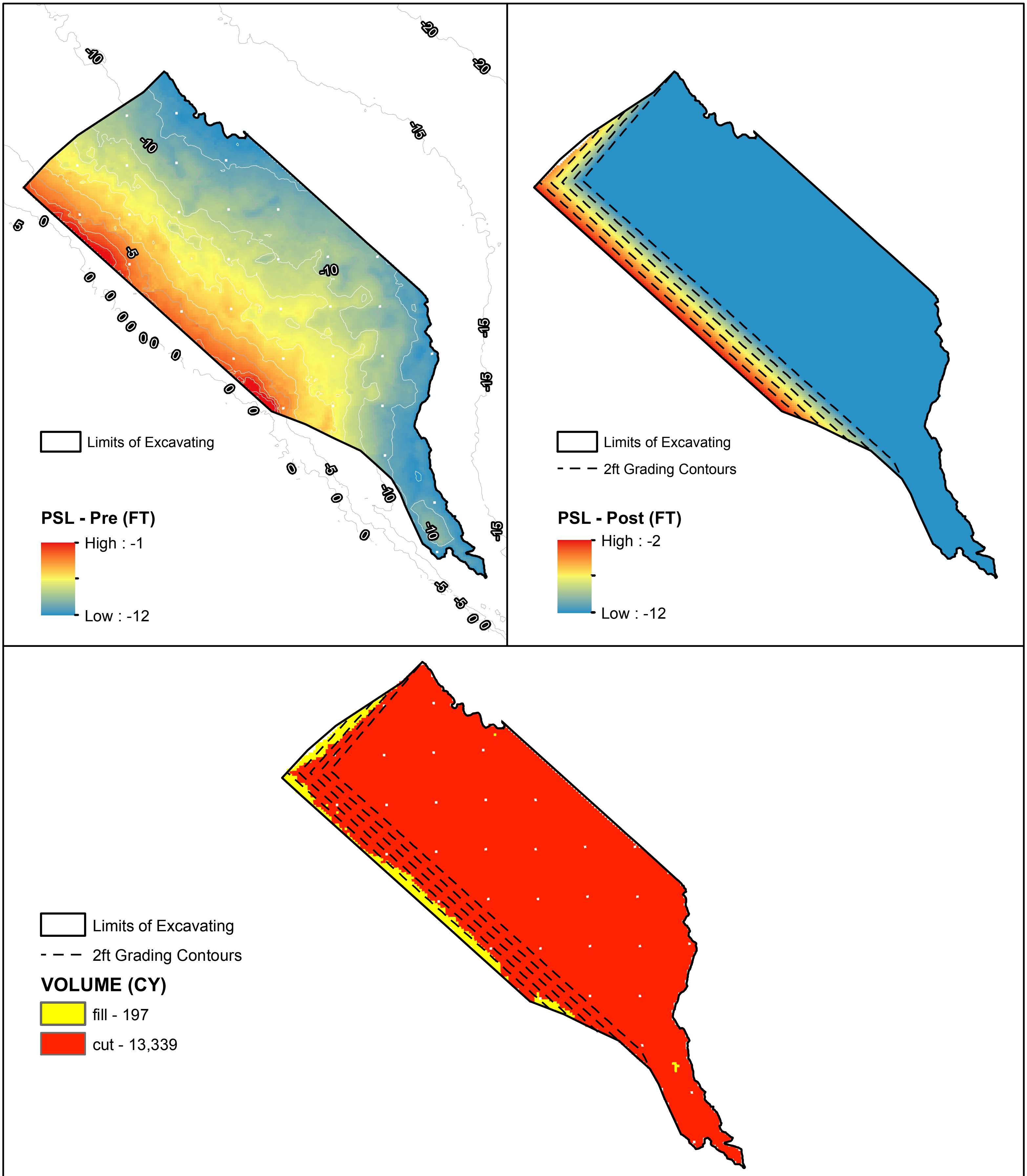
*Merkel & Associates, Inc.*

### *Access Channel Excavating and Beneficial Reuse Plateau Design*

The present eelgrass mitigation plan is intended to provide a plan suitable to support eelgrass mitigation in the context of the Corp's breakwater repair project. As such, an excavation concept was developed to estimate project impacts to eelgrass. The excavating plan was developed by M&A working in conjunction with access needs provided by the Corps and equipment information garnered from marine contractors as well as through measuring rock repair work construction spreads captured in Google Earth aerial photography. Excavation planning was performed using bathymetric data provide by the Corps. The access channel floor elevation was developed through an evaluation of draft needs for equipment proposed and goal seeking to optimize the cut depth to support eelgrass. This led to the minimum safe access channel cut possible at -12 feet with an allowance for a depth up to -14 feet MLLW; however, over depth should be minimized. The tin to tin quantity estimated from the channel excavating was determined to be 13,339 cubic yards of cut (Figure 10). This does not account for any over depth volume or continued accretion of the shoal prior to construction. A separate estimate of excavation volume considering these factors was made by the Corps at 15,000 cubic yards. As a result, it should be assumed the cut volume will range between approximately 13,500 and 15,000 cubic yards. Note that, while the -12 foot depth should be achieved in the channel, over depth excavating is not encouraged under this plan.

In some cases, excavating by clam shell excavating methodologies requires subsequent mechanical flattening of the excavated surface to achieve a suitable planting surface that is leveled to eliminate high rugosity that can result in trapping of detritus in depressions or slopes that are too unstable to support planting units. This is addressed by incorporation of tight vertical tolerances, as well as surface slope tolerances. In the case of the present work, it is not believed that tolerances beyond a requirement for excavating to -12 feet MLLW with up to 1 foot unpaid over depth and not more than 10 percent of the site falling below -13 feet MLLW. The unconsolidated sandy nature of the sediments, the high swell environment, and the approximately 6-month long construction period is expected to provide ample time for the sediment in the excavation cut to flatten and become suitable to support plantings without subsequent manipulation of the site.

The Contractor for the breakwater construction should be required to provide a excavating plan that outlines the details of how the excavating and filling of the reuse eelgrass mitigation site plateau will be conducted. The excavating of the access channel should be completed by working from the breakwater outward with the filling of scows in order to ensure that the thinnest excavation cuts in the densest eelgrass will be placed in the uppermost layer of sediment in the reuse area. Scows should be filled and dumped during the same day (24-hr period) in order to minimize decay of eelgrass tissues in the held sediment. The Contractor may offer an alternative excavating operation plan that meets the intent of the mechanized equipment eelgrass translocation. Such a plan would be evaluated by the Corp to assess its suitability to achieve the eelgrass translocation goals.

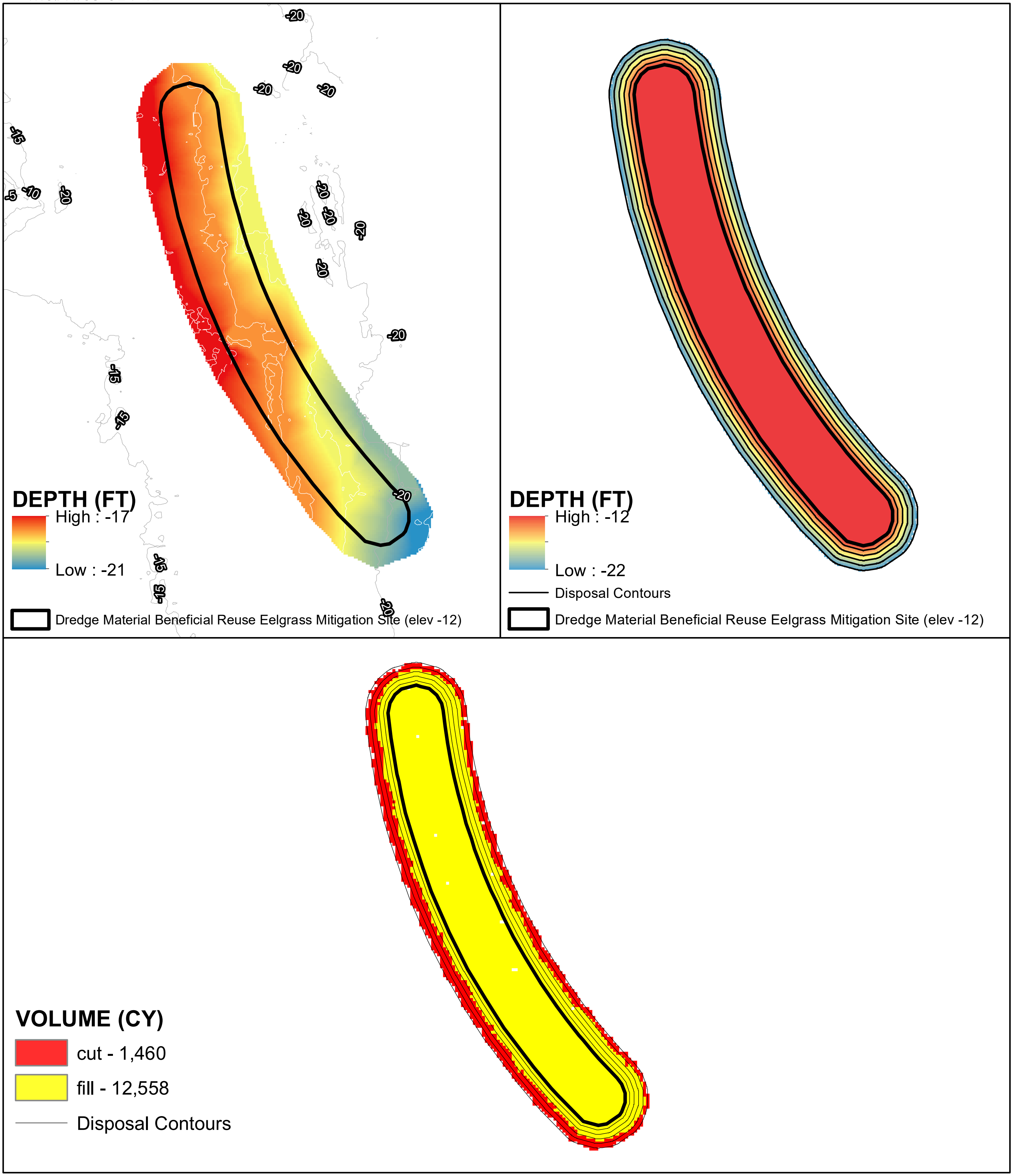



**Access Channel Excavating Footprint Template and Rough Volume Calculation**
Port San Luis Breakwater Repair Sections
San Luis Obispo County, California

**Figure 10**

The sediment reuse site has been designed to maximize the area suitable for eelgrass while remaining well outside of the adjacent eelgrass beds. In general, the feature aligns contour parallel with the sloping seafloor (Figure 11). The planned fill is illustrated at only 12,558 cubic yards, although the intent is to accept all excavated material from the access channel. As a result, the size of the plateau may be required to be expanded slightly towards the east and south to exactly balance the excavation cut volume. It is not expected that placed material will yield any substantive consolidation of the underlying sediment as the sediment is comprised of clean sand and would not be highly compressible material.

The targeted elevation of the reuse site is -12 feet. It is expected that fills brought to only slightly above this target will remain close to the final elevation due to low compressibility of the material being excavated and that underlying the fill. Given the position of the fill and the level of exposure of the site to some long-period swell energy, it is expected that sand will weather off the top and southeasterly tip of the site and be translocated north and westward. However, the site is protected to a degree by the eelgrass beds and shallow water shoal located further south along the breakwater; and thus, erosion is not anticipated to be exceptionally significant or rapid and eelgrass establishment on the plateau will further reduce this issue.

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**Eelgrass Mitigation Site Volume Calculations Will be Adjusted to Balance Cut Volume**

Port San Luis Breakwater Repair Sections
San Luis Obispo County, California

**Figure 11**

### EELGRASS RESTORATION EXECUTION

Eelgrass restoration for the project is expected to require extensive planting units to be prepared and planted with short holding times of less than 48 hours from harvest to planting. In addition, the work requires harvest of a large amount of eelgrass. In order to ensure that plants are not unduly exploited or stressed as a result of wasted material or long-holding time, considerable coordination and transplant management is required. Efficient workflow must be maintained.

#### Transplant Sites

The transplant sites to be used for mitigation purposes are illustrated in Figure 8, and acreage to be planted are summarized in Table 2. A portion of the restoration area consists of unmodified planting sites and prior mooring scars to be restored. The other restoration sites are the access channel excavating sites that will be planted following construction and the beneficial reuse areas that may be supplemented concurrent with the planting of the access channel, should the initial mechanical excavation translocation of material during construction fall short of the desired eelgrass establishment levels. The sites have been discussed previously in this document.

#### Donor Sites

Donor eelgrass for the transplant will be salvaged from within the access channel excavation cuts for the initial unmodified planting sites and the mooring removal sites. The number of planting units required for these areas is summarized in Table 3. Salvaging of material from the access excavation channel will allow for unrestricted harvest from the area to be excavated with subsequent harvest occurring at a less than 10 percent of the rhizomes available level in order to protect the eelgrass habitat from over harvest. In May 2020, eelgrass within the APE was determined to have a density of 54.4±17.5 turions/$m^2$ (n=20), while the combined density of the reference site was determined to be 39.2±18.3 turions/$m^2$ (n=20). Based on the 7,286 $m^2$ area of the excavated access channel and the turion count average of 54.4 turions/$m^2$, an estimated 396,358 turions are available in the excavation footprint, and a high estimated total harvest is anticipated to be 98,423 (Table 3) or approximately 25 percent. The remainder of the eelgrass would be mechanically translocated to the beneficial reuse area.

**Table 3. Potential maximum eelgrass planting units required to support transplants**

| Mitigation Sites | Acres | # Planting Units (# Turions) |
|---|---|---|
| Unmodified Planting | 2.84 | 11,493 PU (91,948 turions) |
| Mooring Removals | 0.20 | 809 PU (6,475 turions) |
| Sediment BU Reuse (replant if needed) | 1.05 | 4,249 PU (33,995 turions) |
| Access Excavation Channel Replanting | 1.80 | 7,285 PU (58,277 turions) |
| Other APE Damage (plant if needed) | <1.50 | 10,472 PU (83,779 turions) |
| **Totals** | **5.89-7.39** | **34,308 PU (274,474 turions)** |

For the later phase of planting of the access excavation channel following completion of breakwater work and any supplemental planting of the beneficial reuse area as well as areas potentially damaged in the APE but not the excavated channel, the maximum number of turions required to prepare planting units is estimated at 176,051. This would result in the requirement to spread harvesting over 11.1 acres of the existing eelgrass bed to remain below 10 percent harvest levels. The large areas required to meet the harvest requirement is based on the low turion density of *Z. pacifica* compared to *Z. marina* and the conservative assumptions applied to calculate potential upper threshold harvest needs. This included assuming all potential planting and replanting would be conducted, eight turions are used in each bundle rather than six, and the eelgrass bed more closely reflects the very low density of the reference area rather than the higher measured density of the APE. Because of the large donor areas required, the entire eelgrass patch has been designated as a donor bed except for the identified reference sites and the restoration plots.

#### Reference Sites

Eelgrass reference sites are identified in Figure 8 and have been selected to represent the characteristics of the entire bed and the widely distributed mitigation sites. Reference sites straddle the eelgrass bed from the highest to the lowest elevations and are well aligned to represent all of the mitigation site conditions. Monitoring of the reference sites will be conducted coincident with the monitoring of the excavation and re-use transplant areas. Changes in the reference sites over time will be considered to represent natural environmental variability when evaluating the performance of the transplant sites (see Monitoring Program sections).

### RESTORATION METHODS

#### California Department of Fish & Wildlife

Under California Fish & Game Code (CFGC) Section 1002, Title 14, CCR Section 650, a Scientific Collection Permit is required to remove eelgrass from waters of the State and under CFGC Section 6400 written authorization is required to plant any aquatic plant into waters of the State. The approval for this translocation activity is administered by the California Department of Fish and Wildlife (CDFW) and granted by permit to the entity physically conducting the collection and transplant activities. Prior to commencing eelgrass transplantation work, permission to harvest and plant eelgrass for the project will be obtained from the CDFW. The restoration Contractor shall be required to demonstrate experience with Pacific eelgrass habitat restoration.

To collect and transplant eelgrass and surfgrass for mitigation, a Scientific Collecting Permit (SCP) from the Department is required. The SCP may include conditions such as donor bed surveys, limits on number and density of turions collected, methods for collection and transplanting, notification of activities, and reporting requirements. The Department recommends submitting the SCP application at least three months in advance of the anticipated collection start date to allow adequate time for review by Department staff.

#### Plant Collection

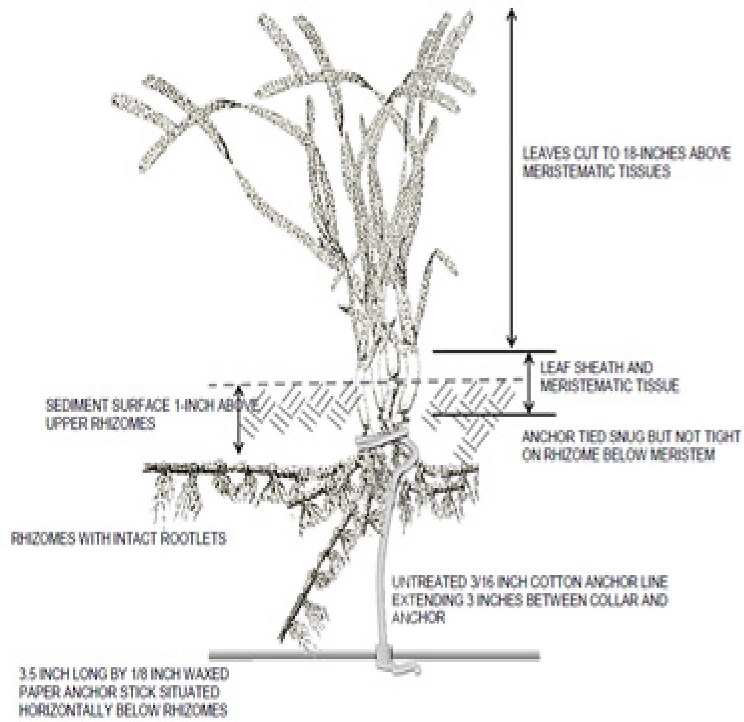
Prior to commencing eelgrass transplants, plant materials will be collected and preserved for future genetic analyses by others. These plant samples will be transferred to NMFS or sent to a third party as directed by Bryant Chesney, NMFS.

Bare-root eelgrass plant material will be salvaged from the donor beds by "raking" rhizomes out of the surface sediment layers and loosely filling a mesh bag with salvaged material. In collecting eelgrass, care will be taken to work the rhizomes free as opposed to ripping the plants free of the sediment. This will preserve as much root material as possible. Salvaged materials will consist of no less than three healthy internodal segments with well-developed root initiates and vigorous shoots. More intact rhizome segments and roots are preferred for use in the planting unit bundles. Salvaging is a mobile exercise and harvesters will move systematically through an area and collect/groom no more than 10 percent of the plant material within a donor bed. At excavation sites, harvesting may be conducted at a 100 percent level if the site has not been excavated previously. If the site has been excavated, then only the loose eelgrass along the excavation cuts of the site margins may be harvested completely.

Collected material will be held in a flow-through seawater source until it is processed into planting units. No material will be stored for over 24 hours from harvesting to unit preparation. Once units are prepared, they will be stored in open water for no longer than 24 hours for a maximum total of 48 hours of storage from harvest to planting with storage generally being loose in flowing seawater or within mesh nets in the bay.

#### Transplant Units

The proposed mitigation will utilize anchored bare-root transplant units. Bare-root transplants are the preferred means of transplanting eelgrass in most situations, and anchored bare- root units are the principal planting units used in large-scale restoration projects at the current time. The survival of such planting units has been shown to be quite high when properly prepared (Fonseca *et al.* 1982; Merkel 1987, 1990a). Similarly, bare-root units have shown an ability to rapidly expand and colonize bare substrate (Merkel 1990b). In addition to offering high unit survival and rapid expansion rates, bare-root units can be prepared with limited damage to the donor bed. Unlike plug extractions, bare-root units can be prepared using materials collected without substantial sediment disturbance. Each transplant unit for the project work will consist of 6-8 turions.




*The Merkel Anchored Bare-root Eelgrass Planting Unit consists of a bundle of turions with intact rhizomes with a minimum of 3 nodes and internodes held on a biodegradable anchor consisting of a cotton twine collar that connects to a wax impregnated paper stick anchor situated horizontally below the planting unit.*

The anchors used in this program will be biodegradable and pliable anchors such as those developed initially for transplants in Mission Bay's Sail Bay (Merkel 1987) and which have subsequently been used in more than 86 eelgrass restoration projects throughout California, Oregon, Washington, and Alaska. These units have been used in successful transplanting of Pacific eelgrass within both Mission Bay and Lower Newport Bay.

#### Planting Eelgrass Units

Planting at all excavation and re-use transplant sites will be conducted by planting along temporary planting lines laid by spooling weighted lines out from a surface vessel navigating consecutively spaced lines using RTK GPS. By setting lines in this manner early in the day prior to afternoon winds, lines can generally be set with extreme accuracy of less than one meter error. Lines are marked with uniquely identified buoys to allow for location, information management, and surface based retrieval after lines are planted. Using planting lines, the restoration sites are to be planted on 1-meter centers. This layout will allow for ease of tracking work progress and completion of quality control reviews.

The plant materials will be planted by excavating a hole in the sediments with a small trowel or by hand. Each anchor will be planted parallel to the sediment surface and the root/rhizome bundle will be planted approximately 3 to 5 cm below the sediment surface with the anchor being placed approximately 15 cm below the sediment surface. During planting, spot checks of the plantings will be made to ensure proper planting depth and firmness of the anchoring system.

Planting unit spacing is typically determined by balancing the rate of bed establishment with the cost of the transplant project. In some instances, rapid bed establishment is required to minimize potential storm damage or scouring of unconsolidated rhizome mats. In other cases, rapid recovery rates are desirable to meet bed establishment milestone objectives. Taking into account the rate of eelgrass growth, a planting unit spacing of one meter on center will be used for direct transplanting activities.

#### Timing of the Restoration Work

Under the planned construction schedule, physical work on the breakwater repairs would be targeted to be completed during the summer and fall months, when sea state allows for the most effective and controlled construction with the least amount of swell or storm interference. This means that the pre-construction eelgrass restoration activities would be completed ahead of the summer months of the year of construction during the spring (April-May) and the subsequent post-construction eelgrass transplant would occur during the following spring (April-June) based on the construction terminating in the late fall after the eelgrass high growth period has ended.

The completion of the transplants would require approximately 4 weeks for work conducted prior to commencement of the access channel excavating and 6 weeks during the spring of the subsequent year following completion of construction activities during the fall-winter period.

## MONITORING PROGRAM

### Establishment of Mitigation Requirements

Following completion of breakwater repairs, the pre-construction and post-construction surveys will be compared to determine the ultimate impact and mitigation need in accordance with the CEMP. The impacts and resultant compensatory mitigation required under the provisions of the CEMP will be documented in the post-construction eelgrass survey report. The report will document any damage beyond the anticipated levels as well as any site conditions that are anticipated to detract from successful mitigation. It is important to keep clear the distinction between the restoration area targeted in the mitigation plan to address risks of mitigation shortfall and the mitigation required, which is derived by the impact assessment independent from the restoration target designed to ensure mitigation is met.

### Establishment Monitoring

Upon completion of the planting effort, a monitoring program will be initiated and will continue for a 60-month (5-year) period as outlined in the CEMP. Spatial distribution, areal extent, percent vegetated cover, and turion density of the transplanted eelgrass and reference sites will be monitored and reported as outlined in the CEMP. Spatial metrics will be evaluated using interferometric sidescan sonar with motion control and RTK corrected GPS for enhanced positional accuracy. The sidescan system provides an acoustic swath image of seafloor within the entire surveyed area. Sidescan backscatter data will be acquired at a frequency of 400 kHz or greater. All data will be collected in latitude and longitude using the North American Datum of 1983 (NAD 83). Surveys will be conducted by running transects spaced to allow for overlap between adjoining sidescan swaths. Following completion of each survey, the data will be converted into a geographically registered mosaic through digital post-processing, and plotted on a geo-rectified aerial image of the excavation, transplant, and reference sites. Eelgrass will then be digitized to show its distribution within the surveyed areas. Eelgrass turion densities will be determined within each transplanted bed collecting a minimum of 20 turion density counts per 1/16 $m^2$ quadrat within each transplant and reference plot as required to control variance to a level suitable to detect a 25 percent difference between reference and transplant sites with statistical power of 90 percent and $\alpha=0.10$ and $\beta=0.10$.

The monitoring program will be conducted at intervals of 6, 12, 24, 36, 48, and 60-months post-transplant. When monitoring dates fall outside of the normal eelgrass-growing season, dates will be shifted to coincide with the growing season to ensure that valuable information on growth and survival is collected. For each monitoring interval, a draft monitoring report will be prepared and submitted within 30 days of completion of the monitoring interval and data processing. It is anticipated that each monitoring interval will require up to 4 field days to complete the monitoring at all sites.

Monitoring reports will include information from previous monitoring intervals, including numerical comparisons and graphical presentations of changing bed configurations. Graphical comparisons will include generalized bathymetry. The monitoring report will include an analysis of any declines or expansions in eelgrass coverage based on physical conditions of the site, as well as any other significant observations. Finally, the monitoring report will provide a prognosis for the future of the eelgrass bed and will identify the timing for the next monitoring period.

#### MITIGATION SUCCESS CRITERIA

Mitigation will be deemed successful when it has met the success criteria outlined in the CEMP. Criteria for determination of transplant success will be based upon a comparison of bed areal extent, percent vegetated cover and density (turions per square meter) between the reference sites and the transplant sites. Specific performance metrics include the areal extent as defined where eelgrass is present and where gaps in coverage are less than one meter between individual turion clusters. Density of turions (shoots) is identified as the number of turions per square meter, as measured from representative areas within the control or transplanted beds.

Key success criteria are as follows:

- Month 0 – Monitoring should confirm the full coverage distribution of planting units over the initial mitigation site as appropriate to the geographic region.
- Month 6 – Persistence and growth of eelgrass within the initial mitigation area should be confirmed, and there should be a survival of at least 50 percent of the initial planting units with well-distributed coverage over the initial mitigation site. For seed buoys, there should be demonstrated recruitment of seedlings at a density of not less than one seedling per four (4) square meters with a distribution over the extent of the initial planting area. The timing of this monitoring event should be flexible to ensure work is completed during the active growth period.
- Month 12– The mitigation site should achieve a minimum of 40 percent coverage of eelgrass and 20 percent density of reference site(s) over not less than 1.2 times the area of the impact site.
- Month 24– The mitigation site should achieve a minimum of 85 percent coverage of eelgrass and 70 percent density of reference site(s) over not less than 1.2 times the area of the impact site.
- Month 36– The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.
- Month 48– The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.
- Month 60– The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Areas that do not meet the above success criteria may be revegetated and again monitored until the final goal is achieved. Should replanting of the areas at the project site fail to meet the success criteria, reconstruction of portions of one or more transplant sites may be required to carry out this revegetation. Should the reference areas fail or decline alongside the transplant mitigation areas for reasons outside the control of the City, the City will not be held responsible for similar declines in the excavation or transplant mitigation areas.

### Mitigation Program Schedule

Based on the presently planned transplant window, the preliminary schedule of work is as follows:

| ACTIVITIES | TIME PERIOD | REPORTING PERIOD |
|---|---|---|
| Pre-construction Surveys | April-May –YR 1 | 30 Days |
| Phase I (Planting Prior to Access Channel Excavating) | April-May –YR 1 | - |
| Phase II (Access Channel Excavating) | June – YR 1 | 30 Days- |
| Phase III (Overall Construction) | June-December – YR 1 | |
| Phase IV (Post Construction Restoration) | April-June –YR 2 | |
| Complete 0-Month Survey | June – YR 2 | July – YR 2 |
| Complete 6-Month Survey | October – YR 2 | December – YR 2 |
| Complete 12-Month Survey | June – YR 3 | July – YR 3 |
| Complete 24-Month Survey | June – YR 4 | July – YR 4 |
| Complete 36-Month Survey | June – YR 5 | July – YR 5 |
| Complete 48-Month Survey | June – YR 6 | July – YR 6 |
| Complete 60-Month Survey | June – YR 7 | July – YR 7 |

## SURFGRASS MANAGEMENT MEASURES

### IMPACTS AND MITIGATION FOR SURFGRASS

Approximately 31 $m^2$ of surfgrass patches occur within the APE and are generally located outside of the proposed work footprint but within the limits of high levels of construction activities. It is presently believed that direct construction impacts to surfgrass may be avoided. However, placing new revetment stone is not an exact science and the specific geometry of all of the rock and the need for construction of a stable terrace to support new stone by repositioning stone may result in some mishandles and dropped or rolled rock. Because surfgrass is at and just below the lower limit of planned construction, there is potential that it may be damaged inadvertently during rock handling or it may be necessary to move a few of the rocks supporting surfgrass to create a base for new rock. Finally, it is anticipated that excavating for the access channel will create the potential for shoal sand to move away from the breakwater down towards the access channel floor. It is presently believed that some of the rock supporting surfgrass is suspended in a matrix of sand rather than being bedded on underlying rock. As result, some of the surfgrass sustaining rock may shift in a manner that impacts surfgrass. These issues may be likely to impact an unknown fraction of the surfgrass present.

The small area of surfgrass present in the APE and the expectation of limited impacts that surfgrass may suffer from the work combine to suggest that compensatory mitigation for this resource is not warranted. Rather, measures should be taken that focus on protection of the resource and bettering the capacity to address unavoidable larger scale impacts in the future. To achieve this, it is recommended that measures include the following:

1) Implementation of best practices to minimize impacts to *in situ* surfgrass;
2) Undertaking field efforts to relocate surfgrass where impacts are deemed unavoidable; and,
3) Implementation of a pilot translocation to advance the understanding of the capacity to restore surfgrass in the future.

### SURFGRASS PROTECTION BEST PRACTICES

The surfgrass protection best practices recommendations include the following:

1) Do not remove rock that has fallen off the breakwater and which now resides at the shallow toe on sand. This is typically between Station 3+50 and 5+00 and from approximately 7+50 and 8+20;
2) Minimize access excavation encroachment towards the breakwater adjacent to surfgrass between Station 3+50 and 5+00 and from approximately 7+50 and 8+20. Leave as wide a berth as possible from the toe that will still allow work to be performed. The goal is to minimize sand migration away from the surfgrass areas and potentially undermining the rock in these areas;
3) Do not stage or stockpile rock on the shallow terraces for rehandling or repositioning of stone and don’t walk on the surfgrass when completing the work;

#### Surfgrass Rock Relocation

While it is not anticipated to be required, should a rock supporting surfgrass need to be relocated, the Contractor should be directed to grapple the rock up and move it to a similar location, elevation, and orientation where it is to be replaced and positioned. To the extent practical, this process should be monitored to ensure positioning of the rock at the best orientation to provide potential for surfgrass survival. If it is becoming clear that sand is migrating out from around rocks with surfgrass and they are shifting, the rocks should be preemptively salvaged and repositioned where they are sitting atop underlying rock or on sand that remains buttressed by other sand such as north of Station 4+00. Where possible, attempt to maintain the same angle and bedding level of the rock as it was initially.

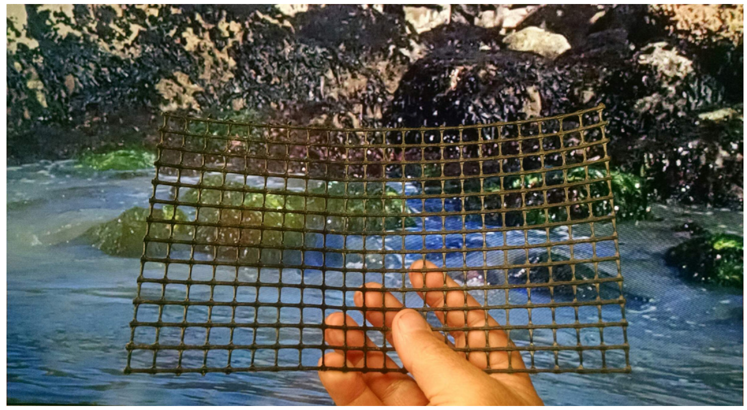
#### Pilot Surfgrass Translocation

Surfgrass has not been historically restored on a project mitigation scale in coastal California, athough small and short-term studies have been undertaken to translocate laboratory reared seedlings from a laboratory to field sites. These met with mixed success, with some translocations exhibiting short-term survival rates comparable to naturally recruited seedlings. The study, however, was only short-term and did not follow translocated plants for long periods (Holbrook et al 2002, Reed and Holbrook 2003). Other studies explored the potential for restoration of surfgrass by harvested plugs or sprigs that were attached to rock and then deployed (deWit et al. 1998) or attached to native rock (Bull et al. 2004). Pilot transplants were conducted on quarried jetty stone in Mission Bay in the early 1980s by epoxy attaching surfgrass to the rock. However, this met with low success, and the study was terminated after a few months. A second study was conducted using surfgrass attached by sewing surfgrass to squares of shag carpeting that were epoxied to the shore platform rock at Ocean Beach. This study showed promising results with most of the surfgrass surviving and some extending off the carpet samples and becoming attached to the native rock on the shore platform (Merkel, unpub. data, 2008). However, this study was also terminated early as it was undertaken for curiosity sake rather than as a substantive project and field time was ultimately consumed with work endeavors.

While there has been a significant paucity of surfgrass restoration studies, many of the studies that do exist suggest promise for restoration of surfgrass over a short term scale. However, none of the studies extended long enough to determine the ultimate fate of transplants. As a result, there remains such uncertainty with respect to the capacity to restore surfgrass on a large scale that it is not generally mitigated in kind when unavoidable impacts occur. The observations of recent and continuous expansion of surfgrass on the Morro Bay jetties provides some insight into the expansion capacity of surfgrass if it is well distributed in the area. The present breakwater project provides an opportunity to implement a small pilot project to transplant plots of surfgrass that may be followed for an extended period of time concurrent with the 5-year eelgrass mitigation monitoring program. Because the leeward side of the breakwater is highly accessible for work, but receives limited traffic by foot, the area provides a good candidate site to evaluate the potential for and cost effectiveness of establishing surfgrass transplants plots on quarried jetty rock.

A pilot transplant of surfgrass is proposed to be conducted in conjunction with the larger eelgrass restoration project. The work would be conducted as a management directed effort without survival, growth or coverage success standards. The principal project objectives are to test the efficacy of surfgrass over a long period of time suited to a mitigation program and differing from the short period over which experimental transplants have been monitored. The plots would be distributed in replicated clusters of 5 replicate units in each of eight different blocks (2 elevations, and 4 degrees of surge energy and sand exposure) for a total of 40 units (Figure 12).

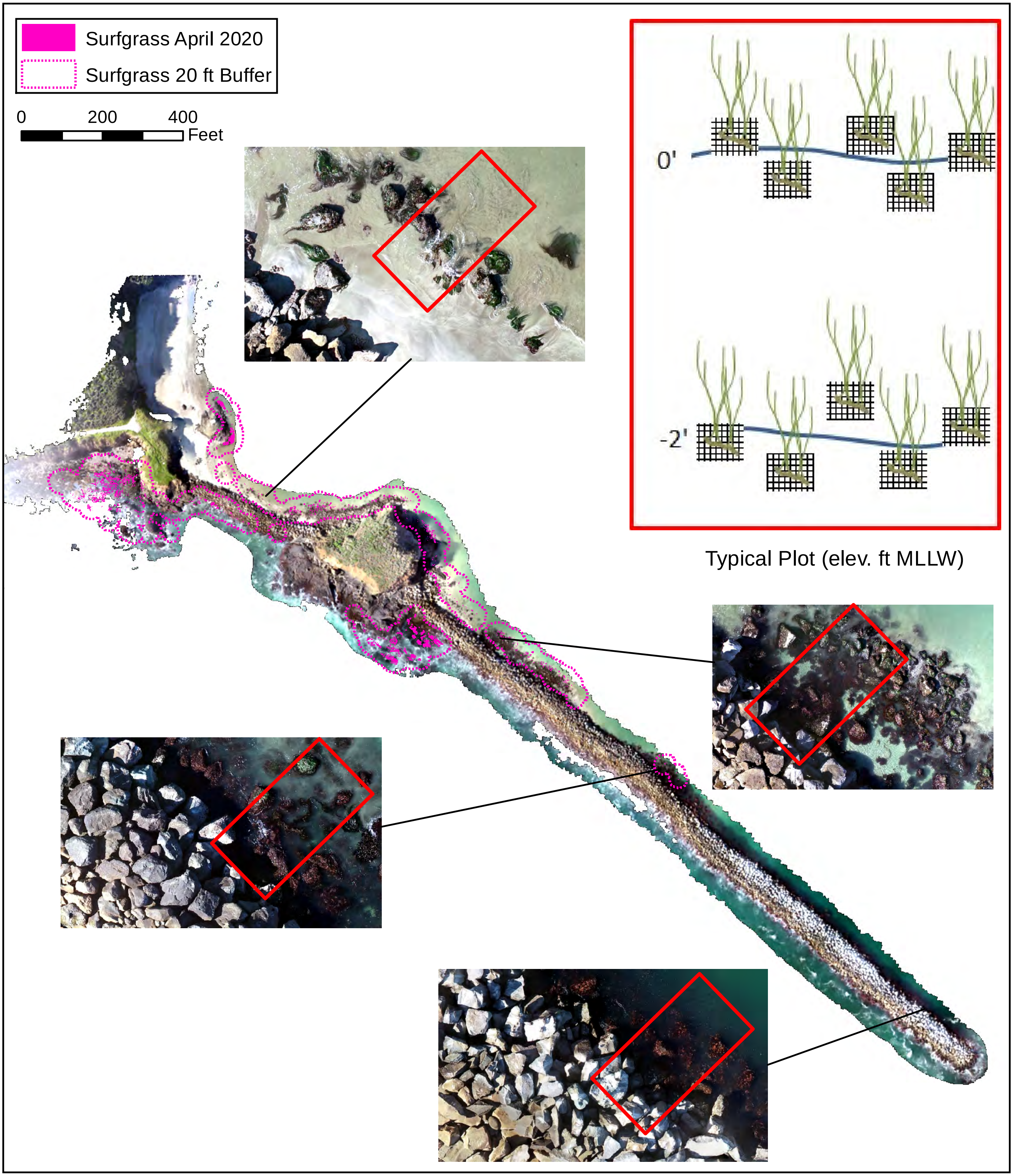
All of the planting units would be constructed in the same manner by threading surfgrass through a 1 cm HDPE plastic mesh that is subsequently attached to rock by marine epoxy. The plots would be monitored during each of the eelgrass monitoring events at 0, 6, 12, 24, 36, 48, and 60 months, and the status of the plots would be reported on during the reporting windows.



*HDPE grid to be used to attach surfgrass to breakwater rock with marine epoxy in small test plots. The plots will be established along differing portions of the breakwater in clusters to evaluate long-term survival and growth of plants under different circumstances and the capacity to conduct such transplants at a scale and with the performance certainty necessary to serve as compensatory mitigation.*

The monitoring to be conducted includes survival of the transplants, lateral spread based on maximum axial basal spread and maximum basal width as measured perpendicular to the long axis of the plant. Additional data to be recorded is spread beyond the starting grid, algae present with the surfgrass, flowering, leaf length, and observations of any recruitment of new plants near the transplants. The primary benefit of the study is found in the capacity to evaluate potential for restoration over longer periods of time more suitable to a mitigation monitoring performance assessment than a research study. The data is expected to inform future project planning where impacts to surfgrass are larger and deemed to be significant by determining if in-kind mitigation would be feasible based on potential for success affordability, and success potential.

Figure 12 identifies the preliminary locations considered for establishment of nested transplant plots consisting of four blocks of five replicates distributed across paired high and low elevations (0 and -2 feet MLLW). Some of the transplant plots will end up being located within areas supporting healthy surfgrass; and thus, method effect can be evaluated directly by comparing the conditions of the surrounding nature patches.




**Surfgrass Pilot Transplant Plan**

Port San Luis Breakwater Repair Sections
San Luis Obispo County, California

**Figure 12**

## REFERENCES


Bull, J. S., D. C. Reed, and S. J. Holbrook. 2004. An experimental evaluation of different methods of restoring surfgrass (*Phyllospadix torreyi*). Restoration Ecology 12:70-79.

deWit, L. A., R. C. Phillips, R. R. Ware, and L. E. Fausak. 1998. Artificial attachment of surf grass (*Phyllospadix* sp.) within a nearshore, rocky habitat in southern California. In Taking a look at California's ocean resources: An agenda for the future, Vol. 2, 1695-1701.

Fonseca, Mark S., W. Judson Kenworthy, G. W. Thayer. 1982. A Low-Cost Planting Technique for Eelgrass (*Zostera marina L.*). Coastal Engineering Aid No. 82-6. U. S. Army Engineer Coastal Engineering Research Center, Fort Belvoir, Virginia. 15 pp.

Holbrook, S. J., D. C. Reed, and J. S. Bull. 2002. Survival experiments with out planted seedlings of surfgrass (*Phyllospadix torreyi*) to enhance establishment on artificial structures. Journal of Marine Science 59: 350-355.

Merkel, Keith W. 1987. Use of a New Bio-Degradable Anchor Unit for Eelgrass (Zostera marina) Revegetation. Presented at the First California Eelgrass Symposium, Tiburon, California. 8-9 May 1987. Pages 28-42.

Merkel, Keith W. 1990a. Eelgrass Transplanting in South San Diego Bay, California. In: K. W. Merkel and R. S. Hoffman, eds. Proceedings of the California Eelgrass Symposium, Chula Vista, California, May 27-28, 1988. Pages 28-42.

Merkel, Keith W. 1990b. Growth and Survival of Transplanted Eelgrass: the Importance of Planting Unit Size and Spacing. In: K. W. Merkel and R. S. Hoffman, eds. Proceedings of the California Eelgrass Symposium, Chula Vista, California May 27-28, 1988. Pages 70-78.

Merkel & Associates, Inc. 2005. Baywide Eelgrass (Zostera marina L.) Inventory in San Francisco Bay: Eelgrass Bed Characteristics and Predictive Eelgrass Model. Prepared for Caltrans and NOAA Fisheries. September 2005.

Merkel & Associates, Inc. 2017. Humboldt Bay Eelgrass Comprehensive Management Plan. Prepared for Humboldt Bay Harbor, Recreation, and Conservation District and U.S. Environmental Protection Agency.

Merkel & Associates, Inc. 2019. Biological Investigations of the Port San Luis Breakwater in support of the Port San Luis Breakwater Repair Station B 6+00 to Station B 13+00, San Luis Obispo County, CA. May 2019

[NMFS] National Marine Fisheries Service. 2014. California Eelgrass Mitigation Policy and Implementing Guidelines. NOAA Fisheries West Coast Region (October 2014)

Pacific Fishery Management Council. 2008. Pacific Coast Groundfish Fishery Management Plan. December 2008.

Reed, D. C. and S. J. Holbrook 2003. An experimental evaluation of methods of surfgrass (*Phyllospadix torreyi*) restoration using early life history stages. Final Technical Summary; Final Study Report. Prepared under MMS Cooperative Agreement No. 14-35-0001-30758. May 2003.

Wyllie-Echeverria, T., M. Hannan, S. Wyllie-Echeverria, and D, Shafer. 2007. Surfgrass Restoration in the Northeast Pacific. ERDC TN-EMRRP-ER-07. September 2007

United States Geological Survey (USGS). 2020. Coastal Storm Modeling System (CoSMoS) for Central California, v3.1. https://doi.org/10.5066/P9NUO62B. May 4, 2020.

**Appendix A**: **California Eelgrass Mitigation Policy (NOAA 2014)**

NOAA FISHERIES
West Coast Region

# California Eelgrass Mitigation Policy and Implementing Guidelines

October 2014

Photo credit: www.Lorenz-Avelar.com

## Table of Contents

## I. National Marine Fisheries Service's (NMFS) California Eelgrass Mitigation Policy

### A. Policy Statement

It is NMFS' policy to recommend **no net loss of eelgrass habitat function** in California.

For all of California, compensatory mitigation should be recommended for the loss of existing eelgrass habitat function, but only after avoidance and minimization of effects to eelgrass have been pursued to the maximum extent practicable. Our approach is congruous with the approach taken in the federal Clean Water Act guidelines under section 404(b)(1) (40 CFR 230). In absence of a complete functional assessment, eelgrass distribution and density should serve as a proxy for eelgrass habitat function. Compensatory mitigation options include comprehensive management plans, in-kind mitigation, mitigation banks and in-lieu-fee programs, and out-of-kind mitigation. While in-kind mitigation is preferred, the most appropriate form of compensatory mitigation should be determined on a case-by-case basis.

Further, it is the intent of this policy to ensure that there is no loss associated with delays in establishing compensatory mitigation. This should be accomplished by creating a greater amount of eelgrass than is lost, if the mitigation is performed contemporaneously or after the impacts occur. To achieve this, NMFS, in most instances, should recommend compensatory mitigation for vegetated and unvegetated eelgrass habitat be successfully completed at a ratio of at least 1.2:1 mitigation area to impact area. This ratio is based on present value calculation[1] using a discount rate of 0.03 (NOAA-DARP 1999). This ratio assumes that restored eelgrass habitat achieves habitat function comparable to existing eelgrass habitat within a period of three years or less (Hoffman 1986, Evans & Short 2005, Fonseca *et al.* 1990).

For ongoing projects, once mitigation has been successfully implemented to compensate for the loss of eelgrass habitat function within a specified footprint, NMFS should not recommend additional mitigation for subsequent loss of eelgrass habitat if 1) ongoing project activities result in subsequent loss of eelgrass habitat function within the same footprint for which mitigation was completed and 2) the project applicant can document that no new area of eelgrass habitat is impacted by project activities.

This policy does not address mitigation for potential eelgrass habitat. NMFS recognizes impacts to potential eelgrass habitat may preclude eelgrass movement or expansion to suitable unvegetated areas in the future, potentially resulting in declines in eelgrass abundance over time. In addition, it does not address other shallow water habitats. Regulatory protections in the estuarine/marine realm typically focus on wetlands and submerged aquatic vegetation. Mudflats, sandflats, and other superficially bare habitats do not garner the same degree of recognition and

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[1] Present Value (PV) is a calculation used in finance to determine the present day value of an amount that is received at a future date. The premise of the equation is that receiving something today is worth more than receiving the same item at a future date; $PV = C_1/(1+r)^n$ where $C_1$= resource at period 1, r= interest or discount rate, n=number of periods.

concern, even though these are some of the most productive and fragile ecosystems (Reilly *et al*. 1999). NMFS will continue to collaborate with federal and state partners on these issues.

### B. Eelgrass Background and Information

Eelgrass species (*Zostera marina* L. and *Z. pacifica*) are seagrasses that occur in the temperate unconsolidated substrate of shallow coastal environments, enclosed bays, and estuaries. Eelgrass is a highly productive species and is considered to be a "foundation" or habitat forming species. Eelgrass contributes to ecosystem functions at multiple levels as a primary and secondary producer, as a habitat structuring element, as a substrate for epiphytes and epifauna, and as sediment stabilizer and nutrient cycling facilitator. Eelgrass provides important foraging areas and shelter to young fish and invertebrates, food for migratory waterfowl and sea turtles, and spawning surfaces for invertebrates and fish such as the Pacific herring. Eelgrass also provides a significant source of carbon to the detrital pool which provides important organic matter in sometimes food-limited environments (*e.g.*, submarine canyons). In addition, eelgrass has the capacity to sequester carbon in the underlying sediments and may help offset carbon emissions. Given the significance and diversity of the functions and services provided by seagrass, Costanza *et al.* (2007) determined seagrass ecosystems to be one of Earth's most valuable.

California supports dynamic eelgrass habitats that range in extent from less than 11,000 acres to possibly as much as 15,000 acres statewide. This is inclusive of estimates for poorly documented beds in smaller coastal systems as well as open coastal and insular areas. While among the most productive of habitats, the overall low statewide abundance makes eelgrass one of the rarest habitats in California. Collectively just five systems, Humboldt Bay, San Francisco Bay, San Diego Bay, Mission Bay and Tomales Bay support over 80 percent of the known eelgrass in the state. The uneven distribution of eelgrass resources increases the risk to this habitat and also contributes to its dynamic nature. Further, the narrow depth range within which eelgrass can occur further places this habitat at risk in the face of global climate change and sea level rise predictions.

Seagrass habitat has been lost from temperate estuaries worldwide (Duarte 2002, Lotze *et al.* 2006, Orth *et al.* 2006). While both natural and human-induced mechanisms have contributed to these losses, impacts from human population expansion and associated pollution and upland development is the primary cause (Short and Wyllie-Echeverria 1996). Human activities that affect eelgrass habitat distribution and abundance, including, but not limited to, urban development, harbor development, aquaculture, agricultural runoff, effluent discharges, and upland land use associated sediment discharge (Duarte 2008) occur throughout California. For example, dredging and filling; shading and alteration of circulation patterns; and watershed inputs of sediment, nutrients, and unnaturally concentrated or directed freshwater flows can directly and indirectly destroy eelgrass habitats. Conversely, in many areas great strides have been made at restoring water quality and expanding eelgrass resources through directed efforts at environmental improvements and resource enhancement. While improvements in eelgrass management have occurred overall, the importance of eelgrass both ecologically and economically, coupled with ongoing human pressure and potentially increasing degradation and losses associated with climate change, highlight the need to protect, maintain, and where feasible, enhance eelgrass habitat.

### C. Purpose and Need for Eelgrass Mitigation Policy

Eelgrass warrants a strong protection strategy because of the important biological, physical, and economic values it provides, as well as its importance to managed species under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Vegetated shallows that support eelgrass are also considered special aquatic sites under the 404(b)(1) guidelines of the Clean Water Act (40 C.F.R. § 230.43). The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) developed this policy to establish and support a goal of protecting this resource and its habitat functions, including spatial coverage and density of eelgrass habitats. This NMFS policy and implementing guidelines are being shared with agencies and the public to ensure there is a clear and transparent process for developing eelgrass mitigation recommendations.

Pursuant to the MSA, eelgrass is designated as an essential fish habitat (EFH) habitat area of particular concern (HAPC) for various federally-managed fish species within the Pacific Coast Groundfish Fishery Management Plan (FMP) (PFMC 2008). An HAPC is a subset of EFH that is rare, particularly susceptible to human-induced degradation, especially ecologically important, and/or located in an environmentally stressed area. HAPC designations are used to provide additional focus for conservation efforts.

This policy and guidelines support but do not expand upon existing NMFS authorities under the MSA, the Fish and Wildlife Coordination Act (FWCA), and the National Environmental Policy Act (NEPA). Pursuant to the EFH provisions of the MSA, FWCA, and obligations under the NEPA as a responsible agency, NMFS annually reviews and provides recommendations on numerous actions that may affect eelgrass resources throughout California. Section 305(b)(1)(D) of the MSA requires NMFS to coordinate with, and provide information to, other federal agencies regarding the conservation and enhancement of EFH. Section 305(b)(2) requires all federal agencies to consult with NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH. Under section 305(b)(4) of the MSA, NMFS is required to provide EFH Conservation Recommendations to federal and state agencies for actions that would adversely affect EFH (50 C.F.R. § 600.925). NMFS makes its recommendations with the goal of avoiding, minimizing, or otherwise compensating for adverse effects to EFH. When impacts to NMFS trust resources are unavoidable, NMFS may recommend compensatory mitigation to offset those impacts. In order to fulfill its consultative role, NMFS may also recommend, among other things, the development of mitigation plans, habitat distribution maps, surveys and survey reports, progress milestones, monitoring programs, and reports verifying the completion of mitigation activities.

Eelgrass impact management and mitigation throughout California has historically been undertaken without a statewide strategy. Federal actions with impacts to eelgrass require considerable NMFS staff time for project review, coordination and development of conservation recommendations. As federal staff resources vary with budgets, and threats to aquatic resources remain steady or increase, regulatory streamlining and increased efficiency are crucial for continued protection of important coastal habitats, including eelgrass. The California Eelgrass Mitigation Policy (CEMP) is meant to increase efficiency of existing regulatory authorities in a programmatic manner, provide transparency to federal agencies and action proponents, and ensure that unavoidable impacts to eelgrass habitat are fully and appropriately mitigated. It is the intent of NMFS to collaborate with other federal, state, and local agencies charged with the protection of marine resources to seek a unified approach to actions affecting eelgrass such that consistency across agencies with respect to this resource may be enhanced.

### D. Relevance to Other Federal and State Policies

Based on our understanding of existing federal and state policies regarding aquatic resource conservation, the CEMP does not conflict with existing policies and complements the federal and state wetland policies as described below. NMFS does not intend to make any recommendations, which, if adopted by the action agency and carried out, would violate other federal, state, or local laws. The CEMP also complements the NOAA Aquaculture Policy and National Shellfish Initiative and builds upon the NOAA Seagrass Conservation Guidelines and the Southern California Eelgrass Mitigation Policy.

1. Corps/EPA Mitigation Rule and supporting guidance

In 2008, the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) issued revised regulations governing compensatory mitigation for authorized impacts to wetlands, streams, and other waters of the U.S. under Section 404 of the Clean Water Act. The regulations emphasize avoiding impacts to wetlands and other water resources. For unavoidable impacts, the rule incorporates Natural Resource Council recommendations to improve planning, implementing and managing wetland replacement projects, including: science-based assessment of impacts and compensation measures, watershed assessments to drive mitigation sites and plans, measurable and enforceable ecological performance standards for evaluating mitigation projects, mitigation monitoring to document whether the mitigation employed meets ecological performance standards, and complete compensation plans. The regulations also encourage the expansion of mitigation banking and in lieu fee agreements to improve the quality and success of compensatory mitigation projects.

The NMFS policy to recommend no net loss of eelgrass function and the eelgrass mitigation guidelines offered herein align with the provisions of the EPA and Corps mitigation rule, but provide more specific recommendations on how to avoid and minimize impacts to eelgrass and how to implement eelgrass surveys, assessments, mitigation, and monitoring.

2. State of California Wetland Conservation Policies

The 1993 State of California Wetlands Conservation Policy established a framework and strategy to ensure no overall net loss and long-term gain in the quantity, quality, and permanence of wetlands acreage and values in California in a manner that fosters creativity, stewardship, and respect for private property, reduce procedural complexity in administration of state and federal wetlands conservation programs, and encourage partnerships to make landowner incentive programs and cooperative planning efforts the primary focus of wetlands conservation and restoration.

The State of California is also developing a Wetland and Riparian Area Protection Policy. The first phase of this effort was published as the "Preliminary Draft Wetland Area Protection Policy" with the purpose of protecting all waters of the State, including wetlands, from dredge and fill discharges. It includes a wetland definition and associated delineation methods, an assessment framework for collecting and reporting aquatic resource information, and requirements applicable to discharges of dredged or fill material. The draft specifies that dredge or fill projects will provide for replacement of existing beneficial uses through compensatory mitigation. The preliminary policy includes a determination that compensatory mitigation will sustain and improve the overall abundance, diversity and condition of aquatic resources in a project watershed area.

Based on the definition of wetlands included in these state wetland policies, the policies do not directly apply to subtidal eelgrass habitat, but may apply to intertidal eelgrass habitat. The NMFS policy of recommending no net loss to eelgrass habitat function and recommendations for compensatory mitigation for eelgrass impacts complement the state protection policies for wetlands.

### 3. NOAA Aquaculture Policy and National Shellfish Initiative

In 2011, NOAA released the National Marine Aquaculture Policy and the National Shellfish Initiative. The Policy encourages and fosters sustainable aquaculture development that provides domestic jobs, products, and services and that is in harmony with healthy, productive, and resilient marine ecosystems, compatible with other uses of the marine environment, and consistent with the National Policy for the Stewardship of the Ocean, our Coasts, and the Great Lakes (National Ocean Policy). The goal of the Initiative is to increase populations of bivalve shellfish in our nation's coastal waters—including oysters, clams, abalone, and mussels—through both sustainable commercial production and restoration activities. The Initiative supports shellfish industry jobs and business opportunities to meet the growing demand for seafood, while protecting and enhancing habitat for important commercial, recreational, and endangered and threatened species and species recovery. The Initiative also highlights improved water quality, nutrient removal, and shoreline protection as benefits from shellfish production and restoration. Both the Policy and the Initiative seek to improve interagency coordination for permitting commercial and restoration shellfish projects, as well as support research and other data collection to assess and refine conservation strategies and priorities.

The regulatory efficiencies, transparency, and compensation for impacts to eelgrass promoted by the CEMP directly support the National Aquaculture Policy statements and National Shellfish Initiative through: (1) protection of eelgrass, an important component of productive and resilient coastal ecosystems in California and habitat for wild species, and (2) improved coordination with federal partners regarding planning and permitting for commercial shellfish projects. Furthermore, research conducted under the direction of the National Shellfish Initiative could be informed by and also inform NMFS consultations regarding eelgrass impacts and mitigation in California.

### 4. NOAA Seagrass Conservation Guidelines

The NOAA publication, "Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters" (1998) was developed by Mark Fonseca of NOAA's Beaufort Laboratory along with Jud Kenworthy and Gordon Thayer and was funded by NOAA's Coastal Ocean Program. The document presents an overview of seagrass conservation and restoration in the United States, discusses important issues that should be addressed in planning seagrass restoration projects, describes different planting methodologies, proposes monitoring criteria and means for evaluation success, and discusses issues faced by resource managers. The CEMP considers information presented in the Fonseca *et al*. document, but deviates in some cases in order to provide reasonable and practicable guidelines for eelgrass conservation in California.

### 5. Southern California Eelgrass Mitigation Policy

In southern and central California, eelgrass mitigation has been addressed in accordance with the Southern California Eelgrass Mitigation Policy applied by NMFS, US Fish & Wildlife Service, California Department of Fish and Wildlife, California Coastal Commission, US Army Corps of Engineers, and other resource and regulatory agencies since 1991, and which has generally been effective at ensuring eelgrass impacts are mitigated in most circumstances. Given the success of the Southern California Eelgrass Mitigation Policy over its 20-year history, this policy reflects an expansion of the application of the Southern California policy with minor modifications to ensure a high standard of statewide eelgrass management and protection. This policy will supersede the Southern California Eelgrass Mitigation Policy for all areas of California upon its adoption.

## II. Implementing Guidelines for California

This policy and guidelines will serve as the guidance for staff and managers within NMFS for developing recommendations concerning eelgrass issues through EFH and FWCA consultations and NEPA reviews throughout California. This policy will inform NMFS's position on eelgrass issues for California in other roles as a responsible, advisory, or funding agency or trustee. In addition, this document provides guidance to assist NMFS in performing its consultative role under the statutes described above. Finally, pursuant to NMFS obligation to provide information to federal agencies under Section 305(b)(1)(D) of the MSA, this policy serves that role by providing information intended to further the conservation and enhancement of EFH. Should this policy or guidelines be inconsistent with any formally-promulgated NMFS regulations, those formally-promulgated regulations will take precedence over any inconsistent provisions of this policy.

While many of the activities impacting eelgrass are similar across California, eelgrass stressors and growth characteristics differ between southern California (U.S./Mexico border to Pt. Conception), central California (Point Conception to San Francisco Bay entrance), San Francisco Bay, and northern California (San Francisco Bay to the California/Oregon border). The amount of scientific information available to base management decisions on also differs among areas within California, with considerably more information and history with eelgrass habitat management in southern California than the other regions. Gaps in region-specific scientific information do not override the need to be protective of eelgrass habitat while relying on the best information currently available from areas within and outside of California. Although the primary orientation of this policy is toward statewide use, where indicated below, specific elements of this policy may differ between southern California, central California, northern California and San Francisco Bay.

NMFS will continue to explore the science of eelgrass habitat and improve our understanding of eelgrass habitat function, impacts, assessment techniques, and mitigation efficacy. Approximately every 5 years, NMFS intends to evaluate monitoring and survey data collected by federal agencies and action proponents per the recommendations of these guidelines. NMFS managers will determine if updates to these guidelines are appropriate based on information evaluated during the 5-year review. Updates to these guidelines and supporting technical information will be available on the NMFS website.

The information below serves as a common starting place for NMFS recommendations to achieve no net loss of eelgrass habitat function. NMFS employees should not depart from the guidelines provided herein without appropriate justification and supervisory concurrence. However, the recommendations that NMFS ultimately makes should be provided on a case-by-case basis to provide flexibility when site specific conditions dictate. In the EFH context, NMFS recommendations are provided to the action agency, which has final approval of the action; in accordance with the MSA, the action agency may take up NMFS recommendations or articulate its reasons for not following the recommendations. In the FWCA context, NMFS makes recommendations which must be considered, but the action agency is ultimately responsible for the wildlife protective measures it adopts (if any). For these reasons, neither this policy nor its implementing guidelines are to be interpreted as binding on the public.

### A. Eelgrass Habitat Definition

Eelgrass distribution fluctuates and can expand, contract, disappear, and recolonize areas within suitable environments. Vegetated eelgrass areas can expand by as much as 5 meters (m) and contract by as much as 4 m annually (Donoghue 2011). Within eelgrass habitat, eelgrass is expected to fluctuate in density and patch extent based on prevailing environmental factors (*e.g.*, turbidity, freshwater flows, wave and current energy, bioturbation, temperature, etc.). To account for seagrass fluctuation, Fonseca *et al.* (1998) recommends that seagrass habitat include the vegetated areas as well as presently unvegetated spaces between seagrass patches.

In addition, there is an area of functional influence, where the habitat function provided by the vegetated cover extends out into adjacent unvegetated areas. Those functions include detrital enrichment, energy dampening and sediment trapping, primary productivity, alteration of current or wave patterns, and fish and invertebrate use, among other functions. The influence of eelgrass on the local environment can extend up to 10 m from individual eelgrass patches, with the distance being a function of the extent and density of eelgrass comprising the bed as well as local biologic, hydrographic, and bathymetric conditions (Bostrom and Bonsdorff 2000, Bostrom *et al*. 2001, Ferrell and Bell 1991, Peterson *et al*. 2004, Smith *et al.* 2008, van Houte-Howes *et al.* 2004, Webster *et al*. 1998). Detrital enrichment will generally extend laterally as well as down slope from the beds, while fish and invertebrates that utilize eelgrass beds may move away from the eelgrass core to areas around the bed margins for foraging and in response to tides or diurnal cycles (Smith *et al*. 2008).

To encompass fluctuating eelgrass distribution and functional influence around eelgrass cover, for the purposes of this policy and guidelines, eelgrass habitat is defined as areas of vegetated eelgrass cover (any eelgrass within 1 $m^2$ quadrat and within 1 m of another shoot) bounded by a 5 m wide perimeter of unvegetated area (See Attachment 1 for a graphical depiction of this definition). Unvegetated areas may have eelgrass shoots a distance greater than 1 m from another shoot, and may be internal as well as external to areas of vegetated cover. For isolated patches and on a case-by-case basis, it may be acceptable to include an unvegetated area boundary less than or greater than 5 m wide. The definition excludes areas of unsuitable environmental conditions such as hard bottom substrates, shaded locations, or areas that extend to depths below those supporting eelgrass. Suitable depths can vary substantially depending upon site-specific conditions. In general, eelgrass does not extend deeper than 12 feet mean lower low water (MLLW) in most protected bays and harbors in Southern California, and is more limited in Central and Northern California embayments. However, eelgrass can grow much deeper in entrance channels and offshore areas

## B. Surveying Eelgrass

NMFS may recommend action agencies conduct surveys of eelgrass habitat to evaluate effects of a proposed action. Eelgrass habitat should be surveyed using visual or acoustic methods and mapping technologies and scales appropriate to the action, scale, and area of work. Surveys should document both vegetated eelgrass cover as well as unvegetated areas within eelgrass habitat (See section II.A. for definition). Assessing impacts to eelgrass habitat relies on the completion of quality surveys and mapping. As such, inferior quality of surveys and mapping (*e.g.*, completed at an inappropriate scale or using inappropriate methods) may make proper evaluation of impacts impossible, and may result in a recommendation from NMFS to re-survey and re-map project areas. Also, to account for fluctuations in eelgrass habitat due to environmental variations, a reference site(s) should be incorporated into the survey (See section V.B.4 below for more details).

### 1. Survey Parameters

Because eelgrass growth conditions in California vary, eelgrass mapping techniques will also vary. Diver transects or boundary mapping may be suited to very small scale mapping efforts, while aerial and/or acoustic survey with ground-truthing may be more suited to larger survey areas. Aerial and above-water visual survey methods should be employed only where the lower limit of eelgrass is clearly visible or in combination with methods that adequately inventory eelgrass in deeper waters.

The survey area should be scaled as appropriate to the size of the potential action and the potential extent and distribution of eelgrass impacts, including both direct and indirect effects. The resolution of mapping should be adequate to address the scale of effects reasonably expected to occur. For small projects, such as individual boat docks, higher mapping resolution is appropriate in order to detect actual effects to eelgrass at a scale meaningful to the project size. At larger scales, the mapping resolution may be less refined over a larger area, assuming that minor errors in mapping will balance out over the larger scale. Survey reports should provide a detailed description of the survey coverage (*e.g.*, number, location, and type of samples) and any interpolation methods used in the mapping.

While many parameters may be useful to describe eelgrass habitat condition (*e.g.*, plant biomass, leaf length, shoot:root ratios, epiphytic loading), many are labor intensive and may be impractical for resource management applications on a day-to-day basis. For this reason, four parameters have been identified for use in eelgrass habitat surveys and assessment of effects of an action on eelgrass. These parameters that should be articulated in eelgrass surveys are: 1) spatial distribution, 2) areal extent, 3) percentage of vegetated cover, and 4) the turion (shoot) density.

*a) Spatial Distribution*

The spatial distribution of eelgrass habitat should be delineated by a contiguous boundary around all areas of vegetated eelgrass cover extending outward a distance of 5 m, excluding gaps within the vegetated cover that have individual plants greater than 10 m from neighboring plants. Where such separations occur, either a separate area should be defined, or a gap in the area should be defined by extending a line around the void along a boundary defined by adjacent plants and including the 5 meter perimeter. The boundary of the eelgrass habitat should not extend into areas where depth, substrate, or existing structures are unsuited to supporting eelgrass habitat.

*b) Aerial Extent*

The eelgrass habitat aerial extent is the quantitative area (*e.g.*, square meters) of the spatial distribution boundary polygon of the eelgrass habitat. The total aerial extent should be broken down into extent of vegetated cover and extent of unvegetated habitat. Areal extent should be determined using commercially available geo-spatial analysis software. For small projects, coordinate data for polygon vertices could be entered into a spreadsheet format, and area could be calculated using simple geometry.

*c) Percent Vegetated Cover*

Eelgrass vegetated cover exists when one or more leaf shoots (turions) per square meter is present. The percent bottom cover within eelgrass habitat should be determined by totaling the area of vegetated eelgrass cover and dividing this by the total eelgrass habitat area. Where substantial differences in bottom cover occur across portions of the eelgrass habitat, the habitat could be subdivided into cover classes (*e.g.*, 20% cover, 50% cover, 75% cover).

*d) Turion (Shoot) Density*

Turion density is the mean number of eelgrass leaf shoots per square meter within mapped eelgrass vegetated cover. Turion density should be reported as a mean ± the standard deviation of replicate measurements. The number of replicate measurements (n) should be reported along with the mean and deviation. Turion densities are determined only within vegetated areas of eelgrass habitat and therefore, it is not possible to measure a turion density equal to zero. If different cover classes are used, a turion density should be determined for each cover class.

2. Eelgrass Mapping

For all actions that may directly or indirectly affect eelgrass habitat, an eelgrass habitat distribution map should be prepared on an accurate bathymetric chart with contour intervals of not greater than 1 foot (local vertical datum of MLLW). Exceptions to the detailed bathymetry could be made for small projects or for projects where detailed bathymetry may be infeasible. Unless region-specific mapping format and protocols are developed by NMFS (in which case such region-specific mapping guidance should be used), the mapping should utilize the following format and protocols:

*a) Bounding Coordinates*

Horizontal datum - Universal Transverse Mercator (UTM), NAD 83 meters, Zone 11 (for southern California) or Zone 10 (for central, San Francisco Bay, and northern California) is the preferred projection and datum. Another projection or datum may be used; however, the map and spatial data should include metadata that accurately defines the projection and datum.

Vertical datum - Mean Lower Low Water (MLLW), depth in feet.

*b) Units*

Transects, grids, or scale bars should be expressed in meters. Area measurements should be in square meters.

*c) File Format*

A spatial data layer compatible with readily available commercial geographic information system software producing file formats compatible with ESRI® ArcGIS software should be sent to NMFS when the area mapped supports at least 10 square meters of eelgrass. For those areas supporting less than 10 square meters of eelgrass, a table may alternatively be provided giving the vertices bounding x, y coordinates of the eelgrass areas in a spreadsheet or an ASCII file format. In addition to a spatial layer and/or table, a hard-copy map should be included with the survey report. The projection and datum should be clearly defined in the metadata and/or an associated text file.

Eelgrass maps should, at a minimum, include the following:

- A graphic scale bar, north arrow, legend, horizontal datum and vertical datum;
- A boundary illustrating the limits of the area surveyed;
- Bathymetric contours for the survey area, including both the action area(s) and reference site(s) in increments of not more than 1 foot;
- An overlay of proposed action improvements and construction limits;
- The boundary of the defined eelgrass habitat including an identification of area exclusions based on physical unsuitability to support eelgrass habitat; and

- The existing eelgrass cover within the defined eelgrass habitat at the time of the survey.

3. Survey Period

All mapping efforts should be completed during the active growth period for eelgrass (typically March through October for southern California, April through October for central California, April through October for San Francisco Bay, and May through September for northern California) and should be considered valid for a period of 60 days to ensure significant changes in eelgrass distribution and density do not occur between survey date and the project start date. The 60 day period is particularly important for eelgrass habitat survey conducted at the very beginning of the growing season, if eelgrass habitat expansion occurs as the growing season progresses. A period other than 60 days could be warranted and should be evaluated on a case-by-case basis, particularly for surveys completed in the middle of the growing season. However, when the end of the 60-day validity period falls outside of the region-specific active growth period, the survey could be considered valid until the beginning of the next active growth period. For example, a survey completed in southern California in the August-October time frame would be valid until the resumption of the active growth phase (i.e., in most instances, March 1). In some cases, NMFS and the action agency may agree to surveys being completed outside of the active growth period. For surveys completed during or after unusual climatic events (*e.g.*, high fluvial discharge periods, El Niño conditions), NMFS staff should be contacted to determine if any modifications to the common survey period are warranted.

4. Reference Site Selection

Eelgrass habitat spatial extent, aerial extent, percent cover and turion density are expected to naturally fluctuate through time in response to natural environmental variables. As a result, it is necessary to correct for natural variability when conducting surveys for the purpose of evaluating action effects on eelgrass or performance of mitigation areas. This is generally accomplished through the use of a reference site(s), which is expected to respond similarly to the action area in response to natural environmental variability. It is beneficial to select and monitor multiple reference sites rather than a single site and to utilize the average reference site condition as a metric for environmental fluctuations. This is especially true when a mitigation site is located within an area of known environmental gradients, and reference sites may be selected on both sides of the mitigation site along the gradient. Environmental conditions (*e.g.*, sediment, currents, proximity to action area, shoot density, light availability, depth, onshore and watershed influences) at the reference site(s) should be representative of the environmental conditions at the impact area (Fonseca *et al*. 1998). Where practical, the reference site(s) should be at least the size of the anticipated impact and/or mitigation area to limit the potential for minor changes in a reference site (*e.g.*, propeller scarring or ray foraging damage) overly affecting mitigation needs. The logic for site(s) selection should be documented in the eelgrass mitigation planning documents.

## C. Avoiding and Minimizing Impacts to Eelgrass

This section describes measures to avoid and minimize impacts to eelgrass caused by turbidity, shading, nutrient loading, sedimentation and alteration of circulation patterns. Not all measures are equally suited to a particular project or condition. Measures to avoid or minimize impacts should be focused on stressors where the source and control are within the purview of the permittee and action agency. Action agencies in coordination with NMFS should evaluate and establish impact avoidance and minimization measures on a case-by-case basis depending on the action and site-specific information, including prevailing current patterns, sediment source, characteristics, and quantity, as well as the nature and duration of work.

1. Turbidity

To avoid and minimize potential turbidity-related impacts to eelgrass:
- Where practical, actions should be located as far as possible from existing eelgrass; and
- In-water work should occur as quickly as possible such that the duration of impacts is minimized.

Where proposed turbidity generating activities must occur in proximity to eelgrass and increased turbidity will occur at a magnitude and duration that may affect eelgrass habitat, measures to control turbidity levels should be employed when practical considering physical and biological constraints and impacts. Measures may include:
- Use of turbidity curtains where appropriate and feasible;
- Use of low impact equipment and methods (*e.g.*, environmental buckets, or a hydraulic suction dredge instead of clamshell or hopper dredge, provided the discharge may be located away from the eelgrass habitat and appropriate turbidity controls can be provided at the discharge point);
- Limiting activities by tide or day-night windows to limit light degradation within eelgrass habitat;
- Utilizing 24-hour dredging to reduce the overall duration of work and to take advantage of dredging during dark periods when photosynthesis is not occurring; or
- Other measures that an action party may propose and be able to employ to minimize potential for adverse turbidity effects to eelgrass.

NMFS developed a flowchart for a stepwise decision making process as guidance for action agencies to determine when to implement best management practices (BMPs) for minimizing turbidity from dredging actions as part of a programmatic EFH consultation in San Francisco Bay. The parameters considered in the flow chart are relevant to all marine areas of California. This document is posted on the NMFS West Coast Region web page (http://www.westcoast.fisheries.noaa.gov/habitat/habitat_types/seagrass_info/california_eelgrass.html) and may be used to evaluate avoidance and minimization measures for any project that generates increased turbidity.

2. Shading

A number of potential design modifications may be used to minimize effects of shading on eelgrass. Boat docks, ramps, gangways, and similar structures should avoid eelgrass habitat to the maximum extent feasible. If avoidance of eelgrass or habitat is infeasible, impacts should be minimized by utilizing, to the maximum extent feasible, design modifications and construction materials that allow for greater light penetration. Action modifications should include, but are not limited to:

- Avoid siting over-water or landside structures in areas where shading of eelgrass habitat would occur;
- Maximizing the north-south orientation of the structure;
- Maximizing the height of the structure above the water;
- Minimizing the width and supporting structure mass to decrease shade effects;
- Relocating the structure in deeper water and limiting the placement of structures in shallow areas where eelgrass occurs to the extent feasible; and
- Utilizing light transmitting materials in structure design.

Construction materials used to increase light passage beneath the structures may include, but are not limited to, open grating or adequate spacing between deck boards to allow for effective illumination to support eelgrass habitat. The use of these shade reducing options may be appropriate where they do not conflict with safety, ADA compliance, or structure utility objectives.

NMFS developed a stepwise key as guidance for action agencies to determine which combination of modifications are best suited for minimizing shading effects from overwater structures on eelgrass as part of a programmatic EFH consultation in San Francisco Bay. The parameters considered in the flow chart are relevant to all marine areas of California. This document is posted on the West Coast Region web page (http://www.westcoast.fisheries.noaa.gov/habitat/habitat_types/seagrass_info/california_eelgrass.html) and may be used to evaluate avoidance and minimization measures for any project that results in shading.

### 3. Circulation patterns

Where appropriate to the scale and nature of potential eelgrass impacts, action parties should evaluate if and how the action may alter the hydrodynamics of the action area such that eelgrass habitat within or in proximity to the action area may be adversely affected. To maintain good water flow and low residence time of water within eelgrass habitat, action agencies should ensure actions:

- Minimize scouring velocities near or within eelgrass beds;
- Maintain wind and tidal circulation to the extent practical by considering orientation of piers and docks to maintain predominant wind effects;
- Incorporate setbacks on the order of 15 to 50 meters from eelgrass habitat where practical to allow for greater circulation and reduced impact from boat maneuvering, grounding, and propeller damage, and to address shading impacts; and
- Minimize the number of piles and maximize pile spacing to the extent practical, where piles are needed to support structures.

For large-scale actions in the proximity of eelgrass habitats, NMFS may request specific modeling and/or field hydrodynamic assessments of the potential effects of work on characteristics of circulation within eelgrass habitat.

4. Nutrient loading

Where appropriate to the scale and nature of potential eelgrass impacts, the following measures should be considered for implementation to reduce the potential for excessive nutrient loading to eelgrass habitat:

- diverting site runoff from landscaped areas away from discharges around eelgrass habitat;
- implementation of fertilizer reduction program;
- reduction of watershed nutrient loading;
- controlling local sources of nutrients such as animal wastes and leach fields; and
- maintaining good circulation and flushing conditions within the water body.

Reducing nutrient loading may also provide opportunities for establishing eelgrass as mitigation for project impacts.

5. Sediment loading

Watershed development and changes in land use may increase soil erosion and increase sedimentation to downstream embayments and lagoons.

- To the extent practicable, maintain riparian vegetation buffers along all streams in the watershed.
- Incorporate watershed analysis into agricultural, ranching, and residential/commercial development projects.
- Increase resistance to soil erosion and runoff. Sediment basins, contour farming, and grazing management are examples of key practices.
- Implement best management practices for sediment control during construction and maintenance operations (*e.g.,* Caltrans 2003).

Reducing sediment loading may also provide opportunities for establishing eelgrass as mitigation for project impacts in systems for which sedimentation is a demonstrable limiting factor to eelgrass.

### D. Assessing Impacts to Eelgrass Habitat

If appropriate to the statute under which the consultation occurs, NMFS should consider both direct and indirect effects of the project in order to assess whether a project may impact eelgrass. NMFS is aware that many of the statutes and regulations it administers may have more specific meanings for certain terms, including “direct effect” and “indirect effect”, and will use the statutory or regulatory meaning of those terms when conducting consultations under those statutes.[2] Nevertheless, it is useful for NMFS to consider effects experienced

[2] In the EFH context, adverse effects include any impact that reduces quality and/or quantity of EFH, including direct or indirect physical, chemical, or biological alterations of the waters or substrate (50 CFR 600.910). The Council of Environmental Quality (CEQ) regulations regarding NEPA implementation (40 CFR 1508.8(a)) define direct and indirect impacts of an action for the purposes of NEPA. Other NMFS statutes provide their own definitions regarding effects.

contemporaneously with project actions (both at the project site and away from the project site) and which might occur later in time.

Generally, effects to eelgrass habitat should be assessed using pre- and post-project surveys of the impact area and appropriate reference site(s) conducted during the time period of maximum eelgrass growth (typically March through October for southern California, April through October for central California, April through October for San Francisco Bay, and May through September for northern California). NMFS should consider the likelihood that the effects would occur before recommending pre- and post-project eelgrass surveys. The pre-construction survey of the eelgrass habitat in the action area and an appropriate reference site(s) should be completed within 60 days before start of construction. After construction, a post-action survey of the eelgrass habitat in the action area and at an appropriate reference site(s) should be completed within 30 days of completion of construction, or within the first 30 days of the next active growth period following completion of construction that occurs outside of the active growth period. Copies of all surveys should be provided to the lead federal agency, NMFS, and other interested regulatory and/or resource agencies within 30 days of completing the survey. The recommended timing of surveys is intended to minimize changes in eelgrass habitat distribution and abundance during the period between survey completion and construction initiation and completion. For example, a post-action survey completed beyond 30 days following construction or outside of the active growing season may show declines in eelgrass habitat as a result of natural senescence rather than the action.

The lead federal agency and NMFS should consider reference area eelgrass performance, physical evidence of impact, turbidity and construction activities monitoring data, as well as other documentation in the determination of the impacts of the action undertaken. Impact analyses should document whether the impacts are anticipated to be complete at the time of the assessment, or whether there is an anticipation of continuing eelgrass impacts due to chronic or intermittent effects. Where eelgrass at the impact site declines coincident with and similarly to decline at the reference site(s), the percentage of decline at the reference site should be deducted from the decline at the impact site. However, if eelgrass expands within the reference site(s), the impact site should only be evaluated against the pre-construction condition of the reference site and not the expanded condition. If an action results in increased eelgrass habitat relative to the reference sites, this increase could potentially be considered (subject to the caveats identified herein) by NMFS and the action agency as potential compensation for impacts to eelgrass habitat that occur in the future (see Section II. E. 3). An assessment should also be made as to whether impacts or portions of the impact are anticipated to be temporary. Information supporting this determination may be derived from the permittee, NMFS, and other resource and regulatory agencies, as well as other eelgrass experts.

For some projects, environmental planning and permitting may take longer than 60 days. To accommodate longer planning schedules, it may also be necessary to do a preliminary eelgrass survey prior to the pre-construction survey. This preliminary survey can be used to anticipate potential impacts to eelgrass for the purposes of mitigation planning during the permitting process. In some cases, preliminary surveys may focus on spatial distribution of eelgrass habitat only or may be a qualitative reconnaissance to allow permittees to incorporate avoidance and minimization measures into their proposed action or to plan for future mitigation needs. The pre-and post- project surveys should then verify whether impacts occur as anticipated, and if planned mitigation is adequate. In some cases, a preliminary survey could be completed a year or more in advance of the project action.

1. Direct Effects

Biologists should consider the potential for localized losses of eelgrass from dredging or filling, construction-associated damage, and similar spatially and temporally proximate impacts (these effects could be termed "direct"). The actual area of the impact should be determined from an analysis that compares the pre-action condition of eelgrass habitat with the post-action conditions from this survey, relative to eelgrass habitat change at the reference site(s).

2. Indirect Effects

Biologists should also consider effects caused by the action which occur away from the project site; furthermore, effects occurring later in time (whether at or away from the project site) should also be considered. Biologists should consider the potential for project actions to alter conditions of the physical environment in a manner that, in turn, reduce eelgrass habitat distribution or density (*e.g.*, elevated turbidity from the initial implementation or later operations of an action, increased shading, changes to circulation patterns, changes to vessel traffic that lead to greater groundings or wake damage, increased rates of erosion or deposition).

For actions where the impact cannot be fully determined until a substantial period after an action is taken, an estimate of likely impacts should be made prior to implementation of the proposed action based on the best available information (*e.g.*, shading analyses, wave and current modeling). A monitoring program consisting of a pre-construction eelgrass survey and three post-construction eelgrass surveys at the impact site and appropriate reference site(s) should be performed. The action party should complete the first post-construction eelgrass survey within 30 days following completion of construction to evaluate any immediate effects to eelgrass habitat. The second post-construction survey should be performed approximately one year after the first post-construction survey during the appropriate growing season. The third post-construction survey should be performed approximately two years after the first post-construction survey during the appropriate growing season. The second and third post-construction surveys will be used to evaluate if indirect effects resulted later in time due to altered physical conditions; the time frames identified above are aligned with growing season (attempting a survey outside of the growing season would show inaccurate results).

A final determination regarding the actual impact and amount of mitigation needed, if any, to offset impacts should be made based upon the results of two annual post-construction surveys, which document the changes in the eelgrass habitat (areal extent, bottom coverage, and shoot density within eelgrass) in the vicinity of the action, compared to eelgrass habitat change at the reference site(s). Any impacts determined by these monitoring surveys should be mitigated. In the event that monitoring demonstrates the action to have resulted in greater eelgrass habitat impacts than initially estimated, additional mitigation should be implemented in a manner consistent with these guidelines. In some cases, adaptive management may allow for increased success in eelgrass mitigation without the need for additional mitigation.

## E. Mitigation Options

The term mitigation is defined differently by various federal and State laws, regulations and policies. In a broad sense, mitigation may include a range of measures from complete avoidance of adverse effects to compensation for adverse effects by preserving, restoring or creating similar resources at onsite or offsite locations. The Corps and EPA issued regulations governing compensatory mitigation to offset unavoidable adverse effects to waters of the United States authorized by Clean Water Act section 404 permits and other permits issued by the Corps (73 FR 19594; April 10, 2008). For those regulations (33 CFR 332.2 and 40 CFR 230.92, respectively), the Corps and EPA, define "compensatory mitigation" as "the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse effects which remain after all appropriate and practicable avoidance and minimization has been achieved."

When impacts to eelgrass would occur, the action agency should develop a mitigation plan to achieve no net loss in eelgrass function following the recommended steps in this policy. If NMFS determines a mitigation plan is needed, and it was not included with the EFH Assessment for the proposed action, NMFS may recommend, either as comments on the EFH Assessment or as an EFH Conservation Recommendation, that one be provided. Potential mitigation options are described below. The action agency should consider site specific conditions when determining the most appropriate mitigation option for an action.

### 1. Comprehensive management plans

NMFS supports the development of comprehensive management plans (CMPs) that protect eelgrass resources within the context of broader ecosystem needs and management objectives. Recommendations different from specific elements described below for in-kind mitigation may be appropriate where a CMP (*e.g.,* an enforceable programmatic permit, Special Area Management Plan, harbor plan, or ecosystem-based management plan) exists that is considered to provide adequate population-level and local resource distribution protections to eelgrass. One such CMP under development at the time these guidelines were developed is *City of Newport Beach Eelgrass Protection Mitigation Plan for Shallow Water in Lower Newport Bay: An Ecosystem Based Management Plan.* If satisfactorily completed and adopted, it is anticipated the protection measures for eelgrass within this area would be adequate to meet the objectives of this policy.

In general, it is anticipated that CMPs may be most appropriate in situations where a project or collection of similar projects will result in incremental but recurrent impacts to a small portion of local eelgrass populations through time (*e.g.*, lagoon mouth maintenance dredging, maintenance dredging of channels and slips within established marinas, navigational hazard removal of recurrent shoals, shellfish farming, and restoration or enhancement actions). In order to ensure that these alternatives provide adequate population-level and local resource distribution protections to eelgrass and that the plan is consistent with the overall conservation objectives of this policy, NMFS should be involved early in the plan's development.

### 2. In-kind mitigation

In-kind compensatory mitigation is the creation, restoration, or enhancement of habitat to mitigate for adverse impacts to the same type of habitat. In most cases in-kind mitigation is the preferred option to compensate for impacts to eelgrass. Generally, in-kind mitigation should achieve a final mitigation ratio of 1.2:1 across all areas of the state, independent of starting mitigation ratios. A starting mitigation ratio is the ratio of mitigation area to impact area when mitigation is initiated. The final mitigation ratio is the ratio of mitigation area to impact area once mitigation is complete. The 1.2:1 ratio assumes: (1) there is no eelgrass function at the mitigation site prior to mitigation efforts, (2) eelgrass function at the mitigation site is achieved within three years, (3) mitigation efforts are successful, and (4) there are no landscape differences (*e.g.*, degree of urban influence, proximity to freshwater source), between the impact site and the mitigation site. Variations from these assumptions may warrant higher or lower mitigation ratios. For example, a higher ratio would be appropriate for an enhancement project where the mitigation site has some level of eelgrass function prior to the mitigation action.

Typically, in-kind eelgrass mitigation involves transplanting or seeding of eelgrass into unvegetated habitat. Successful in-kind mitigation may also warrant modification of physical conditions at the mitigation site to prepare for transplants (*e.g.*, alter sediment composition, depth, etc.). In some areas, other in-kind mitigation options such as removing artificial structures that preclude eelgrass growth may be feasible. If in-kind mitigation that does not include transplants or seeding is proposed, post-mitigation monitoring as described below should be implemented to verify that mitigation is successful.

Information provided below in Section II.F includes specific recommendations for in-kind mitigation, including site selection, reference sites, starting mitigation ratios, mitigation methods, mitigation monitoring and performance criteria. Many of the recommendations provided in these guidelines for eelgrass assessments, surveys, and mitigation may apply throughout the state even if a non-transplant mitigation option is proposed.

### 3. Mitigation banks and in-lieu-fee programs

In 2006 and 2011, the NMFS Southwest Region (merged with the Northwest Region in 2013 to form the West Coast Region) signed interagency Memorandum of Understandings that established and refined a framework for developing and using combined or coordinated approaches to mitigation and conservation banking and in-lieu-fee programs in California. Other signatory agencies include: the California Resources Agency, California Department of Fish and Wildlife, the Corps, the US Fish &Wildlife Service, the EPA, the Natural Resource Conservation Service, and the State Water Resources Control Board.

Under this eelgrass policy, NMFS supports the use of mitigation bank and in-lieu fee programs to compensate for impacts to eelgrass habitat, where such instruments are available and where such programs are appropriate to the statutory structure under which mitigation is recommended. Mitigation banks and in-lieu fee conservation programs are highly encouraged by NMFS in heavily urbanized waters. Credits should be used at a ratio of 1:1 if those credits have been established for a full three-year period prior to use. If the bank credits have been in place for a period less than three years, credits should be used at a ratio determined through application of the wetland mitigation calculator (King and Price 2004).

At the request of the action party, and only with approval of NMFS and other appropriate resource agencies and subject to the caveats below, surplus eelgrass area that, after 60-months, exceeds the mitigation needs, as defined in section II.F.6 Mitigation Monitoring and Performance Milestones, has the potential to be considered for future mitigation needs. Additionally, only with the approval of NMFS and other appropriate resource agencies and subject to the caveats below, eelgrass habitat expansion resulting from project activities, and that otherwise would not have occurred, has the potential to be considered for future mitigation needs. Exceeding mitigation needs does not guarantee or entitle the action party or action agency to credit such mitigation to future projects, since every future project must be considered on a case-by-case basis (including the location and type of impact) and viewed in light of the relevant statutory authorities.

#### 4. Out-of-kind mitigation

Out-of-kind compensatory mitigation means the adverse impacts to one habitat type are mitigated through the creation, restoration, or enhancement of another habitat type. In most cases, out-of-kind mitigation is discouraged, because eelgrass is a rare, special-status habitat in California. There may be some scenarios, however, where out-of-kind mitigation for eelgrass impacts is ecologically desirable or when in-kind mitigation is not feasible. This determination should be made based on an established ecosystem plan that considers ecosystem function and services relevant to the geographic area and specific habitat being impacted. Any proposal for out-of-kind mitigation should demonstrate that the proposed mitigation will compensate for the loss of eelgrass habitat function within the ecosystem. Out-of-kind mitigation that generates services similar to eelgrass habitat or improves conditions for establishment of eelgrass should be considered first. NMFS and the federal action agency should be consulted early when out-of-kind mitigation is being proposed in order to determine if out-of-kind mitigation is appropriate, in coordination with other relevant resource agencies (e.g., California Department of Fish and Wildlife, California Coastal Commission, U.S. Fish and Wildlife Service)

### F. In-kind Mitigation for Impacts to Eelgrass

As all mitigation project specifics will be determined on a case-by-case basis, circumstances may exist where NMFS staff will need to modify or deviate from the recommended measures described below before providing their recommendation to action agencies.

#### 1. Mitigation Site Selection

Eelgrass habitat mitigation sites should be similar to the impact site. Site selection should consider distance from action, depth, sediment type, distance from ocean connection, water quality, and currents. Where eelgrass that is impacted occurs in marginally suitable environments, it may be necessary to conduct mitigation in a preferable location and/or modify the site to be better suited to support eelgrass habitat creation. Mitigation site modification should be fully coordinated with NMFS staff and other appropriate resource and regulatory agencies. To the extent feasible, mitigation should occur within the same hydrologic system (*e.g.*, bay, estuary, lagoon) as the impacts and should be appropriately distributed within the same ecological subdivision of larger systems (*e.g.*, San Pablo Bay or Richardson Bay in San Francisco Bay), unless NMFS and the action agency concur that good justification exists for altering the distribution based on valued ecosystem functions and services.

In identifying potentially suitable mitigation sites, it is advisable to consider the current habitat functions of the mitigation site prior to mitigation use. In general, conversion of unvegetated subtidal areas or disturbed uplands to eelgrass habitats may be considered appropriate means to mitigate eelgrass losses, while conversion of other special aquatic sites (*e.g.*, salt marsh, intertidal mudflats, and reefs) is unlikely to be considered suitable. It may be necessary to develop suitable environmental conditions at a site prior to being able to effectively transplant eelgrass into a mitigation area. Mitigation sites may need physical modification, including increasing or lowering elevation, changing substrate, removing shading or debris, adding wave protection or removing impediments to circulation.

2. Mitigation Area Needs

In-kind mitigation plans should address the components described below to ensure mitigation actions achieve no net loss of eelgrass habitat function. Alternative contingent mitigation should be specified and included in the mitigation plan to address situations where performance milestones are not met.

*a) Impacts to Areal Extent of Eelgrass Habitat*

Generally, mitigation of eelgrass habitat should be based on replacing eelgrass habitat extent at a 1.2 (mitigation) to 1 (impact) mitigation ratio for eelgrass throughout all regions of California. However, given variable degrees of success across regions and potential for delays and mitigation failure, NMFS calculated *starting* mitigation ratios using "The Five-Step Wetland Mitigation Ratio Calculator" (King and Price 2004) developed for NMFS Office of Habitat Conservation. The calculator utilizes methodology similar to Habitat Equivalency Analysis (HEA), which is an accepted method to determine the amount of compensatory restoration needed to provide natural resource services that are equivalent to loss of natural resource services following an injury (http://www.darrp.noaa.gov/economics/pdf/heaoverv.pdf). HEA is commonly used by NOAA during damage assessment cases, including those involving seagrass. Similar to HEA, the mitigation calculator is based on the "net present value" approach to asset valuation, an economics concept used to compare values of all types of investments, and then modified to incorporate natural resource services. Using the calculator allows for consistency in methodology for all areas within California, avoids arbitrary identification of size of the mitigation area, and avoids cumulative loss to eelgrass habitat that would likely occur with a standard 1:1 ratio (because of the complexity of eelgrass mitigation and the time for created eelgrass to achieve full habitat function).

The calculator includes a number of metrics to determine appropriate ratios that focus on comparisons of quality and quantity of function of the mitigation relative to the site of impact to ensure full compensation of lost function. (see Attachment 4). Among other metrics, the calculator employs a metric of likelihood of failure within the mitigation site based on regional mitigation failure history. As such, the mitigation calculator identifies a recommended starting mitigation ratio (the mitigation area to eelgrass impact area) based on regional history of success in eelgrass mitigation. Increased initial mitigation site size should be considered to provide greater assurance that the performance milestones, as specified in Section II.F.6, will be met. This is a common practice in the eelgrass mitigation field to reduce risk of falling short of mitigation needs (Thom 1990). Independent of starting mitigation ratio utilized for a given mitigation action, mitigation success should generally be evaluated against a ratio of 1.2:1.

The elevated starting mitigation ratio should be applied to the area of impact to vegetated eelgrass cover only. For unvegetated eelgrass habitat, a starting mitigation ratio of 1.2:1 is appropriate.

To determine the recommended starting mitigation ratio for each region, the percentage of transplant successes and failures was examined over the history of transplanting in the region. NMFS staff examined transplants projects over the past 25 years in all mitigation regions (see Attachment 6). Eelgrass mitigation in Southern California has a 35-year history with 66 transplants performed over that period. In the past 25 years, a total of 47 eelgrass transplants for mitigation purposes have been conducted in Southern California. Forty-three of these were established long enough to evaluate success for these transplants. The overall failure rate, with failure defined as not meeting success criteria established for the project, was 13 percent. Eelgrass mitigation within central California has a better history of successful completion than within southern California, San Francisco Bay, and northern California. However, the number of eelgrass mitigation actions conducted in this region is low and limited to areas within Morro Bay. While the success of eelgrass mitigation in central California has been high, the low number of attempts makes mitigation in this region uncertain. Eelgrass habitat creation/restoration in San Francisco Bay and in northern California has had varied success.

In all cases, best information available at the time of this policy's development was used to determine the parameter values entered into the calculator formula. As regional eelgrass mitigation success changes and the results of ongoing projects become available, the starting mitigation ratio may be updated. Updates in mitigation calculator inputs should not be made on an individual action basis, because the success or lack of success of an individual mitigation project may not reflect overall mitigation success for the region. Rather NMFS should re-evaluate the regional transplant history approximately every 5 years, increasing the record of transplant success in 5 year increments for new projects implemented after NMFS' adoption of these guidelines. If the 5-year review shows that new efforts are more successful than those from the beginning of the 25-year period, NMFS staff should consider removing early projects (*e.g.*, those completed 20 years prior) from the analysis.

On a case-by-case basis and in consultation with action agencies, NMFS may consider proposals with different starting mitigation ratios where sufficient justification is provided that indicates the mitigation site would achieve the no net loss goal. In addition, CMPs could consider different starting mitigation ratios, or other mitigation elements and techniques, as appropriate to the geographic area addressed by the CMP.

Regardless of starting mitigation ratio, eelgrass mitigation should be considered successful, if it meets eelgrass habitat coverage over an area that is 1.2 times the impact area with comparable eelgrass density as impacted habitat. Please note, delayed implementation, supplemental transplant needs, or NMFS and action agency agreement may result in an altered mitigation area. In the EFH consultation context, NMFS may recommend an altered mitigation area during implementation of the federal agency's mitigation plan following EFH consultation or NEPA review, or as an EFH Conservation Recommendation if the federal agency re-initiates EFH consultation.

(1) Southern California (Mexico border to Pt. Conception)

For mitigation activities that occur concurrent to the action resulting in damage to existing eelgrass habitat, a starting ratio of 1.38 to 1 (transplant area to vegetated cover impact area) should be recommended to counter the regional failure risk. That is, for each square meter of vegetated eelgrass cover adversely impacted, 1.38 square meters of new habitat with suitable conditions to support eelgrass should be planted with a comparable bottom coverage and eelgrass density as impacted habitat.

(2) Central California (Point Conception to mouth of San Francisco Bay).

For mitigation activities that occur concurrent to the action resulting in damage to existing eelgrass habitat, a starting ratio of 1.20 to 1 (transplant area to vegetated cover impact area) should be recommended based on a 0 percent failure rate over the past 25 years (4 transplant actions). It should however be noted that all of these successful transplants included a greater area of planting than was necessary to achieve success such that the full mitigation area would be achieved, even with areas of minor transplant failure.

(3) San Francisco Bay (including south, central, San Pablo and Suisun Bays).

For mitigation activities that occur concurrent to the action resulting in damage to the existing eelgrass bed resource, a ratio of 3.01 to 1 (transplant area to vegetated cover impact area) should be recommended based on a 60 percent failure rate over the past 25 years (10 transplant actions). That is, for each square meter adversely impacted, 3.01 square meters of new habitat with suitable conditions to support eelgrass should be planted with a comparable bottom coverage and eelgrass density as impacted habitat.

(4) Northern California (mouth of San Francisco Bay to Oregon border).

For mitigation activities that occur concurrent to the action resulting in damage to the existing eelgrass habitat, a starting ratio of 4.82 to 1 (transplant area to vegetated cover impact area) should be recommended based on a 75 percent failure rate over the past 25 years (4 transplant actions). That is, for each square meter of eelgrass habitat adversely impacted, 4.82 square meters of new habitat with suitable conditions to support eelgrass should be planted with a comparable bottom coverage and eelgrass density as impacted habitat.

### b) *Impacts to Density of Eelgrass Beds*

Degradation of existing eelgrass habitat that results in a permanent reduction of eelgrass turion density greater than 25 percent, and that is a statistically significant difference from pre-impact density, should be mitigated based on an equivalent area basis. The 25 percent and statistically significant threshold is believed reasonable based on supporting information (Fonseca *et al.* 1998, WDFW 2008), and professional practice under SCEMP. In these cases, eelgrass remains present at the action site, but density may be potentially affected by long-term chronic or intermittent effects of the action. Reduction of density should be determined to have occurred when the mean turion density of the impact site is found to be statistically different ($\alpha$=0.10 and $\beta$=0.10) from the density of a reference and at least 25 percent below the reference mean during two annual sampling events following implementation of an action. The number of samples taken to describe density at each site (*e.g.*, impact and reference) should be sufficient to provide for appropriate statistical power. For small impact areas that do not allow for a sample size that provides statistical power, alternative methods for pre- and post- density comparisons could be considered. Mitigation for reduction of turion density without change in eelgrass habitat area should be on a one-for-one basis either by augmenting eelgrass density at the impact site or by establishing new eelgrass habitat comparable to the change in density at the impact site. For example, a 25 percent reduction in density of 100-square meters (100 turions/square meter) of eelgrass habitat to 75 turions/square meter should be mitigated by the establishing 25 square meters of new eelgrass habitat with a density at or above the 100 turions/square meter pre-impact density.

## 3. Mitigation Technique

In-kind mitigation technique should be determined on a case-by-case basis. Techniques for eelgrass mitigation should be consistent with the best available technology at the time of mitigation implementation and should be tailored to the specific needs of the mitigation site. Eelgrass transplants have been highly successful in southern and central California, but have had mixed results in San Francisco Bay and northern California. Bare-root bundles and seed buoys have been utilized with some mixed success in northern portions of the state. Transplants using frames have also been used with some limited success. For transplants in southern California, plantings consisting of bare-root bundles consisting of 8-12 individual turions each have proven to be most successful (Merkel 1988).

Donor material should be taken from the area of direct impact whenever practical, unless the action resulted in reduced density of eelgrass at the area of impact. Site selections should consider the similarity of physical environments between the donor site and the transplant receiver site and should also consider the size, stability, and history of the donor site (*e.g.*, how long has it persisted and is it a transplant site). Plants harvested should be taken in a manner to thin an existing bed without leaving any noticeable bare areas. For all geographic areas, no more than 10 percent of an existing donor bed should be harvested for transplanting purposes. Ten percent is reasonable based on recommendations in Thom *et al.* (2008) and professional practice under SCEMP. Harvesting of flowering shoots for seed buoy techniques should occur only from widely separated plants.

It is important for action agencies to note that state laws and regulations affect the harvesting and transplantation of donor plants and permission from the state, where required, should be obtained; for example, California Department of Fish and Wildlife may need to provide written authorization for harvesting and transplanting donor plants and/or flowering shoots.

### 4. Mitigation Plan

NMFS should recommend that a mitigation plan be developed for in-kind mitigation efforts. During consultation, NMFS biologists should request that mitigation plans be provided at least 60 days prior to initiation of project activities to allow for NMFS review. When feasible, mitigation plans should be developed based on preliminary or pre-project eelgrass surveys. When there is uncertainty regarding whether impacts to eelgrass will occur, and the need for mitigation is based on comparison of pre- and post-project eelgrass surveys, NMFS biologists should request that the mitigation plan be provided no more than 60 days following the post-project survey to allow for NMFS review and minimize any delay in mitigation implementation.

At a minimum, the mitigation plan should include:

- Description of the project area
- Results of preliminary eelgrass survey and pre/post-project eelgrass surveys if available (see Section II.B.1 and II.B.2)
- Description of projected and/or documented eelgrass impacts
- Description of proposed mitigation site and reference site(s) (see Section II.B.4)
- Description of proposed mitigation methods (see Section II.F.3)
- Construction schedule, including specific starting and ending dates for all work including mitigation activities. (see Section II.F.5)
- Schedule and description of proposed post-project monitoring and when results will be provided to NMFS
- Schedule and description of process for continued coordination with NMFS through mitigation implementation
- Description of alternative contingent mitigation or adaptive management should proposed mitigation fail to achieve performance measures (see Section II.F.6)

### 5. Mitigation Timing

Mitigation should commence within 135 days following the initiation of the in-water construction resulting in impact to the eelgrass habitat, such that mitigation commences within the same eelgrass growing season as impacts occur. If possible, mitigation should be initiated prior to or concurrent with impacts. For impacts initiated within 90 days prior to, or during, the low-growth period for the region, mitigation may be delayed to within 30 days after the start of the following growing season, or 90 days following impacts, whichever is longer, without the need for additional mitigation as described below. This timing avoids survey completion during the low growth season, when results may misrepresent progress towards performance milestones.

Delays in eelgrass mitigation result in delays in ultimate reestablishment of eelgrass habitat functions, increasing the duration and magnitude of project impacts to eelgrass. To offset loss of eelgrass habitat function that accumulates through delay, an increase in successful eelgrass mitigation is needed to achieve the same compensatory habitat function. Because habitat function is accumulated over time once the mitigation habitat is in place, the longer the delay in initiation of mitigation, the greater the additional habitat area needed (i.e., mitigation ratio increasingly greater than 1.2:1) to offset losses. Unless a specific delay is authorized or dictated by the initial schedule of work, federal action agencies should determine whether delays in mitigation initiation in excess of 135 days warrant an increased final mitigation ratio. If increased mitigation ratios are warranted, NMFS should recommend higher mitigation ratios (see Attachment 7). Where delayed implementation is authorized by the action agency, the increased mitigation ratio may be determined by utilizing the Wetlands Mitigation Calculator (King and Price 2004) with an appropriate value for parameter D (See Attachment 4). Examples of delay multipliers generated using the Wetlands Mitigation Calculator are provided in Attachment 5.

Conversely, implementing mitigation ahead of impacts can be used to reduce the mitigation needs by achieving replacement of eelgrass function and services ahead of eelgrass losses. If eelgrass is successfully transplanted three years ahead of impacts, the mitigation ratio would drop from 1.2:1 to 1:1. If mitigation is completed less than three years ahead of impacts, the mitigation calculator can be used to determine the appropriate intermediate mitigation ratio.

### 6. Mitigation Monitoring and Performance Milestones

In order to document progress and persistence of eelgrass habitat at the mitigation site through and beyond the initial establishment period, which generally is three years, monitoring should be completed for a period of five years at both the mitigation site and at an appropriate reference site(s) (Section II.B.4. Reference Site Selection). Monitoring at a reference site(s) may account for any natural changes or fluctuations in habitat area or density. Monitoring should determine the area of eelgrass and density of plants at 0, 12, 24, 36, 48, and 60 months after completing the mitigation. These intervals will provide yearly updates on the establishment and persistence of eelgrass during the growing season. These monitoring recommendations are consistent with findings of the National Research Council (NRC 2001), the Corps requirements for compensatory mitigation (33 CFR 332.6(b)), and other regional resource policies (Corps 2010, Evans and Leschen 2010, SFWMD 2007).

All monitoring work should be conducted during the active eelgrass growth period and should avoid the recognized low growth season for the region to the maximum extent practicable (typically November through February for southern California, November through March for central California, November through March for San Francisco Bay, and October through April for northern California). Sufficient flexibility in the scheduling of the 6 month surveys should be allowed in order to ensure the work is completed during this active growth period. Additional monitoring beyond the 60-month period may be warranted in those instances where the stability of the proposed mitigation site is questionable, where the performance of the habitat relative to reference sites is erratic, or where other factors may influence the long-term success of mitigation. Mitigation plans should include a monitoring schedule that indicates when each of the monitoring events will be completed.

The monitoring and performance milestones described below are included as eelgrass transplant success criteria in the SCEMP. These numbers represent milestones and associated timelines typical of successful eelgrass habitat development based on NMFS' experience with: (1) conducting eelgrass surveys and monitoring and (2) reviewing mitigation monitoring results for projects implemented under SCEMP. Restored eelgrass habitat is expected to develop through an initial 3 year monitoring period such that, within 36 months following planting, it meets or exceeds the full coverage and not less than 85 percent of the density relative to the initial condition of affected eelgrass habitat. Restored eelgrass habitat is expected to sustain this condition for at least 2 additional years.

Monitoring events should evaluate the following performance milestones:

Month 0 – Monitoring should confirm the full coverage distribution of planting units over the initial mitigation site as appropriate to the geographic region.

Month 6 – Persistence and growth of eelgrass within the initial mitigation area should be confirmed, and there should be a survival of at least 50 percent of the initial planting units with well-distributed coverage over the initial mitigation site. For seed buoys, there should be demonstrated recruitment of seedlings at a density of not less than one seedling per four (4) square meters with a distribution over the extent of the initial planting area. The timing of this monitoring event should be flexible to ensure work is completed during the active growth period.

Month 12–The mitigation site should achieve a minimum of 40 percent coverage of eelgrass and 20 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Month 24–The mitigation site should achieve a minimum of 85 percent coverage of eelgrass and 70 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Month 36–The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Month 48–The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Month 60–The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Performance milestones may be re-evaluated or modified if declines at a mitigation site are also demonstrated at the reference site, and therefore, may be a result of natural environmental stressors that are unrelated to the intrinsic suitability of the mitigation site. In the EFH consultation context, NMFS should provide recommendations regarding modification of performance milestones as technical assistance during interagency coordination as described in the mitigation plan or as EFH Conservation Recommendations if the federal action agency re-initiates EFH consultation.

### 7. Mitigation Reporting

NMFS biologists should request monitoring reports and spatial data for each monitoring event in both hard copy and electronic version, to be provided within 30 days after the completion of each monitoring period to allow timely review and feedback from NMFS. These reports should clearly identify the action, the action party, mitigation consultants, relevant points of contact, and any relevant permits. The size of permitted eelgrass impact estimates, actual eelgrass impacts, and eelgrass mitigation needs should be identified, as should appropriate information describing the location of activities. The report should include a detailed description of eelgrass habitat survey methods, donor harvest methods and transplant methods used. The reports should also document mitigation performance milestone progress (see II.F.6. Mitigation Monitoring and Performance Milestones). The first report (for the 0-month post-planting monitoring) should document any variances from the mitigation plan, document the sources of donor materials, and document the full area of planting. The final mitigation monitoring report should provide the action agency and NMFS with an overall assessment of the performance of the eelgrass mitigation site relative to natural variability of the reference site to evaluate if mitigation responsibilities were met. An example summary is provided in Attachment 3.

### 8. Supplemental Mitigation

Where development of the eelgrass habitat at the mitigation site falls short of achieving performance milestones during any interim survey, the monitoring period should be extended and supplemental mitigation may be recommended to ensure that adequate mitigation is achieved. In the EFH consultation context, NMFS should provide recommendations regarding extended monitoring as technical assistance during interagency coordination as described in the mitigation plan or as EFH Conservation Recommendations if the federal action agency re-initiates EFH consultation. In some instances, an adaptive management corrective action to the existing mitigation area may be appropriate. In the event of a mitigation failure, the action agency should convene a meeting with the action party, NMFS, and applicable regulatory and/or resource agencies to review the specific circumstances and develop a solution to achieve no net loss in eelgrass habitat function.

As indicated previously, while in-kind mitigation is preferred, the most appropriate form of compensatory mitigation should be determined on a case-by-case basis. In cases where it is demonstrated that in-kind replacement is infeasible, out-of-kind mitigation may be appropriate over completion of additional in-kind mitigation. The determination that an out-of-kind mitigation is appropriate will be made by NMFS, the action agency, and the applicable regulatory agencies, where a regulatory action is involved.

## G. Special Circumstances

Depending on the circumstances of each individual project, NMFS may make recommendations different from those described above on a case by case basis. For the scenarios described below, for example, NMFS could recommend a mitigation ratio or 1:1 or for use of out-of-kind mitigation. Because NMFS needs a proper understanding of eelgrass habitat in the project area and potential impacts of the proposed project to evaluate the full effects of authorized activities, NMFS should not make recommendations that diverge from these guidelines if they would result in surveys, assessments or reports inferior to those which might be obtained through the guidance in Section II. The area thresholds described below are taken from the SCEMP and/or reflect recommendations NMFS staff have repeatedly made during individual EFH consultations. These thresholds minimize impacts to eelgrass habitat quality and quantity, based on NMFS' experience with: (1) conducting eelgrass surveys and monitoring and (2) reviewing project monitoring results for projects implemented under SCEMP. The special circumstance included for shellfish aquaculture longlines is supported by Rumrill and Poulton (2004) and the NMFS Office of Aquaculture.

1. Localized Temporary Impacts

NMFS may consider modified target mitigation ratios for localized temporary impacts wherein the damage results in impacts of less than 100 square meters and eelgrass habitat is fully restored within the damage footprint within one year of the initial impact (e.g., placement of temporary recreational facilities, shading by construction equipment, or damage sustained through vessel groundings or environmental clean-up operations). In such cases, the 1.2:1 mitigation ratio should not apply, and a 1:1 ratio of impact to recovery would apply. A monitoring program consisting of a pre-construction eelgrass survey and three post-construction eelgrass surveys at the impact site and appropriate reference site(s) should be completed in order to demonstrate the temporary nature of the impacts. NMFS should recommend that surveys be completed as follows: 1) the first post-construction eelgrass survey should be completed within 30 days following completion of construction to evaluate direct effects of construction, 2) the second and third post-construction surveys should be performed approximately one year after the first post-construction survey, and approximately two years after the first post-construction survey, respectively, during the appropriate growing season to confirm no indirect, or longer term effects resulted from construction. A compelling reason should be demonstrated before any reduced monitoring and reporting recommendations are made.

2. Localized Permanent Impacts

a) If both NMFS and the authorizing action agencies concur, the compensatory mitigation elements of this policy may not be necessary for the placement of a single pipeline, cable, or other similar utility line across existing eelgrass habitat with an impact corridor of no more than 1 meter wide. NMFS should recommend the completion of pre- and post-action surveys as described in section II.B. and II.D. The actual area of impact should be determined from the post-action survey. NMFS should recommend the completion of an additional survey (after 1 year) to ensure that the action or impacts attributable to the action have not exceeded the 1-meter corridor width. NMFS should recommend that, if the post-action or 1 year survey demonstrates a loss of eelgrass habitat greater than the 1-meter wide corridor, mitigation should be undertaken.

b) ) If both NMFS and the authorizing action agencies concur that the spacing of shellfish aquaculture longlines does not result in a measurable net loss of eelgrass habitat in the project area, then mitigation associated with local losses under longlines may not be necessary. NMFS should recommend the completion of pre- and post-action surveys as described in section II.B. and II.D. NMFS should recommend the completion of additional post-action monitoring surveys (to be completed approximately 1 year and 2 years following implementation of the action) to ensure that the action or impacts attributable to the action have not resulted in net adverse impacts to eelgrass habitat. NMFS should recommend that, if the 1-year or 2-year survey demonstrates measurable impact to eelgrass habitat, mitigation should be undertaken. c) NMFS should consider mitigation on a 1:1 basis for impacts less than 10 square meters to eelgrass patches where impacts are limited to small portions of well-established eelgrass habitat or eelgrass habitat that, despite highly variable conditions, generally retain extensive eelgrass, even during poor years. A reduced mitigation ratio should not be considered where impacts would occur to isolated or small eelgrass habitat areas within which the impacted area constitutes more than 1% of the eelgrass habitat in the local area during poor years.

c) If NMFS concurs and suitable out-of-kind mitigation is proposed, compensatory mitigation may not be necessary for actions impacting less than 10 square meters of eelgrass.

## III. Glossary of Terms

Except where otherwise specified, the explanations of the following terms are provided for informational purposes only and are described solely for the purposes of this policy; where a NMFS statute, regulation, or agreement requires a different understanding of the relevant term, that understanding of the term will supplant these explanations provided below.

Compensatory mitigation – restoration, establishment, or enhancement of aquatic resources for the purposes of offsetting unavoidable authorized adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Ecosystem – a geographically specified system of organisms, the environment, and the processes that control its dynamics. Humans are an integral part of an ecosystem.

Ecosystem function – ecological role or process provided by a given ecosystem.

Ecosystem services – contributions that a biological community and its habitat provide to the physical and mental well-being of the human population (*e.g.*, recreational and commercial opportunities, aesthetic benefits, flood regulation).

Eelgrass habitat – areas of vegetated eelgrass cover (any eelgrass within 1 square meter quadrat and within 1 m of another shoot) bounded by a 5 m wide perimeter of unvegetated area

Essential fish habitat (EFH) – EFH is defined in the MSA as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

EFH Assessment – An assessment as further explained in 50 C.F.R. § 600.920(e).

EFH Consultation – The process explained in 50 C.F.R. § 600.920

EFH Conservation Recommendation – provided by the National Marine Fisheries Service (NMFS) to a federal or state agency pursuant to section 305(b)(4)(A) of the Magnuson-Stevens Act regarding measures that can be taken by that agency to conserve EFH. As further explained in 50 C.F.R. § 600.925, EFH Conservation Recommendations may be provided as part of an EFH consultation with a federal agency, or may be provided by NMFS to any federal or state agency whose actions would adversely affect EFH .

Habitat – environment in which an organism(s) lives, including everything that surrounds and affects its life, including biological, chemical and physical processes.

Habitat function – ecological role or process provided by a given habitat (*e.g.*, primary production, cover, food, shoreline protection, oxygenates water and sediments, etc.).

In lieu fee program – a program involving the restoration, establishment, and/or enhancement of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation needs; an in lieu fee program works like a mitigation bank, however, fees to compensate for impacts to habitat function are collected prior to establishing an on-the-ground conservation/restoration project.

In-kind mitigation – mitigation where the adverse impacts to a habitat are mitigated through the creation, restoration, or enhancement of the same type of habitat.

Mitigation – action or project undertaken to offset impacts to an existing natural resource.

Mitigation bank – a parcel of land containing natural resource functions/values that are conserved, restored, created and managed in perpetuity and used to offset unavoidable impacts to comparable resource functions/values occurring elsewhere. The resource functions/values contained within the bank are translated into quantified credits that may be sold by the banker to parties that need to compensate for the adverse effects of their activities.

Out-of-kind mitigation – mitigation where the adverse impacts to one habitat type are mitigated through the creation, restoration, or enhancement of another habitat type

## IV. Literature Cited

Bostrom, C. and E. Bonsdorff. 2000. Zoobenthic community establishment and habitat complexity–the importance of seagrass shoot density, orphology and physical disturbance for faunal recruitment. Marine Ecology Progress Series 205:123-138.

Bostrom, C., E. Bonsdorff, P. Kangas, and A. Norkko. 2002. Long-term changes of a Brackish-water eelgrass (Zostera marina L.) community indicate effects of coastal eutrophication. Estuarine, Coastal and Shelf Science 55: 795-804.

California Department of Transportation. 2003. Storm Water Quality Handbooks: Construction Site Best Management Practices (BMPs) Manual.

Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M, Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V.O., Paruelo, J., Raskin, R.G., Sutton, P., and M. van den Belt. 1997. The value of the world's ecosystem services and natural capital. Nature 387: 253-260.

Council on Environmental Quality (CEQ). Regulations 1508 – National Environmental Policy Act (40 CFR 1508).

Donoghue, C. 2011. Technical Memorandum: Operational Definition of an Eelgrass (*Zostera marina*) Bed. A Summary of a Workgroup Discussion and Related Analysis. Washington State Department of Natural Resources. October 2011.

Duarte, C. M. 2002. The future of seagrass meadows. Environmental Conservation 29(2):192-206.

Duarte, C.M., Dennison, W.C., Orth, R.J.W. and T.J.B. Carruthers. 2008. The charisma of coastal ecosystems: addressing the imbalance. Estuaries and Coasts: J CERF 31:233–238.

Evans, N.T. and Leschen, A. 2010. Technical guidelines for the delineation, restoration, and monitoring of eelgrass (*Zostera marina*) in Massachusetts coastal waters. Massachusetts Division of Marine Fisheries Technical Report TR-43. 8 p.

Evans, N. T., and F. T. Short. 2005. Functional trajectory models for assessment of transplanted eelgrass, Zostera marina L., in the Great Bay Estuary, New Hampshire. Estuaries 28(6):936-947.

Ferrell, D. J., and J.D. Bell. 1991. Differences among assemblages of fish associated with *Zostera capricorni* and bare sand over a large spatial scale. Marine Ecology Progress Series 72:15-24.

Fonseca, M.S., Kenworthy, W.J., Thayer, G.W. 1998. Guidelines for the conservation and restoration of seagrasses in the United Stated and adjacent waters. NOAA Coastal Ocean Program Decision Analysis Series, No. 12. NOAA Coastal Ocean Office, Silver Spring, MD. 222 p.

Fonseca, M. S., W. J. Kenworthy, D. R. Colby, K. A. Rittmaster, and G. W. Thayer. 1990. Comparisons of fauna among natural and transplanted eelgrass Zostera marina meadows: criteria for mitigation. Marine Ecology Progress Series 65:251-264

Hoffman, R. S. 1986. Fishery Utilization of Eelgrass (Zostera marina) Beds and Non-vegetated Shallow Water Areas in San Diego Bay. SWR-86-4, NMFS/SWR.

King, D. M., and E. W. Price. 2004. Developing Defensible Wetland Mitigation Ratios: A Companion to "The Five-step Wetland Mitigation Ratio Calculator." Prepared by King and Associates, Inc. for NOAA, Office of Habitat Conservation, Habitat Protection Division.

Lotze, H. K., H. S. Lenihan, B. J. Bourque, R. H. Bradbury, R. G. Cooke, M. C. Kay, S. M. Kidwell, M. X. Kirby, C. H. Peterson, and J. B. C. Jackson. 2006. Depletion, degradation, and recovery potential of estuaries and coastal seas. Science 312:1806-1809.

Merkel, K. W. 1988. Growth and survival of transplanted eelgrass: The importance of planting unit size and spacing. In: Proceedings of the California Eelgrass Symposium. Chula Vista, CA.

National Oceanic and Atmospheric Administration-Damage Assessment and Restoration Program (NOAA-DARP). 1999. Discounting and the treatment of uncertainty in natural resource damage assessment. *Technical Paper 99-1.*

National Research Council. 2001. Compensating for Wetlands Losses under the Clean Water Act. National Academy Press, Washington DC, USA.

Orth, R. J., T. J. B. Carruthers, W. C. Dennison, C. M. Duarte, J. W. Fourqurean, K. L. Heck, Jr., A. R. Hughes, G. A. Kendrick, W. J. Kenworthy, S. Olyarnik, F. T. Short, M. Waycott, and S. L. Williams. 2006. A global crisis for seagrass ecosystems. BioScience 56(12):987-996.

Pacific Fishery Management Council (PFMC). 2008. Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery as Amended Through Amendment 19.

Peterson, C.H., R.A. Luttich Jr., F. Micheli, and G.A. Skilleter. 2004. Attenuation of water flow inside seagrass canopies of differing structure. Marine Ecology Progress Series 268: 81-92.

Rumrill, S.S. and V.K. Poulton. 2004. Ecological role and potential impacts of molluscan shellfish culture in the estuarine environment of Humboldt Bay, CA. http://hdl.handle.net/1794/3798

Short, F. T., and S. Wyllie-Echeverria. 1996. Natural and human-induced disturbance of seagrasses. Environmental Conservation 23(1):17-27.

Smith, Timothy M., J. S. Hindell, G. P. Jenkins, and R. M. Connolly. 2008. Edge effects on fish associated with seagrass and sand patches. Marine Ecology Progress Series 359:203-213.

South Florida Water Management District. 2007. Environmental Monitoring Report Guidelines. Environmental Resource Regulation Department. 18 p.

Thom, R.N. 1990. A review of eelgrass (*Zostera marina L.*) transplanting projects in the Pacific Northwest. The Northwest Environmental Journal 6:121-137.

Thom, R.N., J. Gaeckle, A. Borde, M. Anderson, M. Boyle, C. Durance, M. Kyte, P. Schlenger, J. Stutes, D. Weitkamp, S. Wyllie-Echeverria, and S. Rumrill. 2008. Eelgrass (*Zostera marina L.*) restoration in the Pacific Northwest: recommendations to improve project success. U.S. Department of Energy. Technical Report WA-RD 706.1.

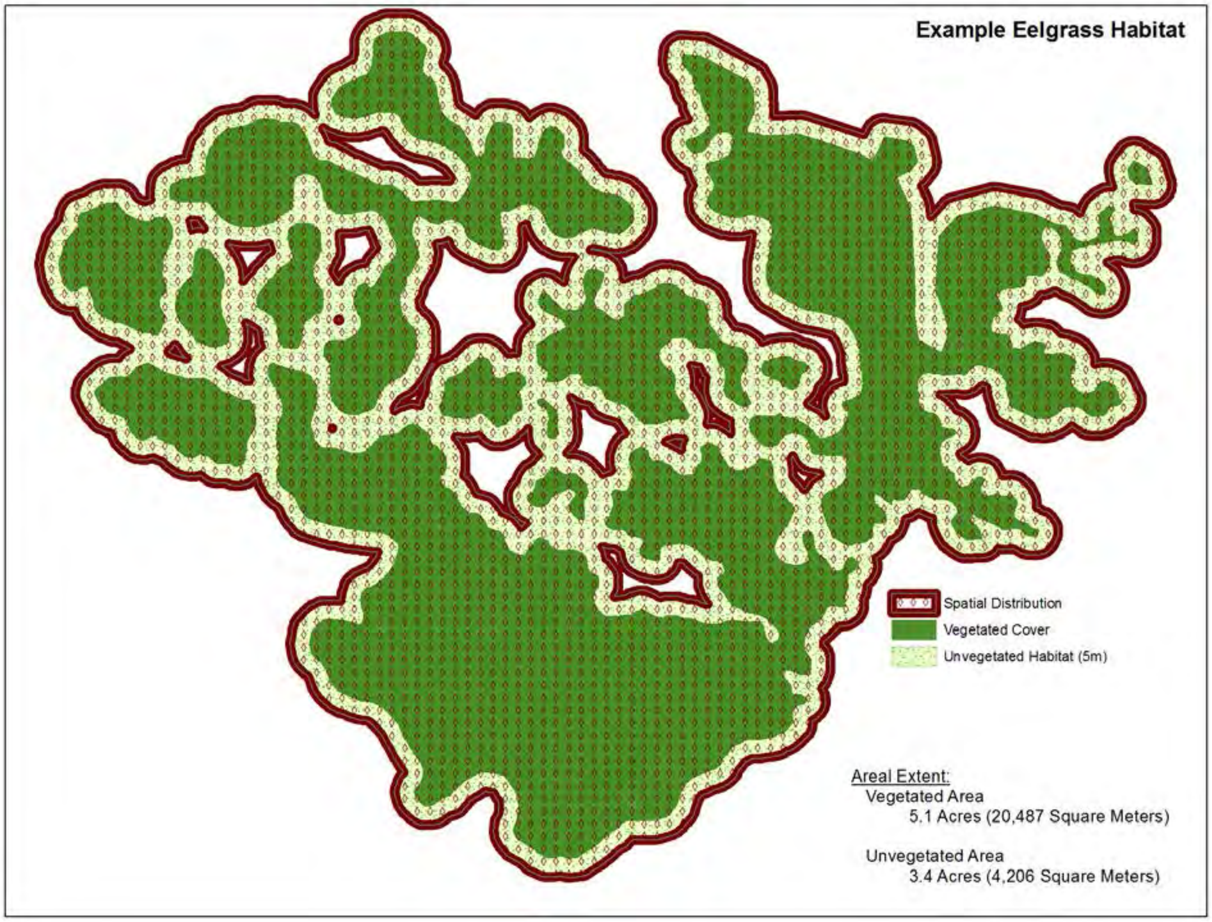
United States Army Corps of Engineers. 2010. New England District Compensatory Mitigation Guidance. 94 p.

van Houte-Howes, S.J. Turner, and C. A. Pilditch. 2004. Spatial Differences in Macroinvertebrate Communities in Intertidal Seagrass Habitats and Unvegetated Sediment in Three New Zealand Estuaries. Estuaries 27(6):945-957.

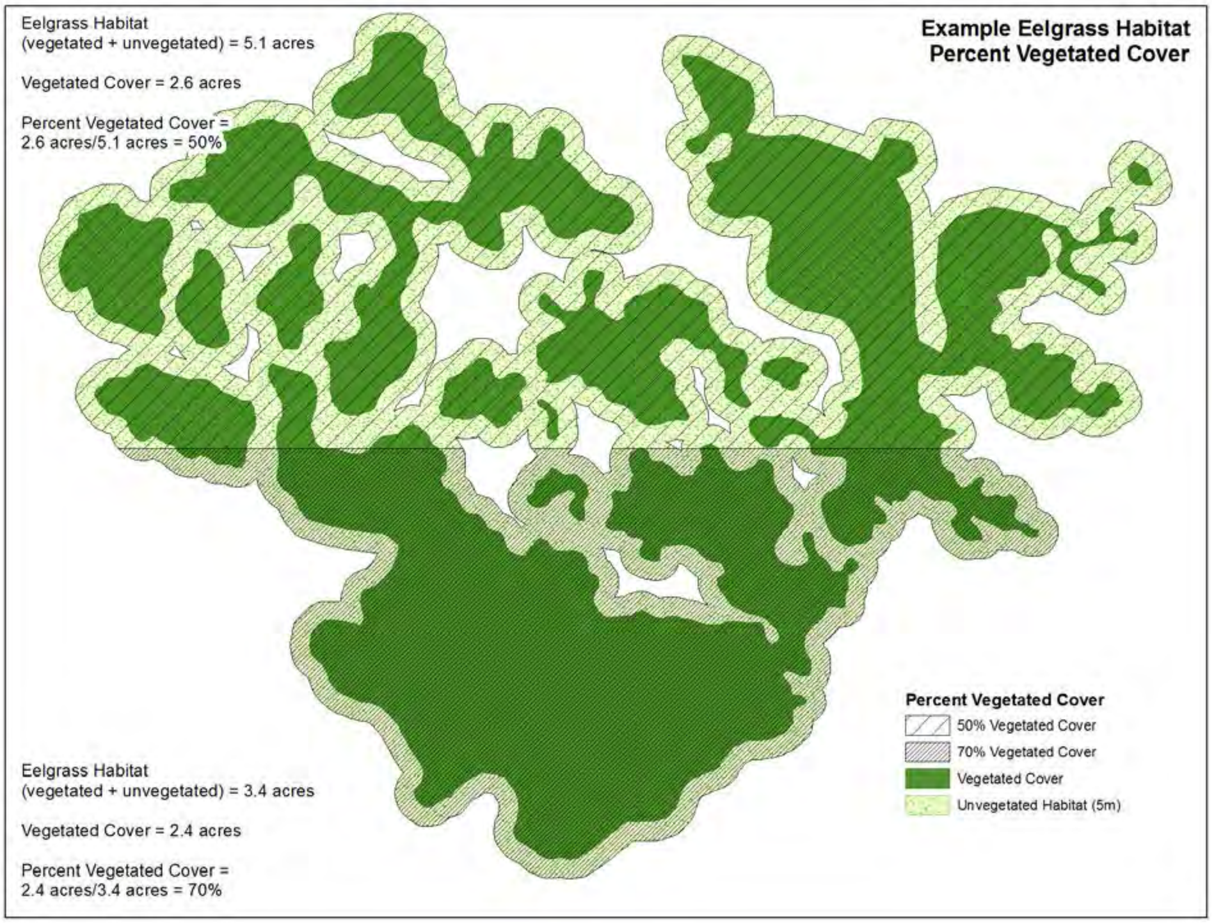
Washington Department of Fish and Wildlife. 2008. Eelgrass/macroalgae habitat interim survey guidelines (http://wdfw.wa.gov/publications/00714/).

Webster, P.J., A.A. Rowden, and M.J. Attrill. 1998. Effect of shoot density on the infaunal macro-invertebrate community within a *Zostera marina* seagrass bed. Estuarine, Coastal and Shelf Science 47: 351-357.

**ATTACHMENT 1. Graphic depiction of eelgrass habitat definition including spatial distribution and aerial coverage of vegetated cover and unvegetated eelgrass habitat.**

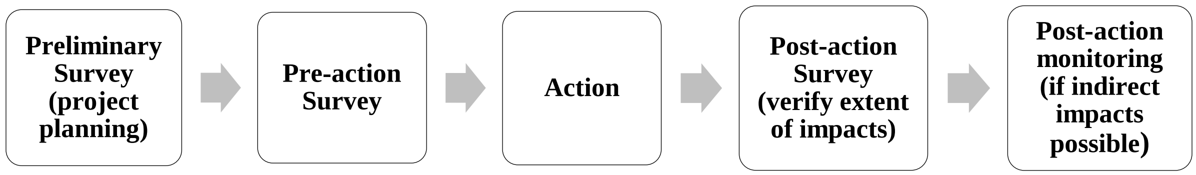


**ATTACHMENT 2. Example Eelgrass Habitat Percent Vegetated Cover.**



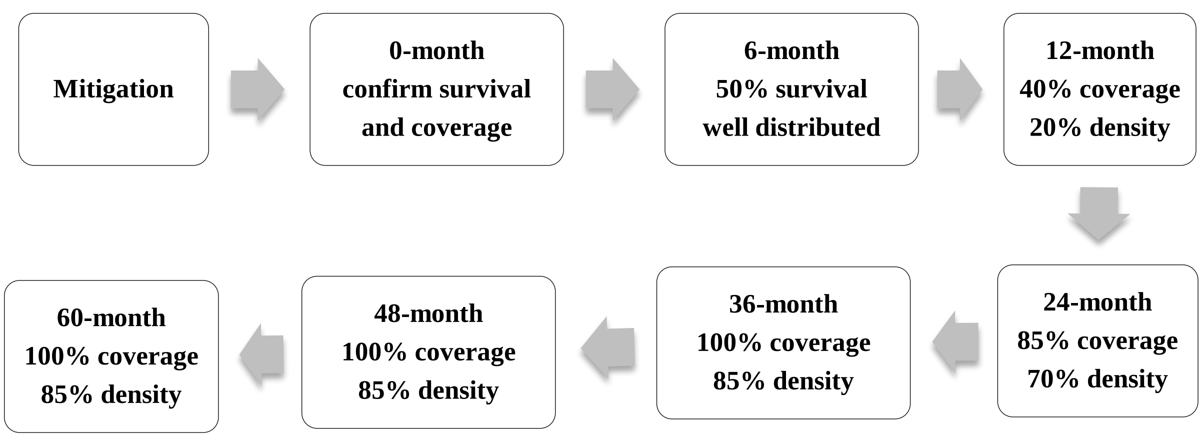
**ATTACHMENT 3. Flow chart depicting timing of surveys and monitoring.**

a) <u>Eelgrass impact surveys</u>




- All surveys should be completed during the growing season
- Surveys should be completed at the impact site and an appropriate reference site(s)
- A preliminary survey completed for planning purposes may be completed a year or more in advance of the action.
- Pre-action and post-action surveys should be completed within 60 days of the action.
- A survey is good for 60 days, or if that 60 day period extends beyond the end of growing season, until start of next growing season
- Two years of monitoring following the initial post-action monitoring event may be needed to verify lack or extent of indirect effects.
- Survey reports should be provided to NMFS and the federal action agency within 30 days of completion of each survey event

b) <u>Eelgrass mitigation monitoring</u>




- Mitigation should occur coincident or prior to the action
- All monitoring should be completed during the growing season
- Performance metrics for each monitoring event are compared to the 1.2:1 mitigation ratio
- Monitoring reports should be provided to NMFS and the federal action agency 30 days of completion of each monitoring event
- NMFS and action agency will evaluate if performance metrics met, and decide if supplemental mitigation or other adaptive management measures are needed

**ATTACHMENT 4. Eelgrass transplant monitoring report.**

In order to ensure that NMFS is aware of the status of eelgrass transplants, action agencies should provide or ensure that NMFS is provided a monitoring report summary with each monitoring report. For illustrative purposes only, an example of a monitoring report summary is provided below.

**ACTION PARTY CONTACT INFORMATION:**

| |
|---|
| Action Name (same as permit reference): |

*(a) Action party Information*

| | | | |
|---|---|---|---|
| Name | | Address | |
| Contact Name | | City, State, Zip | |
| Phone | | Fax | |
| Email | | | |

**MITIGATION CONSULTANT**

| | | | |
|---|---|---|---|
| Name | | Address | |
| Contact Name | | City, State, Zip | |
| Phone | | Fax | |
| Email | | | |

**PERMIT DATA:**

| **Permit** | **Issuance Date** | **Expiration Date** | **Agency Contact** |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

**EELGRASS IMPACT AND MITIGATION NEEDS SUMMARY:**

| | | | |
|---|---|---|---|
| Permitted Eelgrass Impact Estimate ($m^2$): | | | |
| Actual Eelgrass Impact ($m^2$): | | On (post-construction date): | |
| Eelgrass Mitigation Needs ($m^2$): | | Mitigation Plan Reference: | |
| Impact Site Location: | | | |
| Impact Site Center Coordinates (actionion & | | | |

| | |
|---|---|
| datum): | |
| Mitigation Site Location: | |
| Mitigation Site Center Coordinates (actionion & datum): | |

**ACTION ACTIVITY DATA:**

| **Activity** | **Start Date** | **End Date** | **Reference Information** |
|---|---|---|---|
| Eelgrass Impact | | | |
| Installation of Eelgrass Mitigation | | | |
| Initiation of Mitigation Monitoring | | | |

**MITIGATION STATUS DATA:**

| | **Mitigation Milestone** | **Scheduled Survey** | **Survey Date** | **Eelgrass Habitat Area ($m^2$)** | **Bottom Coverage (Percent)** | **Eelgrass Density (turions/$m^2$)** | **Reference Information** |
|---|---|---|---|---|---|---|---|
| **Month** | **0** | | | | | | |
| | **6** | | | | | | |
| | **12** | | | | | | |
| | **24** | | | | | | |
| | **36** | | | | | | |
| | **48** | | | | | | |
| | **60** | | | | | | |

**FINAL ASSESSMENT:**

| | |
|---|---|
| **Was mitigation met?** | |
| **Were mitigation and monitoring performed timely?** | |
| **Were mitigation delay increases needed or were supplemental mitigation programs necessary?** | |

**ATTACHMENT 5. Wetlands mitigation calculator formula and parameters.**

Starting mitigation ratios for each region within California were calculated using "The Five-Step Wetland Mitigation Ratio Calculator" (King and Price 2004) developed for NMFS Office of Habitat Conservation. The discrete time equation this method uses to solve for the appropriate mitigation ratio is as follows:

$$R = \frac{\sum_{t=0}^{T_{\max}} (1+r)^{-t}}{\left(B(1-E)(1+L)-A\right)\left[\sum_{t=-D}^{C-D-1} \frac{(t+D)}{C(1+r)^{t}} + \sum_{C-D}^{T_{\max}} (1+r)^{-t}\right] + \left[\sum_{t=-D}^{T_{\max}} \frac{\left(1-(1-k)^{(t+D)}\right)}{(1+r)^{(t+D)}}\right]\left(A(1+L)\right)}$$

The calculator parameters in the above equation and values used to calculate starting mitigation ratios for CEMP are as follows:

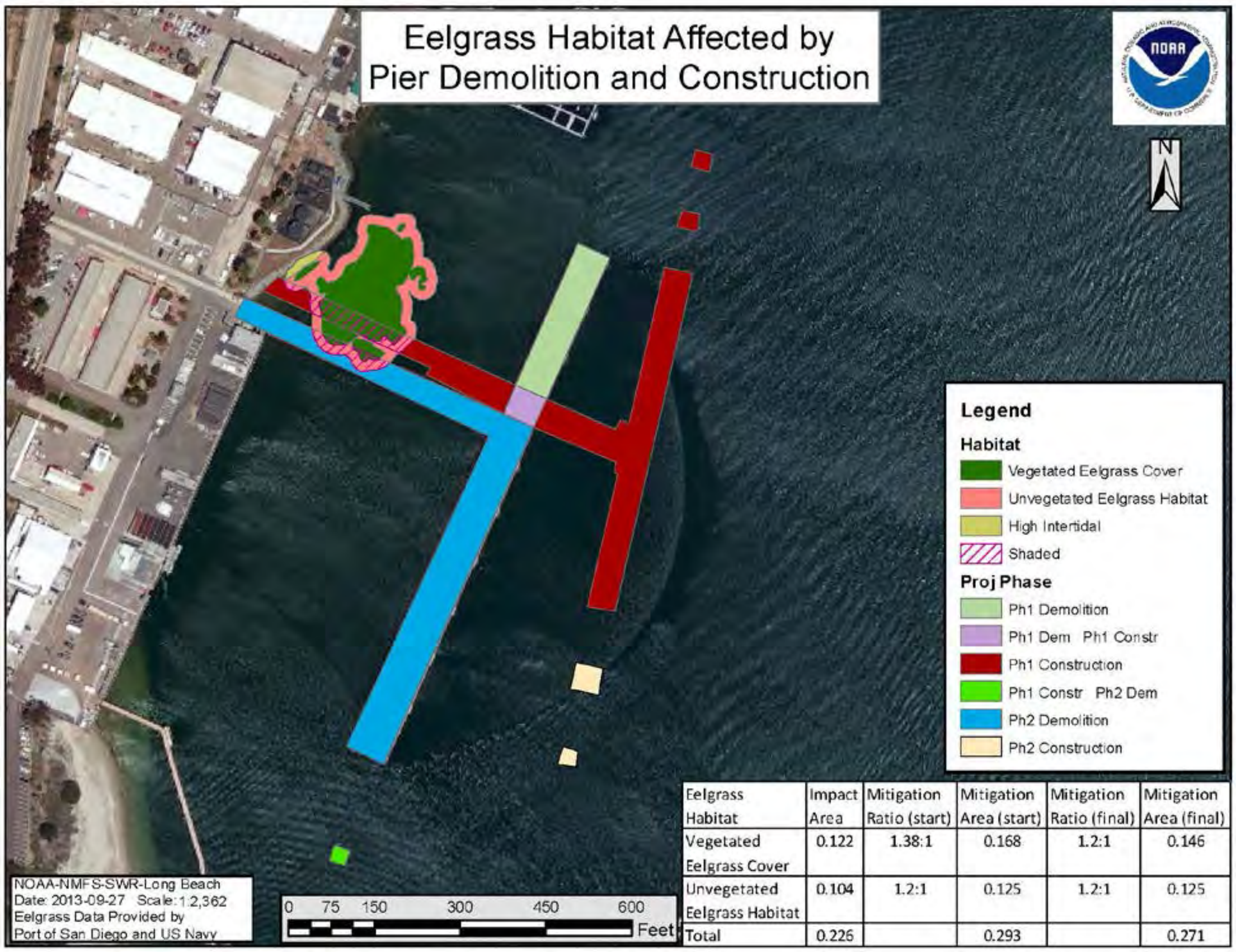
| Symbol | Calculator Parameter | Value |
|---|---|---|
| A | The level of habitat function provided at the mitigation site prior to the mitigation project | 0% |
| B | The maximum level of habitat function that mitigation is expected to attain, if it is successful | 100% |
| C | The number of years after construction that the mitigation project is expected to achieve maximum function | 3 yrs |
| D | The number of years before destruction of the impacted wetland that the mitigation project begins to generate habitat function | 0 yrs |
| E | The percent likelihood that the mitigation project will fail and provide none of the anticipated benefits | various* |
| L | The percent difference in expected habitat function based on differences in landscape context of the mitigation site when compared with the impacted wetland | 0% |
| k | The percent likelihood that the mitigation site, in the absence purchase or easement would be developed in any future year | 0% |
| r | The discount rate used for comparing gains and losses that accrue at different times in terms of their present value | 3%** |
| Tmax | The time horizon used in the analysis (chosen to maintain 1.2:1 ratio at E=100% and other parameter values listed above). | 13 yrs |

* The value for E was based on regional history of success in eelgrass mitigation and varied between regions (see Attachment X).

** NOAA suggests the use of a 3 percent real discount rate for discounting interim service losses and restoration gains, unless a different proxy for the social rate of time preference is more appropriate. (NOAA-DARP 1999) We use this value here, because it is based on best available information and is consistent with the NOAA Damage Assessment and Restoration Program.

**ATTACHMENT 6. Example calculations for application of starting and final mitigation ratios for impacts to eelgrass habitat in southern California.**

In this example, a pier demolition and construction would impact 0.122 acres of vegetated eelgrass habitat (dark green) and 0.104 acres of unvegetated habitat (pink). Area of impact is indicated by purple hatch mark. Application of recommended starting mitigation ratio for southern California (1.38:1) and final mitigation ratio (1.2:1) to compute starting and final mitigation area for this example are shown in the table.




| Eelgrass Habitat | Impact Area | Mitigation Ratio (start) | Mitigation Area (start) | Mitigation Ratio (final) | Mitigation Area (final) |
|---|---|---|---|---|---|
| Vegetated Eelgrass Cover | 0.122 | 1.38:1 | 0.168 | 1.2:1 | 0.146 |
| Unvegetated Eelgrass Habitat | 0.104 | 1.2:1 | 0.125 | 1.2:1 | 0.125 |
| Total | 0.226 | | 0.293 | | 0.271 |

**ATTACHMENT 7. Example mitigation area multipliers for delay in initiation of mitigation activities.**

Delays in eelgrass transplantation result in delays in ultimate reestablishment of eelgrass habitat values, increasing the duration and magnitude of project effects to eelgrass. The delay multipliers in the table below have been generated by altering the implementation start time within "The Five-Step Wetland Mitigation Ratio Calculator" (King and Price 2004).

| MONTHS POST-IMPACT | DELAY MULTIPLIER (Percent of Initial Mitigation Area Needed) |
|---|---|
| 0-3 mo | 100% |
| 4-6 mo | 107% |
| 7-12 mo | 117% |
| 13-18 mo | 127% |
| 19-24 mo. | 138% |
| 25-30 mo. | 150% |
| 31-36 mo | 163% |
| 37-42 mo. | 176% |
| 43-48 mo. | 190% |
| 49-54 mo. | 206% |
| 55-60 mo. | 222% |

**ATTACHMENT 8. Summary of Eelgrass Transplant Actions in California**

*See table starting next page.*

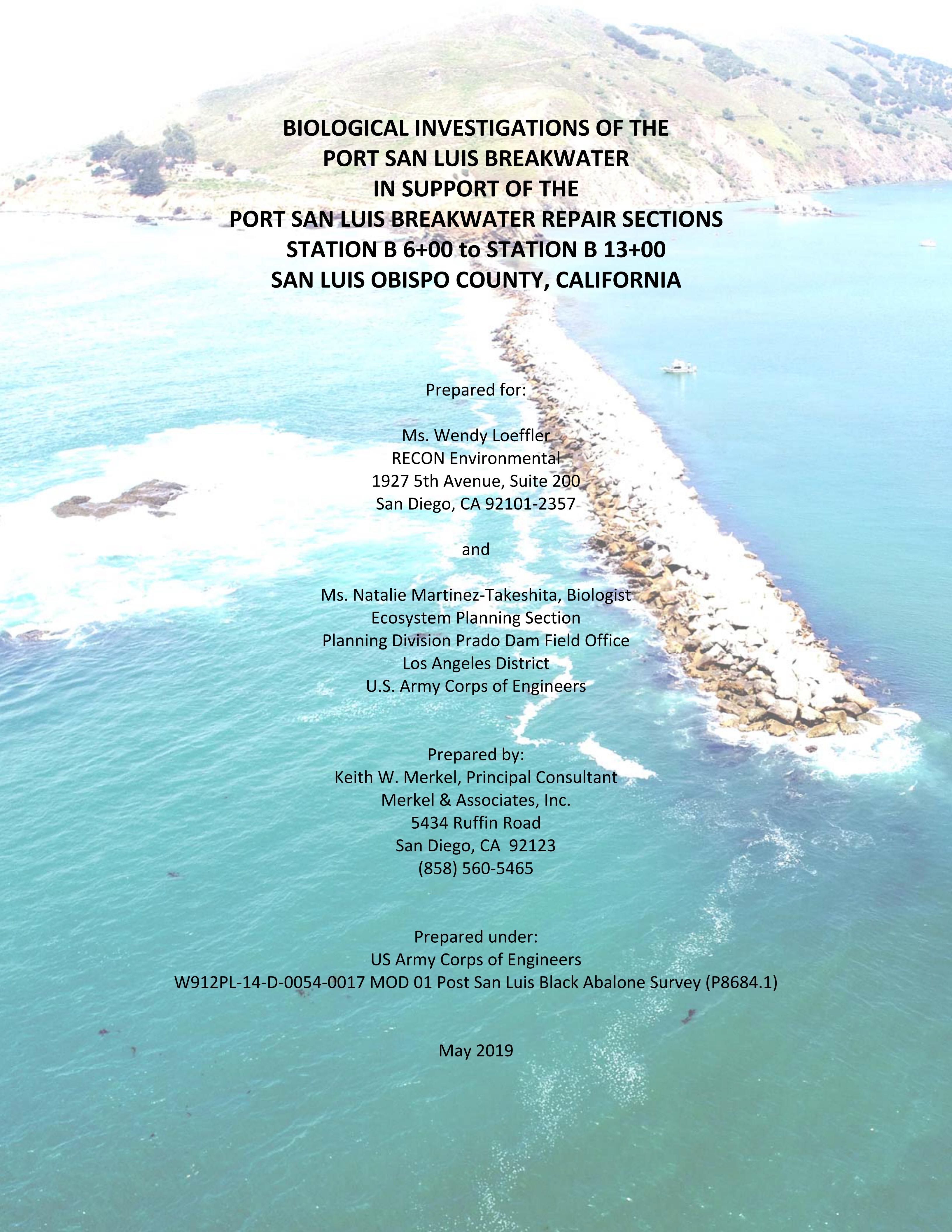
## SUMMARY OF EELGRASS (*ZOSTERA MARINA*) TRANSPLANT PROJECTS IN CALIFORNIA

| No. | Region | System | Location | Year | Size* | Type** | Consistent with Permit Conditions | Success Status*** | Net Result**** |
|---|---|---|---|---|---|---|---|---|---|
| **Southern California Eelgrass Restoration History** | | | | | | | | | |
| | Southern | San Diego Bay | North Island | 1976 | <0.1 | SP | yes | no | - |
| | Southern | San Diego Bay | "Delta" Beach | 1977 | 1.6 | SP | yes | partial | - |
| | Southern | San Diego Bay | North Island | 1978 | <0.1 | SP | yes | yes | + |
| | Southern | Newport Bay | Carnation Cove | 1978 | <0.1 | SP | no | no | - |
| | Southern | Newport Bay | West Jetty | 1980 | <0.1 | SP | yes | partial | 0 |
| | Southern | Mission Bay | multiple beaches | 1982 | <0.1 | SP | no | partial | 0 |
| | Southern | LA/LB Harbor | Cabrillo Beach | 1985 | <0.1 | BR | yes | yes | + |
| | Southern | Alamitos Bay | Peninsula | 1985 | <0.1 | BR | yes | yes | + |
| | Southern | Huntington Hbr. | Main Channel | 1985 | <0.1 | BR | yes | no | 0 |
| | Southern | Newport Bay | Upper | 1985 | <0.1 | BR | yes | no | 0 |
| | Southern | Mission Bay | Sail Bay | 1986 | 2.7 | BR | yes | yes | + |
| | Southern | San Diego Bay | NEMS I | 1987 | 3.8 | BR | no | yes | + |
| | Southern | San Diego Bay | Chula Vista Wildlife Reserve | 1987 | <0.1 | BR | yes | no | +[1] |
| | Southern | San Diego Bay | Harbor Island | 1988 | 0.1 | BR | yes | yes | + |
| | Southern | Huntington Harbour | Entrance Channel | 1989 | 0.1 | BR | no | yes | + |
| | Southern | San Diego Bay | Le Meridien Hotel | 1990 | <0.1 | BR | yes | yes | + |
| | Southern | San Diego Bay | Embarcadero | 1991 | <0.1 | BR | yes | yes | +[2] |
| | Southern | Mission Bay | Sea World Lagoon | 1991 | <0.1 | BR | yes | yes | + |
| | Southern | San Diego Bay | Loew's Marina | 1991 | <0.1 | BR | yes | yes | + |
| | Southern | San Diego Bay | NEMS 2 | 1993 | <0.1 | BR | yes | yes | + |
| | Southern | San Diego Bay | Sea Grant Study | 1993 | <0.1 | BR | yes | yes | + |
| | Southern | Agua Hedionda Lagoon | Outer Lagoon | 1993 | <0.1 | BR | yes | yes | + |
| | Southern | San Diego Bay | NEMS 5 | 1994 | 0.4 | BR | yes | yes | + |
| | Southern | Mission Bay | South Shores Basin | 1994 | 2.9 | BR | yes | yes | + |
| | Southern | Talbert Marsh | Talbert Channel | 1995 | <0.1 | BR | na | yes | +[4] |
| | Southern | Mission Bay | various sites | 1995 | 4.8 | BR | yes | yes | + |
| | Southern | Mission Bay | Ventura Cove[5] | 1996 | 0.5 | BR | yes | yes | +[6] |
| | Southern | Mission Bay | Santa Clara Cove | 1996 | <0.1 | BR | yes | no | 0[10] |
| | Southern | Mission Bay | West Mission Bay Drive Bridge | 1996 | <0.1 | BR | no | yes | 0[10] |
| | Southern | Mission Bay | De Anza Cove | 1996 | <0.1 | BR | yes | yes | + |
| | Southern | Batiquitos Lagoon | all basins | 1997 | 21.6[7] | BR | yes | yes | +[4] |
| | Southern | San Diego Bay | NEMS 5 | 1997 | 7.1 | BR | yes | yes | + |
| | Southern | San Diego Bay | Convair Lagoon | 1998 | 2.5 | BR | yes | no | -[12] |
| | Southern | San Diego Bay | NEMS 6 | 1999 | 0.3 | BR | yes | yes | + |
| | Southern | Aqua Hedionda | Bristol Cove | 1999 | 0.3 | BR | yes | yes | + |
| | Southern | Aqua Hedionda | Middle Lagoon and Inner Lagoon | 1999 | 4 | BR | yes | yes | + |
| | Southern | Newport Bay | Balboa Is.Grand Cana | 1999 | <0.1 | BR | yes | yes | + |
| | Southern | Mission Bay | West Ski Island | 2001 | 0.2 | BR | yes | yes | + |

| No. | Region | System | Location | Year | Size* | Type** | Consistent with Permit Conditions | Success Status*** | Net Result**** |
|---|---|---|---|---|---|---|---|---|---|
| | Southern | San Diego Bay | Expanded NEMS 6 | 2001 | 0.6 | BR | yes | yes | + |
| | Southern | Newport Bay | USCG Corona del Mar | 2002 | <0.1 | BR | yes | yes | + |
| | Southern | Huntington Harbour | Sunset Bay | 2002 | <0.1 | BR | yes | yes | + |
| | Southern | San Diego Bay | Navy Enhancement Is. | 2002 | 1 | BR | yes | yes | + |
| | Southern | San Diego Bay | Coronado Bay Bridge | 2003 | 0.3 | BR | no | no | 0 |
| | Southern | LA Harbor | P300 Expansion Area | 2003 | 5.9 | BR | yes | partial | -[9] |
| | Southern | Newport Bay | Newport Bay Channel Dredging | 2004 | 0.4 | BR | yes | no | - |
| | Southern | San Diego Bay | South Bay Borrow Pit | 2004 | 4.2 | BR | yes | yes | pending[8] |
| | Southern | San Diego Bay | USCG ATC Pier | 2004 | 0.1 | BR | yes | yes | + |
| | Southern | San Diego Bay | South Bay Borrow Pit Sup. | 2006 | 4.2 | BR | yes | yes | pending[8] |
| | Southern | San Diego Bay | D Street Marsh | 2006 | 0.3 | BR | yes | pending | pending |
| | Southern | LA Harbor | P300 Supplement | 2007 | 0.8 | BR | yes | yes | pending |
| | Southern | San Diego Bay | Glorietta Bay Shoreline Park | 2007 | 0.2 | BR | yes | yes | pending |
| | Southern | Bolsa Chica | Pilot Eelgrass Restoration | 2007 | 0.5 | BR | yes | yes | +[4] |
| | Southern | San Diego Bay | Borrow Pit Supplement | 2007 | 4.2 | BR | yes | yes | pending[8] |
| | Southern | San Diego Bay | Sweetwater Silvergate Frac-out | 2008 | <0.1 | BR | yes | yes | 0[11] |
| | Southern | San Diego Bay | Harbor Drive Bridge/NTC Channel | 2009 | <0.1 | BR | yes | pending | pending |
| **Southern California Eelgrass Success Rate (1989-2009, Last 20 Years)** | | | | | | | | **87%** | **n=43** |
| **Central California Eelgrass Restoration History** | | | | | | | | | |
| | Central | Morro Bay | Anchorage Area | 1985 | <0.1 | BR | no | yes | + |
| | Central | Morro Bay | Target Rock | 1997 | <0.1 | BR | no | yes | + |
| | Central | Morro Bay | Morro Bay Launch Ramp | 2000 | <0.1 | BR | yes | yes | + |
| | Central | Morro Bay | Mooring Area A1 | 2002 | 0.3 | BR | yes | yes | + |
| | Central | Morro Bay | Western Shoal | 2010 | 0.8 | BR | yes | pending | pending |
| **Central California Eelgrass Success Rate (1985-2009, Inadequate History to Exclude Older Projects)** | | | | | | | | **100%** | **n=4** |
| **San Francisco Bay Eelgrass Restoration History** | | | | | | | | | |
| | San Francisco Bay | San Francisco Bay | Richmond Training Wall | 1985 | <0.1 | BR | NA | no | NA[4] |
| | San Francisco Bay | San Francisco Bay | Keil Cove and Paradise Cove | 1989 | 0.1 | Plugs | NA | partial | NA[4] |
| | San Francisco Bay | San Francisco Bay | Bayfarm Island/Middle Harbor Shoal | 1998 | 0.1 | BR and Plugs | NA | partial | NA[4] |
| | San Francisco Bay | San Francisco Bay | Bayfarm Island | 1999 | 0.1 | BR | NA | partial | NA[4] |
| | San Francisco Bay | San Francisco Bay | Brickyard Cove, Berkeley | 2002 | 0.2 | BR | yes | yes | +[13] |
| | San Francisco Bay | San Francisco Bay | Emeryville Shoals | 2002 | 0.1 | Mixed Test | NA | no | NA[4] |
| | San Francisco Bay | San Francisco Bay | Marin CDay, R&GC, Audubon | 2006 | 0.6 | Seed Bouy | NA | partial | pending[4] |
| | San Francisco Bay | San Francisco Bay | Marin CDay, R&GC, Audubon | 2006 | <0.1 | mod. TERFS | NA | partial | pending[4] |
| | San Francisco Bay | San Francisco Bay | Marin CDay, R&GC, Audubon | 2006 | <0.1 | Seeding | NA | no | NA[4] |
| | San Francisco Bay | San Francisco Bay | Clipper Yacht Harbor, Sausalito | 2007 | <0.1 | Frames | yes | pending | pending |
| | San Francisco Bay | San Francisco Bay | Albany, Emeryville, San Rafael | 2007 | <0.1 | BR | NA | partial | pending[4] |
| | San Francisco Bay | San Francisco Bay | Belvedere | 2008 | <0.1 | Frames | yes | pending | pending |
| **San Francisco Bay Eelgrass Success Rate (1985-2009, Inadequate History to Exclude Older Projects)** | | | | | | | | **40%** | **n=10** |

| No. | Region | System | Location | Year | Size* | Type** | Consistent with Permit Conditions | Success Status*** | Net Result**** |
|---|---|---|---|---|---|---|---|---|---|
| **Northern California Eelgrass Restoration History** | | | | | | | | | |
| | Northern | Humboldt Bay | Indian Island | 1982 | unknown | BR | unknown | no | - |
| | Northern | Bodega Harbor | Spud Point Marina | 1984 | 1.3 | BR | yes | no | - |
| | Northern | Humboldt Bay | Indian Island | 1986 | <0.1 | BR | yes | no | - |
| | Northern | Humboldt Bay | | 1986 | 0.2 | unknown | unknown | no | - |
| | Northern | Humboldt Bay | SR255 Bridge | 2004 | <0.1 | BR | yes | no | - |
| | Northern | Humboldt Bay | Maintenance Dredging Project | 2005 | <0.1 | BR | yes | yes | + |
| **Northern California Eelgrass Success Rate (1982-2009, Inadequate History to Exclude Older Projects)** | | | | | | | | **25%** | **n=4** |

* size in hectares
SP = sediment laden plug
** BR = bare root
*** success status is measured as yes, no, partial, pending, or unknown. Success rate is reported as percentage of sucessful over total completed within the past 25 years.
yes = 1, partial = 0.5, no = 0, and pending or unknown are not counted in either the numerator or denominator in determining success percentage.
**** + = net increase in eelgrass coverage, 0 = no change in eelgrass coverage, - = net decrease in eelgrass coverage
1 Transplant was initially adversely impacted by an unknown source of sediment and was deemed unsuitable.
2 The transplant declined initially and later recovered from what was determined to be a one time sedimentation event.
3 Transplant was experimental due to dense beds of the exotic muscle *Musculista senhousia*
which inhibited the growth of the transplant. Replacement transplant done elsewhere.
Transplant was completed in an area deemed unsuitable. Insufficient coverage required the construction of a remedial site.
Monitoring continues at both the initial and remedial sites.
4 Transplant was experimental.
5 Multiple sites.
6 Mitigation for marina at Princess Resort, project not built
7 Amount of eelgrass present within all basins as of 2000 mapping.
8 Regional eelgrass decline has resulted in die-offs both within restoration and reference areas equally full recovery had not occurred at the time of evaluation, yet project exceeds control-corrected requ
9 Original site was constructed as a plateau that was underfilled and anticipated to fall short of objectives. A supplemental
transplant was therefore completed when development began to exhibit shortfalls in area.
10 Shortfall mitigated by withdraw from established eelgrass mitigation bank.
11 Exception conditions from SCEMP requiring only replacement in place for unanticipated damage
12 Mitigated out-of-kind with non-eelgrass to satisfy permit requirements after shortfall in eelgrass mitigation.



# BIOLOGICAL INVESTIGATIONS OF THE PORT SAN LUIS BREAKWATER IN SUPPORT OF THE PORT SAN LUIS BREAKWATER REPAIR SECTIONS STATION B 6+00 to STATION B 13+00 SAN LUIS OBISPO COUNTY, CALIFORNIA

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Prepared under:
US Army Corps of Engineers
W912PL-14-D-0054-0017 MOD 01 Post San Luis Black Abalone Survey (P8684.1)

May 2019

## 3.2 Surfgrass Survey

### *3.2.1 Methods*

Surfgrass surveys were conducted using a number of field data collection methods including on-foot low tide surveys, prior diving and snorkeling observation from June 2018, and ultra-low altitude orthorectified photography in June 2018 and January-February 2019. On-foot ground surveys focusing on surfgrass were conducted on the leeward side of the breakwater, while prior black abalone surveys conducted on both the seaward and leeward sides of the study area noted the presence of surfgrass where it occurred, but did not focus on mapping surfgrass. During the January and February 2019 surveys, tide and surf conditions were not suited to ground survey of surfgrass on the exposed portions of the breakwater. However, UAV based photography covered this area very well and prior abalone investigations in 2018 also did not note any surfgrass on the seaward side of the breakwater except for that found on the formational bedrock of Whaler's Island and Point San Luis.

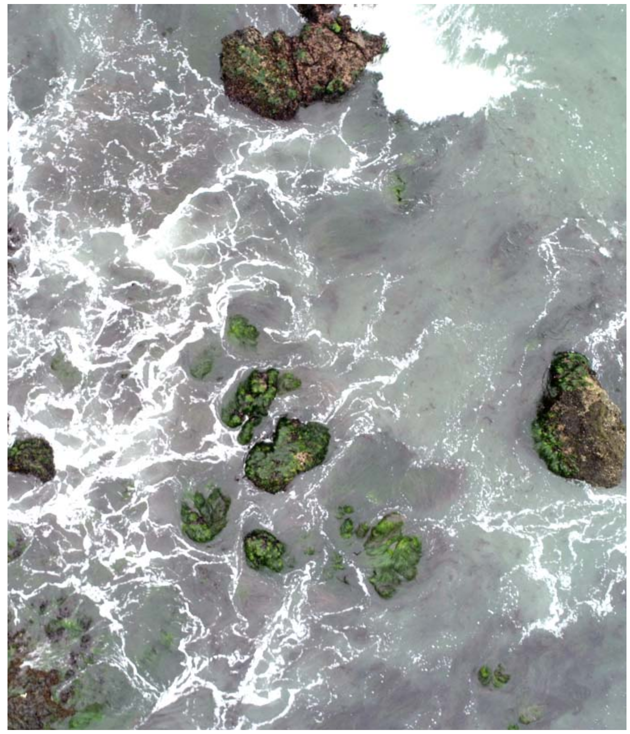
The Port San Luis Breakwater was surveyed at extreme low tides by UAV equipped with a 20 megapixel three color camera on June 30, 2018, January 30 and 31, and February 1, 2019. Surveys were completed at elevations of 400 feet and 250 feet, with a lower flight survey conducted at 100 feet being used to ground-truth the survey data. The native pixel resolutions of the collected imagery ranged from 0.4 inch at 100 feet up to 1.6 inches at 400 feet. The multiple flights were beneficial in providing a range of lighting and turbidity conditions thus ensuring that both exposed and shallow submerged surfgrass could be detected and mapped. The imagery collected was mosaicked to a georectified image and classification of surfgrass was accomplished using a combination of processing tools including spectral classification with manual training, followed by a process of manual cleaning and supplemental mapping completed on a dynamic stretch spectral range adjusted image. The mapping was completed in ESRI ArcGIS software.

### *3.2.2 Results*

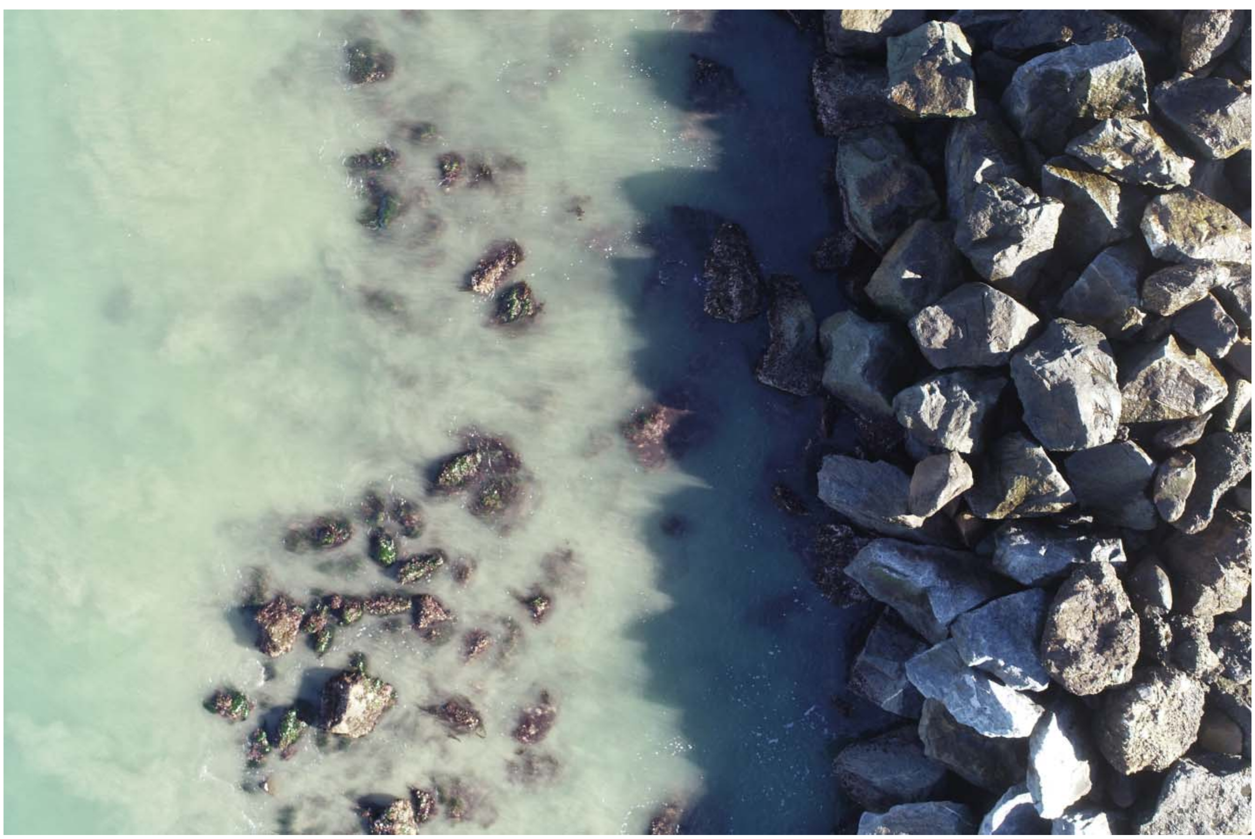
Torrey's surfgrass (*Phyllospadix torreyi*) was found to occur extensively on the native bedrock of Point San Luis and Whaler's Island, and to a much lesser degree on the low-lying boulder rock of what appears to be the remnants of a previously removed construction haul road on the leeward side of the breakwater (Figure 4). Although *P. torreyi* was specifically observed, Scouler's surfgrass (*P. scouleri*) is also present in the area with records existing from Diablo Canyon and Pismo Beach, and it would not be unexpected for both species to be represented in the study area.

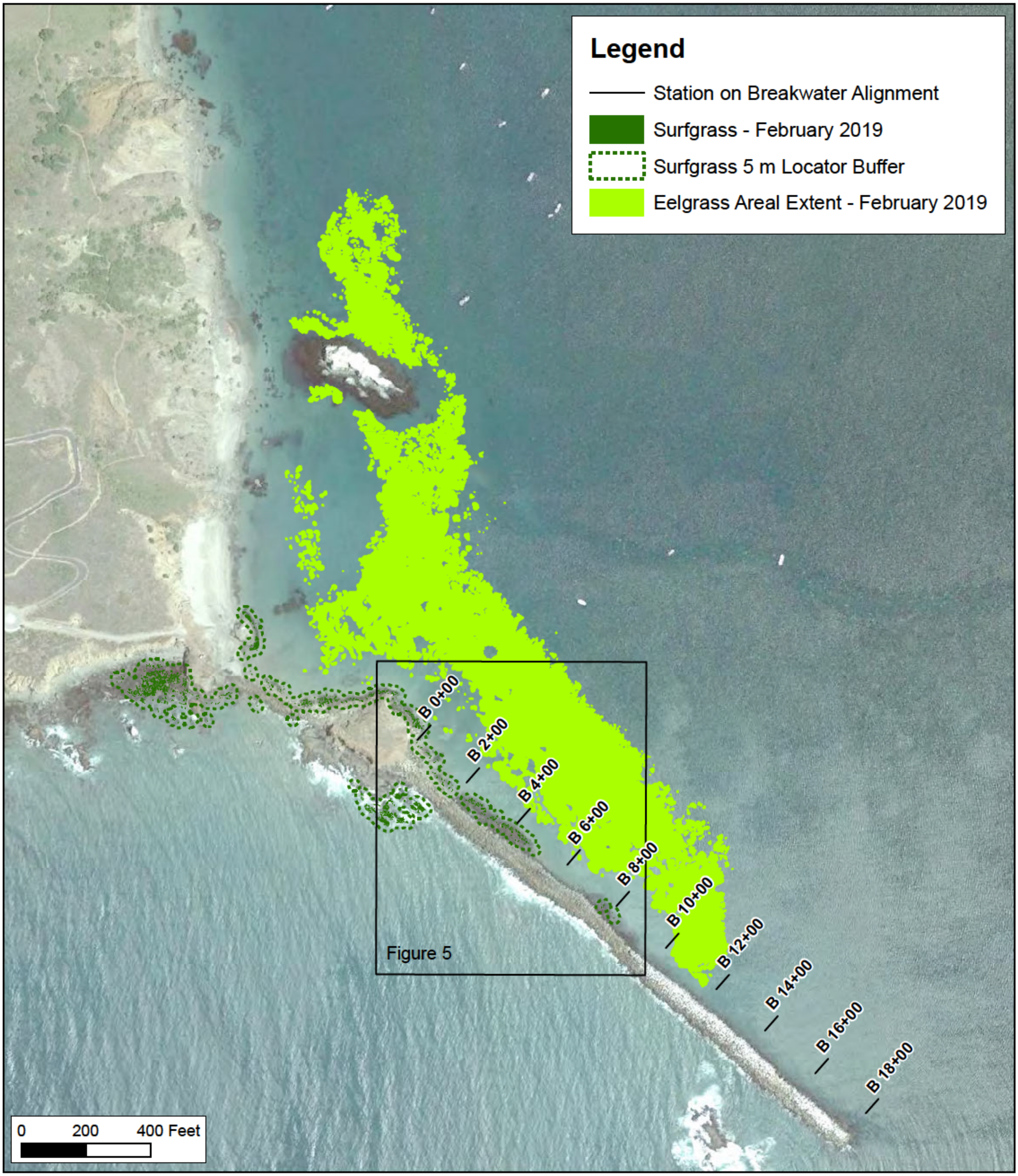
On the seaward side of the breakwater, surfgrass is found only within the partially sheltered areas near Point San Luis. On the lee side of the breakwater, surfgrass was most abundant on small areas of bedrock outcrops extending above the sand or adjacent to the breakwater boulder. However, surfgrass was also found on the lower intertidal imported boulder rubble that extended outward from the breakwater. These locations are intermittently sanded. No surfgrass was found further out on the breakwater where the surfgrass may be precluded from occurrence by a number of factors including well developed macroalgal cover, steep slopes that provide only a narrow potentially suitable elevation range, and a lack of disturbance that would allow surfgrass to become established.

Of particular note to the proposed breakwater repairs is the presence of the limited extent of surfgrass extending along the breakwater between Stations B 0+00 and B 8+00 (Figure 5). All of the surfgrass in this area is located between 0 and -3 feet MLLW. As a result, the surfgrass in this area should be outside of the elevation range within which repairs would take place, however well within the work area limits.



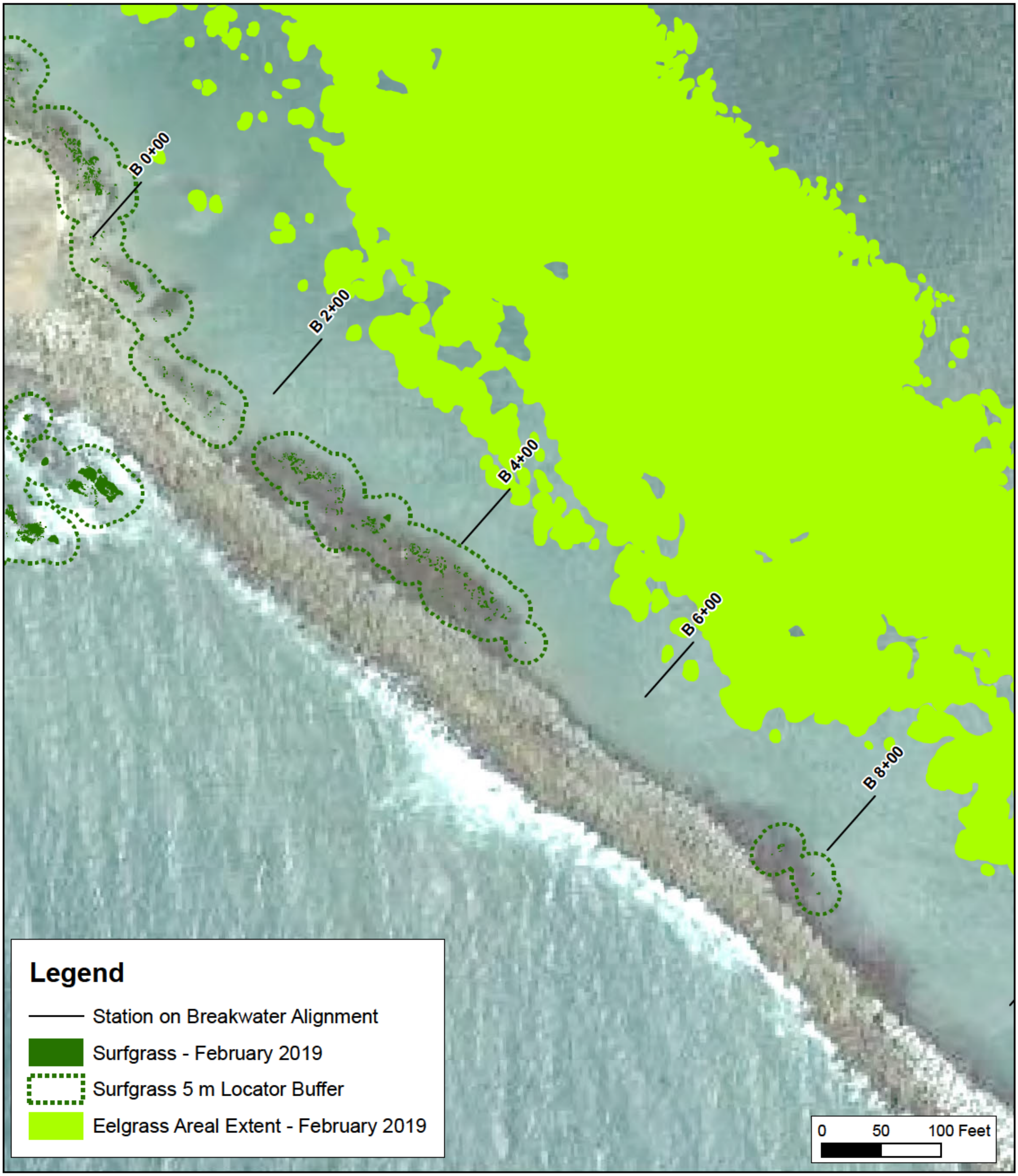
*Surfgrass on bedrock (left) and within orthorectified UAV aerial image of surfgrass January-February 2019 (right). Surfgrass also occurs on what appears to be remnants of a prior breakwater roadway on the lee of the the breakwater (bottom).*






**Surfgrass and Eelgrass - January, February 2019**
Port San Luis Breakwater Repair Sections
Stations B 6+00 to Station B 13+00
San Luis Obispo County, California

**Figure 4**




**Surfgrass and Eelgrass - January, February 2019**
Port San Luis Breakwater Repair Sections
Stations B 6+00 to Station B 13+00
San Luis Obispo County, California

**Figure 5**

## 3.3 Kelp Survey

### 3.3.1 Methods

The kelp surveys at Port San Luis breakwater were conducted from January 29 to February 1, 2019 within 500 feet of the centerline of the breakwater (Figure 1). During the prior black abalone surveys in June and July 2018, kelp surveys were not conducted, but anecdotal observations of canopy kelp were made.

During the winter period survey, no canopy kelp was noted in the kelp survey area. As a result, the kelp assessment was expanded to examine historic kelp distribution in the project region. This was completed by accessing the digital regional kelp mapping data prepared by the CDFW for any kelp beds located within approximately 4,000 feet of the breakwater. Data were acquired for this effort through queries of ftp://ftp.dfg.ca.gov/R7_MR/BIOLOGICAL/Kelp/, on the CDFW data server. The kelp canopy is mapped by CDFW and its contractors using aerial overflight surveys that are subsequently digitally interpreted to plot kelp canopy. The beds identified are typically dominated by giant kelp (*Macrocystis pyrifera*).

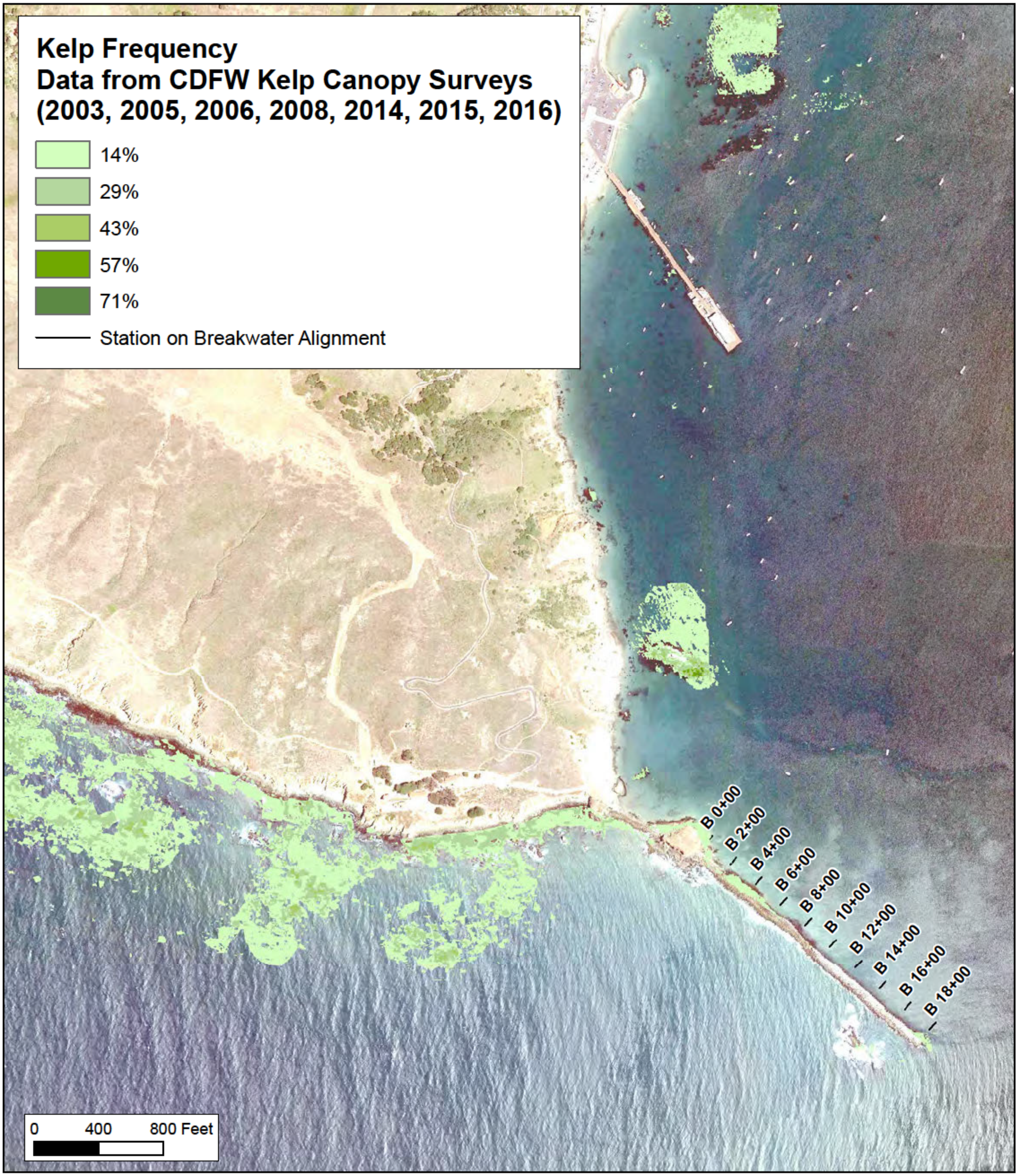
A total of seven kelp surveys for the recent years of 2003, 2005, 2006, 2008, 2014, 2015, and 2016 were accessed. These were compiled as raster data sets and a frequency of occurrence canopy kelp distribution map was prepared by summing the presence of kelp canopy over all survey years and dividing the results by the number of years surveyed (Figure 6).

### 3.3.2 Results

During the June-July 2018 surveys, kelp beds in proximity to the breakwater were explicitly sought but none were identified. Drift bull kelp (*Nereocystis luetkeana*) was observed within surge channels on Point San Luis and Whaler's Island and some individual giant kelp and bull kelp plants were noted very near shore to Point San Luis, but no developed kelp beds were observed. Similarly, during the focused January-February 2019 kelp surveys, no giant kelp or bull kelp was observed anywhere around the project site.

*Drift bull kelp, attached feather boa kelp, and many other macroalgal species in surge channel on Whaler's Island June 2018.*

The canopy kelp frequency analysis completed (Figure 6) suggests an irregular occurrence of kelp canopy along the outside of Point San Luis and kelp extending to north of Smith Island on the lee side of the breakwater. The kelp Is generally non-persistent with the majority of the beds occurring between 14 percent and 29 percent of the time over the surveyed years. An inspection of the data also noted a regularly occurring error in canopy kelp mapping in the very shallow waters along the inside of the breakwater. In these areas, water is too shallow to support canopy kelp, but the areas do support a regular seasonal occurrence of the understory feather boa kelp (*Egregia menzieii*) that was noted in 2018 consistent with areas mapped in Figure 6. This species is often an annual dominant in shallow semi-energetic environments and when reaching the surface, could be mistaken for canopy kelp species. *Egregia* is an abundant macroalgal element along the breakwater on both native bedrock and breakwater boulders.




**Kelp Frequency**
Port San Luis Breakwater Repair Sections
Stations B 6+00 to Station B 13+00
San Luis Obispo County, California

**Figure 6**

## 3.5 Marine Mammals Survey

### 3.5.1 Methods

Marine mammal surveys were conducted in order to identify hauled out mammals along the Port San Luis breakwater and in proximity to the breakwater. Investigations were completed by two methods. The first was visual surveys conducted from a vessel navigated slowly along the breakwater and adjacent rocks to identify marine mammals hauled out. In addition, anecdotal observations were made of marine mammal in the project area during completion of various biological investigations in June-July 2018 and January-February 2019.

The second method of survey was a quantitative assessment of marine mammals on the breakwater and adjacent rock islands completed by completion of multiple UAV overflights. The marine mammal surveys were conducted during two different seasons with varying weather, sea state, and environmental conditions. Surveys were completed on June 30, 2018 and again on January 30 during high and low tides, January 31 during low tide, and February 1, 2019 during high tide and low tides. Aerial flights were conducted at elevations of 250 meters with true vertical overflights and offset oblique photographs of the breakwater and nearby rock islands. Using the collected photographs, marine mammals were identified, counted, and mapped on the breakwater using ESRI ArcGIS spatial mapping software.

The first surveys conducted by M&A biologists for the Port San Luis breakwater repair were completed between June 29–July 1, 2018 and were ancillary to focused surveys for black abalone. During the first survey, biologists noted the presence of marine mammals in the water and on the breakwater, as well as within the protected waters of Port San Luis. During the surveys a UAV was flown over the breakwater to produce an orthomosaic image of the survey area. The field observations and the photomosaic were subsequently used to inventory mammals on the breakwater. During the survey period, the cloud cover was typically overcast in the morning and approximately 20 percent cover in the afternoon. Winds were 0-1 Beaufort Scale (BS), and calm sea state with waves in the range of 1-2 feet on the lee of the breakwater and 3-6 feet on the windward side of the breakwater.

The second set of marine mammal surveys was conducted between January 29 and February 1, 2019. During this time, the Port of San Luis area was experiencing several days of stormy weather conditions and high surf just prior to the commencement of the survey. The weather was generally misty or rainy during the period. The conditions were wet and windy with surf between 4 and 6 feet outside of the breakwater. Breaks in the weather allowed the completion of all necessary aerial survey flights. Conditions during the surveys were between 53 ˚F to 63˚F. Cloud cover ranged from 100 to 30 percent, winds ranged between 0 and 3 BS. Surveys were initially intended to be completed twice, one day apart, but due to an absence of any marine mammals hauled out on the breakwater on the first day, January 29, surveys were conducted on all three days.

*Sea lions photographed in June 2018 using high resolution low altitude UAV aerial photography. Overflights provided an opportunity to map individual animals hauled out by species, gender, and age class.*

*January-February 2019 visual surveys and UAV surveys of the breakwater did not identify any marine mammals. However, during this period Smith's Island supported hauled out Pacific harbor seals.*

### 3.5.2 Results

There were four marine mammal species observed during both surveys. *Species present in the area included Steller sea lion (Eumetopias jubatus), California sea lion (Zalophus californianus*), Southern sea otter (*Enhydra lutris nereis*), and Pacific harbor seal (*Phoca vitulina*). Other marine mammals are known to be sighted within San Luis Obispo County, but are more transient and not likely to utilize the Port San Luis Breakwater repair sections project area as a substantial habitat area.

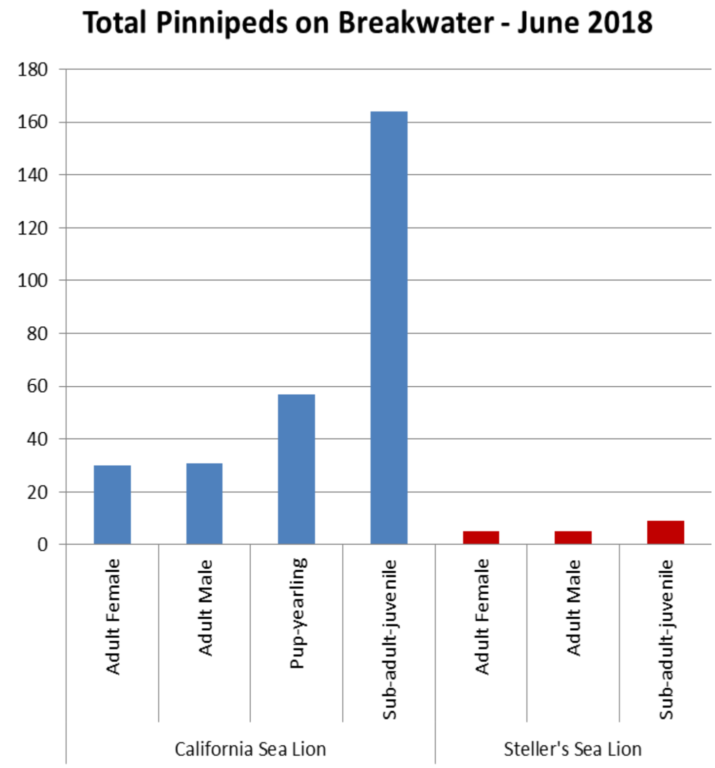
Mammals known in the San Luis Obispo County waters but not observed during the current surveys include: Guadalupe fur seal (*Arctocephalus townsendi*), Northern elephant seal (*Mirounga angustirostris*), Humpback whale (*Megaptera novaeangliae*), Blue whale (*Balaenoptera musculus*), Fin whale (*Balaenoptera physalus*), Killer whale (*Orcinus orca*), Eastern North Pacific Gray whale (*Eschrichtius robustus*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Risso's dolphin (*Grampus griseus*), Northern right whale dolphin (*Lissodelphis borealis*), Long-beaked common dolphin (*Delphinus capensis*), Short-beaked common dolphin (*Delphinus delphis*), Dall's porpoise (*Phocoenoides dalli*), and Bottlenose dolphin (*Tursiops truncatus*). While not observed during the present survey, whale vertebrae, probably from gray whale, were observed at multiple locations on the breakwater during both the 2018 and 2019 surveys.


*One of two whale vertebrae observed on breakwater June 30, 2018*

The marine mammal species observed within the project location during the 2018 survey include Southern sea otter, Pacific harbor seal, Steller sea lion. and California sea lion. During the 2018 black abalone survey work Southern sea otters and Pacific harbor seal were observed in proximity to the breakwater in low abundance and intermittently, and were more common within the inner harbor where they were observed foraging and resting in small patch kelp beds. During the course of the surveys, only two to three otters were observed and observations of seals were likely less than a dozen observations of likely fewer individuals. While not observed, it is believed that the otters were likely foraging on the breakwater as it appears that there are abundant crabs, shellfish, and octopus available on the subtidal and intertidal rocks. Also observed in abundance in the water along the breakwater were otariid pinnipeds including Steller sea lion and California sea lion. No attempt was made to count pinnipeds in the water during the surveys.

High resolution aerial imagery collected on June 30, 2018 allowed counting of hauled out pinnipeds on the breakwater. A total of 282 California sea lions and 19 Steller sea lions were observed occupying areas on the breakwater. The survey divided observed marine mammals first by species then by age class. The most abundant age class was the sub-adult-juvenile class followed by pup-yearling and leaving an almost equal amount of both the adult male and adult female classes in both California sea lion and Steller sea lion. Also notable during the surveys were four dead young pup carcasses on the breakwater rocks. No very young live pups were noted during either the on-water surveys or within the aerial survey photographs.

The general distribution of marine mammals along the breakwater is influenced by direct wave energy against exposed breakwater segments. An offshore rock formation on the seaward side of the breakwater's southern end absorbs direct wave energy and reduces the intensity of waves reaching the breakwater. This allows for manageable haul out locations on both the seaward and leeward sides of the breakwater in proximity to this rock. As Figure 7 shows, the most densely populated haul out areas occur on the leeward side of the south eastern end of the breakwater and spread around the revetment stone to the protected segment of the seaward side of the breakwater. In the open water, near the breakwater shoreline, sea lion were noted to be abundant, but it was not possible to count animals, or positively identify species or demographic metrics. As such, they were noted but not enumerated.

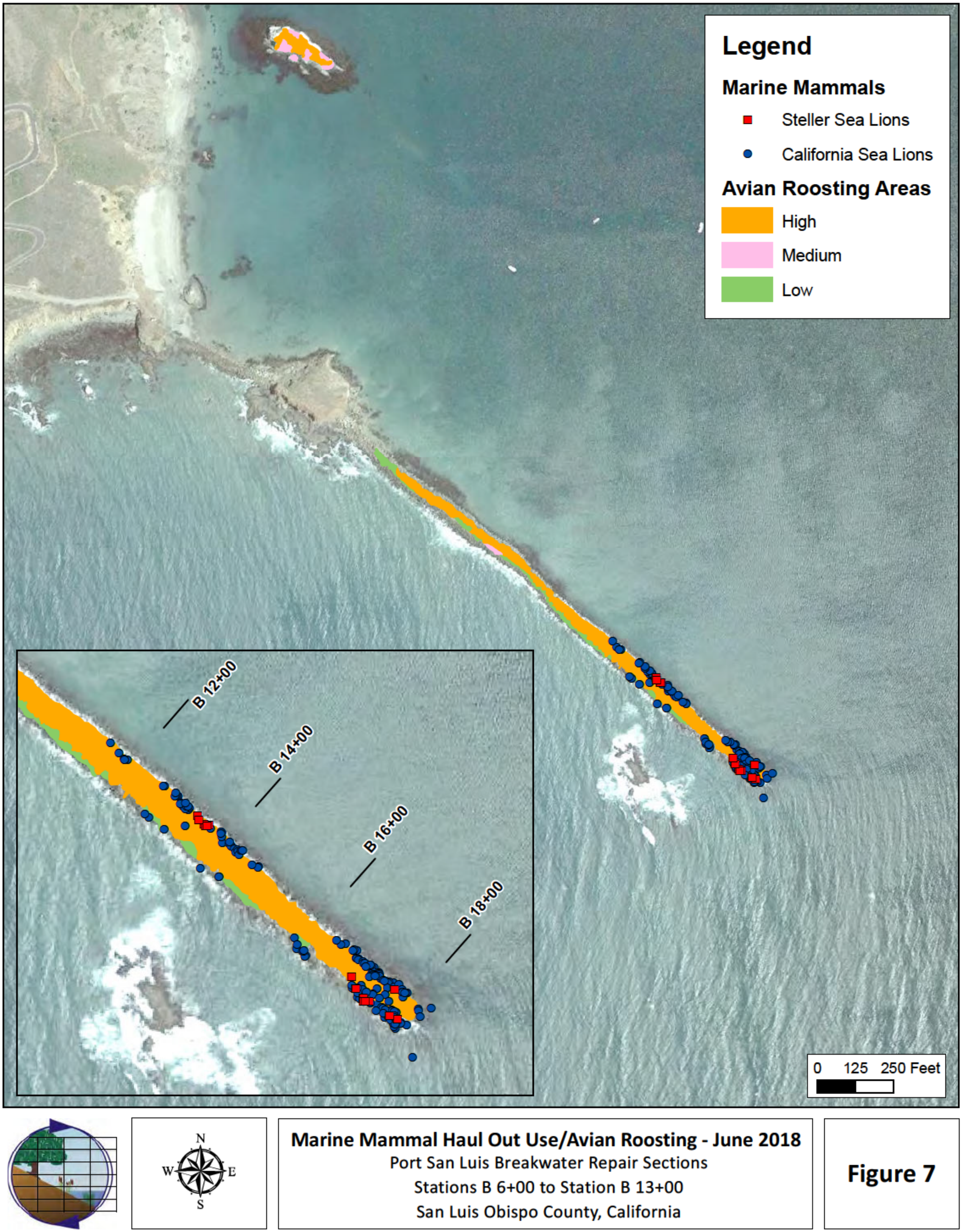



*Population demographics of sea lions hauled out on Port San Luis Breakwater June 30, 2018*

Further from the breakwater, California sea lions were also observed resting on a floating barge just east of the fishing pier. California sea lions, sea otters, and harbor seals were observed transiting / foraging and resting in the water around the fishing pier and boat moorings in the harbor and were even noted to enter the boat hoist launch basin.

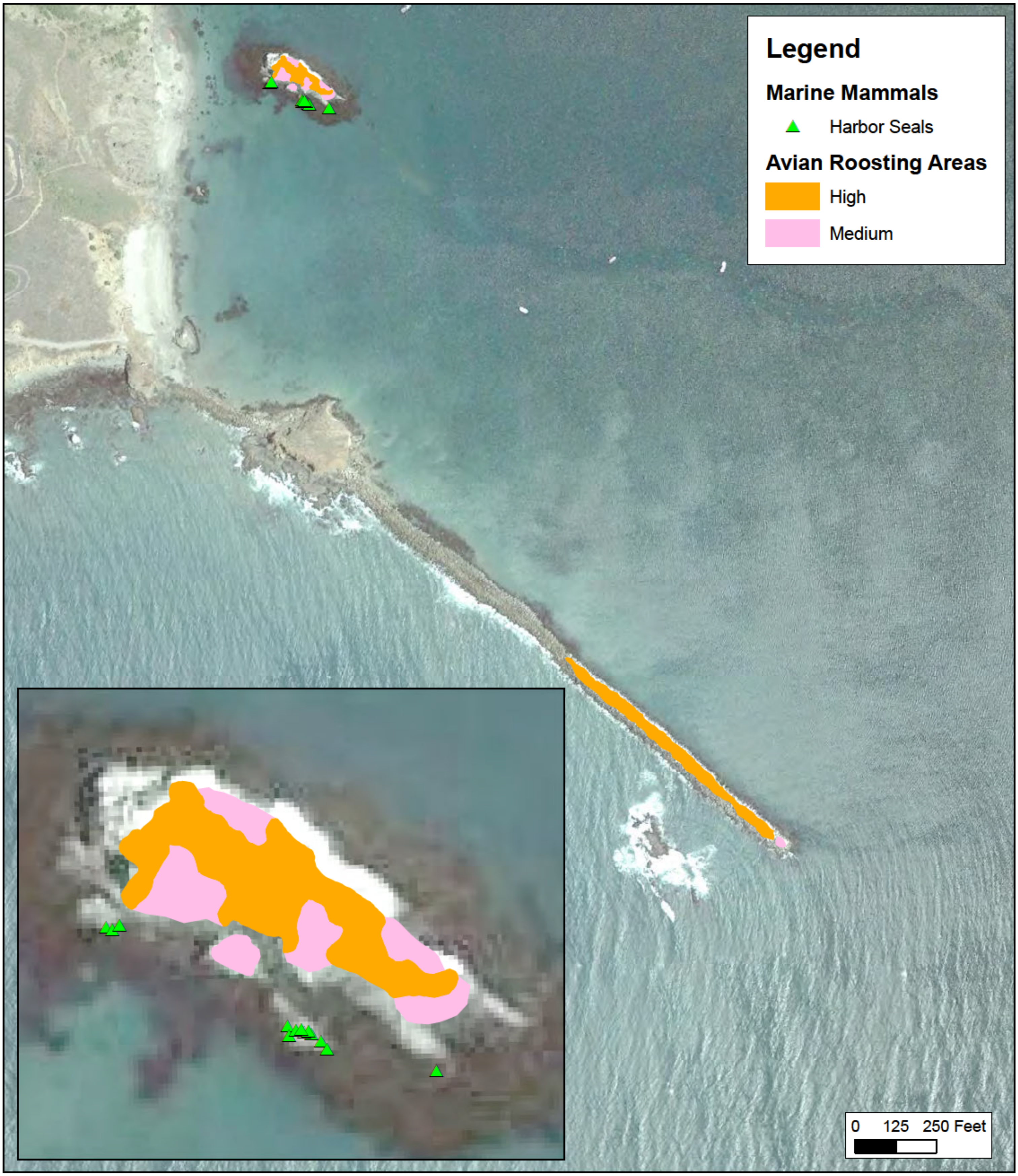
During the January and February 2019 surveys, there were no marine mammals observed on the breakwater or within the immediate project area. A total of 13 Pacific harbor seal were found hauled out on and nearby Smith Island (Figure 8). As was the prior case with sea lions, several additional harbor seals were noted in the water around Smith Island, but were not counted. Smith Island has low lying bedrock benches that are better suited as haul-outs for seals than is the steep boulder rock of the breakwater. Noting that seals haul out on Smith Island, it would not be unexpected to see seals similarly haul out on the sand beach near Point San Luis in the lee of the breakwater, or under calm sea states, on the rocky terraces of Whaler's Island or Point San Luis on the seaward side of the breakwater.

While sea lions were notably absent from the breakwater during the winter months, a small number of California sea lions were noted hauled out on the purpose placed sea lion float near the fishing pier. Other sea lions as well as sea otters and harbor seals were noted in the protected waters of Port San Luis during transiting trips back and forth from moorings and launch facilities to the breakwater.




**Marine Mammal Haul Out Use/Avian Roosting - June 2018**
Port San Luis Breakwater Repair Sections
Stations B 6+00 to Station B 13+00
San Luis Obispo County, California

**Figure 7**





**Marine Mammal Haul Out Use/Avian Roosting - February 2019**
Port San Luis Breakwater Repair Sections
Stations B 6+00 to Station B 13+00
San Luis Obispo County, California

**Figure 8**

## 3.6 Sea Birds

### 3.6.1 Methods

Concurrent with completion of other biological investigations, avian species making use of the survey areas were noted. Some bird nesting on the cliffs of Whaler's Island was noted although not heavily investigated. Bird nesting was also noted on the cliffs of Smith Island. A list of birds observed in the project area was compiled from biologist observations and photographs taken during the surveys and the locations of observations by habitat type were noted.

In addition to anecdotal observations of avian species and activities in the area, a more focused mapping of avian roosting on the breakwater was also undertaken. Using the areal imagery collected during the multiple surveys, the distribution of roosting activities was identified by a combination of both the presence of large aggregations of birds and by the extent of accumulated guano.

*Black oystercatcher on leeward face of Whaler's Island (top) and avian roosting on breakwater (bottom). June 30, 2018*

### 3.6.2 Results

Avian observations were made during both survey periods between June 29 – July 1, 2018 and January 29 and February 1, 2019. A list of birds observed during these two periods by period and habitat has been prepared (Table 2). Because the identification of birds was not undertaken as a specific goal of the surveys, the list should not be taken as comprehensive, but likely included the most notable of species present in the area during the surveys.

The survey periods occurred in summer and in winter which resulted in a change of seasonal / migratory bird presence in the surveyed areas. Avian observations included the broader Port of San Luis breakwater area and were not restricted to the proposed breakwater project area. Further observations of avian use patterns were garnered from photographic evidence of bird roosting on the rocks in the area and of accumulated guano that indicated roosting area patterns (Figures 7 and 8). Roosting was classified as high, medium, and low based on concentration of guano along the breakwater and observed birds. However, these relative classification levels should be interpreted with some caution since guano can be purged by wave washing of the area and thus areas with greater exposure may be under represented as roosting areas due to more frequent cleaning of the rock. However, these areas are also less frequently available to birds due to wave washing influences.

**Table 2. Incidental Avian Species Observed During Monitoring (Summer 2018, Winter 2019)**

| Species | Scientific Name | 6/29 – 7/1/2018 | | | | | 1/29 – 2/1/2019 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flying | Water | Breakwater/Rocky Shore | Beach | Scrub | Flying | Water | Breakwater/Rocky Shore | Beach | Scrub |
| Brant | *Branta bernicla* | | | | | | | | | X | |
| Canada goose | *Branta canadensis* | X | | | | | | | | | |
| Surf scoter | *Melanitta perspicillata* | | | | | | | X | | | |
| Red - throated loon | *Gavia stellata* | | X | | | | | X | | | |
| Common loon | *Gavia immer* | | X | | | | | X | | | |
| Northern fulmar | *Fulmarus glacialis* | | X | | | | | | | | |
| Horned grebe | *Podiceps auritus* | | | | | | | X | | | |
| Western grebe | *Aechmophorus occidentalis* | | | | | | | X | | | |
| Clark's grebe | *Aechmophorus clarkii* | | | | | | | X | | | |
| Brandt's cormorant | *Phalacrocorax penicillatus* | X | | X | | | | | X | | |
| Pelagic cormorant | *Phalacrocorax pelagicus* | X | | X | | | | | X | | |
| Double - crested cormorant | *Phalacrocorax auritus* | X | X | X | | | X | X | X | | |
| Brown pelican | *Pelecanus occidentalis* | X | X | X | | | X | X | X | | |
| Great blue heron | *Ardea herodias* | | | X | | | | | X | X | |
| Snowy egret | Egretta thula | | | | | | | | | X | |
| Black oystercatcher | *Haematopus bachmani* | | | X | | | | | X | | |
| Whimbrel | *Numenius phaeopus* | | | | | | X | | | X | |
| Long - billed curlew | *Numenius americanus* | | | | | | | | | X | |
| Marbled godwit | *Limosa fedoa* | | | | | | | | | X | |
| Black turnstone | *Arenaria melanocephala* | | | X | | | | | X | | |
| Surfbird | *Aphriza virgata* | | | | | | | | X | X | |
| Spotted sandpiper | *Actitis macularius* | | | | | | | | | X | |
| Wandering tattler | *Tringa incana* | | | | | | | | | X | |
| Willet | *Tringa semipalmata* | | | | | | | | | X | |
| Pigeon guillemot | *Cepphus columba* | | X | | | | | | | | |
| Heermann's gull | *Larus heermanni* | | | X | | | X | | X | | |
| Western gull | *Larus occidentalis* | | | X | | | X | X | X | | |
| Caspian tern | *Hydroprogne caspia* | | | | | | | | X | | |
| Royal tern | *Thalasseus maximus* | | | | | | X | | | | |

| Species | Scientific Name | 6/29 – 7/1/2018 | | | | | 1/29 – 2/1/2019 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flying | Water | Breakwater/Rocky Shore | Beach | Scrub | Flying | Water | Breakwater/Rocky Shore | Beach | Scrub |
| Rock pigeon | *Columba livia* | | | X | | | | | | | |
| White - throated swift | *Aeronautes saxatalis* | | X | | | | | | | | |
| Black pheobe | *Sayornis nigricans* | | | | | X | | | | | |
| American crow | *Corvus brachyrhynchos* | | | | | X | | | | X | X |
| Barn swallow | *Hirundo rustica* | X | | | | | | | | | |
| European starling | *Sturnus vulgaris* | X | | | | | | | | | |
| House finch | *Haemorhous mexicanus* | | | | | X | | | | | X |

## 4.0 CONCLUSIONS

Surveys conducted during the present period are varied and add to the information base to support project planning and assessment for the repair of the Port San Luis Breakwater. Notable in the survey results were the following:

- [redacted]
- Pacific eelgrass exists as a contiguous and seasonally stable bed along the leeward margin of the breakwater;
- Surfgrass is present in proximity to the breakwater, but is patchy and restricted in its occurrence to native bedrock terraces and imported boulders that are adjacent too but not part of the breakwater;
- Canopy kelp is intermittent within the study area and is generally located away from the breakwater;
- Although some small kelp occurrences along the breakwater may occur, the mapped kelp on the breakwater is more than likely due to the understory feather boa kelp rather than canopy species;
- Sea lions haul out seasonally on the Port San Luis breakwater and were abundant within the Port San Luis area during June-July 2018, but were highly reduced in numbers and not present on the breakwater during January-February 2019;
- Southern sea otters are present within Port San Luis and do visit the breakwater area in small numbers, and;
- Sea birds roost on the breakwater and other rock features including Whaler's Island and Smith Island and cliff nesting birds nest on Whaler's Island and Smith Island.

# APPENDIX C

**Air Criteria Pollutants Emissions and Greenhouse Gases (GHG) Emissions Analysis**

**Proposed Project Port San Luis Harbor Operations and Maintenance (O&M) Breakwater Repair Project Air Emissions = Construction O&M Breakwater Repair Work Emissions (Excavation around Breakwater Emissions + O&M Rock Repair) + Rock Delivery Transpor**t

Proposed Project O&M Breakwater Repair Work Emissions = Construction (Excavation around Breakwater Emissions + O&M Breakwater Rock Repair Emissions) + Rock Delivery Transport Emissions; Construction (Excavation around Breakwater Emissions + O&M Breakwater Rock Repair) Air Emissions would only occur in Port San Luis Harbor, San Luis Obispo County.

Rock Delivery Scenario Option 1: Sea Vessel Rock Delivery Transport (All Sea vessels transport of rock, from Catalina Island in Los Angeles County to Port San Luis Harbor in San Luis Obispo County).

Rock Delivery Scenario Option 2: Combination Land Rock Haul Truck Roadway Delivery + Sea Vessels Rock Transport (Combination Land Rock Haul Trucks from Apple Valley/Victorville (San Bernardino County High Desert area) to Port of Hueneme (Ventura County), then off loading on to marine barges, and then departing Port of Hueneme by sea to Port San Luis Harbor (San Luis Obispo County).

**Table NAAQS Attainment Status**

| **Air Basin** | **MDAB**[1] | **SCAB**[2] | **SCCAB** [3] | **SCCAB** [4] | **SCCAB** [5] |
|---|---|---|---|---|---|
| **Air District** | **MDAQMD**[1] | **SCAQMD**[2] | **VCAPCD** [3] | **SBCAPCD** [4] | **SLOAPCD** [5] |
| **Pollutant** | | | | | |
| **Ozone ($O_3$)** [7] | Non-attainment (Severe [6] ) | Non-attainment (Extreme [6]) | Non-Attainment (Serious [6]) | Unclassifiable/Attainment | Attainment [6] (Western portion of San Luis Obispo County); Non-Attainment [6] [(Eastern portion of San Luis Obispo County) - Marginal)] |
| **Carbon Monoxide (CO)** | Unclassified/Attainment | Attainment (Maintenance) | Attainment | Attainment | Unclassified |
| **Nitrogen Dioxide ($NO_2$)** | Unclassified/Attainment | Attainment (Maintenance) | Attainment | Unclassifiable/Attainment | Unclassified |
| **Particulate Matter ($PM_{10}$)** | Non-attainment (Moderate[6]) | Attainment (Maintenance) | Attainment | Attainment | Unclassified/Attainment |
| **Particulate Matter ($PM_{2.5}$)** | Unclassified/Attainment | Non-attainment (Serious [6]) | Attainment | Unclassifiable/Attainment | Unclassifiable/Attainment |
| **Sulfur Dioxide ($SO_2$)** | Unclassified/Attainment | Unclassifiable/Attainment | Attainment | Unclassifiable/Attainment | Unclassified |
| **Lead (Pb)** | Unclassified/Attainment | Non-attainment (Serious [6]) | Attainment | Attainment | Attainment |

Source: [1] https://www.mdaqmd.ca.gov/home/showpublisheddocument?id=1267, Accessed January 28, 2021

[2] https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf?sfvrsn=2 , accessed January 28, 2021, February 2-3, 2021

[3] http://www.vcapcd.org/air_quality_standards.htm , Accessed January 28, 2021

[4] https://www.ourair.org/air-quality-standards/#data-table, Accessed January 28, 2021

[5] https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/AttainmentStatus29January2019.pdf (O3 Attainment, Western portion of San Luis Obispo County; O3 Non-Attainment-Marginal, Eastern portion of San Luis Obispo County), accessed 1/28/2021

[6] https://www3.epa.gov/airquality/greenbook/ancl2.html; https://www3.epa.gov/airquality/greenbook/ancl3.html, accessed January 28, 2021, February 2-3, 2021

[7] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). The relation between O3, NOx and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Additionally, due to the variability in rates of ozone formation, EMFAC2007 does not provide estimates for ozone. Instead, the emission associated with ozone precursors (VOCs and NOx) are calculated and used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

**Table Applicable General Conformity Rates (Tons/Year)[1]**

| **Air Basin** | **MDAB** | **SCAB** | **SCCAB** | **SCCAB** | **SCCAB** |
|---|---|---|---|---|---|
| **Air District** | **MDAQMD** | **SCAQMD** | **VCAPCD** | **SBCAPCD** | **SLOAPCD** |
| **Pollutant** | | | | | |
| **Ozone (O3)[3]** | 25 | 10 | 50 | 100 | 100 [2] |
| **Volatile Organic Compound (VOC)[3]** | 25 | 10 | 50 | 100 | 100 |
| **Nitrogen Oxide (NOx) [3]** | 25 | 10 | 50 | 100 | 100 |
| **Carbon Monoxide (CO)** | 100 | 100 | 100 | 100 | 100 |
| **Nitrogen Dioxide (NO2)** | 100 | 100 | 100 | 100 | 100 |
| **Particulate Matter (PM10)** | 100 | 100 | 100 | 100 | 100 |
| **Particulate Matter (PM2.5)** | 100 | 70 | 100 | 100 | 100 |
| **Sulfur Dioxide (SO2)** | 100 | 100 | 100 | 100 | 100 |
| **Lead (Pb)** | 25 | 25 | 25 | 25 | 25 |

Source: [1] 40 CFR 93.153(b)(1) and 40 CFR 93.153(b)(2); https://www.epa.gov/general-conformity/de-minimis-tables, accessed February 2 - 3, 2021

[2] Port San Luis Harbor is located in Western San Luis Obispo County that is in attainment for Ozone (O3); https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/AttainmentStatus29January2019.pdf (O3 Non-Attainment-Marginal, Eastern portion of San Luis Obispo County; O3 Attainment, Western portion of San Luis Obispo County, accessed 1/28/2021)

[3] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). The relation between O3, NOx and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Additionally, due to the variability in rates of ozone formation, EMFAC2007 does not provide estimates for ozone. Instead, the emission associated with ozone precursors (VOCs and NOx) are calculated and used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

**Table Rock Delivery Scenario Option 1: Sea Vessels Rock Delivery Transport Air Emissions from Catalina Island (Pebbly Beach Quarry) located in Los Angeles County to Port San Luis Harbor located in San Luis Obispo County**

**SCAB SCAQMD Air Emission Estimates (Tons/year) - Option 1 : Los Angeles County Sea Vessels Rock Transport Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | | | | |
| **Sea Based Rock Delivery** | | 0.039 | 0.2459 | 1.2089 | 0.036 | 0.033 | 0.087 | Not Calculated (n.c.) | 75.4199 | 68.471 |
| **Total** | | 0.039 | 0.2459 | 1.2089 | 0.036 | 0.033 | 0.087 | Not Calculated (n.c.) | 75.4199 | 68.471 |
| **General Conformity Applicable Rates** | | 10 | 100 | 100 | 100 | 70 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Table Rock Delivery Scenario Option 1: Sea Vessels Rock Delivery Transport Air Emissions from Catalina Island (Pebbly Beach Quarry) located in Los Angeles County to Port San Luis Harbor located in San Luis Obispo County**

**SCCAB VCAPCD Air Emissions Estimates (Tons/year) - Option 1: Ventura County Sea Vessels Rock Delivery Transport Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | | | | |
| **Sea Based Rock Delivery** | | 0.04212 | 0.26568 | 1.30572 | 0.03888 | 0.03564 | 0.09396 | Not Calculated (n.c.) | 81.4536 | 74.196 |
| **Total** | | 0.04212 | 0.26568 | 1.30572 | 0.03888 | 0.03564 | 0.09396 | Not Calculated (n.c.) | 81.4536 | 74.196 |
| **General Conformity Applicable Rates** | | 50 | 100 | 100 | 100 | 100 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead) . Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Table Rock Delivery Scenario Option 1: Sea Vessels Rock Delivery Transport Air Emissions from Catalina Island (Pebbly Beach Quarry) located in Los Angeles County to Port San Luis Harbor located in San Luis Obispo County**

**SCCAB SBCAPCD Air Emissions Estimates (Tons/year) - Option 1: Santa Barbara County Sea Vessels Rock Delivery Transport Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | | | | |
| **Sea Based Rock Delivery** | | 0.03042 | 0.19188 | 0.94302 | 0.02808 | 0.02574 | 0.06786 | Not Calculated (n.c.) | 58.8276 | 53.586 |
| **Total** | | 0.03042 | 0.19188 | 0.94302 | 0.02808 | 0.02574 | 0.06786 | Not Calculated (n.c.) | 58.8276 | 53.586 |
| **General Conformity Applicable Rates** | | 100 | 100 | 100 | 100 | 100 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.)- Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG Units in Metric Tons/Year $CO_2$ equivalent (MT/Year $CO_2$eq).

**Table Rock Delivery Scenario Option 1: Construction O&M Breakwater Repair Work Air Emissions + Sea Vessels Rock Delivery Transport Air Emissions from Catalina Island (Pebbly Beach Quarry) located in Los Angeles County to Port San Luis Harbor located in San Luis Obispo County**

**SCCAB SLOCAPCD Air Emissions Estimates (Tons/year) - Option 1 : San Luis Obispo County Construction O&M Breakwater Repair Work Emissions + San Luis Obispo County Sea Vessels Rock Delivery Transport Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | 0.46 | 2.92 | 14.26 | 0.42 | 0.4 | 1.01 | Not Calculated (n.c.) | 897.01 | 819 |
| **Sea Based Rock Delivery** | | 0.01859 | 0.11726 | 0.57629 | 0.01716 | 0.01573 | 0.04147 | Not Calculated (n.c.) | 35.95026 | 32.8 |
| **Total** | | 0.47859 | 3.03726 | 14.83629 | 0.43716 | 0.41573 | 1.05147 | Not Calculated (n.c.) | 932.9603 | 851.8 |
| **General Conformity Applicable Rates** | | 100 | 100 | 100 | 100 | 100 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Roadway Delivery Transport + Sea Vessels Rock Transport Emissions (Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County**

**MDAB MDAQMD Air Emissions (Tons/Year) – Option 2: San Bernardino County Land Truck Transport on Roadway Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | | | | |
| **Rock Delivery** | | 0.4336688 | 2.2456087 | 4.42155526 | 0.218859 | 0.172072 | 0.015533 | Not Calculated (n.c.) | 1596.085 | 1448.66667 |
| **Total** | | 0.4336688 | 2.2456087 | 4.42155526 | 0.218859 | 0.172072 | 0.015533 | Not Calculated (n.c.) | 1596.085 | 1448.66667 |
| **General Conformity Applicable Rates** | | 25 | 100 | 100 | 100 | 100 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery Transport Emissions (Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County**

**SCAB SCAQMD Air Emissions Estimates (Tons/year) Option 2: Los Angeles County Land Truck Transport on Roadways Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | | | | |
| **Rock Delivery** | | 0.3702051 | 1.9169831 | 3.77449839 | 0.186831 | 0.14689 | 0.013596 | Not Calculated (n.c.) | 1362.512 | 1236.66667 |
| **Total** | | 0.3702051 | 1.9169831 | 3.77449839 | 0.186831 | 0.14689 | 0.013596 | Not Calculated (n.c.) | 1362.512 | 1236.66667 |
| **General Conformity Applicable Rates** | | 10 | 100 | 100 | 100 | 70 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated

by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery Transport Emissions Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County**

**SCCAB VCAPCD Air Emissions Estimates (Tons/year) - Option 2: Ventura County Land Truck Transport on Roadways Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | | | | |
| **Rock Delivery** | | 0.148082 | 0.7667932 | 1.50979936 | 0.074732 | 0.058756 | 0.005304 | Not Calculated (n.c.) | 545.0046 | 494.666667 |
| **Total** | | 0.148082 | 0.7667932 | 1.50979936 | 0.074732 | 0.058756 | 0.005304 | Not Calculated (n.c.) | 545.0046 | 494.666667 |
| **General Conformity Applicable Rates** | | 50 | 100 | 100 | 100 | 100 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants

were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery [5] Transport Emissions Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County**

**SCCAB VCAPCD Air Emissions Estimates (Tons/year) - Option 2: Ventura County Sea Vessels Rock Transport Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | | | | |
| **Rock Delivery** | | 0.02106 | 0.13284 | 0.65286 | 0.01944 | 0.01782 | 0.04698 | Not Calculated (n.c.) | 40.7268 | 37.098 |
| **Total** | | 0.02106 | 0.13284 | 0.65286 | 0.01944 | 0.01782 | 0.04698 | Not Calculated (n.c.) | 40.7268 | 37.098 |
| **General Conformity Applicable Rates** | | 50 | 100 | 100 | 100 | 100 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated

by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

[5] SCCAB VCAPCD Sea Vessels Rock Delivery Transport Emissions for Option 2: Combination Land + Sea Rock Delivery are estimated at approximately half (50% or 0.5), as Port Hueneme is located approximately in the middle of the Ventura County coastline, compared to Sea Vessels Rock Delivery Transport Emissions of the Option 1 SCAAB VCAPCD Sea Rock Delivery Transport Emissions for Ventura County that are for the entire Ventura County coastline.

**Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery Transport Emissions Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County**

**SCCAB SBCAPCD Air Emissions Estimates (Tons/year) - Option 2: Santa Barbara County Sea Vessels Rock Transport Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | | | | |
| **Rock Delivery** | | 0.03042 | 0.19188 | 0.94302 | 0.02808 | 0.02574 | 0.06786 | Not Calculated (n.c.) | 58.8276 | 53.586 |
| **Total** | | 0.03042 | 0.19188 | 0.94302 | 0.02808 | 0.02574 | 0.06786 | Not Calculated (n.c.) | 58.8276 | 53.586 |
| **General Conformity Applicable Rates** | | 100 | 100 | 100 | 100 | 100 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated

by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery Transport (Combined Land Rock Haul Trucks Delivery Transport from Inland Quarry in Apple Valley/Victorville in San Bernardino County to Port of Hueneme in Ventura County, then off loading rock onto sea vessels barges, and then departing Port of Hueneme with rock on sea vessels delivery transport to Port San Luis Harbor in San Luis Obispo County**

**SCCAB SLOCAPCD Air Emissions Estimates (Tons/year) for - Option 2: San Luis Obispo County Construction O&M Breakwater Repair Work Emissions + San Luis Obispo County Sea Vessels Rock Transport Air Emissions**

| Work Activity Emissions (Tons/Year) | Pollutant | VOC [1] | CO | NO2 | PM10 | PM2.5 | SO2 | Pb [2] | GHG [3] | GHG [4] MT/Year CO2eq. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction** | | 0.46 | 2.92 | 14.26 | 0.42 | 0.4 | 1.01 | Not Calculated (n.c.) | 897.01 | 819 |
| **Rock Delivery** | | 0.01859 | 0.11726 | 0.57629 | 0.01716 | 0.01573 | 0.04147 | Not Calculated (n.c.) | 35.95026 | 32.8 |
| **Total** | | 0.47859 | 3.03726 | 14.83629 | 0.43716 | 0.41573 | 1.05147 | Not Calculated (n.c.) | 932.9603 | 851.8 |
| **General Conformity Applicable Rates** | | 100 | 100 | 100 | 100 | 100 | 100 | 25 | [3] | [3] |

Note(s): [1] Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus,

EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Proposed Project Port San Luis Harbor Sea Vessel Rock Delivery (from Catalina Island in Los Angeles County to Port San Luis Harbor in San Luis Obispo County) Air Emission Calculations**

**Project Data**

(1) Equipment: 1 rock barge, tug boats, crew boat, a crane-equipped barge, a small craft support vessel, a crew boat vessel, a work boat, a survey boat.

(2) Approximate production rate: Approximately 60,000 tons of new stone is required to perform operations and maintenance (O&M) repair on the breakwater. Individual stone size range is anticipated to be from 5 to 20 tons.

(3) A rock barge capacity is approximately 2,000 to 4,000 tons per barge

(4) A workday is approximately 11 hours a day (daylight hours); 6 days a week. Rock barge transport by sea is expected to be completed in approximately 60 days, approximately 11 hours a day workday, 6 days a week.

(5) Approximate distance from Pebbly Beach quarry (Catalina Island) to Port San Luis Harbor by sea; approximately 400 miles one way (800 miles round trip).

(6) 10 to 12 laborers for crew/construction work

(7) Proposed Project area (breakwater) is located in Port San Luis Harbor, San Luis Obispo County

| Engine Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Equipment Type | Power Rating (Hp) | Load Factor | # Active | Hourly Hp-Hrs | Hours Per Day | Daily Hp-Hrs | Work Days | Annual Hp-Hrs | Ref. Notes |
| Barge (rock/storage) | 195 | 0.20 | 1 | 39 | 11 | 429 | 60 | 25,740 | (1)(2) |
| Tug Boat | 800 | 0.25 | 2 | 400 | 11 | 4,400 | 60 | 264,000 | (1) (2) |
| Crew Boat | 400 | 0.20 | 1 | 80 | 11 | 880 | 60 | 52,800 | (1) (2) |
| Crane equipped barge | 180 | 0.50 | 1 | 90 | 11 | 990 | 60 | 59,400 | (2) (2) |
| Small Craft Support Vessel | 250 | 0.20 | 1 | 50 | 11 | 550 | 60 | 33,000 | (1) (2) |
| Work Boat | 250 | 0.20 | 1 | 50 | 11 | 550 | 60 | 33,000 | (1) (2) |
| Survey Boat | 250 | 0.20 | 1 | 50 | 11 | 550 | 60 | 33,000 | (1) (2) |

Ref. Notes: (1) Horsepower (Hp) and Load Factor data from Port of Los Angeles (POLA) 2009 Channel Deepening Project AQ Appendix, EIS/EIR

Ref. Notes: (2) Hp from engine data matched to Emission Factors below which are categorized by Hp

| Emission Factors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Emission Factors (Gm/Hp-Hr)** | | **ROG** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Ref. Notes** |
| Off-Road Equipment - 25-50 Hp | | 2.06 | 5.92 | 5.94 | 0.18 | 0.70 | 0.64 | 568 | 0.11 | 0.01 | |
| Off-Road Equipment - 51-120 Hp | | 1.11 | 3.77 | 7.56 | 0.18 | 0.77 | 0.71 | 568 | 0.1 | 0.01 | |
| Off-Road Equipment - 121-175 Hp | | 0.71 | 3.04 | 6.94 | 0.18 | 0.42 | 0.38 | 568 | 0.09 | 0.01 | |
| Off-Road Equipment - 176-250 Hp | | 0.46 | 1.48 | 6.66 | 0.18 | 0.23 | 0.21 | 568 | 0.09 | 0.01 | |
| Off-Road Equipment - 251-500 Hp | | 0.37 | 1.73 | 5.51 | 0.18 | 0.20 | 0.18 | 568 | 0.08 | 0.01 | |
| Off-Road Equipment - 501-750 Hp | | 0.46 | 1.99 | 6.66 | 0.18 | 0.24 | 0.22 | 568 | 0.08 | 0.01 | |
| Off-Road Equipment >750 Hp | | 0.47 | 2.02 | 6.48 | 0.18 | 0.20 | 0.18 | 568 | 0.08 | 0.01 | |
| Crew/Small Craft/Work/Survey Boat | | 0.16 | 1.27 | 7.46 | 0.47 | 0.30 | 0.28 | 481.34 | 0.07 | 0.00 | |
| Tugboat | | 0.20 | 1.87 | 8.94 | 0.81 | 0.22 | 0.21 | 481.34 | 0.07 | 0.01 | |

| Annual Emissions (Tons/year) | | | | | | | GHG = CO2 + CH4 + N20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Activity/Equipment Type | **ROG** [1] | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead)** [2] | **Ref. Notes** |
| Barge (rock/storage) | 0.01 | 0.04 | 0.17 | 0.00 | 0.01 | 0.01 | 14.62 | 0.00 | 0.00 | Not Calculated (n.c.) | |
| Tug Boat | 0.05 | 0.49 | 2.36 | 0.21 | 0.06 | 0.06 | 127.07 | 0.02 | 0.00 | n.c. | |
| Crew Boat | 0.01 | 0.07 | 0.39 | 0.02 | 0.02 | 0.01 | 25.41 | 0.00 | 0.00 | n.c. | |
| Crane equipped barge | 0.03 | 0.09 | 0.40 | 0.01 | 0.01 | 0.01 | 33.74 | 0.01 | 0.00 | n.c. | |
| Small Craft Support Vessel | 0.02 | 0.05 | 0.22 | 0.01 | 0.01 | 0.01 | 18.74 | 0.00 | 0.00 | n.c. | |
| Work Boat | 0.01 | 0.04 | 0.25 | 0.02 | 0.01 | 0.01 | 15.88 | 0.00 | 0.00 | n.c. | |
| Survey Boat | 0.01 | 0.04 | 0.25 | 0.02 | 0.01 | 0.01 | 15.88 | 0.00 | 0.00 | n.c. | |
| **Sea Vessels Rock Delivery Emission(Tons/year)** | 0.13 | 0.82 | 4.03 | 0.29 | 0.12 | 0.11 | 251.36 | 0.04 | 0.00 | n.c. | |

Sea Vessel Rock Delivery GHG emissions = 229 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Total Emissions (Tons/year)**

GHG = CO2 + CH4 + N20

| | ROG [1] | CO | NOx | SOx | PM10 | PM2.5 | CO2 | CH4 | N2O | Pb (Lead) [2] |
|---|---|---|---|---|---|---|---|---|---|---|
| Est. Emissions | 0.13 | 0.82 | 4.03 | 0.29 | 0.12 | 0.11 | 251.36 | 0.04 | 0.00 | n.c. |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Applicability Rates | 100 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | n/a | 25 |

| Daily Emissions (lbs/day) | | | | | | | | GHG = CO2 + CH4 + N20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Activity/Equipment Type | | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** | **Ref. Note** |
| Barge (carrying rock) | | 0.44 | 1.40 | 6.30 | 0.17 | 0.22 | 0.20 | 537.20 | 0.09 | 0.01 | n.c. | (3) |
| Tug Boat | | 1.94 | 18.14 | 86.72 | 7.86 | 2.13 | 2.04 | 4669.08 | 0.68 | 0.05 | n.c. | (3) |
| Crew Boat | | 0.31 | 2.46 | 14.47 | 0.91 | 0.58 | 0.54 | 933.82 | 0.14 | 0.00 | n.c. | (3) |
| Crane Equipped Barge | | 1.00 | 3.23 | 14.54 | 0.39 | 0.50 | 0.46 | 1239.68 | 0.20 | 0.02 | n.c. | (3) |
| Small Craft Support Vessel | | 0.56 | 1.79 | 8.08 | 0.22 | 0.28 | 0.25 | 688.71 | 0.11 | 0.01 | n.c. | (3) |
| Work Boat | | 0.19 | 1.54 | 9.05 | 0.57 | 0.36 | 0.34 | 583.64 | 0.08 | 0.00 | n.c. | (3) |
| Survey Boat | | 0.24 | 2.27 | 10.84 | 0.98 | 0.27 | 0.25 | 583.64 | 0.08 | 0.01 | n.c. | (3) |
| **Total Daily Emissions (lbs/day)** | | 4.68 | 30.83 | 149.99 | 11.10 | 4.34 | 4.09 | 9235.76 | 1.38 | 0.10 | n.c. | |

Ref. Notes: (3) grams to lbs conversion 1lb = 453.6 g

**Proposed Project San Luis Obispo (SLO) County (SLOC) Sea Vessels Rock Delivery Emissions Compared to SLOCAPCD Thresholds (lbs/day); Tons/Quarter (QTR); Tons/Year; GHG MT/year CO2eq** GHG = CO2 + CH4 + N2O

| County | Pollutant | ROG | CO | NOx | SOx | PM10 | PM2.5 | CO2 | CH4 | N20 | GHG | Pb(Lead) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SLO Sea Vessels Rock lb/day** | | 0.67 | 4.41 | 21.45 | 1.59 | 0.62 | 0.58 | 1320.71 | 0.20 | 0.01 | 1320.92 | n.c. |
| **SLO Sea Vessel Rock Tons/QTR** | | 0.01859 | 0.11726 | 0.57629 | 0.04147 | 0.01716 | 0.01573 | 35.94455 | 0.005352 | 0.000358 | 35.95026 | n.c. |
| **SLO Sea Vessel Rock Tons/Year** | | 0.01859 | 0.11726 | 0.57629 | 0.04147 | 0.01716 | 0.01573 | 35.94455 | 0.005352 | 0.000358 | 35.95026 | n.c. |
| **SLO Sea Vessels Rock Delivery GHG MT/year CO2eq** | | | | | | | | | | | 32.8 MT/year CO2eq | |
| **SLOCAPCD Thresholds** | | 137 L/D[a] | | 137 L/D[a] | | 2.5 T/Q[c] | 7 lbs/day[b] | GHG = CO2+CH4+N2O = 10,000 MT/Year CO2eq | | | | |

Notes: [a] ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

[b] Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

[c] Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 ton/qtr (T/Q).

**Proposed Project Sea Vessels Rock Delivery Emissions (Tons/year) compared to General Conformity Applicability Rates (Tons/Year)**

| **Sea Vessels Rock Delivery Emissions (Tons/year)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Air Basin\|Air District\|Emissions General Conformity Applicability Rates (Tons/Year)** | | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2 [3]** | **CH4 [3]** | **N2O [3]** | **Pb (Lead)** |
| SCAB SCAQMD General Conformity Thresholds (Tons/Year) | | 10 | 100 | 100 | 100 | 100 | 70 | n/a | n/a | n/a | 25 |
| SCCAB Ventura CO. APCD Gen. Con. Thresholds (Tons/Year) | | 50 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | n/a | 25 |
| SCCAB Santa Barbara CO. APCD Gen. Con. Thresholds (Tons/Year) | | 100 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | n/a | 25 |
| SCCAB SLOCAPCD General Conformity Thresholds (Tons/Year) | | 100 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | n/a | 25 |

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance. GHG can be comprised of CO2, CH4, N2O.

**Proposed Project Sea Vessels Rock Delivery Emissions in San Luis Obispo (SLO) County; Air Basin/APCD Thresholds (Lbs/day), Tons/Quarter (QTR); Tons/Year; MT/year $CO_2$eq**

GHG = $CO_2$ + $CH_4$ + $N_2O$

| **Air Basin\|Air District\|Emissions Thresholds (lbs/day)** | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **Pb (Lead)** |
|---|---|---|---|---|---|---|---|---|---|---|
| SCAB SCAQMD Emission Thresholds (lbs/day) | 55 lb/day | 550 lb/day | 55 lb/day | 150 lb/day | 150 lb/day | 55 lb/day | GHG: 10,000 MT/yr $CO_2$eq | | | 3 lbs/day |
| SCCAB Ventura CO.APCD Emissions Thresholds (lbs/day) | 25 lb/day | | 25 lb/day | | | | GHG: 10,000 MT/yr $CO_2$eq | | | |
| SCCAB Santa Barbara CO. APCD Thresholds (lbs/day) | 240 lb/day | | 240 lb/day | 240 lb/day | 80 lb/day | | GHG: 10,000 MT/yr $CO_2$eq | | | |
| SCCAB SLOCAPCD Emission Thresholds (lbs) | 137 L/D[a] | | 137 L/D[a] | | 2.5 T/Q[c] | 7 L/D[b] | GHG: 10,000 MT/yr $CO_2$eq | | | |
| SLO County Sea Barge Delivery lb/day | 0.67 | 4.41 | 21.45 | 1.59 | 0.62 | 0.58 | GHG = 1320.92 | | | n.c. |
| SLO Sea Vessel Rock Tons/QTR | 0.01859 | 0.11726 | 0.57629 | 0.04147 | 0.01716 | 0.01573 | 35.94455 | 0.00535 | 0.00036 | n.c. |
| SLO Sea Vessel Rock Tons/Year | 0.01859 | 0.11726 | 0.57629 | 0.04147 | 0.01716 | 0.01573 | 35.94455 | 0.00535 | 0.00036 | n.c. |
| SLO Sea Vessels Rock Delivery GHG MT/year $CO_2$eq | | | | | | | GHG = 32.8 MT/year $CO_2$eq [4] | | | |

Notes: [a] ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly (QTR.) Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

[b] Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

[c] Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/QTR. (T/Q).

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Proposed Project Port San Luis Harbor Breakwater O&M Repair - Inland Quarry Rock Delivery Truck Hauling on Roadways Air Emissions. Inland Quarry in Apple Valley/Victorville (San Bernardino County High Desert) to Port of Hueneme (Ventura County). Maximum emission is work done in 26 weeks @ 6 work days a week, approx. 174 workdays (approx. 7 months)  (year 2021).  Emissions factors from EMFAC2007.**

**OFF ROAD EMISSION FACTORS**

| | H.P. | VOC | CO | NOX | SOX | PM10 | PM2.5 | CO2 | CH4 | Pb (Lead_ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr |
| Crane | 250 | 0.0667 | 0.2407 | 0.4404 | 0.0013 | 0.0152 | 0.0135 | 112 | 0.0060 | Not Calculated (n.c.) |
| Crawler Loader | 250 | 0.0769 | 0.3430 | 0.3814 | 0.0019 | 0.0131 | 0.0116 | 172 | 0.0069 | n.c. |
| Water Truck [a] | 175 | 0.0491 | 0.5858 | 0.2972 | 0.0012 | 0.0142 | 0.0127 | 107 | 0.0044 | n.c. |

**OFF ROAD EMISSIONS**

| | Qty | Hrs/Day | Total Day | VOC | CO | NOX | SOX | PM10 | PM2.5 | CO2 | CH4 | Pb (Lead) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. |
| Crane | 1 | 11 | 174 | 127.5994 | 460.6208 | 842.9429 | 2.41543 | 29.11383 | 25.91131 | 214672.1 | 11.51309 | n.c. |
| Crawler Loader | 1 | 11 | 174 | 147.1011 | 656.4657 | 729.9875 | 3.698491 | 25.02728 | 22.27428 | 328704.6 | 13.2727 | n.c. |
| Water Truck [a] | 1 | 11 | 174 | 93.90437 | 1121.262 | 568.9079 | 2.293902 | 27.25281 | 24.255 | 203871.3 | 8.472841 | n.c. |
| Total Off Road Emissions | | | | 368.6049 | 2238.349 | 2141.838 | 8.407822 | 81.39392 | 72.44059 | 747248 | 33.25862 | n.c. |

**ON ROAD EMISSION FACTORS**

| | | | | VOC | CO | NOX | SOX | PM10 | PM2.5 | CO2 | CH4 | Pb (Lead) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile |
| Flatbed trailer/Dump Trucks [b] | 26 | 11 | 174 | 0.00103095 | 0.00503726 | 0.01179977 | 0.00004033 | 0.00059437 | 0.00046287 | 4.21495573 | 0.00004734 | n.c. |
| Passenger Vehicles | 29 | 2 | 174 | 0.00050573 | 0.00421218 | 0.00037757 | 0.00001073 | 0.00009640 | 0.00006364 | 1.11009559 | 0.00004322 | n.c. |

**ON ROAD EMISSIONS**

| | Qty | total mi per day | total days | VOC | CO | NOX | SOX | PM10 | PM2.5 | CO2 | CH4 | Pb (Lead) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. | Total lbs. | n.c. |
| Flatbed trailer/Dump Trucks [b] | 26 | 360 | 174 | 1679.04 | 8203.88 | 19217.58 | 65.67672 | 968.0178 | 753.8546 | 6864645 | 77.09876 | n.c. |
| Passenger Vehicles | 29 | 20 | 174 | 51.03826 | 425.0928 | 38.10394 | 1.082678 | 9.728331 | 6.422485 | 112030.8 | 4.362244 | n.c. |
| Total On Road Emissions | | | | 1730.078 | 8628.972 | 19255.68 | 66.7594 | 977.7461 | 760.2771 | 6976676 | 81.46101 | n.c. |

| **Rock Delivery Trucks on Roadways EMISSIONS Per YEAR** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total on & off-road emissions(lbs) POUNDS | | | | 2098.683 | 10867.32 | 21397.52 | 75.16722 | 1059.14 | 832.7177 | 7723924 | 114.7196 | n.c. |
| Total on & off-road emissions (tns) TONS | | | | 0.951956 | 4.929385 | 9.705853 | 0.034096 | 0.480423 | 0.377718 | 3503.549 | 0.052036 | n.c. |

Rock Delivery Trucks on Roadways GHG emissions = 3,180 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Note: [a] Used Other Construction Equipment emission for Water Truck emission

[b] Used Heavy-Heavy-Duty Diesel Trucks emissions for Flatbed trailer/Dump Trucks

**Inland Quarry Rock Delivery Truck Hauling on Roadways Land Emissions General Conformity Applicability Rates (Tons/Year); MT/Year CO2 eq**

GHG[3] = CO2[3] + CH4[3]

| Air Basin\|Air District \| General Conformity (Tons/Year) | | | Pollutant | VOC [1] | CO | NOX | SOX | PM10 | PM2.5 | CO2 [3] | CH4 [3] | Pb(Lead)[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDAB Mojave Desert AQMD Gen. Con. Threshold(Tons/Year) | | | | 25 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | 25 |
| SCAB SCAQMD General Conformity Thresholds(Tons/Year) | | | | 10 | 100 | 100 | 100 | 100 | 70 | n/a | n/a | 25 |
| SCCAB Ventura CO. APCD Gen. Con. Thresholds(Tons/Year) | | | | 50 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | 25 |

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

## Highest (Most Conservative) EMFAC2007 (version 2.3)
## Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

### Vehicle Class:
### Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

Scenario Year: **2021**

All model years in the range 1977 to 2021

| HHDT-DSL (pounds/mile) | |
|---|---|
| CO | **0.00503726** |
| NOx | **0.01179977** |
| ROG | **0.00103095** |
| SOx | **0.00004033** |
| PM10 | **0.00059437** |
| PM2.5 | **0.00046287** |
| CO2 | **4.21495573** |
| CH4 | **0.00004734** |

| HHDT-DSL, Exh (pounds/mile) | |
|---|---|
| PM10 | **0.00045411** |
| PM2.5 | **0.00041729** |

## SCAB Fleet Average Emission Factors (Diesel) - Off Road

| 2021 | |
|---|---|
| Air Basin | SC |

| Equipment | MaxHP | ROG (lb/hr) | CO (lb/hr) | NOX (lb/hr) | SOX (lb/hr) | PM (lb/hr) | CO2 (lb/hr) | CH4 (lb/hr) |
|---|---|---|---|---|---|---|---|---|
| Crane | 250 | 0.0667 | 0.2407 | 0.4404 | 0.0013 | 0.0152 | 112 | 0.0060 |
| Loader | 250 | 0.0769 | 0.3430 | 0.3814 | 0.0019 | 0.0131 | 172 | 0.0069 |
| Water Truck | 175 | 0.0491 | 0.5858 | 0.2972 | 0.0012 | 0.0142 | 107 | 0.0044 |

## Highest (Most Conservative) EMFAC2007 (version 2.3)

## Emission Factors for On-Road Passenger Vehicles & Delivery Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

**Vehicle Class:**

**Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)**

Scenario Year: **2021**

All model years in the range 1977 to 2021

| Passenger Vehicles (pounds/mile) | |
|---|---|
| CO | **0.00421218** |
| NOx | **0.00037757** |
| ROG | **0.00050573** |
| SOx | **0.00001073** |
| PM10 | **0.00009640** |
| PM2.5 | **0.00006364** |
| CO2 | **1.11009559** |
| CH4 | **0.00004322** |

| Delivery Trucks (pounds/mile) | |
|---|---|
| CO | **0.00748303** |
| NOx | **0.00773500** |
| ROG | **0.00115568** |
| SOx | **0.00002755** |
| PM10 | **0.00033125** |
| PM2.5 | **0.00025331** |
| CO2 | **2.86434187** |
| CH4 | **0.00004905** |

The above emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and extracting the **Heavy-Heavy-Duty Diesel Truck (HHDT)** Emission Factors.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle/emission categories listed in the tables below, by use of the following equation:

**Emissions (pounds per day) = N x TL x EF**

where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

The **HHDT-DSL** vehicle/emission category accounts for all emissions from heavy-heavy-duty diesel trucks, including start, running and idling exhaust. In addition, ROG emission factors account for diurnal, hot soak, running and resting emissions, and the PM10 & PM2.5 emission factors account for tire and brake wear.

The **HHDT-DSL, Exh** vehicle/emission category includes only the exhaust portion of PM10 & PM2.5 emissions from heavy-heavy-duty diesel trucks.

**Proposed Project Port San Luis Harbor Breakwater O&M Repair - Inland Quarry Rock Truck Hauling Transport on Roadways Construction Air Emissions. Inland Quarry in Apple Valley/Victorville (San Bernardino County High Desert) to Port of Hueneme (Ventura County). Maximum emission is work done in 26 weeks @ 6 work days a week, approx. 174 workdays (approx. 7 months) (year 2021). Emissions factors from EMFAC2007.**

## OFF ROAD EMISSION FACTORS

| | | | | VOC | CO | NOX | SOX | PM10 | PM2.5 | CO2 | CH4 | Pb (Lead_ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr | lb/hr |
| Crane | | | 250 | 0.0667 | 0.2407 | 0.4404 | 0.0013 | 0.0152 | 0.0135 | 112 | 0.0060 | Not Calculated (n.c.) |
| Crawler Loader | | | 250 | 0.0769 | 0.3430 | 0.3814 | 0.0019 | 0.0131 | 0.0116 | 172 | 0.0069 | n.c. |
| Water Truck [a] | | | 175 | 0.0491 | 0.5858 | 0.2972 | 0.0012 | 0.0142 | 0.0127 | 107 | 0.0044 | n.c. |

## OFF ROAD EMISSIONS

| | Qty | Hrs/Day | Total Day | VOC Total lbs. | CO Total lbs. | NOX Total lbs. | SOX Total lbs. | PM10 Total lbs. | PM2.5 Total lbs. | CO2 Total lbs. | CH4 Total lbs. | Pb (Lead) Total lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crane | 1 | 11 | 174 | 127.5994 | 460.6208 | 842.9429 | 2.41543 | 29.11383 | 25.91131 | 214672.1 | 11.51309 | n.c. |
| Crawler Loader | 1 | 11 | 174 | 147.1011 | 656.4657 | 729.9875 | 3.698491 | 25.02728 | 22.27428 | 328704.6 | 13.2727 | n.c. |
| Water Truck [a] | 1 | 11 | 174 | 93.90437 | 1121.262 | 568.9079 | 2.293902 | 27.25281 | 24.255 | 203871.3 | 8.472841 | n.c. |
| Total Off Road Emissions | | | | 368.6049 | 2238.349 | 2141.838 | 8.407822 | 81.39392 | 72.44059 | 747248 | 33.25862 | n.c. |

## ON ROAD EMISSION FACTORS

| | | | | VOC | CO | NOX | SOX | PM10 | PM2.5 | CO2 | CH4 | Pb (Lead) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile | lb/mile |
| Flatbed trailer/Dump Trucks [b] | 26 | 11 | 174 | 0.00103095 | 0.00503726 | 0.01179977 | 0.00004033 | 0.00059437 | 0.00046287 | 4.21495573 | 0.00004734 | n.c. |
| Passenger Vehicles | 12 | 2 | 174 | 0.00050573 | 0.00421218 | 0.00037757 | 0.00001073 | 0.00009640 | 0.00006364 | 1.11009559 | 0.00004322 | n.c. |

## ON ROAD EMISSIONS

| | | Total Trips | Miles per Round trip | VOC Total lbs. | CO Total lbs. | NOX Total lbs. | SOX Total lbs. | PM10 Total lbs. | PM2.5 Total lbs. | CO2 Total lbs. | CH4 Total lbs. | Pb (Lead) n.c. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flatbed trailer/Dump Trucks [b] | 26 | 164 | 360 | 1582.543 | 7732.392 | 18113.12 | 61.9022 | 912.3846 | 710.5296 | 6470126 | 72.6678 | n.c. |
| Passenger Vehicles | 29 | 1820 | 20 | 533.8485 | 4446.373 | 398.5585 | 11.32456 | 101.7561 | 67.17772 | 1171817 | 45.62807 | n.c. |
| Total On Road Emissions | | | | 2116.392 | 12178.77 | 18511.68 | 73.22676 | 1014.141 | 777.7073 | 7641943 | 118.2959 | n.c. |

| TOTAL EMISSIONS DAILY | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total on & offroad emissions (lbs) | | | | 2484.997 | 14417.11 | 20653.52 | 81.63458 | 1095.535 | 850.1479 | 8389190 | 151.5545 | n.c. |
| Total on & offroad emissions (lbs)/day | | | | 13.65383 | 79.21491 | 113.4809 | 0.448542 | 6.019421 | 4.671142 | 46094.45 | 0.832717 | n.c. |

Rock Delivery Trucks on Roadways GHG emissions = 3,180 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Note: [a] Used Other Construction Equipment emission for Water Truck emission

[b] Used Heavy-Heavy-Duty Diesel Trucks emissions for Flatbed trailer/Dump Trucks

**Inland Quarry Rock Truck Haul on Roadways Land Emissions Air Basin/APCD Thresholds(lb/day)**

GHG = CO2 + CH4 + N20

| Air Basin\| Air Districts\|Emissions Thresholds (lbs/day) | ROG [1] | CO | NOx | SOx | PM10 | PM2.5 | CO2 | CH4 | N2O | Pb (Lead) |
|---|---|---|---|---|---|---|---|---|---|---|
| MDAB Mojave Desert AQMD Emission Thresholds (lbs/day) | 137 lb/day | 548 lb/day | 137 lb/day | 137 lb/day | 82 lb/day | 65 lb/day | GHG: 548,000 lb/day | | | 3 lbs/day |
| SCAB SCAQMD Emission Thresholds (lbs/day) | 55 lb/day | 550 lb/day | 55 lb/day | 150 lb/day | 150 lb/day | 55 lb/day | GHG: 10,000 MT/yr CO2eq | | | 3 lbs/day |
| SCCAB Ventura CO.APCD Emissions Thresholds(lbs/day) | 25 lb/day | | 25 lb/day | | | | GHG: 10,000 MT/yr CO2eq | | | |

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

## Highest (Most Conservative) EMFAC2007 (version 2.3)

## Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

**Vehicle Class:**

**Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)**

Scenario Year: **2021**

All model years in the range 1977 to 2021

| HHDT-DSL (pounds/mile) | |
|---|---|
| CO | **0.00503726** |
| NOx | **0.01179977** |
| ROG | **0.00103095** |
| SOx | **0.00004033** |
| PM10 | **0.00059437** |
| PM2.5 | **0.00046287** |
| CO2 | **4.21495573** |
| CH4 | **0.00004734** |

| HHDT-DSL, Edh (pounds/mile) | |
|---|---|
| PM10 | **0.00045411** |
| PM2.5 | **0.00041729** |

## SCAB Fleet Average Emission Factors (Diesel) - Off Road

| 2021 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Air Basin** | **SC** | | | | **(lb/hr)** | **(lb/hr)** | **(lb/hr)** | **(lb/hr)** |
| | | **(lb/hr)** | **(lb/hr)** | **(lb/hr)** | **SOX** | **PM** | **CO2** | **CH4** |
| **Equipment** | **Mash** | **ROG** | **CO** | **NOX** | 0.0013 | 0.0152 | 112 | 0.0060 |
| Crane | 250 | 0.0667 | 0.2407 | 0.4404 | 0.0019 | 0.0131 | 172 | 0.0069 |
| Loader | 250 | 0.0769 | 0.3430 | 0.3814 | 0.0012 | 0.0142 | 107 | 0.0044 |
| Water Truck | 175 | 0.0491 | 0.5858 | 0.2972 | | | | |

## Highest (Most Conservative) EMFAC2007 (version 2.3)
## Emission Factors for On-Road Passenger Vehicles & Delivery Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

### Vehicle Class:
### Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

Scenario Year: **2021**

All model years in the range 1977 to 2021

| **Passenger Vehicles (pounds/mile)** | | **Delivery Trucks (pounds/mile)** | |
|---|---|---|---|
| CO | **0.00421218** | CO | **0.00748303** |
| NOx | **0.00037757** | NOx | **0.00773500** |
| ROG | **0.00050573** | ROG | **0.00115568** |
| SOx | **0.00001073** | SOx | **0.00002755** |
| PM10 | **0.00009640** | PM10 | **0.00033125** |
| PM2.5 | **0.00006364** | PM2.5 | **0.00025331** |
| CO2 | **1.11009559** | CO2 | **2.86434187** |
| CH4 | **0.00004322** | CH4 | **0.00004905** |

The above emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and extracting the **Heavy-Heavy-Duty Diesel Truck (HHDT)** Emission Factors.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle/emission categories listed in the tables below, by use of the following equation:

**Emissions (pounds per day) = N x TL x EF**

where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

The **HHDT-DSL** vehicle/emission category accounts for all emissions from heavy-heavy-duty diesel trucks, including start, running and idling exhaust. In addition, ROG emission factors account for diurnal, hot soak, running and resting emissions, and the PM10 & PM2.5 emission factors account for tire and brake wear.

The **HHDT-DSL, Edh** vehicle/emission category includes only the exhaust portion of PM10 & PM2.5 emissions from heavy-heavy-duty diesel trucks.

**Proposed Project Port San Luis Harbor Excavation Around Breakwater Work Air Emission Calculations**

**Project Data**

(1) Excavation around Breakwater Equipment: a crane-equipped barge (crane will be outfitted with a clamshell bucket), a scow, small craft support vessels, tug boats.

(2) Total work days: approximately 18 days; 11 to 22 hours a day; 6 day work week

(3) Approximate production rate: approximately 1000 cy/day

(4) Total sediment volume: approximately 15,000 cubic yards (cy)

(5) Distance to placement site: approximately 1,000 feet

(6) 10 to 12 laborers for crew/construction work

(7) Proposed Project area (breakwater) is located in Port San Luis Harbor, San Luis Obispo County

**Engine Data**

| Equipment Type | Power Rating (Hp) | Load Factor | # Active | Hourly Hp-Hrs | Hours Per Day | Daily Hp-Hrs | Work Days | Annual Hp-Hrs | Ref. Notes |
|---|---|---|---|---|---|---|---|---|---|
| Crane equipped barge | 180 | 0.50 | 1 | 90 | 22 | 1,980 | 18 | 35,640 | (1) (2) |
| Scow | 195 | 0.50 | 1 | 98 | 22 | 2,145 | 18 | 38,610 | (1) (2) |
| Small Craft Support Vessel | 250 | 0.20 | 2 | 100 | 22 | 2,200 | 18 | 39,600 | (1) (2) |
| Tug Boat | 800 | 0.25 | 2 | 400 | 22 | 8,800 | 18 | 158,400 | (1) (2) |

(1) Horsepower (Hp) and Load Factor data from Port of Los Angeles (POLA) 2009 Channel Deepening Project AQ Appendix, EIS/EIR

(2) Hp from engine data matched to Emission Factors below which are categorized by Hp

**Emission Factors**

| **Emission Factors (Gm/Hp-Hr)** | | **ROG** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Ref. Notes** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road Equipment - 25-50 Hp | | 2.06 | 5.92 | 5.94 | 0.18 | 0.70 | 0.64 | 568 | 0.11 | 0.01 | |
| Off-Road Equipment - 51-120 Hp | | 1.11 | 3.77 | 7.56 | 0.18 | 0.77 | 0.71 | 568 | 0.1 | 0.01 | |
| Off-Road Equipment - 121-175 Hp | | 0.71 | 3.04 | 6.94 | 0.18 | 0.42 | 0.38 | 568 | 0.09 | 0.01 | |
| Off-Road Equipment - 176-250 Hp | | 0.46 | 1.48 | 6.66 | 0.18 | 0.23 | 0.21 | 568 | 0.09 | 0.01 | |
| Off-Road Equipment - 251-500 Hp | | 0.37 | 1.73 | 5.51 | 0.18 | 0.20 | 0.18 | 568 | 0.08 | 0.01 | |
| Off-Road Equipment - 501-750 Hp | | 0.46 | 1.99 | 6.66 | 0.18 | 0.24 | 0.22 | 568 | 0.08 | 0.01 | |
| Off-Road Equipment >750 Hp | | 0.47 | 2.02 | 6.48 | 0.18 | 0.20 | 0.18 | 568 | 0.08 | 0.01 | |
| Small Craft Support Vessels | | 0.16 | 1.27 | 7.46 | 0.47 | 0.30 | 0.28 | 481.34 | 0.07 | 0.00 | |
| Tugboat | | 0.20 | 1.87 | 8.94 | 0.81 | 0.22 | 0.21 | 481.34 | 0.07 | 0.01 | |

**Annual Emissions (Tons/year)**

GHG = CO2 + CH4 + N20

| Activity/Equipment Type | | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** | **Ref. Notes** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crane equipped barge | | 0.02 | 0.05 | 0.24 | 0.01 | 0.01 | 0.01 | 20.24 | 0.00 | 0.00 | Not Calculated (n.c.) | |
| Scow | | 0.02 | 0.06 | 0.26 | 0.01 | 0.01 | 0.01 | 21.93 | 0.00 | 0.00 | n.c. | |
| Small Craft Support Vessels | | 0.01 | 0.05 | 0.30 | 0.02 | 0.01 | 0.01 | 19.06 | 0.00 | 0.00 | n.c. | |
| Tug Boats | | 0.03 | 0.30 | 1.42 | 0.13 | 0.03 | 0.03 | 76.24 | 0.01 | 0.00 | n.c. | |
| | | | | | | | | | | | | |
| **Excavation work Emissions (Tons/year)** | | 0.07 | 0.46 | 2.21 | 0.16 | 0.06 | 0.06 | 137.48 | 0.02 | 0.00 | n.c. | |

Excavation GHG emissions = 125 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator; accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Total Emissions Year 2021**

GHG = CO2 + CH4 + N20

| | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** |
|---|---|---|---|---|---|---|---|---|---|---|
| Est. Emissions | 0.07 | 0.46 | 2.21 | 0.16 | 0.06 | 0.06 | 137.48 | 0.02 | 0.00 | n.c. |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Applicability Rates | 100 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | n/a | 25 |

**Daily Emissions (lbs/day)**

| Activity/Equipment Type | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** | **Ref. Notes** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Crane equipped barge | 2.01 | 6.46 | 29.07 | 0.79 | 1.00 | 0.92 | 2479.37 | 0.39 | 0.04 | n.c. | (3) |
| Scow | 2.18 | 7.00 | 31.49 | 0.85 | 1.09 | 0.99 | 2685.98 | 0.43 | 0.05 | n.c. | (3) |
| Small Craft Support Vessels | 0.78 | 6.16 | 36.18 | 2.28 | 1.46 | 1.36 | 2334.54 | 0.34 | 0.00 | n.c. | (3) |
| Tug Boats | 3.88 | 36.28 | 173.44 | 15.71 | 4.27 | 4.07 | 9338.17 | 1.36 | 0.10 | n.c. | (3) |
| | | | | | | | | | | | |
| **Excavation Emissions (lbs/day)** | 8.84 | 55.90 | 270.19 | 19.63 | 7.81 | 7.34 | 16838.05 | 2.52 | 0.19 | n.c. | |
| Excavation Emissions (Tons/QTR) | 0.07 | 0.46 | 2.21 | 0.16 | 0.06 | 0.06 | 137.48 | 0.02 | 0.00 | n.c | |

Ref. Notes: (3) grams to lbs conversion 1lb = 453.6 g

Ref. Note: lbs to tons conversion 2204.6 lbs = 1 ton

**Excavation Around Breakwater Emissions General Conformity Applicability Rates (Tons/Year)**

$GHG^3 = CO2^3 + CH4^3 + N20^3$

| Air Basin\|Air District\|Emissions(Tons/Year) | General Conformity | ROG [1] | CO | NOx | SOx | PM10 | PM2.5 | CO2 [3] | CH4 [3] | N2O [3] | Pb (Lead) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SCCAB SLOCAPCD General Conformity Thresholds(Tons/Year) | | 100 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | n/a | 25 |

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

**Proposed Project Excavation Around Breakwater Emissions Comparison to SLOCAPCD Daily Thresholds (lbs/day); Tons/QTR**

| **Proposed Project Excavation** | **Pollutant** | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Proposed Project Excavation lb/day | | 8.84 | 55.90 | 270.19 | 19.63 | 7.81 | 7.34 | 16838.05 | 2.52 | 0.19 | n.c. |
| Proposed Project Excavation Tons/QTR | | 0.07 | 0.46 | 2.21 | 0.16 | 0.06 | 0.06 | 137.48 | 0.02 | 0.00 | n.c. |
| Proposed Project Excavation Tons/Year | | 0.07 | 0.46 | 2.21 | 0.16 | 0.06 | 0.06 | 137.48 | 0.02 | 0.00 | n.c. |
| Proposed Project Excavation GHG MT/yr CO2eq | | | | | | | | GHG: 125 MT/yr CO2eq [4] | | | |
| SCCAB SLOCAPCD Emission Thresholds (lbs) | | 137 L/D[a] | | 137 L/D[a] | | 2.5 T/Q[c] | 7 L/D[b] | GHG: 10,000 MT/yr CO2eq | | | |

Notes: [a] ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly (QTR.) Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

[b] Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

[c] Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/QTR (T/Q).

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Proposed Project Port San Luis Harbor Operations and Maintenance (O&M) Breakwater Rock Repair Construction Work Air Emissions Calculations**

Project Data

(1) Equipment:  barges,  tug boats, a crew boat, a crane equipped barge, a scow, a work boat, a skiff vessel.

(2) Total work days: approximately 174 days, 6 day work week, approximately 11 hours workday (daylight hours); an approximately 7 months project duration (April through October)

(3) Approximate production rate (placement of approximately 60,000 tons of new stone placed on breakwater from rock barge.  Approximately 30 to 35 stones can be picked and placed on the breakwater per day using the crane-equipped barge, or roughly three to four stones per hour on average can be placed on the breakwater.

(4) Approximate 29,000 tons of existing rock on breakwater to be reset.

(5) 10 to 12 laborers for crew/construction work

(6) Proposed Project area (breakwater) is located in Port San Luis Harbor, San Luis Obispo County

**Engine Data**

| Equipment Type | Power Rating (Hp) | Load Factor | # Active | Hourly Hp-Hrs | Hours Per Day | Daily Hp-Hrs | Work Days | Annual Hp-Hrs | Ref. Notes |
|---|---|---|---|---|---|---|---|---|---|
| Barge (rock/storage) | 195 | 0.20 | 2 | 78 | 11 | 858 | 174 | 149,292 | (1)(2) |
| Tug Boat | 800 | 0.25 | 2 | 400 | 11 | 4,400 | 174 | 765,600 | (1) (2) |
| Crew Boat | 400 | 0.20 | 1 | 80 | 11 | 880 | 174 | 153,120 | (1) (2) |
| Crane equipped barge | 180 | 0.50 | 1 | 90 | 11 | 990 | 174 | 172,260 | (2) (2) |
| Scow | 195 | 0.20 | 1 | 39 | 11 | 429 | 174 | 74,646 | (1) (2) |
| Work Boat | 250 | 0.20 | 1 | 50 | 11 | 550 | 174 | 95,700 | (1) (2) |
| Skiff vessel (Small Craft Support) | 250 | 0.20 | 1 | 50 | 11 | 550 | 174 | 95,700 | (1) (2) |

Ref. Notes: (1) Horsepower (Hp) and Load Factor data from Port of Los Angeles (POLA) 2009 Channel Deepening Project Air Quality (AQ) Appendix, EIS/EIR

Ref. Notes: (2) Hp from engine data matched to Emission Factors below which are categorized by Hp

**Emission Factors**

| **Emission Factors (Gm/Hp-Hr)** | **ROG** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Ref. Notes** |
|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road Equipment - 25-50 Hp | 2.06 | 5.92 | 5.94 | 0.18 | 0.70 | 0.64 | 568 | 0.11 | 0.01 | |
| Off-Road Equipment - 51-120 Hp | 1.11 | 3.77 | 7.56 | 0.18 | 0.77 | 0.71 | 568 | 0.1 | 0.01 | |
| Off-Road Equipment - 121-175 Hp | 0.71 | 3.04 | 6.94 | 0.18 | 0.42 | 0.38 | 568 | 0.09 | 0.01 | |
| Off-Road Equipment - 176-250 Hp | 0.46 | 1.48 | 6.66 | 0.18 | 0.23 | 0.21 | 568 | 0.09 | 0.01 | |
| Off-Road Equipment - 251-500 Hp | 0.37 | 1.73 | 5.51 | 0.18 | 0.20 | 0.18 | 568 | 0.08 | 0.01 | |
| Off-Road Equipment - 501-750 Hp | 0.46 | 1.99 | 6.66 | 0.18 | 0.24 | 0.22 | 568 | 0.08 | 0.01 | |
| Off-Road Equipment >750 Hp | 0.47 | 2.02 | 6.48 | 0.18 | 0.20 | 0.18 | 568 | 0.08 | 0.01 | |
| Crew /Work/Skiff Boat | 0.16 | 1.27 | 7.46 | 0.47 | 0.30 | 0.28 | 481.34 | 0.07 | 0.00 | |
| Tugboat | 0.20 | 1.87 | 8.94 | 0.81 | 0.22 | 0.21 | 481.34 | 0.07 | 0.01 | |

**Annual Emissions (tons/year)**

GHG = CO2 + CH4 + N20

| Activity/Equipment Type | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** | **Ref. Notes** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Barge (carrying rock) | 0.07 | 0.22 | 0.99 | 0.03 | 0.03 | 0.03 | 84.80 | 0.01 | 0.00 | Not Calculated (n.c.) | |
| Tug Boat | 0.15 | 1.43 | 6.84 | 0.62 | 0.17 | 0.16 | 368.51 | 0.05 | 0.00 | n.c. | |
| Crew Boat | 0.02 | 0.19 | 1.14 | 0.07 | 0.05 | 0.04 | 73.70 | 0.01 | 0.00 | n.c. | |
| Crane equipped barge | 0.08 | 0.25 | 1.15 | 0.03 | 0.04 | 0.04 | 97.84 | 0.02 | 0.00 | n.c. | |
| Scow | 0.03 | 0.11 | 0.50 | 0.01 | 0.02 | 0.02 | 42.40 | 0.01 | 0.00 | n.c. | |
| Work Boat | 0.02 | 0.12 | 0.71 | 0.04 | 0.03 | 0.03 | 46.06 | 0.01 | 0.00 | n.c. | |
| Skiff vessel | 0.02 | 0.12 | 0.71 | 0.04 | 0.03 | 0.03 | 46.06 | 0.01 | 0.00 | n.c. | |
| **Breakwater Rock Repair Emission(Tons/year)** | 0.39 | 2.46 | 12.05 | 0.85 | 0.36 | 0.34 | 759.39 | 0.11 | 0.01 | n.c. | |

Breakwater Rock Repair GHG emissions = 694 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Total Emissions (tons/year)**

GHG = CO2 + CH4 + N20

| | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** |
|---|---|---|---|---|---|---|---|---|---|---|
| Est. Emissions | 0.39 | 2.46 | 12.05 | 0.85 | 0.36 | 0.34 | 759.39 | 0.11 | 0.01 | n.c. |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Applicability Rates | 100 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | n/a | 25 |
| | | | | | | | | | | |

**Daily Emissions (lbs/day)**

GHG = CO2 + CH4 + N20

| Activity/Equipment Type | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** | **Ref. Note** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Barge (carrying rock) | 0.87 | 2.80 | 12.60 | 0.34 | 0.44 | 0.40 | 1074.39 | 0.17 | 0.02 | n.c. | (3) |
| Tug Boat | 1.94 | 18.14 | 86.72 | 7.86 | 2.13 | 2.04 | 4669.08 | 0.68 | 0.05 | n.c. | (3) |
| Crew Boat | 0.31 | 2.46 | 14.47 | 0.91 | 0.58 | 0.54 | 933.82 | 0.14 | 0.00 | n.c. | (3) |
| Crane Equipped Barge | 1.00 | 3.23 | 14.54 | 0.39 | 0.50 | 0.46 | 1239.68 | 0.20 | 0.02 | n.c. | (3) |
| Scow | 0.44 | 1.40 | 6.30 | 0.17 | 0.22 | 0.20 | 537.20 | 0.09 | 0.01 | n.c. | (3) |
| Work Boat (Survey Boat) | 0.19 | 1.54 | 9.05 | 0.57 | 0.36 | 0.34 | 583.64 | 0.08 | 0.00 | n.c. | (3) |
| Tug Boat | 0.24 | 2.27 | 10.84 | 0.98 | 0.27 | 0.25 | 583.64 | 0.08 | 0.01 | n.c. | (3) |
| **Breakwater Rock Repair Emissions (lbs/day)** | 5.00 | 31.84 | 154.51 | 11.22 | 4.50 | 4.23 | 9621.44 | 1.44 | 0.10 | n.c. | (3) |
| Breakwater Rock Repair Emission(Tons/QTR) | 0.18 | 1.13 | 5.50 | 0.40 | 0.16 | 0.15 | 342.28 | 0.05 | 0.00 | n.c. | |

Ref. Notes: (3) grams to lbs conversion 1lb = 453.6 g

Ref. Note: lbs to tons conversion 2204.6 lbs = 1 ton

**Proposed Project O&M Breakwater Rock Repair Emissions General Conformity Applicability Rates (Tons/Year)**

$GHG^3 = CO2^3 + CH4^3 + N20^3$

| **Air Basin\|Air District\|Emissions General Conformity Applicability Rates (Tons/Year)** | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2 [3]** | **CH4 [3]** | **N2O [3]** | **Pb (Lead)** |
|---|---|---|---|---|---|---|---|---|---|---|
| SCCAB SLOCAPCD General Conformity Thresholds(Tons/Year) | 100 | 100 | 100 | 100 | 100 | 100 | n/a | n/a | n/a | 25 |

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

**Proposed Project O&M Breakwater Rock Repair Emissions Comparison to SLOCPACD Thresholds (lbs/day); Tons/QTR; Tons/Year; GHG MT/Year CO2eq**

GHG = CO2 + CH4 + N2O

| **Proposed Project O&M Breakwater Rock Repair** | **Pollutant** | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O&M Breakwater Rock Repair lb/day | | 5.00 | 31.84 | 154.51 | 11.22 | 4.5 | 4.23 | 9621.44 | 1.44 | 0.1 | n.c. |
| O&M Breakwater Rock Repair Tons/QTR | | 0.18 | 1.13 | 5.50 | 0.40 | 0.16 | 0.15 | 342.28 | 0.05 | 0.00 | n.c. |
| O&M Breakwater Rock Repair Tons/Year | | 0.39 | 2.46 | 12.05 | 0.85 | 0.36 | 0.34 | 759.39 | 0.11 | 0.01 | |
| O&M Breakwater Rock Repair GHG MT/Year CO2eq | | | | | | | | GHG = 694 MT/yr CO2eq [4] | | | |
| SCCAB SLOCAPCD Emission Thresholds | | 137 L/D[a] | | 137 L/D[a] | | 2.5 T/Q[c] | 7 L/D[b] | GHG: 10,000 MT/yr CO2eq | | | |

Notes: [a] ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

[b] Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

[c] Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/Quarter (Tons/Qtr) or (T/Q).

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Proposed Project Excavation Around Breakwater Emission Comparison to SLOCAPCD Daily Threshold (lb/day);Ton/QTR; Tons/Year; MT/Year CO2eq**

GHG = CO2 + CH4 + N2O

| Proposed Project Excavation | Pollutant | ROG [1] | CO | NOx | SOx | PM10 | PM2.5 | CO2 | CH4 | N2O | Pb (Lead)[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Excavation lbs/day | | 8.84 | 55.90 | 270.19 | 19.63 | 7.81 | 7.34 | 16838.05 | 2.52 | 0.19 | n.c. |
| Excavation Tons/QTR | | 0.07 | 0.46 | 2.21 | 0.16 | 0.06 | 0.06 | 137.48 | 0.02 | 0.00 | n.c. |
| Excavation Tons/Year | | 0.07 | 0.46 | 2.21 | 0.16 | 0.06 | 0.06 | 137.48 | 0.02 | 0.00 | n.c. |
| Excavation GHG MT/Year CO2eq | | | | | | | | GHG = 125 MT/yr CO2eq [4] | | | |
| SCCAB SLOCAPCD Emission Thresholds | | 137 L/D[a] | | 137 L/D[a] | | 2.5 T/Q[c] | 7 L/D[b] | GHG: 10,000 MT/yr CO2eq | | | |

Notes: [a] ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

[b] Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

[c] Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/Quarter (Tons/Qtr) or (T/Q).

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants

were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Proposed Project SLO County (SLO) Sea Vessels Rock Delivery Emissions Compared to SLOCAPCD Thresholds (lbs/day); Tons/QTR; Tons/Year ; HG MT/Year CO2eq**

GHG = CO2 + CH4 + N2O

| County | Pollutant | ROG | CO | NOx | SOx | PM10 | PM2.5 | CO2 | CH4 | N20 | GHG | Pb(Lead)[2] | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLO Sea Vessels Rock Delivery (lbs/day) | | 0.67 | 4.41 | 21.45 | 1.59 | 0.62 | 0.58 | 1320.71 | 0.20 | 0.01 | 1320.92 | n.c. | lbs/day |
| SLO Sea Vessels Rock Delivery (Tons/QTR) | | 0.01859 | 0.11726 | 0.57629 | 0.04147 | 0.01716 | 0.01573 | 35.94455 | 0.005352 | 0.000358 | 35.95026 | n.c. | Tons/QTr |
| SLO Sea Vessels Rock Delivery (Tons/Year) | | 0.01859 | 0.11726 | 0.57629 | 0.04147 | 0.01716 | 0.01573 | 35.94455 | 0.005352 | 0.000358 | 35.95026 | n.c. | Tons/Year |
| Sea Vessels Rock Delivery GHG (MT/Year CO2eq) | | 137 L/D[a] | | | | | | | | | GHG=CO2+CH4+N2O =32.8 MT/yr CO2eq [4] | | MT/Year CO2eq |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLOCAPCD Thresholds | | 137 L/D[a] | | 137 L/D[a] | | 2.5 T/Q[c] | 7 lbs/day[b] | | | | GHG=CO2+CH4+N2O =10,000 MT/yr CO2eq | | |

Notes: [a] ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

[b] Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

[c] Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/Quarter (Tons/Qtr) or (T/Q).

Note(s): [1] Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

[2] Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

[4] GHG emissions Metric Tons (MT)/Year calculator. Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Proposed Project Construction (Excavation Around Breakwater + O&M Breakwater Rock Repair) Emissions + Sea Vessels Rock Delivery Emissions Comparison to SLOCAPCD Thresholds (lbs/day); Tons/QTR; Ton/Year; MT/Year CO2eq**

GHG = CO2 + CH4 + N2O

| **Proposed Work Activity Emissions** | **Pollutant** | **ROG [1]** | **CO** | **NOx** | **SOx** | **PM10** | **PM2.5** | **CO2** | **CH4** | **N2O** | **Pb (Lead) [2]** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sea Vessel Rock Delivery Emissions(Lb/Day) | | 0.67 | 4.41 | 21.45 | 1.59 | 0.62 | 0.58 | 1320.71 | 0.20 | 0.01 | n.c. |
| Construction(Excavate+ Breakwater Repair) Lb/Day | | 13.84 | 87.74 | 424.70 | 30.85 | 12.31 | 11.57 | 26459.49 | 3.96 | 0.29 | n.c. |
| Total Construction Emissions (Lb/Day) | | 14.51 | 92.15 | 446.15 | 32.44 | 12.93 | 12.15 | 27780.20 | 4.16 | 0.30 | **n.c.** |
| Sea Vessel Rock Delivery Emission(Ton/QTR)) | | 0.01859 | 0.11726 | 0.57629 | 0.04147 | 0.01716 | 0.01573 | 35.94455 | 0.00535 | 0.00036 | n.c. |
| Construction(Excavate+ Breakwater Repair) Tons/QTR | | 0.25 | 1.59 | 7.71 | 0.56 | 0.22 | 0.21 | 479.76 | 0.07 | 0.00 | n.c. |
| Sea Rock Deliver + Construction (Tons/QTR) | | 0.26646 | 1.70997 | 8.28298 | 0.60062 | 0.23725 | 0.22621 | 515.707 | 0.07658 | 0.00392 | n.c |
| Sea Vessel Rock Deliver Emission(Ton/Year) | | 0.01859 | 0.11726 | 0.57629 | 0.04147 | 0.01716 | 0.0173 | 35.94455 | 0.00535 | 0.00036 | n.c. |
| Construction(Excavate+ Breakwater Repair) Tons/Year | | 0.46 | 2.92 | 14.26 | 1.01 | 0.42 | 0.4 | 896.87 | 0.13 | 0.01 | n.c. |
| Sea Rock Deliver + Construction (Tons/Year) | | 0.47859 | 3.03726 | 14.8363 | 1.051457 | 0.43716 | 0.4173 | 932.8146 | 0.13535 | 0.01036 | |
| Sea Vessel Rock Delivery GHG Emissions MT/Year CO2eq | | | | | | | | GHG = 32.80 MT/Year CO2eq | | | |
| Construction (Excavate+ Breakwater Repair) GHG Emissions MT/Year CO2eq | | | | | | | | GHG = 819.00 MT/Year CO2eq | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sea Vessels Rock Delivery + Construction GHG Emissions MT/Year $CO_2eq$ | | | | | | | | GHG = 851.80 MT/Year $CO_2eq$ | | | |
| SCCAB SLOCAPCD Emission Thresholds (lbs) | | 137 L/D[a] | | 137 L/D[a] | | 2.5 T/Q[c] | 7 L/D[b] | GHG: 10,000 MT/Year $CO_2eq$ | | | |

Notes: [a] ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly (QTR) Tier 1 = 2.5 tons; Quarterly (QTR) Tier 2 = 6.3 tons.

[b] Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly (QTR) Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

[c] Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Ton/QTR (T/Q).

Note(s): [1] Ozone ($O_3$) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between $O_3$, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of $O_3$ is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting $O_3$ emissions per the General Conformity Applicability Rates. Since the consumption of VOC in $O_3$ formation reaction is variable and reversible, actual $O_3$ levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone ($O_3$) is for 8-hour. There is no NAAQS 1-hour for Ozone ($O_3$).

[2] Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

[3] Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Greenhouse Gas Equivalenc...

If You Have Energy Data | If You Have Emissions Data

| Amount | Unit | Gas |
|---|---|---|
| 251.36 | Tons | $CO_2$ - Carbon Dioxide or $CO_2$ Equivalent* |
| | Tons | Carbon or Carbon Equivalent |
| 0.04 | Tons | $CH_4$ - Methane |
| 0.00 | Tons | $N_2O$ - Nitrous Oxide |
| | Tons | HCFC-22 - Hydrofluorocarbon gases |
| | Tons | CF4 - Perfluorocarbon gases |
| | Tons | $SF_6$ - Sulfur Hexafluoride |

Calculate

*If your estimated emissions of methane, nitrous oxide, or other non-$CO_2$ gases are already expressed in $CO_2$ equivalent or carbon equivalent, please enter your figures in the row for $CO_2$ or carbon equivalent.

## Equivalency Results

How are they calculated?

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

**229 Metric Tons**

https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Greenhouse Gas Equivalenc...

If You Have Energy Data | If You Have Emissions Data

| Amount | Unit | Gas |
|---|---|---|
| 35.94455 | Tons | $CO_2$ - Carbon Dioxide or $CO_2$ Equivalent* |
| | Tons | Carbon or Carbon Equivalent |
| 0.005352 | Tons | $CH_4$ - Methane |
| 0.000358 | Tons | $N_2O$ - Nitrous Oxide |
| | Tons | HCFC-22 - Hydrofluorocarbon gases |
| | Tons | CF4 - Perfluorocarbon gases |
| | Tons | $SF_6$ - Sulfur Hexafluoride |

Calculate

*If your estimated emissions of methane, nitrous oxide, or other non-$CO_2$ gases are already expressed in $CO_2$ equivalent or carbon equivalent, please enter your figures in the row for $CO_2$ or carbon equivalent.

## Equivalency Results

How are they calculated?

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to: **32.8** **Metric Tons**

https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Greenhouse Gas Equivalenc...

**If You Have Energy Data** | **If You Have Emissions Data**

| Amount | Unit | Gas |
|---|---|---|
| 3503.549 | Tons | $CO_2$ - Carbon Dioxide or $CO_2$ Equivalent* |
| | Tons | Carbon or Carbon Equivalent |
| 0.052036 | Tons | $CH_4$ - Methane |
| | Tons | $N_2O$ - Nitrous Oxide |
| | Tons | HCFC-22 - Hydrofluorocarbon gases |
| | Tons | CF4 - Perfluorocarbon gases |
| | Tons | $SF_6$ - Sulfur Hexafluoride |

**Calculate**

*If your estimated emissions of methane, nitrous oxide, or other non-$CO_2$ gases are already expressed in $CO_2$ equivalent or carbon equivalent, please enter your figures in the row for $CO_2$ or carbon equivalent.

## Equivalency Results

How are they calculated?

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to: **3,180 Metric Tons**

**Greenhouse gas emissions from**

https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Greenhouse Gas Equivalenc...

**If You Have Energy Data** | **If You Have Emissions Data**

| Amount | Unit | Gas |
|---|---|---|
| 137.48 | Tons | $CO_2$ - Carbon Dioxide or $CO_2$ Equivalent* |
| | Tons | Carbon or Carbon Equivalent |
| 0.02 | Tons | $CH_4$ - Methane |
| 0.00 | Tons | $N_2O$ - Nitrous Oxide |
| | Tons | HCFC-22 - Hydrofluorocarbon gases |
| | Tons | CF4 - Perfluorocarbon gases |
| | Tons | $SF_6$ - Sulfur Hexafluoride |

**Calculate**

*If your estimated emissions of methane, nitrous oxide, or other non-$CO_2$ gases are already expressed in $CO_2$ equivalent or carbon equivalent, please enter your figures in the row for $CO_2$ or carbon equivalent.

## Equivalency Results

How are they calculated?

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

125 Metric Tons

https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Greenhouse Gas Equivalenc... ×

If You Have Energy Data | If You Have Emissions Data

| Amount | Unit | Gas |
|---|---|---|
| 759.39 | Tons | $CO_2$ - Carbon Dioxide or $CO_2$ Equivalent* |
| | Tons | Carbon or Carbon Equivalent |
| 0.11 | Tons | $CH_4$ - Methane |
| 0.01 | Tons | $N_2O$ - Nitrous Oxide |
| | Tons | HCFC-22 - Hydrofluorocarbon gases |
| | Tons | CF4 - Perfluorocarbon gases |
| | Tons | $SF_6$ - Sulfur Hexafluoride |

Calculate

*If your estimated emissions of methane, nitrous oxide, or other non-$CO_2$ gases are already expressed in $CO_2$ equivalent or carbon equivalent, please enter your figures in the row for $CO_2$ or carbon equivalent.

## Equivalency Results

How are they calculated?

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

**694** **Metric Tons**

The State of California Air Resources Board (CARB) has established additional standards, California Ambient Air Quality Standards (CAAQS), that are generally more restrictive than the NAAQS. In addition to being subject to the requirements of the CAA, air quality in California is also governed by generally more stringent regulations under CAAQS and regionally under the SLOCAPCD. The SLOCAPCD has developed mass daily emissions rates of criteria pollutants for construction. The daily construction emission thresholds represent the maximum emissions from a project that are not expected to cause of contribute to an exceedance of the most stringent applicable Federal or state ambient air quality standard in the SCCAB. A Table titled **Table SLOCAPCD Threshold of Significance For Construction Operations** summarizes the SLOCAPCD daily (lbs/day) thresholds of significance for construction operations (SLOCAPCD, 2020b).

**Table SLOCAPCD Threshold of Significance For Construction Operations (3)**

| Pollutant | Threshold(1) | | |
|---|---|---|---|
| | **Daily** | **Quarterly Tier 1** | **Quarterly Tier 2** |
| ROG + $NO_x$ (combined) | 137 lbs | 2.5 tons | 6.3 tons |
| Diesel Particulate Matter (DPM) | 7 lbs | 0.13 tons | 0.32 tons |
| Fugitive Particulate Matter ($PM_{10}$), Dust(2) | | 2.5 tons | |
| Greenhouse Gases ($CO_2$, $CH_4$, N20, HFC, CFC, F6S) | Amortized and Combined with Operational Emissions (See Below) | | |

Source: SLOCAPCD, 2020b.

Notes: (1) Daily and quarterly emission thresholds are based on the California Health and Safety Code and the CARB Carl Moyer Guidelines.

(2) Any project with a grading area greater than 4.0 acres of worked area can exceed the 2.5 tons PM10 quarterly threshold.

(3) A Table titled **Table SLOCAPCD Threshold of Significance For Construction Operations** identifying SLOCAPCD Threshold of Significance for Construction Operations is for disclosure purposes under NEPA, and would not be used as a NEPA significance criterion.

The proposed project estimated air pollutant emissions lbs/day and Tons/Quarter (Tons/QTR), and estimated GHG MT/Year CO2eq emissions for the proposed project located in Port San Luis Harbor in the western portion of San Luis Obispo County within the SCCAB governed by the SLOCAPCD are provided in Table titled **SCCAB (San Luis Obispo County portion) Air Pollutant Emissions and GHG Emission Estimates for Construction and Rock Delivery by Sea Vessels (lbs/day)**. Impacts would be temporary. It is anticipated there would be no indirect impacts. Upon project completion, air quality would return to pre-project conditions. Therefore, impacts would be less than significant.

**Table SCCAB (San Luis Obispo County portion) Air Pollutant Emissions and GHG Emission Estimates for Construction and Rock Delivery by Sea Vessels (lbs/day) [4]**

| Pollutant | ROG [1] (VOC) + NOx [2] (NO2) lbs/day | DPM [3] lbs/day | Fugitive Particulate Matter (PM10), Dust, Tons/QTR | GHG |
|---|---|---|---|---|
| Construction | 13.84 + 424.70 = 438.54 lbs/day | 11.57 lbs/day;<br><br>0.21 Tons/QTR | 12.31 lbs/day;<br><br>0.22 Tons/QTR | 819.00 MT/Year CO2eq |
| Rock Delivery by Sea Vessel | 0.67+ 21.45 = 22.12 lbs/day | 0.58 lbs/day;<br><br>0.01573 Tons/QTR | 0.62 lbs/day;<br><br>0.01716 Tons/QTR | 32.80 MT/Year CO2eq |
| Total | 460.66 lbs/day | 12.15 lb/day;<br><br>0.22573 Tons/QTR | 12.93 lbs/day;<br><br>0.23716 Tons/QTR | 851.8 MT/Year CO2eq |
| SLOCAPCD thresholds of significance for construction operations | ROG + NOx (combined) = 137 lbs/day<br><br>Quarterly Tier I 2.5 tons<br><br>Quarterly Tier 2 6.3 tons | 7 lbs/day<br><br>Quarterly Tier 1 0.13 tons<br><br>Quarterly Tier 2 0.32 tons | Quarterly Tier 1 2.5 tons/quarter | 10,000 MT/Year CO2eq |

Notes: [1] ROG, ROC, and VOC are similar and are interchangeable.
[2] NOx is represented by NO2.
[3] DPM is assumed to be PM2.5.
[4] A Table titled Table **SCCAB (San Luis Obispo County portion) Air Pollutant Emissions and GHG Emission Estimates for Construction and Rock Delivery by Sea Vessels (lbs/day)** identifying SCCAB (San Luis Obispo County portion) Air Pollutant Emissions and GHG Emission Estimates for Construction and Rock Delivery by Sea (lbs/day) under the jurisdiction of SLOCAPCD is for disclosure purposes under NEPA, and would not be used as a NEPA significance criterion.

# APPENDIX D

**Sediment and Chemical Analysis Results**
**of the Proposed Excavated Material**
**(1991-1992; 2013-2014; 2020)**

Appendix D: Chemical Analysis Results (December 1991) of Proposed Excavated Material
(Source:1992 Final Environmental Assessment For The Repairs To The Port San Luis Breakwater, U.S. Army Corps of Engineers)

# APPENDIX D

## Chemical Analysis Results of the Proposed Excavated Material to be Disposed in the Surf Zone

Prepared by:

United States Army Corps of Engineers

Los Angeles District

Los Angeles, California

March 1992

Client No: 700
Client Name: U.S. Army Corps of Engin.
NET Log No: 91.1256

Date: 12/24/1991

Page: xxx

Ref: Port San Luis

| | | | Descriptor, Lab No. and Results | | |
|---|---|---|---|---|---|
| | | | 91-607Q<br>12/05/1991 | 91-608Q<br>12/05/1991 | |
| Parameter | Method | Reporting Limit | 107933 | 107934 | Units |
| Percent Solids | | 0.1 | 77.4 | 78.8 | % |
| Oil & Grease (IR,TRPH) | 5520 C/E/F | 50 | 58 | 37 | mg/Kg |
| ICP Prep (Solid) | | | 8291/a-20 | 8291/a-20 | |
| GFAA Prep (Solid) | | | 8293\D2 | 8293\D2 | |
| Hg Prep (Solid) | | | 8299 | 8299 | |
| Arsenic (GFAA) | EPA 7060 | 0.5 | | | mg/Kg |
| Cadmium (ICP) | EPA 6010 | 2.0 | | | mg/Kg |
| Chromium (ICP) | EPA 6010 | 2.0 | | | mg/Kg |
| Copper (ICP) | EPA 6010 | 2.0 | | | mg/Kg |
| Lead (GFAA) | EPA 7421 | 0.2 | | | mg/Kg |
| Mercury (CVAA) | EPA 7471 | 0.1 | ND | ND | mg/Kg |
| Nickel (ICP) | EPA 6010 | 5.0 | | | mg/Kg |
| Selenium (GFAA) | EPA 7740 | 0.5 | | | mg/Kg |
| Silver (ICP) | EPA 6010 | 2.0 | | | mg/Kg |
| Zinc (ICP) | EPA 6010 | 2.0 | | | mg/Kg |
| GC Ext. (Solid, 8080) | | | 12-18-91 | 12-18-91 | |

PRELIMINARY REPORT

Port San Luis 2013 Sediment Sampling and Analysis (Source: Sediment Sampling and Analysis Report in Support of 2014 Dredge Permit Application, Port San Luis Harbor District, 2014)

*Port San Luis Harbor District*

# Sediment Sampling and Analysis Report in Support of 2014 Dredge Permit Application


**November 15, 2013**

***Submitted to:***

Mr. Loch Dreizler, *Facilities Manager*
Port San Luis Harbor District
Post Office Box 249, Pier 3
Avila Beach, CA 93424

***Prepared by:***

TENERA Environmental
141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401
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ESLO2013-046.1

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# 1.0 Introduction

In order to maintain accessibility to its boat launch facilities, the Port San Luis Harbor District must periodically dredge the approaches to its Mobile Hoist Pier and Sport Launch. Dredging activities, and the subsequent deposition of the dredge spoils, are regulated by the U. S. Army Corps of Engineers (ACOE) as specified in Dredging Permit #200201383-LM, and by the California Coastal Commission (CCC) as set forth in Coastal Development Permit No. 3-08-038.

In February of 2013, Port San Luis Harbor District (the Port) submitted a sampling and analysis plan (SAP) for the testing of sediments to be collected from the Port San Luis dredge site to the ACOE. The SAP was assembled in accordance with the EPA's 1998 "Evaluation of Dredged Material Proposed for Discharge in the Waters of the U.S. – Testing Manual (Inland Testing Manual)" (EPA 1998). The SAP was approved by the ACOE and subsequently implemented. Sediment samples were collected from the proposed dredge area and the two disposal sites currently used by the Port on October 11, 2013. The samples were submitted for chemical and physical analysis in accordance with the SAP. This report documents the collection and analysis of those samples. Results of the analyses are summarized in the report and all laboratory reports are included in the appendices.

# 2.0 Project Description

Port San Luis Harbor District (the Port) proposes to dredge bottom sediments from the basins adjacent to Mobile Hoist Pier, the Sport Launch (referred to as the Trailer Boat Launch in some of the past documents submitted to the ACOE), and the area adjacent to the shoreward end of Harford Pier, down to a depth of –10 feet below Mean Lower Low Water (MLLW). The currently permitted dredge area is described in ACOE Dredging Permit #200201383-LM, and is shown, along with the six approved dredge spoil disposal sites, in **Figure 1**. It should be noted that although the permitted dredge area encompasses 32 acres, at the present time and for the foreseeable future dredging will be limited to the areas immediately adjacent to those areas noted above.

The maximum dredge depth permitted is 10 feet below MLLW, with an additional foot to allow for overdredging. Sand in the vicinity of Mobile Hoist Pier will be removed to the maximum depth allowed. Dredging in the vicinity of the Sport Launch, however, is limited by the nature of the bottom substrate. An underlying rocky bottom limits dredging in the area immediately adjacent to the Sport Launch to about 5 to 7 feet below MLLW. The depth to which dredgeable material can be found increases as one moves away from the Sport Launch, and dredging will extend to the maximum depth of 10 feet below MLLW where it can be achieved.

The Port anticipates that the volume of sediment to be removed annually from the entire dredge area will not exceed the maximum 250,000 cubic yards of material currently allowed by their dredge permit. Over the past five years (2009 – 2013) the average annual volume of material removed during maintenance dredging has been 30,272 cubic yards (**Table 1**). The Port anticipates that a similar volume of material will be removed annually for the foreseeable future.

Dredged material will be used for beach nourishment at the sites shown in **Figure 1**. The sites currently permitted for this purpose include those historically used for disposal, specifically, Fisherman’s Beach and Olde Port Beach, and four sites introduced in 2003: Lighthouse Beach, Avila Beach, West Bluff Beach and Jetty disposal sites. At this time, the West Bluff Beach site is being used exclusively for beach nourishment and the Fisherman’s Beach site could be potentially used. The Port does not anticipate using any of the other four sites in the foreseeable future.

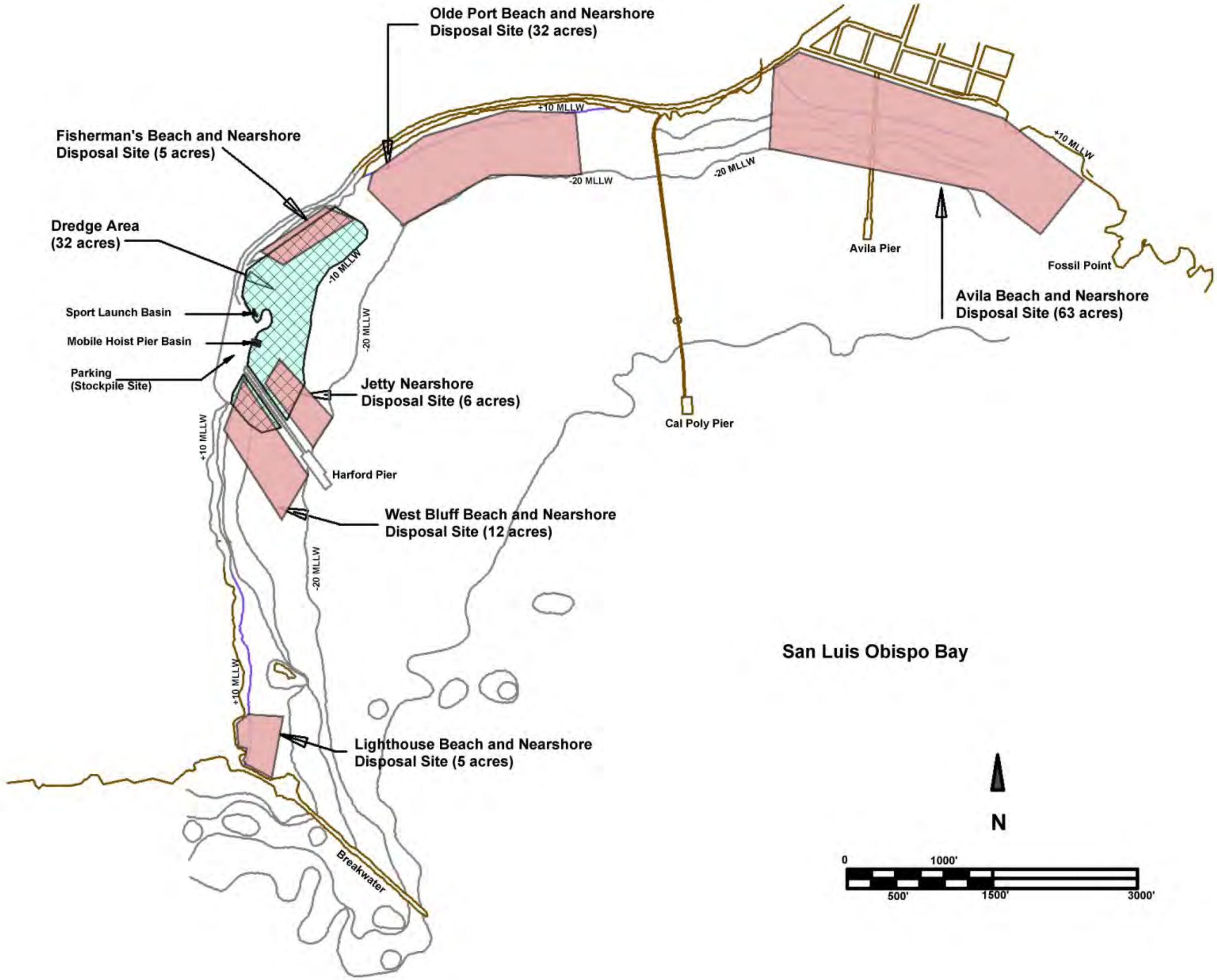



**Figure 1**. Map of Port San Luis Harbor 2013 Dredge and Disposal Sites

# 3.0 Site History

Port San Luis Harbor is a small craft harbor located in the lee of Point San Luis about 8 miles southwest of the city of San Luis Obispo, California. The harbor is protected by a rock rubble breakwater that extends southeast from Point San Luis for a distance of about 2,000 feet. While the point and breakwater provide adequate protection from the majority of the predominantly northwesterly swells, the high-energy nature of the ocean along this section of coastline can still produce significant water movement within the harbor. This is most notable during southerly and southwesterly swells, or during the larger northwesterly swells generated by winter storms. Wave action, combined with non-wave driven currents, is responsible for the transport of sand and other suspended particles from San Luis Creek and the outer coastal areas into the quieter waters of the harbor where they are deposited. Sand deposited in the lee of the breakwater is later transported within the harbor and contributes to the shoaling in areas like the Mobile Hoist Pier and the Sport Launch basins. This ongoing process necessitates the periodic dredging of these areas to allow their continued access by boats.

The volume of material dredged from the vicinity of the Sport Launch and Mobile Hoist Pier basins during the period from 1994 through the present is shown in **Table 1**.

**Table 1**. Chronology of recent dredge activity at Port San Luis, California.

| Period of Dredge Activity | Sport Launch Dredge Vol. (yds$^3$) | Mobile Boat Hoist Dredge Vol. (yds$^3$) | Total Dredge Vol. (yds$^3$) |
|---|---|---|---|
| 03/94 – 05/94 | 3,223 | 3,282 | **6,505** |
| 02/95 – 06/95 | 3,397 | 2,768 | **6,165** |
| 12/95 – 05/96 | 3,751 | 3,711 | **7,462** |
| 11/96 – 06/97 | 3,555 | 3,904 | **7,459** |
| 02/98 (post El Niño storms) | 4,882 | 6,621 | **11,503** |
| 02/99 – 08/99 | 4,407 | 3,105 | **7,512** |
| 11/99 – 12/99 | 350 | 0 | **350** |
| 02/00 – 09/00 | 3,410 | 3,563 | **6,973** |
| 01/01 – 08/01 | 7,335 | 1,420 | **8,755** |
| 02/02 – 07/02 | 4,465 | 965 | **5,430** |
| 03/03 – 05/03 | 10,560 | 7,995 | **18,555** |
| 03/04 - 05/04 | 7,507 | 4,620 | **12,127** |
| 03/05 – 05/05 | 8,032 | 5,115 | **13,147** |
| 03/06 – 08/06 | 17,605 | 6,551 | **24,156** |
| 03/07 – 08/07 | 15,012 | 6,930 | **21,942** |
| 03/08 – 07/08 | 9,660 | 8,085 | **17,745** |
| 03/09 – 06/09 | 11,655 | 6,335 | **17,990** |
| 03/10 – 10/10 | 21,175 | 18,673 | **39,848** |
| 03/11 – 05/11 | 11,565 | 6,139 | **17,704** |
| 03/12 – 06/12 | 19,682 | 10,287 | **29,969** |
| 03/13 – 08/13 | 23,800 | 22,050 | **45,850** |

# 4.0 TIER I Evaluation

As described in the ACOE “Inland Testing Manual”, Tier I evaluations consist of the review and evaluation of existing data from a proposed dredge site. Sediment samples were collected from the dredge area and analyzed for their chemical constituents and physical characteristics (grain size) in 1996, 1998, 1999, 2000, 2003, and 2009. The results of these analyses were reported to the ACOE by the Port San Luis Harbor District at the conclusion of each sampling interval. Physical and chemical analyses of the sediment samples found the material to be relatively clean, coarse to medium grained sand with a low percentage of fines. Such characteristics would be consistent with those expected of sediments that had recently been deposited in an area of relatively high water movement. The limited residence time of the sediments at the dredge site would tend to reduce their potential to accumulate any contaminants, while water movement would inhibit the deposition of finer grained sediments. The frequency of dredging and the rapidity with which shoaling takes place in the dredge zone, inhibits stratification of the sediments in this area.

# 5.0 Methods

Two sediment sampling stations were established within the PSL dredge zone as shown in **Figure 2**. The locations of the sampling stations were chosen to place them adjacent to the principal storm drains that discharge into the dredge area. Proximity of the sampling stations to these discharge points should maximize the probability of sampling any potential contaminants that have accumulated in the sediments from land based sources. The locations of areas of potential pollutant contact are also shown in **Figure 2**, as is the direction of runoff, runoff discharge points and the positions of the sediment sampling stations relative to the discharge points. Each of the stations specified has been sampled at least three times previously during the period from 1996 through 2009.

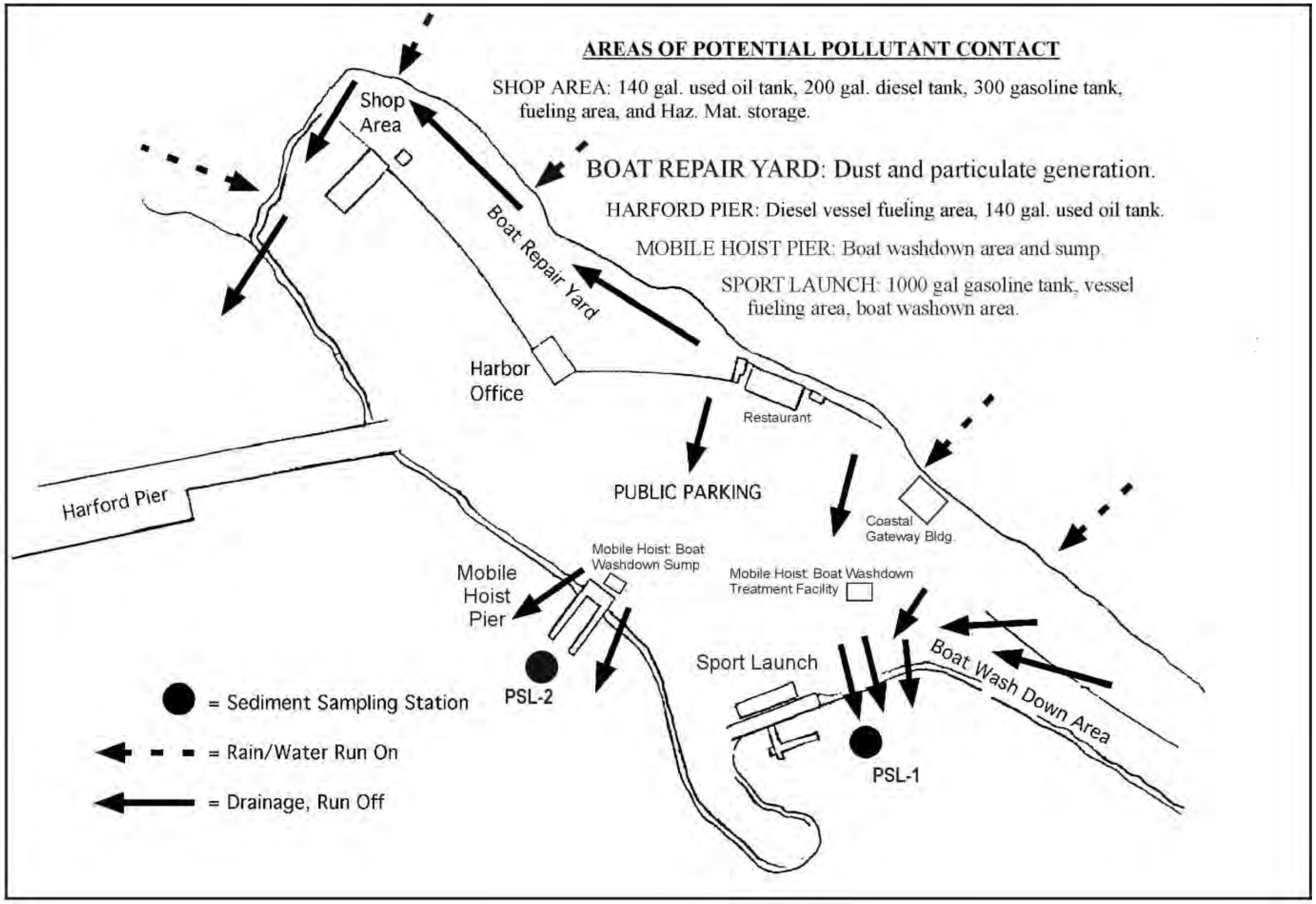



**Figure 2**. Port San Luis Drainage, Potential Sediment Contaminants, and Sediment Sampling Sites.

To accurately characterize the sediments at each of the sampling stations, three individual cores were collected along a line running perpendicular to the shoreline and proceeding down the natural slope of the bottom as shown in **Figure 3**. Individual cores were capped and extruded, then combined to produce a composite sample representative of the mixed material that will be deposited on the beach by the dredge. All sediment samples were collected using a diver-operated coring device. The device utilizes a 2-inch diameter stainless steel tube with a removable plastic liner. Each individual core was driven into the sediment achieving a nominal core length of about 3 feet. The composited samples cover the entire depth range of the area to be dredged, extending down to 11 feet below MLLW. The date and time of the sample collection, water depth where each core was taken, the depth of the core and field notes were recorded during sampling, this information is summarized in **Table 2.** The locations of the individual cores are shown graphically in **Figure 4**.

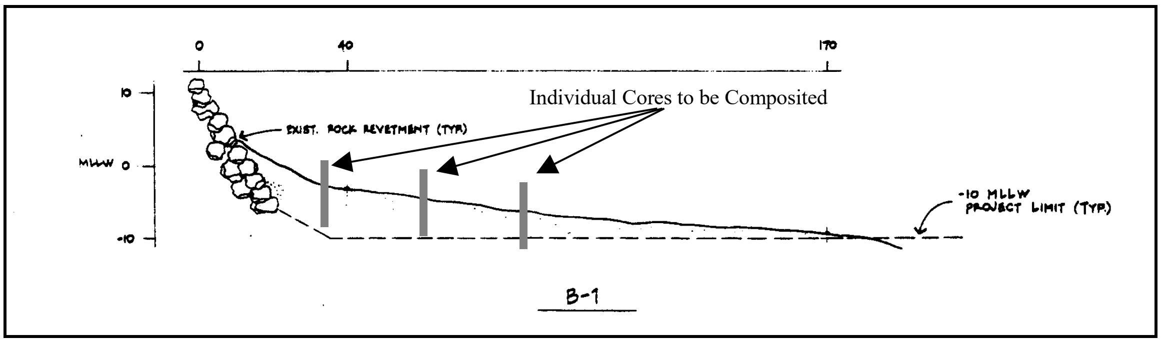



**Figure 3**. Profile of core sampling technique.

**Table 2.** Field data for cores collected from Port San Luis Harbor on October 11, 2013.

| Station | Core # | Time (PDT) | Water Depth (ft) | Depth of Core (ft) | ~ Tide (ft MLLW) | Tide adjusted Core Depth (ft MLLW) | Composite Core Depth (ft MLLW) |
|---|---|---|---|---|---|---|---|
| PSL-1 | I | 0943 | -5.0 | 3.0 | 3.0 | -2.0 to -5.0 | -2.0 |
| PSL-1 | II | 0948 | -8.0 | 3.0 | 3.0 | -5.0 to -8.0 | to |
| PSL-1 | III | 0951 | -11.0 | 3.0 | 3.0 | -8.0 to -11.0 | -11.0 |
| PSL-2 | I | 1008 | -5.0 | 3.0 | 3.0 | -2.0 to -5.0 | -2.0 |
| PSL-2 | II | 1018 | -8.0 | 3.0 | 3.0 | -5.0 to -8.0 | to |
| PSL-2 | III | 1023 | -11.0 | 2.75 | 3.1 | -7.9 to -10.7 | -10.7 |

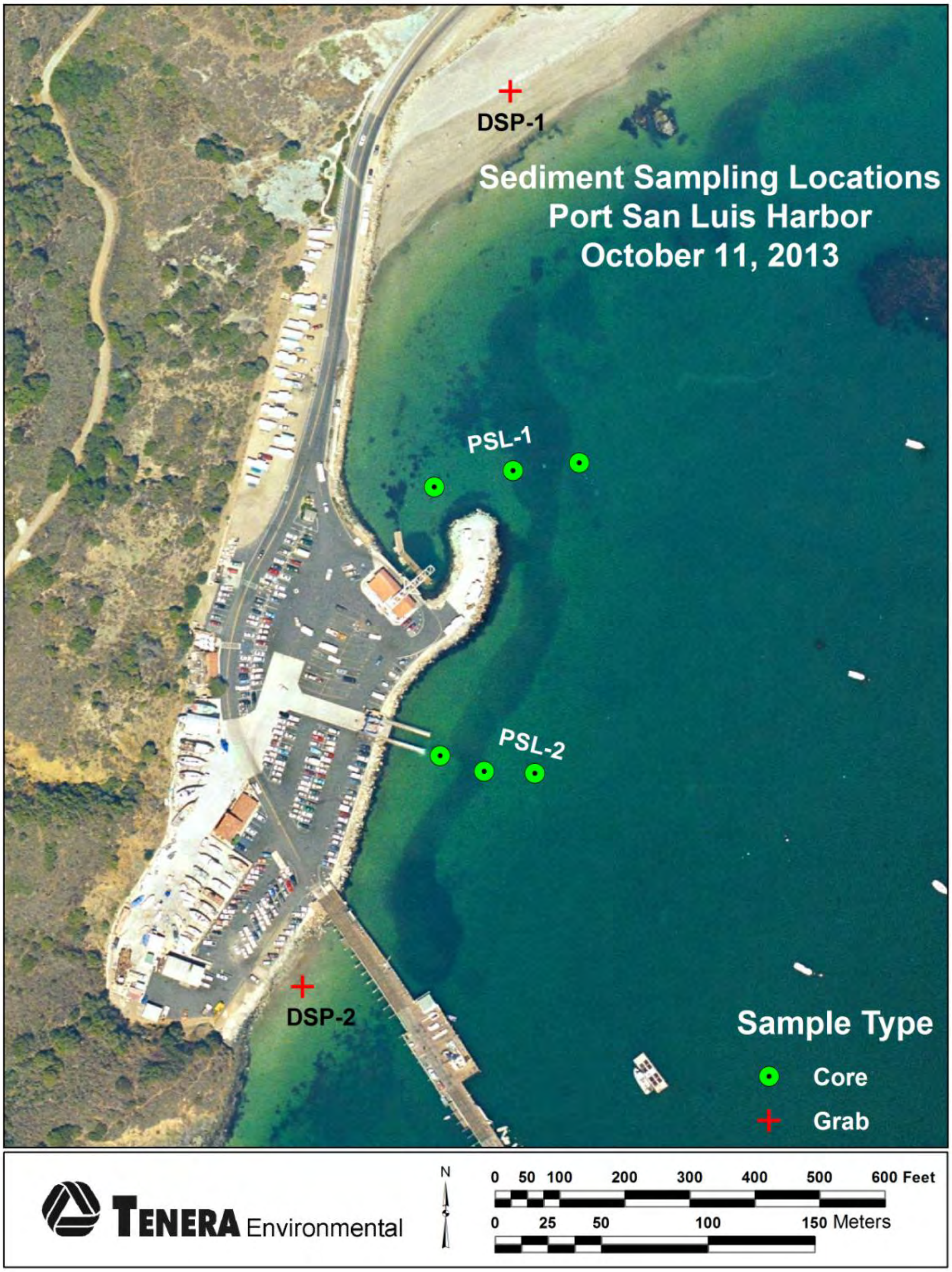



**Figure 4**. Locations of individual sediment cores and grab samples collected in the Port San Luis Harbor dredge and disposal areas on October 11, 2013.

For the purpose of subsequent physical and chemical analyses, three sub-samples were taken from each composite sample. One subsample was used for chemical analyses, another for particle grain size analysis, and a third sample was archived. The chemical constituents tested for are shown in **Table 3**. The methods used for chemical analyses and the acceptable detection limits for these tests are specified in the EPA's 1995 "QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations – Chemical Evaluations" (EPA 1995), and is cited by the "Inland Testing Manual" (EPA 1998) as the source of this information. In some cases, newer or revised methods of analysis have been substituted based on conversations with the EPA and California Department of Fish and Wildlife.

**Table 3**. Chemical constituents tested and methods of analysis for sediment samples.

| Chemical Constituents | EPA Method | PQL. (Practical Quantitation Limit) (mg/kg) |
|---|---|---|
| Metals | | |
| Arsenic (As) | 6010B | 0.5 |
| Cadmium (Ca) | 6010B | 0.3 |
| Chromium (Cr) | 6010B | 0.5 |
| Copper (Cu) | 6010B | 0.5 |
| Lead (Pb) | 6010B | 0.5 |
| Mercury (Hg) | 7471A | 0.03 |
| Nickel (Ni) | 6010B | 0.5 |
| Selenium (Se) | 6010B | 0.5 |
| Silver (Ag) | 6010B | 0.5 |
| Zinc (Zn) | 6010B | 1 |
| Total Sulfides | 9034 | 10 |
| Organo – Chlorine Pesticides | 8081 | |
| Non-Polar Oil and Grease | 9071B | 500 |
| Total Oil and Grease | 9071B | 500 |
| Polynuclear Aromatic Hydrocarbons (PAH) | 8270-SIM | |

EPA method 9071B was used to test for non-polar and total oil and grease at the recommendation of the testing laboratory (FGL Laboratories). In the past EPA method 1664A had been used, but that method is recommended by the EPA for testing aqueous matrices while EPA9071B is recommended for sediments and solids. The test measures all oil and grease including that occurring naturally in animal and plant tissues. There are currently no EPA guidelines for oil and grease in dredge sediment used for beach replenishment.

Samples taken for particle grain size analysis only, were collected from the two sites that are currently being used for dredge disposal. Samples from Fisherman's Beach, and West Bluff Beach disposal sites were collected from approximately 3 feet above MLLW elevation (**Figure 4**).

The two resultant samples were analyzed for grain size distribution to determine their compatibility with sediments collected from the dredge area sampling stations. Current Army Corps of Engineers guidance requires that the percentage of dredge area and disposal site sediments that are retained by a #200 sieve be within 10% of each other to be considered compatible.

# 6.0 Results

The results of the chemical and particle size analyses performed on the sediment samples collected from Port San Luis on October 11, 2013 are summarized in this section. Copies of the chemical analysis data sheets supplied by FGL Laboratories are included in **Appendix A**. Copies of the particle size analysis data sheets supplied by Earth Systems Pacific are included in **Appendix B**.

## 6.1 Results of Chemical Analyses

The results of the chemical analyses performed on the two composite sediment samples collected from the Port San Luis dredge area on October 11, 2013 are summarized in **Table 4**.

**Table 4**. Results of chemical analyses of Port San Luis 2013 sediment samples. Also included are the Effects Range Low (ERL) guidelines for metals (Long, et al., 1995).

| Chemical Constituent | Method | PSL-1 (mg/kg) | PSL-2 (mg/kg) | ERL (mg/kg) |
|---|---|---|---|---|
| Metals | | | | |
| Arsenic | EPA-6010 | 0.8 | 0.9 | 8.2 |
| Cadmium | EPA-6010 | ND | ND | 1.2 |
| Chromium | EPA-6010 | 17.7 | 17.3 | 81 |
| Copper | EPA-6010 | 4.6 | 4.3 | 34 |
| Lead | EPA-6010 | 1.6 | 1.6 | 46.7 |
| Mercury | EPA-7471 | 0.06 | 0.04 | 0.15 |
| Nickel | EPA-6010 | 13.1 | 12.8 | 20.9 |
| Selenium | EPA-6010 | ND | ND | |
| Silver | EPA-6010 | ND | ND | 1.0 |
| Zinc | EPA-6010 | 11 | 11 | 150 |
| | | | | |
| Total Sulfides | EPA-9034 | ND | ND | |
| | | | | |
| Organo-Pesticides | EPA-8081 | ND | ND | |
| | | | | |
| Non-Polar Oil and Grease | EPA-9071B | 999 | 1240 | |
| Total Oil and Grease | EPA-9071B | 1170 | 1420 | |
| | | | | |
| Polynuclear Aromatic - Hydrocarbons (PAH) | EPA-8270-SIM | ND | ND | |

It should be noted that that the laboratory subcontracted to perform test EPA 8081 (Babcock Laboratories) originally performed the wrong test (EPA 8082) on the sample and then later performed the correct test on the remainder of the sample. This exceeded the normal hold time for the test by several days. The results of the test, and subsequent QC testing, are documented in the report from the laboratory included in Appendix A.

## 6.2 Results of Particle Size Analysis

The results of the particle size analysis performed on the two composite sediment samples collected from the Port San Luis dredge area and the two samples collected from the dredge disposal sites currently in use are summarized in **Table 5**.

**Table 5.** Particle size distribution of Port San Luis dredge and disposal site samples.

| Station (Sample Code) | Percent Gravel [1] | Percent Sand [2] | Percent Silt & Clay [3] |
|---|---|---|---|
| PSL-1 | 1.0 | 94.9 | 4.1 |
| PSL-2 | 0.0 | 96.7 | 3.3 |
| Fisherman's Beach (DSP-1) | 0.0 | 98.0 | 2.0 |
| West Bluff Beach (DSP-2) | 6.0 | 92.6 | 1.4 |

[1] Gravel = fraction of sediment retained by #8 US Standard Sieve
[2] Sand = fraction of sediment passing through #8, but retained by #200 US Standard Sieve
[3] Silt and Clay = fraction of sediment passing through #200 US Standard Sieve

# 7.0 Discussion

The results of the chemical analyses performed on the two composite sediment samples collected from the Port San Luis Harbor dredge area on October 11, 2013 are summarized in **Table 4**. The results indicate that the sediments are relatively clean of contaminants. Of the metals that were detected, the concentrations present were well below the effects range-low (ERL) levels described by E.R Long (1995) as the level below which the likelihood of adverse biological effects would be minimal. Long's work is generally accepted as a standard in the evaluation of the potential biological effects of chemical contaminants in marine and estuarine sediments. No organo-pesticides or PAH's were detected in any of the samples. The samples were also free of sulfides.

As previously noted the test for organo-pesticides (EPA 8081) was performed several days after the normal hold time after the laboratory contracted to perform the test (Babcock Laboratories) initially performed the wrong test (EPA 8082) on a portion of the sample. Neither FGL Laboratories nor Babcock Laboratories believe that this delay affected the outcome of the test. Also, no organo-pesticides were detected in the previous sediments collected and tested in 2003 or 2009 (Tenera, 2003, Tenera, 2009).

EPA method 9071B was used to test for non-polar and total oil and grease at the recommendation of the testing laboratory (FGL Laboratories). In the past EPA method 1664A had been used, but that method is recommended by the EPA for testing aqueous matrices while EPA9071B is recommended for sediments and solids. The test measures all oil and grease including that occurring naturally in animal and plant tissues. There are currently no EPA guidelines for oil and grease in dredge sediments used for beach replenishment. Since this was the first time this method was used at PSL, there are no results from previous sediment surveys for comparison.

The results of the particle size analysis performed on the two composite sediment samples collected from the Port San Luis Harbor dredge area and the two disposal sites are summarized in **Table 5**. All of the samples can be characterized as coarse to medium grained sand. The percentage of fines in the four samples (material of a grain size small enough to pass through a #200 US Standard Sieve) ranged from 1.4 to 4.1 percent. When these same stations and an additional six sites were tested in 2009 (Tenera, 2009), the results were similar at all of the ten sites, with the percentage of fines ranging from 0.1 to 5.4 percent. Based on these data, we believe that the material to be removed from the dredge site is compatible for beach nourishment with that found at the disposal sites.

# 8.0 References

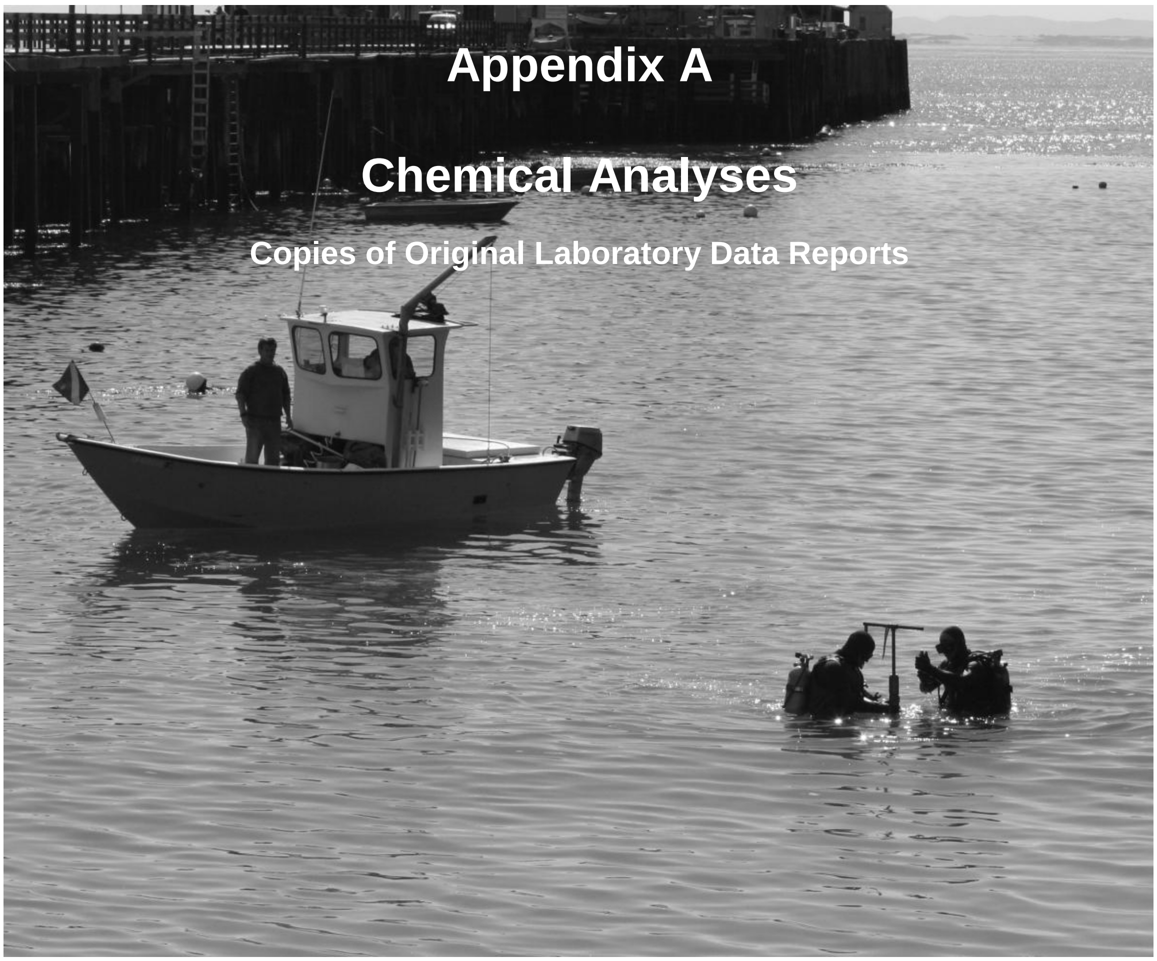
EPA. 1995. QC/QA Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations – Chemical Evaluations. EPA-823-B-95-001.

EPA. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual – Inland Testing Manual. EPA-823-B-98-004.

Long, E. R., D. D. Macdonald, S. L. Smith, and F. D. Calder. 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environmental Management Vol. 19, No. 1, pp. 81-97.

Tenera. 2003. Sediment Sampling and Analysis Report in Support of 2003 Dredge Permit Application. Prepared for Port San Luis Harbor District. 17 p. plus appendices.

Tenera. 2009. Sediment Sampling and Analysis Report in Support of Coastal Development Permit No. 3-08-038. Prepared for Port San Luis Harbor District. 17 p. plus appendices.


Appendix A
Chemical Analyses
Copies of Original Laboratory Data Reports

November 7, 2013

**Tenera Environmental**
141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401

Lab ID : CC 1383751
Customer : 8-769

## Laboratory Report

**Introduction:** This report package contains total of 22 pages divided into 3 sections:

| | | |
|---|---|---|
| Case Narrative | (2 pages) | : An overview of the work performed at FGL. |
| Sample Results | (8 pages) | : Results for each sample submitted. |
| Quality Control | (12 pages) | : Supporting Quality Control (QC) results. |

## Case Narrative

This Case Narrative pertains to the following samples:

| Sample Description | Date Sampled | Date Received | FGL Lab ID # | Matrix |
|---|---|---|---|---|
| PSL - 1 | 10/11/2013 | 10/11/2013 | CC 1383751-001 | Sld |
| PSL - 2 | 10/11/2013 | 10/11/2013 | CC 1383751-002 | Sld |

**Sampling and Receipt Information:** All samples were received, prepared and analyzed within the method specified holding times. All samples arrived on ice. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

**Quality Control:** All samples were prepared and analyzed according to the following tables:

### Inorganic - Metals QC

| | |
|---|---|
| 3050 | 10/24/2013:212227 All preparation quality controls are within established criteria, except:<br>The following note applies to Zinc, Copper:<br>435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.<br>The following note applies to Silver, Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Selenium, Zinc:<br>430 Post Digestion Spike (PDS) not within Acceptance Range (AR) because of matrix interferences affecting this analyte. |
| 6010B | 10/28/2013:215941 All analysis quality controls are within established criteria. |
| | 10/29/2013:216017 All analysis quality controls are within established criteria. |
| 7471 | 10/18/2013:212023 All preparation quality controls are within established criteria, except: |



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November 7, 2013 | Lab ID : CC 1383751
**Tenera Environmental** | Customer : 8-769

## Inorganic - Metals QC

| | |
|---|---|
| 7471 | The following note applies to Mercury:<br>435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.<br>The following note applies to Mercury:<br>435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery. |
| 7471A | 10/18/2013:215448 All analysis quality controls are within established criteria. |

## Organic QC

| | |
|---|---|
| 8270C | 10/24/2013:215920 All analysis quality controls are within established criteria, except:<br>The following note applies to 2,4-Dimethylphenol, Benzidine, Nitrobenzene:<br>360 CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted. |
| | 10/16/2013:211880 All preparation quality controls are within established criteria, except:<br>The following note applies to 4-Nitroaniline:<br>435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.<br>The following note applies to 2-Nitrophenol, N-Nitrosodimethylamine:<br>435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery. |

**Discussion of Analytical Results:** Amended Report

Amended to correct Method notations for Total Metals and Mercury.

**Certification::** I certify that this data package is in compliance with NELAC standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Approved By **Kelly A. Dunnahoo, B.S.**

Digitally signed by Kelly A. Dunnahoo, B.S.
Title: Laboratory Director
Date: 2013-11-07

November 7, 2013

**Tenera Environmental**
141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401

Lab ID : CC 1383751-001
Customer ID : 8-769

Sampled On : October 11, 2013-09:51
Sampled By : Tenera Environmental
Received On : October 11, 2013-13:30
Matrix : Solid

Description : PSL - 1
Project : Port San Luis Sediment

## Sample Result - Inorganic

| Constituent | Result | PQL | Units | Note | Sample Preparation | | Sample Analysis | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Method | Date/ID | Method | Date/ID |
| **Metals, Total**[G:1] | | | | | | | | |
| Arsenic | 0.8 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Cadmium | ND | 0.3 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Chromium | 17.7 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Copper | 4.6 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Lead | 1.6 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Mercury | 0.06 | 0.03 | mg/kg | | 7471 | 10/18/13:212023 | 7471A | 10/18/13:215448 |
| Nickel | 13.1 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Selenium | ND | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Silver | ND | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Zinc | 11 | 1 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (G) Glass Jar Preservatives: N/A ‡Surrogate. * PQL adjusted for dilution.



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November 7, 2013

Lab ID : CC 1383751-001
Customer ID : 8-769

**Tenera Environmental**
141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401

Sampled On : October 11, 2013-09:51
Sampled By : Tenera Environmental
Received On : October 11, 2013-13:30
Matrix : Solid

Description : PSL - 1
Project : Port San Luis Sediment

## Sample Result - Organic

| Constituent | Result | PQL | Units | Note | Sample Preparation Method | Sample Preparation Date/ID | Sample Analysis Method | Sample Analysis Date/ID |
|---|---|---|---|---|---|---|---|---|
| **EPA 8270**[G:1] | | | | | | | | |
| 2-Fluorobiphenyl‡ | 59.9 | 29-97 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Fluorophenol‡ | 51.8 | 32-96 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Nitrobenzene-d5‡ | 54.8 | 18-95 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Phenol-d6‡ | 54.0 | 30-92 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| p-Terphenyl-d14‡ | 70.4 | 27-103 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4,6-Tribromophenol‡ | 64.6 | 47-105 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Acenaphthene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Acenaphthylene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Aniline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Anthracene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 1,2-Diphenylhydrazine | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzidine | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(a)anthracene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(b)fluoranthene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(k)fluoranthene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(g,h,i)perylene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(a)pyrene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzoic Acid | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzylalcohol | ND | 2 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Bromophenylphenylether | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Butylbenzylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| bis(2-Chloroethoxy)methane | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| bis(2-Chloroethyl)ether | ND | 6 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| bis(2-Chloroisopropyl)ether | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| bis(2-Ethylhexyl)phthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Chloroaniline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Chloro-3-methylphenol | ND | 2 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Chloronaphthalene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Chlorophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Chlorophenylphenylether | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Chrysene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Dibenzo(a,h)anthracene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Dibenzofuran | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Di-n-butylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 1,2-Dichlorobenzene | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |



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November 7, 2013 | Lab ID : CC 1383751-001
Description : PSL - 1 | Customer ID : 8-769

## Sample Result - Organic

| Constituent | Result | PQL | Units | Note | Sample Preparation | | Sample Analysis | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Method | Date/ID | Method | Date/ID |
| **EPA 8270**[G:1] | | | | | | | | |
| 1,3-Dichlorobenzene | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 1,4-Dichlorobenzene | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 3,3'-Dichlorobenzidine | ND | 2 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4-Dichlorophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Diethylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4-Dimethylphenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Dimethylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4,6-Dinitro-2-methylphenol | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4-Dinitrophenol | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4-Dinitrotoluene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,6-Dinitrotoluene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Di-n-octylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Fluoranthene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Fluorene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Hexachlorobenzene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Hexachlorobutadiene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Hexachlorocyclopentadiene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Hexachloroethane | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Indeno(1,2,3-c,d)pyrene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Isophorone | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Methylnaphthalene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Methylphenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 3- and 4-Methylphenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Naphthalene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Nitroanaline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 3-Nitroanaline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Nitroanaline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Nitrobenzene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Nitrophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Nitrophenol | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| N-Nitrosodimethylamine | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| N-Nitrosodiphenylamine | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| N-Nitrosodi-n-propylamine | ND | 2 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Pentachlorophenol | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Phenanthrene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Phenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Pyrene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 1,2,4-Trichlorobenzene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |

November 7, 2013
Description : PSL - 1

Lab ID : CC 1383751-001
Customer ID : 8-769

## Sample Result - Organic

| Constituent | Result | PQL | Units | Note | Sample Preparation | | Sample Analysis | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Method | Date/ID | Method | Date/ID |
| **EPA 8270**G:1 | | | | | | | | |
| 2,4,5-Trichlorophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4,6-Trichlorophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (G) Glass Jar Preservatives: N/A ‡Surrogate. * PQL adjusted for dilution.

November 7, 2013

**Tenera Environmental**
141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401

Lab ID : CC 1383751-002
Customer ID : 8-769

Sampled On : October 11, 2013-10:23
Sampled By : Tenera Environmental
Received On : October 11, 2013-13:30
Matrix : Solid

Description : PSL - 2
Project : Port San Luis Sediment

## Sample Result - Inorganic

| Constituent | Result | PQL | Units | Note | Sample Preparation | | Sample Analysis | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Method | Date/ID | Method | Date/ID |
| **Metals, Total**[G:1] | | | | | | | | |
| Arsenic | 0.9 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Cadmium | ND | 0.3 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Chromium | 17.3 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Copper | 4.3 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Lead | 1.6 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Mercury | 0.04 | 0.03 | mg/kg | | 7471 | 10/18/13:212023 | 7471A | 10/18/13:215448 |
| Nickel | 12.8 | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Selenium | ND | 12* | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/29/13:216017 |
| Silver | ND | 0.5 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |
| Zinc | 11 | 1 | mg/kg | | 3050 | 10/24/13:212227 | 6010B | 10/28/13:215941 |

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (G) Glass Jar Preservatives: N/A ‡Surrogate. * PQL adjusted for dilution.



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November 7, 2013

Lab ID : CC 1383751-002
Customer ID : 8-769

**Tenera Environmental**
141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401

Sampled On : October 11, 2013-10:23
Sampled By : Tenera Environmental
Received On : October 11, 2013-13:30
Matrix : Solid

Description : PSL - 2
Project : Port San Luis Sediment

## Sample Result - Organic

| Constituent | Result | PQL | Units | Note | Sample Preparation Method | Sample Preparation Date/ID | Sample Analysis Method | Sample Analysis Date/ID |
|---|---|---|---|---|---|---|---|---|
| **EPA 8270**[G:1] | | | | | | | | |
| 2-Fluorobiphenyl‡ | 53.5 | 29-97 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Fluorophenol‡ | 45.7 | 32-96 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Nitrobenzene-d5‡ | 47.3 | 18-95 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Phenol-d6‡ | 46.8 | 30-92 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| p-Terphenyl-d14‡ | 62.6 | 27-103 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4,6-Tribromophenol‡ | 57.8 | 47-105 | % | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Acenaphthene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Acenaphthylene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Aniline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Anthracene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 1,2-Diphenylhydrazine | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzidine | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(a)anthracene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(b)fluoranthene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(k)fluoranthene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(g,h,i)perylene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzo(a)pyrene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzoic Acid | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Benzylalcohol | ND | 2 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Bromophenylphenylether | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Butylbenzylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| bis(2-Chloroethoxy)methane | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| bis(2-Chloroethyl)ether | ND | 6 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| bis(2-Chloroisopropyl)ether | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| bis(2-Ethylhexyl)phthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Chloroaniline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Chloro-3-methylphenol | ND | 2 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Chloronaphthalene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Chlorophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Chlorophenylphenylether | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Chrysene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Dibenzo(a,h)anthracene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Dibenzofuran | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Di-n-butylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 1,2-Dichlorobenzene | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |



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November 7, 2013
Description : PSL - 2

Lab ID : CC 1383751-002
Customer ID : 8-769

## Sample Result - Organic

| Constituent | Result | PQL | Units | Note | Sample Preparation Method | Sample Preparation Date/ID | Sample Analysis Method | Sample Analysis Date/ID |
|---|---|---|---|---|---|---|---|---|
| **EPA 8270**[G:1] | | | | | | | | |
| 1,3-Dichlorobenzene | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 1,4-Dichlorobenzene | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 3,3'-Dichlorobenzidine | ND | 2 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4-Dichlorophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Diethylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4-Dimethylphenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Dimethylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4,6-Dinitro-2-methylphenol | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4-Dinitrophenol | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4-Dinitrotoluene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,6-Dinitrotoluene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Di-n-octylphthalate | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Fluoranthene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Fluorene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Hexachlorobenzene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Hexachlorobutadiene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Hexachlorocyclopentadiene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Hexachloroethane | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Indeno(1,2,3-c,d)pyrene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Isophorone | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Methylnaphthalene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Methylphenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 3- and 4-Methylphenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Naphthalene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Nitroanaline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 3-Nitroanaline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Nitroanaline | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Nitrobenzene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2-Nitrophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 4-Nitrophenol | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| N-Nitrosodimethylamine | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| N-Nitrosodiphenylamine | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| N-Nitrosodi-n-propylamine | ND | 2 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Pentachlorophenol | ND | 5 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Phenanthrene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Phenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| Pyrene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 1,2,4-Trichlorobenzene | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |

November 7, 2013
Description : PSL - 2

Lab ID : CC 1383751-002
Customer ID : 8-769

## Sample Result - Organic

| Constituent | Result | PQL | Units | Note | Sample Preparation | | Sample Analysis | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Method | Date/ID | Method | Date/ID |
| **EPA 8270**[G:1] | | | | | | | | |
| 2,4,5-Trichlorophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |
| 2,4,6-Trichlorophenol | ND | 1 | mg/kg | | 8270C | 10/16/13:211880 | 8270C | 10/24/13:215920 |

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (G) Glass Jar Preservatives: N/A ‡Surrogate. * PQL adjusted for dilution.

November 7, 2013 Lab ID : CC 1383751
**Tenera Environmental** Customer : 8-769

## Quality Control - Inorganic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Metals** | | | | | | | | |
| Arsenic | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <0.5 | |
| | | | LCS | mg/kg | 40.00 | 98.8 % | 85-115 | |
| | | | MS | mg/kg | 40.00 | 103 % | 75-125 | |
| | | (CC 1383692-001) | MSD | mg/kg | 40.00 | 97.1 % | 75-125 | |
| | | | MSRPD | mg/kg | 40.02 | 5.6% | ≤20 | |
| | | | PDS | mg/kg | 40.00 | 135 % | 75-125 | 430 |
| Cadmium | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <0.3 | |
| | | | LCS | mg/kg | 40.00 | 99.2 % | 85-115 | |
| | | | MS | mg/kg | 40.00 | 101 % | 75-125 | |
| | | (CC 1383692-001) | MSD | mg/kg | 40.00 | 95.3 % | 75-125 | |
| | | | MSRPD | mg/kg | 40.02 | 5.9% | ≤20 | |
| | | | PDS | mg/kg | 40.00 | 132 % | 75-125 | 430 |
| Chromium | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <0.5 | |
| | | | LCS | mg/kg | 40.00 | 104 % | 85-115 | |
| | | | MS | mg/kg | 40.00 | 102 % | 75-125 | |
| | | (CC 1383692-001) | MSD | mg/kg | 40.00 | 96.2 % | 75-125 | |
| | | | MSRPD | mg/kg | 40.02 | 5.6% | ≤20 | |
| | | | PDS | mg/kg | 40.00 | 135 % | 75-125 | 430 |
| Copper | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <0.5 | |
| | | | LCS | mg/kg | 40.00 | 104 % | 85-115 | |
| | | | MS | mg/kg | 40.00 | 78.0 % | 75-125 | |
| | | (CC 1383692-001) | MSD | mg/kg | 40.00 | 57.8 % | 75-125 | 435 |
| | | | MSRPD | mg/kg | 40.02 | 4.5% | ≤20 | |
| | | | PDS | mg/kg | 40.00 | 171 % | 75-125 | 430 |
| Lead | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <0.5 | |
| | | | LCS | mg/kg | 40.00 | 101 % | 85-115 | |
| | | | MS | mg/kg | 40.00 | 97.9 % | 75-125 | |
| | | (CC 1383692-001) | MSD | mg/kg | 40.00 | 93.4 % | 75-125 | |
| | | | MSRPD | mg/kg | 40.02 | 4.4% | ≤20 | |
| | | | PDS | mg/kg | 40.00 | 130 % | 75-125 | 430 |
| Nickel | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <0.5 | |
| | | | LCS | mg/kg | 40.00 | 103 % | 85-115 | |
| | | | MS | mg/kg | 40.00 | 101 % | 75-125 | |
| | | (CC 1383692-001) | MSD | mg/kg | 40.00 | 95.1 % | 75-125 | |
| | | | MSRPD | mg/kg | 40.02 | 5.1% | ≤20 | |
| | | | PDS | mg/kg | 40.00 | 131 % | 75-125 | 430 |
| Selenium | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <0.5 | |
| | | | LCS | mg/kg | 40.00 | 98.9 % | 85-115 | |
| | | | MS | mg/kg | 40.00 | 105 % | 75-125 | |
| | | (CC 1383692-001) | MSD | mg/kg | 40.00 | 99.9 % | 75-125 | |
| | | | MSRPD | mg/kg | 40.02 | 5.1% | ≤20 | |
| | | | PDS | mg/kg | 40.00 | 138 % | 75-125 | 430 |
| Silver | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <0.5 | |
| | | | LCS | mg/kg | 40.02 | 99.8 % | 85-115 | |
| | | | MS | mg/kg | 40.02 | 102 % | 75-125 | |
| | | (CC 1383692-001) | MSD | mg/kg | 40.02 | 96.7 % | 75-125 | |
| | | | MSRPD | mg/kg | 40.02 | 5.5% | ≤20 | |
| | | | PDS | mg/kg | 40.02 | 132 % | 75-125 | 430 |
| Zinc | 3050 | 10/24/13:212227amb | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 40.00 | 103 % | 85-115 | |
| | | | MS | mg/kg | 40.00 | 66.5 % | 75-125 | 435 |
| | | (CC 1383692-001) | MSD | mg/kg | 40.00 | 50.3 % | 75-125 | 435 |
| | | | MSRPD | mg/kg | 40.02 | 4.1% | ≤20 | |
| | | | PDS | mg/kg | 40.00 | 151 % | 75-125 | 430 |
| Arsenic | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 98.0 % | 90-110 | |



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November 7, 2013
**Tenera Environmental**

Lab ID : CC 1383751
Customer : 8-769

# Quality Control - Inorganic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Metals** | | | | | | | | |
| Arsenic | 6010B | 10/28/13:215941AC | CCB | ppm | | 0.0006 | 0.01 | |
| | | | CCV | ppm | 1.000 | 95.2 % | 90-110 | |
| | | | CCB | ppm | | -0.0016 | 0.01 | |
| Cadmium | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 96.5 % | 90-110 | |
| | | | CCB | ppm | | -0.00011 | 0.005 | |
| | | | CCV | ppm | 1.000 | 94.6 % | 90-110 | |
| | | | CCB | ppm | | -0.00027 | 0.005 | |
| Chromium | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 97.8 % | 90-110 | |
| | | | CCB | ppm | | -0.00001 | 0.01 | |
| | | | CCV | ppm | 1.000 | 95.5 % | 90-110 | |
| | | | CCB | ppm | | -0.0009 | 0.01 | |
| Copper | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 97.4 % | 90-110 | |
| | | | CCB | ppm | | 0.0005 | 0.01 | |
| | | | CCV | ppm | 1.000 | 96.1 % | 90-110 | |
| | | | CCB | ppm | | 0.0004 | 0.01 | |
| Lead | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 97.3 % | 90-110 | |
| | | | CCB | ppm | | -0.0018 | 0.01 | |
| | | | CCV | ppm | 1.000 | 93.9 % | 90-110 | |
| | | | CCB | ppm | | -0.0027 | 0.01 | |
| Nickel | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 97.6 % | 90-110 | |
| | | | CCB | ppm | | 0.0008 | 0.01 | |
| | | | CCV | ppm | 1.000 | 95.1 % | 90-110 | |
| | | | CCB | ppm | | 0.0004 | 0.01 | |
| Selenium | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 96.5 % | 90-110 | |
| | | | CCB | ppm | | -0.0022 | 0.01 | |
| | | | CCV | ppm | 1.000 | 93.0 % | 90-110 | |
| | | | CCB | ppm | | -0.0024 | 0.01 | |
| | 6010B | 10/29/13:216017AC | CCV | ppm | 1.000 | 99.6 % | 90-110 | |
| | | | CCB | ppm | | 0.0044 | 0.01 | |
| | | | CCV | ppm | 1.000 | 96.8 % | 90-110 | |
| | | | CCB | ppm | | 0.0055 | 0.01 | |
| Silver | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 97.1 % | 90-110 | |
| | | | CCB | ppm | | 0.0001 | 0.01 | |
| | | | CCV | ppm | 1.000 | 95.7 % | 90-110 | |
| | | | CCB | ppm | | 0.0002 | 0.01 | |
| Zinc | 6010B | 10/28/13:215941AC | CCV | ppm | 1.000 | 97.5 % | 90-110 | |
| | | | CCB | ppm | | -0.0043 | 0.02 | |
| | | | CCV | ppm | 1.000 | 93.8 % | 90-110 | |
| | | | CCB | ppm | | -0.0058 | 0.02 | |
| Mercury | 7471 | 10/18/13:212023ac | Blank | mg/kg | | ND | <0.03 | |
| | | | LCS | mg/kg | 0.2500 | 89.4 % | 85-115 | |
| | | | MS | mg/kg | 0.2500 | 107 % | 75-125 | |
| | | (CC 1383751-002) | MSD | mg/kg | 0.2500 | 261 % | 75-125 | 435 |
| | | | MSRPD | mg/kg | 0.2500 | 76.6% | ≤20 | 435 |
| | 7471A | 10/18/13:215448AC | ICV | ppb | 4.000 | 98.0 % | 90-110 | |
| | | | ICB | ppb | | -0.002 | 10 | |
| | | | CCV | ppb | 4.000 | 98.2 % | 90-110 | |
| | | | CCB | ppb | | 0.0 | 10 | |

**Definition**

| | |
|---|---|
| PDS | : PDS failed, matrix - Post Digestion Spike (PDS) not within Acceptance Range (AR) because of matrix interferences affecting this analyte. |
| ICV | : Initial Calibration Verification - Analyzed to verify the instrument calibration is within criteria. |
| ICB | : Initial Calibration Blank - Analyzed to verify the instrument baseline is within criteria. |
| CCV | : Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria. |

## Quality Control - Inorganic

| **Definition** | |
|---|---|
| CCB | : Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria. |
| Blank | : Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples. |
| LCS | : Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery. |
| MS | : Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery. |
| MSD | : Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery. |
| MSRPD | : MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis. |
| ND | : Non-detect - Result was below the DQO listed for the analyte. |
| DQO | : Data Quality Objective - This is the criteria against which the quality control data is compared. |

| **Explanation** | |
|---|---|
| 430 | : Post Digestion Spike (PDS) not within Acceptance Range (AR) because of matrix interferences affecting this analyte. |
| 435 | : Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery. |

## Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| 1,2,4-Trichlorobenzene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 59.6 % | 23-69 | |
| | | | MS | mg/kg | 4.929 | 33.3 % | 3-58 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 30.1 % | 3-58 | |
| | | | MSRPD | mg/kg | 9.975 | 0.14 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 107 % | 80-120 | |
| 1,2-Dichlorobenzene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 5.000 | 58.6 % | 23-73 | |
| | | | MS | mg/kg | 4.929 | 29.0 % | 0-88 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 26.1 % | 0-88 | |
| | | | MSRPD | mg/kg | 9.975 | 0.13 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 105 % | 80-120 | |
| 1,2-Diphenylhydrazine | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 5.000 | 62.8 % | 20-105 | |
| | | | MS | mg/kg | 4.929 | 42.4 % | 0-157 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.4 % | 0-157 | |
| | | | MSRPD | mg/kg | 9.975 | 0.38 | ≤5 | |
| 1,3-Dichlorobenzene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 5.000 | 59.2 % | 25-67 | |
| | | | MS | mg/kg | 4.929 | 27.7 % | 0-85 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 24.8 % | 0-85 | |
| | | | MSRPD | mg/kg | 9.975 | 0.13 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 110 % | 80-120 | |
| 1,4-Dichlorobenzene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 5.000 | 58.9 % | 25-71 | |
| | | | MS | mg/kg | 4.929 | 28.9 % | 0-83 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 26.0 % | 0-83 | |
| | | | MSRPD | mg/kg | 9.975 | 0.12 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 110 % | 80-120 | |
| 2,4,5-Trichlorophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 54.7 % | 28-84 | |
| | | | MS | mg/kg | 9.857 | 38.4 % | 0-100 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 32.9 % | 0-100 | |
| | | | MSRPD | mg/kg | 9.975 | 0.51 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 97.9 % | 70-130 | |
| 2,4,6-Tribromophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | 10.00 | 30.7 % | 47-105 | |
| | | | LCS | mg/kg | 10.00 | 69.5 % | 47-105 | |
| | | | MS | mg/kg | 9.857 | 42.7 % | N/A | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 35.0 % | N/A | |
| | | | MSRPD | mg/kg | 9.975 | 0.71 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 200.0 | 104 % | 80-120 | |
| 2,4,6-Trichlorophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 60.9 % | 28-86 | |
| | | | MS | mg/kg | 9.857 | 41.7 % | 0-101 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 35.2 % | 0-101 | |
| | | | MSRPD | mg/kg | 9.975 | 0.60 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 112 % | 80-120 | |
| 2,4-Dichlorophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 53.6 % | 7-97 | |
| | | | MS | mg/kg | 9.857 | 37.3 % | 0-100 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 33.3 % | 0-100 | |
| | | | MSRPD | mg/kg | 9.975 | 0.35 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 101 % | 80-120 | |
| 2,4-Dimethylphenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 60.5 % | 33-93 | |

## Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| 2,4-Dimethylphenol | 8270C | | MS | mg/kg | 9.857 | 47.5 % | 0-117 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 42.7 % | 0-117 | |
| | | | MSRPD | mg/kg | 9.975 | 0.43 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 122 % | 80-120 | 360 |
| 2,4-Dinitrophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 44.7 % | 18-90 | |
| | | | MS | mg/kg | 9.857 | 6.9 % | 0-52 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 3.6 % | 0-52 | |
| | | | MSRPD | mg/kg | 9.975 | 0.32 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 85.8 % | 80-120 | |
| 2,4-Dinitrotoluene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 58.8 % | 33-77 | |
| | | | MS | mg/kg | 4.929 | 35.2 % | 0-178 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 22.8 % | 0-178 | |
| | | | MSRPD | mg/kg | 9.975 | 0.60 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 106 % | 80-120 | |
| 2,6-Dinitrotoluene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 59.2 % | 34-81 | |
| | | | MS | mg/kg | 4.929 | 37.0 % | 0-251 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 22.9 % | 0-251 | |
| | | | MSRPD | mg/kg | 9.975 | 0.68 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 100 % | 80-120 | |
| 2-Chlorophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 54.1 % | 17-88 | |
| | | | MS | mg/kg | 9.857 | 34.2 % | 0-93 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 31.5 % | 0-93 | |
| | | | MSRPD | mg/kg | 9.975 | 0.23 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 99.2 % | 80-120 | |
| 2-Fluorobiphenyl | 8270C | 10/16/13:211880CCG | Blank | mg/kg | 5.000 | 9.0 % | 29-97 | |
| | | | LCS | mg/kg | 5.000 | 61.9 % | 29-97 | |
| | | | MS | mg/kg | 4.929 | 38.4 % | N/A | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 35.0 % | N/A | |
| | | | MSRPD | mg/kg | 9.975 | 0.15 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 100.0 | 103 % | 80-120 | |
| 2-Fluorophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | 10.00 | 19.3 % | 32-96 | |
| | | | LCS | mg/kg | 10.00 | 52.1 % | 32-96 | |
| | | | MS | mg/kg | 9.857 | 31.0 % | N/A | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 28.6 % | N/A | |
| | | | MSRPD | mg/kg | 9.975 | 0.20 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 200.0 | 88.4 % | 80-120 | |
| 2-Methylnaphthalene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 58.3 % | 26-105 | |
| | | | MS | mg/kg | 9.857 | 36.5 % | 0-103 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 33.0 % | 0-103 | |
| | | | MSRPD | mg/kg | 9.975 | 0.31 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 89.7 % | 70-120 | |
| 2-Methylphenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 56.1 % | 19-81 | |
| | | | MS | mg/kg | 9.857 | 38.6 % | 0-88 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 33.2 % | 0-88 | |
| | | | MSRPD | mg/kg | 9.975 | 0.49 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 101 % | 70-130 | |
| 2-Nitroaniline | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 57.1 % | 29-86 | |

## Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| 2-Nitroaniline | 8270C | | MS | mg/kg | 9.857 | 37.7 % | 0-93 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 27.9 % | 0-93 | |
| | | | MSRPD | mg/kg | 9.975 | 0.93 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 86.0 % | 70-130 | |
| 2-Nitrophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 55.9 % | 22-79 | |
| | | | MS | mg/kg | 9.857 | 34.0 % | 0-90 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 17.3 % | 0-90 | |
| | | | MSRPD | mg/kg | 9.975 | 1.6 | ≤1 | 435 |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 109 % | 80-120 | |
| 3,3-Dichlorobenzidine | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <2 | |
| | | | LCS | mg/kg | 10.00 | 69.8 % | 25-88 | |
| | | | MS | mg/kg | 9.857 | 20.5 % | 0-87 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 17.7 % | 0-87 | |
| | | | MSRPD | mg/kg | 9.975 | 0.25 | ≤2 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 115 % | 80-120 | |
| 3-Nitroaniline | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 53.2 % | 0-107 | |
| | | | MS | mg/kg | 9.857 | 30.6 % | 0-125 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 27.7 % | 0-125 | |
| | | | MSRPD | mg/kg | 9.975 | 0.25 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 82.7 % | 70-130 | |
| 4,6-Dinitro-2-methylphenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 56.4 % | 11-108 | |
| | | | MS | mg/kg | 9.857 | 8.0 % | 0-79 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 0.7 % | 0-79 | |
| | | | MSRPD | mg/kg | 9.975 | 0.72 | ≤5 | |
| 4,6-Dinitro-o-cresol | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 92.9 % | 80-120 | |
| 4-Bromophenylphenylether | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 61.8 % | 27-82 | |
| | | | MS | mg/kg | 4.929 | 41.9 % | 0-108 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.3 % | 0-108 | |
| | | | MSRPD | mg/kg | 9.975 | 0.36 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 98.1 % | 80-120 | |
| 4-Chloro-3-methylphenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <2 | |
| | | | LCS | mg/kg | 10.00 | 54.2 % | 29-85 | |
| | | | MS | mg/kg | 9.857 | 37.1 % | 11-90 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 32.3 % | 11-90 | |
| | | | MSRPD | mg/kg | 9.975 | 0.43 | ≤2 | |
| 4-Chloroaniline | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 59.0 % | 17-60 | |
| | | | MS | mg/kg | 9.857 | 26.0 % | 0-82 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 21.6 % | 0-82 | |
| | | | MSRPD | mg/kg | 9.975 | 0.41 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 94.8 % | 70-130 | |
| 4-Methylphenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 51.7 % | 28-85 | |
| | | | MS | mg/kg | 9.857 | 36.3 % | 8-87 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 32.4 % | 8-87 | |
| | | | MSRPD | mg/kg | 9.975 | 0.35 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 93.7 % | 70-130 | |
| 4-Nitroaniline | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 53.3 % | 38-80 | |
| | | | MS | mg/kg | 9.857 | 28.8 % | 28-88 | |

November 7, 2013
**Tenera Environmental**

Lab ID : CC 1383751
Customer : 8-769

# Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| 4-Nitroaniline | 8270C | (SP 1310784-001) | MSD | mg/kg | 9.975 | 24.4 % | 28-88 | 435 |
| | | | MSRPD | mg/kg | 9.975 | 0.41 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 89.9 % | 70-130 | |
| 4-Nitrophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 32.2 % | 4-110 | |
| | | | MS | mg/kg | 9.857 | 20.9 % | 0-110 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 20.4 % | 0-110 | |
| | | | MSRPD | mg/kg | 9.975 | 0.024 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 84.8 % | 80-120 | |
| Acenaphthene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 61.8 % | 32-79 | |
| | | | MS | mg/kg | 4.929 | 40.5 % | 3-94 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 35.0 % | 3-94 | |
| | | | MSRPD | mg/kg | 9.975 | 0.25 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 105 % | 80-120 | |
| Acenaphthylene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 56.5 % | 27-63 | |
| | | | MS | mg/kg | 4.929 | 36.7 % | 0-77 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 31.6 % | 0-77 | |
| | | | MSRPD | mg/kg | 9.975 | 0.23 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 108 % | 80-120 | |
| Aniline | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 57.2 % | 23-77 | |
| | | | MS | mg/kg | 9.857 | 27.3 % | 0-100 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 21.9 % | 0-100 | |
| | | | MSRPD | mg/kg | 9.975 | 0.51 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 99.5 % | 70-130 | |
| Anthracene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 61.9 % | 30-84 | |
| | | | MS | mg/kg | 4.929 | 39.4 % | 0-111 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.2 % | 0-111 | |
| | | | MSRPD | mg/kg | 9.975 | 0.23 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 104 % | 80-120 | |
| Azobenzene | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 105 % | 80-120 | |
| Benzidine | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 47.2 % | 9-54 | |
| | | | MS | mg/kg | 9.857 | 0.0 % | 0-35 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 0.3 % | 0-35 | |
| | | | MSRPD | mg/kg | 9.975 | 0.026 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 366 % | 70-130 | 360 |
| Benzo(a)anthracene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 62.3 % | 23-96 | |
| | | | MS | mg/kg | 4.929 | 41.5 % | 0-99 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.9 % | 0-99 | |
| | | | MSRPD | mg/kg | 9.975 | 0.30 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 104 % | 80-120 | |
| Benzo(a)pyrene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 60.4 % | 0-118 | |
| | | | MS | mg/kg | 4.929 | 40.3 % | 9-112 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.6 % | 9-112 | |
| | | | MSRPD | mg/kg | 9.975 | 0.26 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 92.5 % | 80-120 | |
| Benzo(b)fluoranthene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 62.8 % | 0-130 | |

November 7, 2013
**Tenera Environmental**

Lab ID : CC 1383751
Customer : 8-769

## Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| Benzo(b)fluoranthene | 8270C | | MS | mg/kg | 4.929 | 44.0 % | 0-141 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 40.6 % | 0-141 | |
| | | | MSRPD | mg/kg | 9.975 | 0.14 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 84.1 % | 80-120 | |
| Benzo(g,h,i)perylene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 64.7 % | 1-120 | |
| | | | MS | mg/kg | 4.929 | 37.7 % | 0-107 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 26.3 % | 0-107 | |
| | | | MSRPD | mg/kg | 9.975 | 0.55 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 84.9 % | 80-120 | |
| Benzo(k)fluoranthene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 76.7 % | 0-108 | |
| | | | MS | mg/kg | 4.929 | 53.1 % | 0-165 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 43.0 % | 0-165 | |
| | | | MSRPD | mg/kg | 9.975 | 0.47 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 114 % | 80-120 | |
| Benzoic Acid | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 58.3 % | 28-74 | |
| | | | MS | mg/kg | 9.857 | 19.3 % | 0-36 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 3.9 % | 0-36 | |
| | | | MSRPD | mg/kg | 9.975 | 1.5 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 130 % | 70-130 | |
| Benzylalcohol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <2 | |
| | | | LCS | mg/kg | 10.00 | 64.3 % | 0-104 | |
| | | | MS | mg/kg | 9.857 | 41.6 % | 0-111 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 34.5 % | 0-111 | |
| | | | MSRPD | mg/kg | 9.975 | 0.66 | ≤2 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 93.5 % | 70-130 | |
| bis(2-Chloroethoxy)methane | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 5.000 | 59.6 % | 0-93 | |
| | | | MS | mg/kg | 4.929 | 37.4 % | 0-88 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 33.8 % | 0-88 | |
| | | | MSRPD | mg/kg | 9.975 | 0.15 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 101 % | 80-120 | |
| bis(2-Chloroethyl)ether | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <6 | |
| | | | LCS | mg/kg | 5.000 | 59.2 % | 14-94 | |
| | | | MS | mg/kg | 4.929 | 35.6 % | 0-123 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 33.4 % | 0-123 | |
| | | | MSRPD | mg/kg | 9.975 | 0.091 | ≤6 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 98.4 % | 80-120 | |
| bis(2-Chloroisopropyl)ether | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 5.000 | 58.5 % | 27-69 | |
| | | | MS | mg/kg | 4.929 | 31.1 % | 0-89 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 28.7 % | 0-89 | |
| | | | MSRPD | mg/kg | 9.975 | 0.10 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 85.0 % | 80-120 | |
| bis(2-Ethylhexyl)phthalate | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 68.9 % | 17-95 | |
| | | | MS | mg/kg | 4.929 | 41.7 % | 17-104 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 36.1 % | 17-104 | |
| | | | MSRPD | mg/kg | 9.975 | 0.25 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 114 % | 80-120 | |
| Butylbenzylphthalate | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 64.4 % | 19-89 | |

# Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| Butylbenzylphthalate | 8270C | | MS | mg/kg | 4.929 | 42.0 % | 9-121 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 36.7 % | 9-121 | |
| | | | MSRPD | mg/kg | 9.975 | 0.24 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 111 % | 80-120 | |
| Chloronaphthalene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 59.4 % | 29-81 | |
| | | | MS | mg/kg | 4.929 | 39.8 % | 0-116 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.4 % | 0-116 | |
| | | | MSRPD | mg/kg | 9.975 | 0.25 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 109 % | 80-120 | |
| Chlorophenylphenylether | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 62.8 % | 33-82 | |
| | | | MS | mg/kg | 4.929 | 41.2 % | 1-97 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 35.7 % | 1-97 | |
| | | | MSRPD | mg/kg | 9.975 | 0.25 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 103 % | 80-120 | |
| Chrysene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 62.3 % | 13-99 | |
| | | | MS | mg/kg | 4.929 | 40.3 % | 0-99 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.3 % | 0-99 | |
| | | | MSRPD | mg/kg | 9.975 | 0.27 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 104 % | 80-120 | |
| Dibenzo(a,h)anthracene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 69.1 % | 0-122 | |
| | | | MS | mg/kg | 4.929 | 39.2 % | 0-115 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 29.2 % | 0-115 | |
| | | | MSRPD | mg/kg | 9.975 | 0.47 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 90.8 % | 80-120 | |
| Dibenzofuran | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 55.9 % | 20-89 | |
| | | | MS | mg/kg | 9.857 | 38.4 % | 0-124 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 33.1 % | 0-124 | |
| | | | MSRPD | mg/kg | 9.975 | 0.48 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 120.0 | 86.0 % | 70-130 | |
| Diethylphthalate | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 62.7 % | 42-76 | |
| | | | MS | mg/kg | 4.929 | 45.2 % | 1-101 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 39.0 % | 1-101 | |
| | | | MSRPD | mg/kg | 9.975 | 0.28 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 114 % | 80-120 | |
| Dimethylphthalate | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 40.2 % | 34-79 | |
| | | | MS | mg/kg | 4.929 | 41.5 % | 0-98 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 35.3 % | 0-98 | |
| | | | MSRPD | mg/kg | 9.975 | 0.29 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 102 % | 80-120 | |
| Di-n-butylphthalate | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 62.0 % | 28-83 | |
| | | | MS | mg/kg | 4.929 | 40.8 % | 0-109 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 35.2 % | 0-109 | |
| | | | MSRPD | mg/kg | 9.975 | 0.26 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 104 % | 80-120 | |
| Di-n-octylphthalate | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 73.0 % | 0-128 | |

# Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| Di-n-octylphthalate | 8270C | | MS | mg/kg | 4.929 | 55.6 % | 0-157 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 51.2 % | 0-157 | |
| | | | MSRPD | mg/kg | 9.975 | 0.19 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 104 % | 80-120 | |
| Fluoranthene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 62.2 % | 30-88 | |
| | | | MS | mg/kg | 4.929 | 38.1 % | 0-118 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.4 % | 0-118 | |
| | | | MSRPD | mg/kg | 9.975 | 0.16 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 102 % | 80-120 | |
| Fluorene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 63.8 % | 32-89 | |
| | | | MS | mg/kg | 4.929 | 41.8 % | 2-102 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 36.4 % | 2-102 | |
| | | | MSRPD | mg/kg | 9.975 | 0.24 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 105 % | 80-120 | |
| Hexachlorobenzene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 65.8 % | 29-81 | |
| | | | MS | mg/kg | 4.929 | 41.8 % | 0-116 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 34.3 % | 0-116 | |
| | | | MSRPD | mg/kg | 9.975 | 0.35 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 111 % | 80-120 | |
| Hexachlorobutadiene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 61.8 % | 27-69 | |
| | | | MS | mg/kg | 4.929 | 32.3 % | 0-89 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 29.8 % | 0-89 | |
| | | | MSRPD | mg/kg | 9.975 | 0.11 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 107 % | 80-120 | |
| Hexachlorocyclopentadiene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 35.7 % | 17-49 | |
| | | | MS | mg/kg | 4.929 | 3.8 % | 0-23 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 1.3 % | 0-23 | |
| | | | MSRPD | mg/kg | 9.975 | 0.12 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 117 % | 80-120 | |
| Hexachloroethane | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 58.2 % | 26-66 | |
| | | | MS | mg/kg | 4.929 | 21.1 % | 0-79 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 14.1 % | 0-79 | |
| | | | MSRPD | mg/kg | 9.975 | 0.33 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 105 % | 80-120 | |
| Indeno(1,2,3-c,d)pyrene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 64.6 % | 0-130 | |
| | | | MS | mg/kg | 4.929 | 38.2 % | 0-114 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 28.2 % | 0-114 | |
| | | | MSRPD | mg/kg | 9.975 | 0.48 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 85.6 % | 80-120 | |
| Isophorone | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 58.9 % | 16-80 | |
| | | | MS | mg/kg | 4.929 | 34.1 % | 0-94 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 29.9 % | 0-94 | |
| | | | MSRPD | mg/kg | 9.975 | 0.19 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 100 % | 80-120 | |
| Naphthalene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 61.5 % | 27-79 | |

November 7, 2013 Lab ID : CC 1383751
**Tenera Environmental** Customer : 8-769

# Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| Naphthalene | 8270C | | MS | mg/kg | 4.929 | 36.9 % | 0-103 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 33.9 % | 0-103 | |
| | | | MSRPD | mg/kg | 9.975 | 0.13 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 103 % | 80-120 | |
| Nitrobenzene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 84.2 % | 15-100 | |
| | | | MS | mg/kg | 4.929 | 53.2 % | 5-94 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 47.6 % | 5-94 | |
| | | | MSRPD | mg/kg | 9.975 | 0.25 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 128 % | 80-120 | 360 |
| Nitrobenzene-d5 | 8270C | 10/16/13:211880CCG | Blank | mg/kg | 5.000 | 12.9 % | 18-95 | |
| | | | LCS | mg/kg | 5.000 | 55.2 % | 18-95 | |
| | | | MS | mg/kg | 4.929 | 30.9 % | N/A | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 29.9 % | N/A | |
| | | | MSRPD | mg/kg | 9.975 | 0.029 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 100.0 | 96.8 % | 80-120 | |
| N-Nitrosodimethylamine | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 50.7 % | 8-75 | |
| | | | MS | mg/kg | 4.929 | 26.6 % | 0-83 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 0.8 % | 0-83 | |
| | | | MSRPD | mg/kg | 9.975 | 1.3 | ≤1 | 435 |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 96.9 % | 80-120 | |
| N-Nitrosodi-N-propylamine | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <2 | |
| | | | LCS | mg/kg | 5.000 | 57.2 % | 16-97 | |
| | | | MS | mg/kg | 4.929 | 33.4 % | 0-87 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 27.0 % | 0-87 | |
| | | | MSRPD | mg/kg | 9.975 | 0.30 | ≤2 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 91.7 % | 80-120 | |
| N-Nitrosodiphenylamine | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 77.9 % | 46-102 | |
| | | | MS | mg/kg | 4.929 | 56.0 % | 0-164 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 43.6 % | 0-164 | |
| | | | MSRPD | mg/kg | 9.975 | 0.59 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 120 % | 80-120 | |
| p-Chloro-m-cresol | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 98.8 % | 80-120 | |
| Pentachlorophenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <5 | |
| | | | LCS | mg/kg | 10.00 | 68.7 % | 3-111 | |
| | | | MS | mg/kg | 9.857 | 36.0 % | 0-85 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 23.5 % | 0-85 | |
| | | | MSRPD | mg/kg | 9.975 | 1.2 | ≤5 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 118 % | 80-120 | |
| Phenanthrene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 62.8 % | 26-89 | |
| | | | MS | mg/kg | 4.929 | 42.3 % | 0-120 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 35.1 % | 0-120 | |
| | | | MSRPD | mg/kg | 9.975 | 0.34 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 102 % | 80-120 | |
| Phenol | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 10.00 | 49.9 % | 31-79 | |
| | | | MS | mg/kg | 9.857 | 34.1 % | 0-106 | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 30.3 % | 0-106 | |
| | | | MSRPD | mg/kg | 9.975 | 0.34 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 95.0 % | 80-120 | |
| Phenol-d6 | 8270C | 10/16/13:211880CCG | Blank | mg/kg | 10.00 | 25.7 % | 30-92 | |

November 7, 2013
**Tenera Environmental**

Lab ID : CC 1383751
Customer : 8-769

## Quality Control - Organic

| Constituent | Method | Date/ID | Type | Units | Conc. | QC Data | DQO | Note |
|---|---|---|---|---|---|---|---|---|
| **Organic** | | | | | | | | |
| Phenol-d6 | 8270C | 10/16/13:211880CCG | LCS | mg/kg | 10.00 | 53.9 % | 30-92 | |
| | | | MS | mg/kg | 9.857 | 34.7 % | N/A | |
| | | (SP 1310784-001) | MSD | mg/kg | 9.975 | 29.8 % | N/A | |
| | | | MSRPD | mg/kg | 9.975 | 0.45 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 200.0 | 85.9 % | 80-120 | |
| p-Terphenyl-d14 | 8270C | 10/16/13:211880CCG | Blank | mg/kg | 5.000 | 36.6 % | 27-103 | |
| | | | LCS | mg/kg | 5.000 | 68.4 % | 27-103 | |
| | | | MS | mg/kg | 4.929 | 43.7 % | N/A | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 37.4 % | N/A | |
| | | | MSRPD | mg/kg | 9.975 | 0.29 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 100.0 | 117 % | 80-120 | |
| Pyrene | 8270C | 10/16/13:211880CCG | Blank | mg/kg | | ND | <1 | |
| | | | LCS | mg/kg | 5.000 | 68.5 % | 24-94 | |
| | | | MS | mg/kg | 4.929 | 45.5 % | 15-81 | |
| | | (SP 1310784-001) | MSD | mg/kg | 4.988 | 36.8 % | 15-81 | |
| | | | MSRPD | mg/kg | 9.975 | 0.41 | ≤1 | |
| | 8270C | 10/24/13:215920VRG | CCV | mg/L | 80.00 | 119 % | 80-120 | |

**Definition**

| | |
|---|---|
| CCV | : Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria. |
| Blank | : Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples. |
| LCS | : Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery. |
| MS | : Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery. |
| MSD | : Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery. |
| MSRPD | : MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis. |
| ND | : Non-detect - Result was below the DQO listed for the analyte. |
| DQO | : Data Quality Objective - This is the criteria against which the quality control data is compared. |

**Explanation**

| | |
|---|---|
| 360 | : CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted. |
| 435 | : Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery. |

October 25, 2013

Tenera Environmental
141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401

**Subject: Subcontract Analyses for FGL Lab No. CC 1383751**

Enclosed please find results for the following sample(s) which were received by FGL.

- Sub Inorganic-H2S
- Sub Contracted-Oil & Grease - SGT by EPA 9071B
- Sub Contracted-Oil & Grease - HEM by EPA 9071B

Please note that this analysis was performed by Associated Laboratories (NELAP Certified Laboratory)

Thank you for using FGL Environmental.

Sincerely,

**Cindy Aguirre** Digitally signed by Cindy Aguirre
Title: Customer Service Rep
Date: 2013-10-25

Enclosure

# Associated Laboratories

806 N. Batavia - Orange, CA 92868
Tel (714)771-6900 Fax (714)538-1209
www.associatedlabs.com
Info@associatedlabs.com


ACCREDITED IN ACCORDANCE WITH nelac 04232CA

| | | | |
|---|---|---|---|
| Client: | FGL | Lab Request: | 330508 |
| Address: | 853 Corporation St. | Report Date: | 10/24/2013 |
| | Santa Paula, CA 93060 | Date Received: | 10/12/2013 |
| | | Client ID: | 6050 |
| Attn: | Cindy Aguirre | | |
| Comments: | Project #CC1383751-(8-769)<br>Quote #CC 20130220-01 | | |

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods. Methods accredited by NELAC are indicated on the report. This cover letter is an integral part of the final report.

| Sample # | Client Sample ID |
|---|---|
| 330508-001 | PSL-1 |
| 330508-002 | PSL-2 |

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Nina Prasad
President

NOTE: Unless notified in writing , all samples will be discarded by appropriate disposal protocol 45 days from date reported.



TESTING & CONSULTING
Chemical
Microbiological
Environmental

| | | |
|---|---|---|
| **Matrix:** Solid | **Client:** FGL | **Collector:** Client |
| **Sampled:** 10/11/2013 09:51 | **Site:** | |
| **Sample #:** 330508-001 | **Client Sample #:** PSL-1 | **Sample Type:** |

| Analyte | Result | DF | RDL | Units | Analyzed | By | Notes |
|---|---|---|---|---|---|---|---|
| **Method:** EPA 9034 *NELAC* | **Prep Method:** SW-846 9030B | | | | | **QCBatchID:** | QC1140777 |
| Sulfide | ND | 1 | 10 | mg/Kg | 10/17/13 | hanhkhong | |
| **Method:** EPA 9071B | **Prep Method:** Method | | | | | **QCBatchID:** | QC1140837 |
| Non-Polar Oil and Grease | **999** | 1 | 500 | mg/Kg | 10/19/13 | rybechay | |
| Total Oil and Grease | **1170** | 1 | 500 | mg/Kg | 10/19/13 | rybechay | |

| | | |
|---|---|---|
| **Matrix:** Solid | **Client:** FGL | **Collector:** Client |
| **Sampled:** 10/11/2013 10:23 | **Site:** | |
| **Sample #:** 330508-002 | **Client Sample #:** PSL-2 | **Sample Type:** |

| Analyte | Result | DF | RDL | Units | Analyzed | By | Notes |
|---|---|---|---|---|---|---|---|
| **Method:** EPA 9034 *NELAC* | **Prep Method:** SW-846 9030B | | | | | **QCBatchID:** | QC1140777 |
| Sulfide | ND | 1 | 10 | mg/Kg | 10/17/13 | hanhkhong | |
| **Method:** EPA 9071B | **Prep Method:** Method | | | | | **QCBatchID:** | QC1140837 |
| Non-Polar Oil and Grease | **1240** | 1 | 500 | mg/Kg | 10/19/13 | rybechay | |
| Total Oil and Grease | **1420** | 1 | 500 | mg/Kg | 10/19/13 | rybechay | |

| QCBatchID: QC1140777 | Analyst: hanhkhong | Method: EPA 9034 |
|---|---|---|
| Matrix: Solid | Analyzed: 10/17/2013 | Instrument: CHEM (group) |

### *Blank Summary*

| Analyte | Blank Result | Units | | RDL | Notes |
|---|---|---|---|---|---|
| **QC1140777MB1** | | | | | |
| Total Sulfide | ND | mg/Kg | | 10 | |

### *Lab Control Spike/ Lab Control Spike Duplicate Summary*

| Analyte | Spike Amount LCS | Spike Amount LCSD | Spike Result LCS | Spike Result LCSD | Units | Recoveries LCS | Recoveries LCSD | RPD | Limits %Rec | Limits RPD | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC1140777LCS1** | | | | | | | | | | | |
| Total Sulfide | 329 | | 314.0 | | mg/Kg | 95 | | | 80-120 | | |

| QCBatchID: QC1140837 | Analyst: rybechay | Method: EPA 9071B |
|---|---|---|
| Matrix: Solid | Analyzed: 10/21/2013 | Instrument: CHEM (group) |

### *Blank Summary*

| Analyte | Blank Result | Units | | RDL | Notes | |
|---|---|---|---|---|---|---|
| **QC1140837MB1** | | | | | | |
| Non-Polar Oil and Grease | ND | mg/Kg | | 500 | | |
| Total Oil and Grease | ND | mg/Kg | | 500 | | |

### *Lab Control Spike/ Lab Control Spike Duplicate Summary*

| Analyte | Spike Amount LCS | Spike Amount LCSD | Spike Result LCS | Spike Result LCSD | Units | Recoveries LCS | Recoveries LCSD | RPD | Limits %Rec | Limits RPD | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC1140837LCS1** | | | | | | | | | | | |
| Total Oil and Grease | 4000 | | 3900 | | mg/Kg | 98 | | | 78-114 | | |

### *Duplicate Summary*

| Analyte | Sample Amount | Duplicate Amount | Units | RPD | Limits RPD | Notes |
|---|---|---|---|---|---|---|
| **QC1140837DUP1** | | | | | | **Source: 330508-002** |
| Non-Polar Oil and Grease | 1240 | 1258.4 | mg/Kg | 1.6 | 25 | |
| Total Oil and Grease | 1420 | 1470 | mg/Kg | 3.5 | 25 | |

# Notes and Definitions

| | |
|---|---|
| B | Analyte was present in an associated method blank. Associated sample data was reported with qualifier. |
| C | Laboratory Contamination. |
| D | The sample duplicate RPD was not within control limits, the sample data was reported without further clarification. |
| DF | Dilution Factor |
| DW | Sample result is calculated on a dry weigh basis |
| J | Reported value is estimated |
| L | The laboratory control sample (LCS) or laboratory control sample duplicate (LCSD) was out of control limits. Associated sample data was reported with qualifier. |
| M | The matrix spike (MS) or matrix spike duplicate (MSD) was not within control limits due to matrix interference. The associated LCS and/or LCSD was within control limits and the sample data was reported without further clarification. |
| MDL | Method Detection Limit |
| NC | The analyte concentration in the sample exceeded the spike level by a factor of four or greater, spike recovery and limits do not apply. |
| ND | Analyte was not detected or was less than the detection limit. |
| P | Sample was received without proper preservation according to EPA guidelines. |
| Q1 | Analyte Calibration Verification exceeds criteria and the result was reported with qualifier. |
| RDL | Reporting Detection Limit |
| S | The surrogate recovery was out of control limits due to matrix interference. The associated method blank surrogate recovery was within control limits and the sample data was reported without further clarification. |
| T | Sample was extracted/analyzed past the holding time. |
| T2 | Sample was analyzed ASAP but received and analyzed past the 15 minute holding time. |

*ASSOCIATED LABORATORIES*

*806 North Batavia – Orange, California 92868 – 714-771-6900* *FAX 714-538-1209*

## SAMPLE ACCEPTANCE CHECKLIST

**Section 1**
Client: FCRL
Project:
Date Received: 10/12/13
Sampler's Name: Yes No
Sample temperature:
Sample(s) received in cooler: Yes No (Skip Section 2)
Shipping Information: ontrac

**Section 2**
Was the cooler packed with: X Ice ___ Ice Packs ___ Bubble Wrap ___ Styrofoam
___ Paper ___ None ___ Other ___
Cooler Temperature: 4°C

*(Acceptance range is 0 to 6 Deg. C. or arrival on ice; For Microbiology sample ≤10 Deg. C or arrival on ice)*

| Section 3 | YES | NO | N/A |
|---|---|---|---|
| Was a COC received? | X | | |
| Is it properly completed? (IDs, sampling date and time, signature, test) | X | | |
| Were custody seals present? | | X | |
| If Yes – were they intact? | | | X |
| Were all samples sealed in plastic bags? | X | | |
| Did all samples arrive intact? If no, indicate below. | X | | |
| Did all bottle labels agree with COC? (ID, dates and times) | X | | |
| Were correct containers used for the tests required? | X | | |
| Was a sufficient amount of sample sent for tests indicated? | X | | |
| Was there headspace in VOA vials? | | | X |
| Were the containers labeled with correct preservatives? | | | X |
| Was total residual chlorine measured (Fish Bioassay samples only)? * | | | X |

*: If the answer is no, please inform Fish Bioassay Dept. immediately.

**Section 4**
Explanations/Comments

**Section 5**
Was Project Manager notified of discrepancies: Y / N N/A
Project Manager's response:

Completed By: Phong Date: 10/12/13

# FGL ENVIRONMENTAL

**Special Subcontract to Associated Laboratories**

www.fglinc.com

# CHAIN OF CUSTODY

Laboratory Copy (1 of 3) 330508

80777:03/04/2013

TEST DESCRIPTION - See Reverse side for Container, Preservative and Sampling information

Client: **Fruit Growers Laboratory, Inc.**
Address: FGL Environmental, Inc.
853 Corporation St.
Santa Paula, CA 93060-3005

Phone: (805)392-2039 Fax: (805)525-6264

Contact Person:

Project Name: OC1383751 - **(8-769)**

Purchase Order Number:

Quote Number: CC **20130220-01**

Sampler(s) TE

Sampling Fee: ________ Pickup Fee: ________

Compositor Setup Date: ___/___/___ Time: ___/___

Lab Number:

| Samp Num | Location Description | Date Sampled | Time Sampled | Method of Sampling: Composite(C) Grab(G) | Type of Sample **SEE REVERSE SIDE** | Potable(P) Non-Potable(NP) Ag Water(AgW) | Bacti Type: Other(O) System(SYS) Source(SR) Waste(W) | Bacti Reason: Routine(ROUT) Repeat(RPT) Replace(RPL) Other(O) Special(SPL) | Sub Inorganic-H2S 8oz(G) | Sub Contracted-Oil & Grease - SGT by EPA 9071B 8oz(G) | Sub Contracted-Oil & Grease - HEM by EPA 9071B 8oz(G) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PSL-1 | 10/11 | 0951 | G | Sld | | | | 1 | 1 | 1 |
| 2 | PSL-2 | 10/11 | ~~0951~~ 1023 | G | Sld | | | | 1 | 1 | 1 |

Remarks:

| Relinquished | Date: | Time: | Relinquished | Date: | Time: | Relinquished | Date: | Time: |
|---|---|---|---|---|---|---|---|---|
| [signature] | 10/11/13 | 1700 | | | | | | |
| **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** |
| ON TRAC | 10/11/13 | 1700 | [signature] | 10/12/13 | 1200 | | | |


**Corporate Offices & Laboratory**
853 Corporation Street
Santa Paula, CA 93060
TEL: 805/392-2000
FAX: 805/525-4172

**Office & Laboratory**
2500 Stagecoach Road
Stockton, CA 95215
TEL: 209/942-0182
FAX: 209/942-0423

**Office & Laboratory**
563 E. Lindo Avenue
Chico, CA 95926
TEL: 530/343-5818
FAX: 530/343-3807

**Office & Laboratory**
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: 805/783-2940
FAX: 805/525-4172

**Field Office**
Visalia, California
TEL: 559/734-9473
Mobile: 559/737-2399
FAX: 559/734-8435

ENVIRONMENTAL FGL AGRICULTURAL
Analytical Chemists

November 6, 2013

Tenera Environmental
141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401

**Subject: Subcontract Analysis for FGL Lab No. CC 1383751**

Enclosed please find results for the following sample(s) which were received by FGL.

- EPA 8081 - The B3J1321 report has the EPA 8081 Pesticide results; however, there is no EPA 8081 spike results since these were extracted on 10/15/2013 as EPA 8082 samples. The B3J2724 reports has the pesticide results along with the pesticide QC spike; however these were extracted on 10/30/2013 past Hold Time as indicated by the ``T`` in the Flag column of the report.

Please note that this analysis was performed by Babcock & Sons, Inc. (NELAP Certified Laboratory)

Thank you for using FGL Environmental.

Sincerely,

**Cindy Aguirre** Digitally signed by Cindy Aguirre
Title: Customer Service Rep
Date: 2013-11-06

Enclosure


**Corporate Offices & Laboratory**
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA NELAP Certification No. 01110CA

**Office & Laboratory**
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

**Office & Laboratory**
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

**Office & Laboratory**
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

**Office & Laboratory**
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

E.S.BABCOCK & Sons, Inc.
Environmental Laboratories est 1906

| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 1 of 8 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J1321** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes   Temp: 1 °C |

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

## Sample Identification

| Lab Sample # | Client Sample ID | Matrix | Date Sampled | By | Date Submitted | By |
|---|---|---|---|---|---|---|
| B3J1321-01 | CC1383751-(8-769) 1 PSL-1 Grab | Solid | 10/11/13 09:51 | TE | 10/12/13 11:05 | Courier (OnTrac) |
| B3J1321-02 | CC1383751-(8-769) 2 PSL-2 Grab | Solid | 10/11/13 10:23 | TE | 10/12/13 11:05 | Courier (OnTrac) |

**Included in this Data Package please find an amended report for the laboratory numbers referenced below.**
**Laboratory Number: B3J1321-01 and B3J1321-02**
**Reason for Amendment:**
**Due to a sample control error, the incorrect analysis was logged-in and performed. Since the hold time for the initially requested analysis had been exceeded, the client instructed Babcock Laboratories to perform EPA 8081 on the original EPA 8082 extracts; including the method blank (identified as 13J3007-BLK2). Results for EPA 8081 are found herein.**
**This report supersedes the report issued on 21-Oct-2013.**

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 2 of 8 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J1321** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes Temp: 1 °C |

Laboratory Reference Number

**B3J1321-01**

| Sample Description | Matrix | Sampled Date/Time | Received Date/Time |
|---|---|---|---|
| CC1383751-(8-769) 1 PSL-1 | Solid | 10/11/13 09:51 | 10/12/13 11:05 |

| Analyte(s) | Result | RDL | Units | Method | Analysis Date | Analyst | Flag |
|---|---|---|---|---|---|---|---|
| Organochlorine Pesticides and PCBs by EPA 8000 Series | | | | | | | |
| 4,4'-DDD | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| 4,4'-DDE | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| 4,4'-DDT | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| a-BHC | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Aldrin | ND | 8.0 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| b-BHC | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Chlordane | ND | 100 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| d-BHC | ND | 28 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Dieldrin | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Endosulfan I | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Endosulfan II | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Endosulfan Sulfate | ND | 40 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Endrin | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Endrin Aldehyde | ND | 28 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Heptachlor | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Heptachlor Epoxide | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Hexachlorobenzene | ND | 160 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Lindane | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Methoxychlor | ND | 110 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| Toxaphene | ND | 320 | ug/kg | EPA 8081A | 10/31/13 12:03 | sbart | N_RLm |
| *Surrogate: Decachlorobiphenyl* | 70.7 % | 10-158 | | EPA 8081A | 10/31/13 12:03 | sbart | |

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: FGL Environmental, Inc.
Contact: Cindy Aguirre
Address: 853 Corporation Street
Santa Paula, CA 93060

Report Date: 06-Nov-2013


Project Name: No Project
Project Number: CC1383751-(8-769)

**Work Order Number: B3J1321**
Received on Ice (Y/N): Yes Temp: 1 °C

Laboratory Reference Number
**B3J1321-02**

| Sample Description | Matrix | Sampled Date/Time | Received Date/Time |
|---|---|---|---|
| CC1383751-(8-769) 2 PSL-2 | Solid | 10/11/13 10:23 | 10/12/13 11:05 |

| Analyte(s) | Result | RDL | Units | Method | Analysis Date | Analyst | Flag |
|---|---|---|---|---|---|---|---|
| Organochlorine Pesticides and PCBs by EPA 8000 Series | | | | | | | |
| 4,4'-DDD | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| 4,4'-DDE | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| 4,4'-DDT | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| a-BHC | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Aldrin | ND | 8.0 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| b-BHC | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Chlordane | ND | 100 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| d-BHC | ND | 28 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Dieldrin | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Endosulfan I | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Endosulfan II | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Endosulfan Sulfate | ND | 40 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Endrin | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Endrin Aldehyde | ND | 28 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Heptachlor | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Heptachlor Epoxide | ND | 12 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Hexachlorobenzene | ND | 160 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Lindane | ND | 16 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Methoxychlor | ND | 110 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| Toxaphene | ND | 320 | ug/kg | EPA 8081A | 10/31/13 12:49 | sbart | N_RLm |
| *Surrogate: Decachlorobiphenyl* | 69.9 % | 10-158 | | EPA 8081A | 10/31/13 12:49 | sbart | |

*mailing*
P.O. Box 432
Riverside, CA 92502-0432

*location*
6100 Quail Valley Court
Riverside, CA 92507-0704

P 951 653 3351
F 951 653 1662
www.babcocklabs.com

NELAP no. 02101CA
CA Elap no. 2698
EPA no. CA00102

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: FGL Environmental, Inc.
Contact: Cindy Aguirre
Address: 853 Corporation Street
Santa Paula, CA 93060

Report Date: 06-Nov-2013


Project Name: No Project
Project Number: CC1383751-(8-769)

**Work Order Number: B3J1321**
Received on Ice (Y/N): Yes Temp: 1 °C

## Organochlorine Pesticides and PCBs by EPA 8000 Series - Batch Quality Control

| Analyte(s) | Result | RDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Flag |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 13J3007 - EPA 3550B** | | | | | | | | | | |
| **Blank (13J3007-BLK1)** | | | | Prepared: 10/30/13 Analyzed: 10/31/13 | | | | | | |
| 4,4'-DDD | ND | 4.0 | ug/kg | | | | | | | |
| 4,4'-DDE | ND | 3.0 | ug/kg | | | | | | | |
| 4,4'-DDT | ND | 4.0 | ug/kg | | | | | | | |
| a-BHC | ND | 4.0 | ug/kg | | | | | | | |
| Aldrin | ND | 2.0 | ug/kg | | | | | | | |
| b-BHC | ND | 4.0 | ug/kg | | | | | | | |
| Chlordane | ND | 25 | ug/kg | | | | | | | |
| d-BHC | ND | 7.0 | ug/kg | | | | | | | |
| Dieldrin | ND | 3.0 | ug/kg | | | | | | | |
| Endosulfan I | ND | 3.0 | ug/kg | | | | | | | |
| Endosulfan II | ND | 4.0 | ug/kg | | | | | | | |
| Endosulfan Sulfate | ND | 10 | ug/kg | | | | | | | |
| Endrin | ND | 3.0 | ug/kg | | | | | | | |
| Endrin Aldehyde | ND | 7.0 | ug/kg | | | | | | | |
| Heptachlor | ND | 3.0 | ug/kg | | | | | | | |
| Heptachlor Epoxide | ND | 3.0 | ug/kg | | | | | | | |
| Hexachlorobenzene | ND | 40 | ug/kg | | | | | | | |
| Lindane | ND | 4.0 | ug/kg | | | | | | | |
| Methoxychlor | ND | 27 | ug/kg | | | | | | | |
| Toxaphene | ND | 80 | ug/kg | | | | | | | |
| *Surrogate: Decachlorobiphenyl* | *15* | | ug/kg | *20.0* | | *77.3* | *10-158* | | | |
| **Blank (13J3007-BLK2)** | | | | Prepared: 10/15/13 Analyzed: 10/31/13 | | | | | | |
| 4,4'-DDD | ND | 4.0 | ug/kg | | | | | | | |
| 4,4'-DDE | ND | 3.0 | ug/kg | | | | | | | |
| 4,4'-DDT | ND | 4.0 | ug/kg | | | | | | | |
| a-BHC | ND | 4.0 | ug/kg | | | | | | | |
| Aldrin | ND | 2.0 | ug/kg | | | | | | | |
| b-BHC | ND | 4.0 | ug/kg | | | | | | | |
| Chlordane | ND | 25 | ug/kg | | | | | | | |
| d-BHC | ND | 7.0 | ug/kg | | | | | | | |
| Dieldrin | ND | 3.0 | ug/kg | | | | | | | |
| Endosulfan I | ND | 3.0 | ug/kg | | | | | | | |
| Endosulfan II | ND | 4.0 | ug/kg | | | | | | | |
| Endosulfan Sulfate | ND | 10 | ug/kg | | | | | | | |
| Endrin | ND | 3.0 | ug/kg | | | | | | | |

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Environmental Laboratories est 1906

Client Name: FGL Environmental, Inc.
Contact: Cindy Aguirre
Address: 853 Corporation Street
Santa Paula, CA 93060

Report Date: 06-Nov-2013


Project Name: No Project
Project Number: CC1383751-(8-769)

**Work Order Number: B3J1321**
Received on Ice (Y/N): Yes Temp: 1 °C

## Organochlorine Pesticides and PCBs by EPA 8000 Series - Batch Quality Control

| Analyte(s) | Result | RDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Flag |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 13J3007 - EPA 3550B** | | | | | | | | | | |
| **Blank (13J3007-BLK2)** | | | | Prepared: 10/15/13 | Analyzed: 10/31/13 | | | | | |
| Endrin Aldehyde | ND | 7.0 | ug/kg | | | | | | | |
| Heptachlor | ND | 3.0 | ug/kg | | | | | | | |
| Heptachlor Epoxide | ND | 3.0 | ug/kg | | | | | | | |
| Hexachlorobenzene | ND | 40 | ug/kg | | | | | | | |
| Lindane | ND | 4.0 | ug/kg | | | | | | | |
| Methoxychlor | ND | 27 | ug/kg | | | | | | | |
| Toxaphene | ND | 80 | ug/kg | | | | | | | |
| *Surrogate: Decachlorobiphenyl* | *47* | | ug/kg | *66.7* | | *71.2* | *10-158* | | | |
| **LCS (13J3007-BS1)** | | | | Prepared: 10/30/13 | Analyzed: 10/31/13 | | | | | |
| 4,4'-DDD | 13.6 | 4.0 | ug/kg | 16.7 | | 81.5 | 67.1-122 | | | |
| 4,4'-DDE | 13.6 | 3.0 | ug/kg | 16.7 | | 81.6 | 69.9-120 | | | |
| 4,4'-DDT | 13.5 | 4.0 | ug/kg | 16.7 | | 81.0 | 68.4-130 | | | |
| a-BHC | 12.5 | 4.0 | ug/kg | 16.7 | | 74.9 | 54.3-108 | | | |
| Aldrin | 13.0 | 2.0 | ug/kg | 16.7 | | 77.8 | 52.8-113 | | | |
| b-BHC | 13.9 | 4.0 | ug/kg | 16.7 | | 83.7 | 36.6-124 | | | |
| d-BHC | 7.88 | 7.0 | ug/kg | 16.7 | | 47.3 | 21.3-103 | | | |
| Dieldrin | 13.2 | 3.0 | ug/kg | 16.7 | | 79.4 | 68.5-119 | | | |
| Endosulfan I | 13.7 | 3.0 | ug/kg | 16.7 | | 82.4 | 64.8-127 | | | |
| Endosulfan II | 14.2 | 4.0 | ug/kg | 16.7 | | 85.0 | 64.3-127 | | | |
| Endrin | 14.6 | 3.0 | ug/kg | 16.7 | | 87.7 | 80.7-142 | | | |
| Endrin Aldehyde | 12.7 | 7.0 | ug/kg | 16.7 | | 76.3 | 33.8-100 | | | |
| Heptachlor | 13.7 | 3.0 | ug/kg | 16.7 | | 82.3 | 67.4-127 | | | |
| Heptachlor Epoxide | 13.5 | 3.0 | ug/kg | 16.7 | | 81.0 | 67.4-121 | | | |
| Lindane | 12.8 | 4.0 | ug/kg | 16.7 | | 77.0 | 54.7-114 | | | |
| *Surrogate: Decachlorobiphenyl* | *16* | | ug/kg | *20.0* | | *77.6* | *10-158* | | | |
| **LCS Dup (13J3007-BSD1)** | | | | Prepared: 10/30/13 | Analyzed: 10/31/13 | | | | | |
| 4,4'-DDD | 12.8 | 4.0 | ug/kg | 16.7 | | 76.6 | 67.1-122 | 6.20 | 20 | |
| 4,4'-DDE | 12.6 | 3.0 | ug/kg | 16.7 | | 75.9 | 69.9-120 | 7.27 | 20 | |
| 4,4'-DDT | 12.8 | 4.0 | ug/kg | 16.7 | | 76.5 | 68.4-130 | 5.77 | 20 | |
| a-BHC | 12.0 | 4.0 | ug/kg | 16.7 | | 71.8 | 54.3-108 | 4.16 | 20 | |
| Aldrin | 12.2 | 2.0 | ug/kg | 16.7 | | 73.4 | 52.8-113 | 5.83 | 20 | |
| b-BHC | 13.3 | 4.0 | ug/kg | 16.7 | | 79.9 | 36.6-124 | 4.67 | 20 | |
| d-BHC | 7.48 | 7.0 | ug/kg | 16.7 | | 44.9 | 21.3-103 | 5.18 | 22.5 | |
| Dieldrin | 12.4 | 3.0 | ug/kg | 16.7 | | 74.4 | 68.5-119 | 6.53 | 20 | |

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| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 6 of 8 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J1321** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes  Temp: 1 °C |

## Organochlorine Pesticides and PCBs by EPA 8000 Series - Batch Quality Control

| Analyte(s) | Result | RDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Flag |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 13J3007 - EPA 3550B** | | | | | | | | | | |
| **LCS Dup (13J3007-BSD1)** | | | | Prepared: 10/30/13 | | Analyzed: 10/31/13 | | | | |
| Endosulfan I | 12.9 | 3.0 | ug/kg | 16.7 | | 77.4 | 64.8-127 | 6.30 | 20 | |
| Endosulfan II | 13.4 | 4.0 | ug/kg | 16.7 | | 80.4 | 64.3-127 | 5.55 | 20 | |
| Endrin | 13.7 | 3.0 | ug/kg | 16.7 | | 82.1 | 80.7-142 | 6.60 | 20 | |
| Endrin Aldehyde | 12.2 | 7.0 | ug/kg | 16.7 | | 72.9 | 33.8-100 | 4.52 | 30.9 | |
| Heptachlor | 13.1 | 3.0 | ug/kg | 16.7 | | 78.6 | 67.4-127 | 4.52 | 20 | |
| Heptachlor Epoxide | 12.7 | 3.0 | ug/kg | 16.7 | | 76.2 | 67.4-121 | 6.10 | 20 | |
| Lindane | 12.3 | 4.0 | ug/kg | 16.7 | | 73.8 | 54.7-114 | 4.16 | 20 | |
| *Surrogate: Decachlorobiphenyl* | *16* | | ug/kg | *20.0* | | *78.4* | *10-158* | | | |
| **Matrix Spike (13J3007-MS1)** | | **Source: B3J2724-02** | | Prepared: 10/30/13 | | Analyzed: 10/31/13 | | | | |
| 4,4'-DDD | 12.3 | 16 | ug/kg | 16.7 | ND | 73.6 | 5-169 | | | Q_RL |
| 4,4'-DDE | 11.0 | 12 | ug/kg | 16.7 | ND | 66.0 | 20.8-133 | | | Q_RL |
| 4,4'-DDT | 11.9 | 16 | ug/kg | 16.7 | ND | 71.3 | 5-172 | | | Q_RL |
| a-BHC | 13.3 | 16 | ug/kg | 16.7 | ND | 79.8 | 5-141 | | | Q_RL |
| Aldrin | 11.3 | 8.0 | ug/kg | 16.7 | ND | 68.0 | 23.1-110 | | | |
| b-BHC | 14.9 | 16 | ug/kg | 16.7 | ND | 89.6 | 5-134 | | | Q_RL |
| d-BHC | 8.43 | 28 | ug/kg | 16.7 | ND | 50.6 | 5-106 | | | Q_RL |
| Dieldrin | 11.6 | 12 | ug/kg | 16.7 | ND | 69.7 | 28-137 | | | Q_RL |
| Endosulfan I | 11.7 | 12 | ug/kg | 16.7 | ND | 70.5 | 17.1-147 | | | Q_RL |
| Endosulfan II | 12.4 | 16 | ug/kg | 16.7 | ND | 74.3 | 15.9-132 | | | Q_RL |
| Endrin | 13.2 | 12 | ug/kg | 16.7 | ND | 79.1 | 32.1-150 | | | |
| Endrin Aldehyde | 12.2 | 28 | ug/kg | 16.7 | ND | 73.3 | 5-102 | | | Q_RL |
| Heptachlor | 12.3 | 12 | ug/kg | 16.7 | ND | 73.7 | 26.4-126 | | | |
| Heptachlor Epoxide | 11.7 | 12 | ug/kg | 16.7 | ND | 70.1 | 28.3-122 | | | Q_RL |
| Lindane | 12.6 | 16 | ug/kg | 16.7 | ND | 75.7 | 6.65-134 | | | Q_RL |
| *Surrogate: Decachlorobiphenyl* | *15* | | ug/kg | *20.0* | | *76.3* | *10-158* | | | |
| **Matrix Spike Dup (13J3007-MSD1)** | | **Source: B3J2724-02** | | Prepared: 10/30/13 | | Analyzed: 10/31/13 | | | | |
| 4,4'-DDD | 12.4 | 16 | ug/kg | 16.7 | ND | 74.2 | 5-169 | 0.852 | 55 | Q_RL |
| 4,4'-DDE | 11.2 | 12 | ug/kg | 16.7 | ND | 67.5 | 20.8-133 | 2.28 | 50 | Q_RL |
| 4,4'-DDT | 11.8 | 16 | ug/kg | 16.7 | ND | 71.1 | 5-172 | 0.308 | 34 | Q_RL |
| a-BHC | 12.9 | 16 | ug/kg | 16.7 | ND | 77.6 | 5-141 | 2.79 | 60 | Q_RL |
| Aldrin | 11.1 | 8.0 | ug/kg | 16.7 | ND | 66.7 | 23.1-110 | 1.82 | 60 | |
| b-BHC | 16.7 | 16 | ug/kg | 16.7 | ND | 100 | 5-134 | 11.2 | 60 | |
| d-BHC | 7.88 | 28 | ug/kg | 16.7 | ND | 47.3 | 5-106 | 6.84 | 54 | Q_RL |
| Dieldrin | 11.5 | 12 | ug/kg | 16.7 | ND | 69.2 | 28-137 | 0.627 | 60 | Q_RL |

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| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 7 of 8 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J1321** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes Temp: 1 °C |

## Organochlorine Pesticides and PCBs by EPA 8000 Series - Batch Quality Control

| Analyte(s) | Result | RDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Flag |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 13J3007 - EPA 3550B** | | | | | | | | | | |
| **Matrix Spike Dup (13J3007-MSD1)** | | **Source: B3J2724-02** | | Prepared: 10/30/13 | | Analyzed: 10/31/13 | | | | |
| Endosulfan I | 11.9 | 12 | ug/kg | 16.7 | ND | 71.3 | 17.1-147 | 1.07 | 59 | Q_RL |
| Endosulfan II | 12.5 | 16 | ug/kg | 16.7 | ND | 74.7 | 15.9-132 | 0.612 | 60 | Q_RL |
| Endrin | 12.8 | 12 | ug/kg | 16.7 | ND | 77.0 | 32.1-150 | 2.73 | 60 | |
| Endrin Aldehyde | 12.7 | 28 | ug/kg | 16.7 | ND | 75.9 | 5-102 | 3.55 | 60 | Q_RL |
| Heptachlor | 12.0 | 12 | ug/kg | 16.7 | ND | 72.2 | 26.4-126 | 2.12 | 60 | |
| Heptachlor Epoxide | 11.7 | 12 | ug/kg | 16.7 | ND | 70.1 | 28.3-122 | 0.0103 | 60 | Q_RL |
| Lindane | 12.0 | 16 | ug/kg | 16.7 | ND | 71.8 | 6.65-134 | 5.29 | 60 | Q_RL |
| *Surrogate: Decachlorobiphenyl* | *17* | | ug/kg | *20.0* | | *83.5* | *10-158* | | | |

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| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 8 of 8 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J1321** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes    Temp: 1 °C |

## Notes and Definitions

| | |
|---|---|
| N_RLm | Due to sample matrix, the reporting limit has been raised. |
| Q_RL | Due to sample matrix, the reporting limit for this analyte in this QC sample has been raised. |
| ND: | Analyte NOT DETECTED at or above the Method Detection Limit **(if MDL is reported)**, otherwise at or above the Reportable Detection Limit (RDL) |
| NR: | Not Reported |
| RDL: | Reportable Detection Limit |
| MDL: | Method Detection Limit |
| * / "' : | NELAP does not offer accreditation for this analyte/method/matrix combination |

## Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted. Babcock Laboratories and its officers and employees assume no responsibility and make no warranty, express or implied, for uses or interpretations made by any recipients, intended or unintended, of this report.

cc:

e-Standard.rpt

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Environmental Laboratories est 1906

| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 1 of 1 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J1321** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes  Temp: 1 °C |

FGL ENVIRONMENTAL — Special Subcontract to Babcock & Sons, Inc. — CHAIN OF CUSTODY — Laboratory Copy (1 of 3)

80777:03/04/2013 — TEST DESCRIPTION - See Reverse side for Container, Preservative and Sampling information

Client: Fruit Growers Laboratory, Inc.
Address: FGL Environmental, Inc.
853 Corporation St.
Santa Paula, CA 93060-3005
Phone: (805)392-2039  Fax: (805)525-6264
Contact Person:
Project Name CC1383751 - (8-769)
Purchase Order Number:
Quote Number: CC 20130220-01
Sampler(s) TE
Sampling Fee: ____ Pickup Fee: ____
Compositor Setup Date: __/__/__ Time: __/__
Lab Number:

Method of Sampling: Composite(C) Grab(G)
Type of Sample **SEE REVERSE SIDE**
Potable(P) Non-Potable(NP) Ag Water(AgW)
Bacti Type: Other(O) System(SYS) Source(SR) Waste(W)
Bacti Reason: Routine(ROUT) Repeat(RPT) Replace(RPL) Other(O) Special(SPL)

| Samp Num | Location Description | Date Sampled | Time Sampled | Method of Sampling | Type of Sample | Sub Organic-EPA 8081 8oz(G) |
|---|---|---|---|---|---|---|
| 1 | PSL-1 | 10/11 | 0951 | G | SRd | 1 |
| 2 | PSL-2 | ↓ | 1023 | G | SRd | 1 |

B3J1321 AB
OCT 14 2013

Remarks: 1°C

| Relinquished | Date: | Time: | Relinquished | Date: | Time: | Relinquished | Date: | Time: |
|---|---|---|---|---|---|---|---|---|
| R Dawson | 10/14/13 | 1700 | OnTrac | | | | | |
| **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** |
| ONTRAC | ↓ | ↓ | David Keller | 10/15/13 | 1105 | | | |

Corporate Offices & Laboratory — 853 Corporation Street, Santa Paula, CA 93060, TEL: 805/392-2000
Office & Laboratory — 2500 Stagecoach Road, Stockton, CA 95215, TEL: 209/942-0182
Office & Laboratory — 563 E. Lindo Avenue, Chico, CA 95926, TEL: 530/343-5818
Office & Laboratory — 3442 Empresa Drive, Suite D, San Luis Obispo, CA 93401, TEL: 805/783-2940
Field Office — Visalia, California, TEL: 559/734-9473, Mobile: 559/737-2399

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 1 of 10 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J2724** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes Temp: 1 °C |

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

## Sample Identification

| Lab Sample # | Client Sample ID | Matrix | Date Sampled | By | Date Submitted | By |
|---|---|---|---|---|---|---|
| B3J2724-01 | CC1383751-(8-769) 1 PSL-1 Grab | Solid | 10/11/13 09:51 | TE | 10/12/13 11:05 | Courier (OnTrac) |
| B3J2724-02 | CC1383751-(8-769) 2 PSL-2 Grab | Solid | 10/11/13 10:23 | TE | 10/12/13 11:05 | Courier (OnTrac) |

**Case Narrative-**
**Laboratory Number: B3J2724-01 and B3J2724-02**
**Analysis: EPA 8081**
**Reason for Amendment:**
**Due to a laboratory oversight, the incorrect analysis was logged-in, performed, and reported on work order B3J1321. Upon discovering the error, the hold time for the originally requested analysis had since passed. Under these circumstances, the client instructed the laboratory to continue with EPA 8081 past hold time.**
**This report supersedes the report issued on 21-Oct-2013.**

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: FGL Environmental, Inc.
Contact: Cindy Aguirre
Address: 853 Corporation Street
Santa Paula, CA 93060

Report Date: 06-Nov-2013


Project Name: No Project
Project Number: CC1383751-(8-769)

**Work Order Number: B3J2724**
Received on Ice (Y/N): Yes Temp: 1 °C

Laboratory Reference Number
**B3J2724-01**

| Sample Description | Matrix | Sampled Date/Time | Received Date/Time |
|---|---|---|---|
| CC1383751-(8-769) 1 PSL-1 | Solid | 10/11/13 09:51 | 10/12/13 11:05 |

| Analyte(s) | Result | RDL | Units | Method | Analysis Date | Analyst | Flag |
|---|---|---|---|---|---|---|---|
| Organochlorine Pesticides and PCBs by EPA 8000 Series | | | | | | | |
| 4,4'-DDD | ND | 16 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| 4,4'-DDE | ND | 12 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| 4,4'-DDT | ND | 16 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| a-BHC | ND | 16 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Aldrin | ND | 8.0 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| b-BHC | ND | 16 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Chlordane | ND | 100 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| d-BHC | ND | 28 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Dieldrin | ND | 12 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Endosulfan I | ND | 12 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Endosulfan II | ND | 16 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Endosulfan Sulfate | ND | 40 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Endrin | ND | 12 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Endrin Aldehyde | ND | 28 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Heptachlor | ND | 12 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Heptachlor Epoxide | ND | 12 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Hexachlorobenzene | ND | 160 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Lindane | ND | 16 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Methoxychlor | ND | 110 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |
| Toxaphene | ND | 320 | ug/kg | EPA 8081A | 10/31/13 13:35 | sbart | N_HTa, N_RLm |

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: FGL Environmental, Inc.
Contact: Cindy Aguirre
Address: 853 Corporation Street
Santa Paula, CA 93060

Report Date: 06-Nov-2013


Project Name: No Project
Project Number: CC1383751-(8-769)

**Work Order Number: B3J2724**
Received on Ice (Y/N): Yes Temp: 1 °C

Laboratory Reference Number
## B3J2724-01

| Sample Description | Matrix | Sampled Date/Time | Received Date/Time |
|---|---|---|---|
| CC1383751-(8-769) 1 PSL-1 | Solid | 10/11/13 09:51 | 10/12/13 11:05 |

| Analyte(s) | Result | RDL | Units | Method | Analysis Date | Analyst | Flag |
|---|---|---|---|---|---|---|---|
| Organochlorine Pesticides and PCBs by EPA 8000 Series | | | | | | | |
| *Surrogate: Decachlorobiphenyl* | 77.7 | % 10-158 | | EPA 8081A | 10/31/13 13:35 | sbart | *N_HTa* |

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| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 4 of 10 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J2724** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes    Temp: 1 °C |

Laboratory Reference Number

**B3J2724-02**

| Sample Description | Matrix | Sampled Date/Time | Received Date/Time |
|---|---|---|---|
| CC1383751-(8-769) 2 PSL-2 | Solid | 10/11/13 10:23 | 10/12/13 11:05 |

| Analyte(s) | Result | RDL | Units | Method | Analysis Date | Analyst | Flag |
|---|---|---|---|---|---|---|---|
| Organochlorine Pesticides and PCBs by EPA 8000 Series | | | | | | | |
| 4,4'-DDD | ND | 16 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| 4,4'-DDE | ND | 12 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| 4,4'-DDT | ND | 16 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| a-BHC | ND | 16 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Aldrin | ND | 8.0 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| b-BHC | ND | 16 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Chlordane | ND | 100 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| d-BHC | ND | 28 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Dieldrin | ND | 12 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Endosulfan I | ND | 12 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Endosulfan II | ND | 16 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Endosulfan Sulfate | ND | 40 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Endrin | ND | 12 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Endrin Aldehyde | ND | 28 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Heptachlor | ND | 12 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Heptachlor Epoxide | ND | 12 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Hexachlorobenzene | ND | 160 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Lindane | ND | 16 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Methoxychlor | ND | 110 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |
| Toxaphene | ND | 320 | ug/kg | EPA 8081A | 10/31/13 14:21 | sbart | N_HTa, N_RLm |

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Client Name: FGL Environmental, Inc.
Contact: Cindy Aguirre
Address: 853 Corporation Street
Santa Paula, CA 93060

Report Date: 06-Nov-2013


Project Name: No Project
Project Number: CC1383751-(8-769)

**Work Order Number: B3J2724**
Received on Ice (Y/N): Yes Temp: 1 °C

Laboratory Reference Number
**B3J2724-02**

| Sample Description | Matrix | Sampled Date/Time | Received Date/Time |
|---|---|---|---|
| CC1383751-(8-769) 2 PSL-2 | Solid | 10/11/13 10:23 | 10/12/13 11:05 |

| Analyte(s) | Result | RDL | Units | Method | Analysis Date | Analyst | Flag |
|---|---|---|---|---|---|---|---|
| Organochlorine Pesticides and PCBs by EPA 8000 Series | | | | | | | |
| *Surrogate: Decachlorobiphenyl* | 74.3 | % 10-158 | | EPA 8081A | 10/31/13 14:21 | sbart | *N_HTa* |

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Environmental Laboratories est 1906

| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 6 of 10 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J2724** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes    Temp: 1 °C |

## Organochlorine Pesticides and PCBs by EPA 8000 Series - Batch Quality Control

| Analyte(s) | Result | RDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Flag |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 13J3007 - EPA 3550B** | | | | | | | | | | |
| **Blank (13J3007-BLK1)** | | | | Prepared: 10/30/13 Analyzed: 10/31/13 | | | | | | |
| 4,4'-DDD | ND | 4.0 | ug/kg | | | | | | | |
| 4,4'-DDE | ND | 3.0 | ug/kg | | | | | | | |
| 4,4'-DDT | ND | 4.0 | ug/kg | | | | | | | |
| a-BHC | ND | 4.0 | ug/kg | | | | | | | |
| Aldrin | ND | 2.0 | ug/kg | | | | | | | |
| b-BHC | ND | 4.0 | ug/kg | | | | | | | |
| Chlordane | ND | 25 | ug/kg | | | | | | | |
| d-BHC | ND | 7.0 | ug/kg | | | | | | | |
| Dieldrin | ND | 3.0 | ug/kg | | | | | | | |
| Endosulfan I | ND | 3.0 | ug/kg | | | | | | | |
| Endosulfan II | ND | 4.0 | ug/kg | | | | | | | |
| Endosulfan Sulfate | ND | 10 | ug/kg | | | | | | | |
| Endrin | ND | 3.0 | ug/kg | | | | | | | |
| Endrin Aldehyde | ND | 7.0 | ug/kg | | | | | | | |
| Heptachlor | ND | 3.0 | ug/kg | | | | | | | |
| Heptachlor Epoxide | ND | 3.0 | ug/kg | | | | | | | |
| Hexachlorobenzene | ND | 40 | ug/kg | | | | | | | |
| Lindane | ND | 4.0 | ug/kg | | | | | | | |
| Methoxychlor | ND | 27 | ug/kg | | | | | | | |
| Toxaphene | ND | 80 | ug/kg | | | | | | | |
| *Surrogate: Decachlorobiphenyl* | *15* | | ug/kg | *20.0* | | *77.3* | *10-158* | | | |
| **Blank (13J3007-BLK2)** | | | | Prepared: 10/15/13 Analyzed: 10/31/13 | | | | | | |
| 4,4'-DDD | ND | 4.0 | ug/kg | | | | | | | |
| 4,4'-DDE | ND | 3.0 | ug/kg | | | | | | | |
| 4,4'-DDT | ND | 4.0 | ug/kg | | | | | | | |
| a-BHC | ND | 4.0 | ug/kg | | | | | | | |
| Aldrin | ND | 2.0 | ug/kg | | | | | | | |
| b-BHC | ND | 4.0 | ug/kg | | | | | | | |
| Chlordane | ND | 25 | ug/kg | | | | | | | |
| d-BHC | ND | 7.0 | ug/kg | | | | | | | |
| Dieldrin | ND | 3.0 | ug/kg | | | | | | | |
| Endosulfan I | ND | 3.0 | ug/kg | | | | | | | |
| Endosulfan II | ND | 4.0 | ug/kg | | | | | | | |
| Endosulfan Sulfate | ND | 10 | ug/kg | | | | | | | |
| Endrin | ND | 3.0 | ug/kg | | | | | | | |

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Environmental Laboratories est 1906

| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 7 of 10 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J2724** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes     Temp: 1 °C |

## Organochlorine Pesticides and PCBs by EPA 8000 Series - Batch Quality Control

| Analyte(s) | Result | RDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Flag |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 13J3007 - EPA 3550B** | | | | | | | | | | |
| **Blank (13J3007-BLK2)** | | | | Prepared: 10/15/13 | Analyzed: 10/31/13 | | | | | |
| Endrin Aldehyde | ND | 7.0 | ug/kg | | | | | | | |
| Heptachlor | ND | 3.0 | ug/kg | | | | | | | |
| Heptachlor Epoxide | ND | 3.0 | ug/kg | | | | | | | |
| Hexachlorobenzene | ND | 40 | ug/kg | | | | | | | |
| Lindane | ND | 4.0 | ug/kg | | | | | | | |
| Methoxychlor | ND | 27 | ug/kg | | | | | | | |
| Toxaphene | ND | 80 | ug/kg | | | | | | | |
| *Surrogate: Decachlorobiphenyl* | *47* | | ug/kg | *66.7* | | *71.2* | *10-158* | | | |
| **LCS (13J3007-BS1)** | | | | Prepared: 10/30/13 | Analyzed: 10/31/13 | | | | | |
| 4,4'-DDD | 13.6 | 4.0 | ug/kg | 16.7 | | 81.5 | 67.1-122 | | | |
| 4,4'-DDE | 13.6 | 3.0 | ug/kg | 16.7 | | 81.6 | 69.9-120 | | | |
| 4,4'-DDT | 13.5 | 4.0 | ug/kg | 16.7 | | 81.0 | 68.4-130 | | | |
| a-BHC | 12.5 | 4.0 | ug/kg | 16.7 | | 74.9 | 54.3-108 | | | |
| Aldrin | 13.0 | 2.0 | ug/kg | 16.7 | | 77.8 | 52.8-113 | | | |
| b-BHC | 13.9 | 4.0 | ug/kg | 16.7 | | 83.7 | 36.6-124 | | | |
| d-BHC | 7.88 | 7.0 | ug/kg | 16.7 | | 47.3 | 21.3-103 | | | |
| Dieldrin | 13.2 | 3.0 | ug/kg | 16.7 | | 79.4 | 68.5-119 | | | |
| Endosulfan I | 13.7 | 3.0 | ug/kg | 16.7 | | 82.4 | 64.8-127 | | | |
| Endosulfan II | 14.2 | 4.0 | ug/kg | 16.7 | | 85.0 | 64.3-127 | | | |
| Endrin | 14.6 | 3.0 | ug/kg | 16.7 | | 87.7 | 80.7-142 | | | |
| Endrin Aldehyde | 12.7 | 7.0 | ug/kg | 16.7 | | 76.3 | 33.8-100 | | | |
| Heptachlor | 13.7 | 3.0 | ug/kg | 16.7 | | 82.3 | 67.4-127 | | | |
| Heptachlor Epoxide | 13.5 | 3.0 | ug/kg | 16.7 | | 81.0 | 67.4-121 | | | |
| Lindane | 12.8 | 4.0 | ug/kg | 16.7 | | 77.0 | 54.7-114 | | | |
| *Surrogate: Decachlorobiphenyl* | *16* | | ug/kg | *20.0* | | *77.6* | *10-158* | | | |
| **LCS Dup (13J3007-BSD1)** | | | | Prepared: 10/30/13 | Analyzed: 10/31/13 | | | | | |
| 4,4'-DDD | 12.8 | 4.0 | ug/kg | 16.7 | | 76.6 | 67.1-122 | 6.20 | 20 | |
| 4,4'-DDE | 12.6 | 3.0 | ug/kg | 16.7 | | 75.9 | 69.9-120 | 7.27 | 20 | |
| 4,4'-DDT | 12.8 | 4.0 | ug/kg | 16.7 | | 76.5 | 68.4-130 | 5.77 | 20 | |
| a-BHC | 12.0 | 4.0 | ug/kg | 16.7 | | 71.8 | 54.3-108 | 4.16 | 20 | |
| Aldrin | 12.2 | 2.0 | ug/kg | 16.7 | | 73.4 | 52.8-113 | 5.83 | 20 | |
| b-BHC | 13.3 | 4.0 | ug/kg | 16.7 | | 79.9 | 36.6-124 | 4.67 | 20 | |
| d-BHC | 7.48 | 7.0 | ug/kg | 16.7 | | 44.9 | 21.3-103 | 5.18 | 22.5 | |
| Dieldrin | 12.4 | 3.0 | ug/kg | 16.7 | | 74.4 | 68.5-119 | 6.53 | 20 | |

Client Name: FGL Environmental, Inc.
Contact: Cindy Aguirre
Address: 853 Corporation Street
Santa Paula, CA 93060

Report Date: 06-Nov-2013


Project Name: No Project
Project Number: CC1383751-(8-769)

**Work Order Number: B3J2724**

Received on Ice (Y/N): Yes Temp: 1 °C

## Organochlorine Pesticides and PCBs by EPA 8000 Series - Batch Quality Control

| Analyte(s) | Result | RDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Flag |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 13J3007 - EPA 3550B** | | | | | | | | | | |
| **LCS Dup (13J3007-BSD1)** | | | | Prepared: 10/30/13 | | Analyzed: 10/31/13 | | | | |
| Endosulfan I | 12.9 | 3.0 | ug/kg | 16.7 | | 77.4 | 64.8-127 | 6.30 | 20 | |
| Endosulfan II | 13.4 | 4.0 | ug/kg | 16.7 | | 80.4 | 64.3-127 | 5.55 | 20 | |
| Endrin | 13.7 | 3.0 | ug/kg | 16.7 | | 82.1 | 80.7-142 | 6.60 | 20 | |
| Endrin Aldehyde | 12.2 | 7.0 | ug/kg | 16.7 | | 72.9 | 33.8-100 | 4.52 | 30.9 | |
| Heptachlor | 13.1 | 3.0 | ug/kg | 16.7 | | 78.6 | 67.4-127 | 4.52 | 20 | |
| Heptachlor Epoxide | 12.7 | 3.0 | ug/kg | 16.7 | | 76.2 | 67.4-121 | 6.10 | 20 | |
| Lindane | 12.3 | 4.0 | ug/kg | 16.7 | | 73.8 | 54.7-114 | 4.16 | 20 | |
| *Surrogate: Decachlorobiphenyl* | *16* | | ug/kg | *20.0* | | *78.4* | *10-158* | | | |
| **Matrix Spike (13J3007-MS1)** | | **Source: B3J2724-02** | | Prepared: 10/30/13 | | Analyzed: 10/31/13 | | | | |
| 4,4'-DDD | 12.3 | 16 | ug/kg | 16.7 | ND | 73.6 | 5-169 | | | Q_RL |
| 4,4'-DDE | 11.0 | 12 | ug/kg | 16.7 | ND | 66.0 | 20.8-133 | | | Q_RL |
| 4,4'-DDT | 11.9 | 16 | ug/kg | 16.7 | ND | 71.3 | 5-172 | | | Q_RL |
| a-BHC | 13.3 | 16 | ug/kg | 16.7 | ND | 79.8 | 5-141 | | | Q_RL |
| Aldrin | 11.3 | 8.0 | ug/kg | 16.7 | ND | 68.0 | 23.1-110 | | | |
| b-BHC | 14.9 | 16 | ug/kg | 16.7 | ND | 89.6 | 5-134 | | | Q_RL |
| d-BHC | 8.43 | 28 | ug/kg | 16.7 | ND | 50.6 | 5-106 | | | Q_RL |
| Dieldrin | 11.6 | 12 | ug/kg | 16.7 | ND | 69.7 | 28-137 | | | Q_RL |
| Endosulfan I | 11.7 | 12 | ug/kg | 16.7 | ND | 70.5 | 17.1-147 | | | Q_RL |
| Endosulfan II | 12.4 | 16 | ug/kg | 16.7 | ND | 74.3 | 15.9-132 | | | Q_RL |
| Endrin | 13.2 | 12 | ug/kg | 16.7 | ND | 79.1 | 32.1-150 | | | |
| Endrin Aldehyde | 12.2 | 28 | ug/kg | 16.7 | ND | 73.3 | 5-102 | | | Q_RL |
| Heptachlor | 12.3 | 12 | ug/kg | 16.7 | ND | 73.7 | 26.4-126 | | | |
| Heptachlor Epoxide | 11.7 | 12 | ug/kg | 16.7 | ND | 70.1 | 28.3-122 | | | Q_RL |
| Lindane | 12.6 | 16 | ug/kg | 16.7 | ND | 75.7 | 6.65-134 | | | Q_RL |
| *Surrogate: Decachlorobiphenyl* | *15* | | ug/kg | *20.0* | | *76.3* | *10-158* | | | |
| **Matrix Spike Dup (13J3007-MSD1)** | | **Source: B3J2724-02** | | Prepared: 10/30/13 | | Analyzed: 10/31/13 | | | | |
| 4,4'-DDD | 12.4 | 16 | ug/kg | 16.7 | ND | 74.2 | 5-169 | 0.852 | 55 | Q_RL |
| 4,4'-DDE | 11.2 | 12 | ug/kg | 16.7 | ND | 67.5 | 20.8-133 | 2.28 | 50 | Q_RL |
| 4,4'-DDT | 11.8 | 16 | ug/kg | 16.7 | ND | 71.1 | 5-172 | 0.308 | 34 | Q_RL |
| a-BHC | 12.9 | 16 | ug/kg | 16.7 | ND | 77.6 | 5-141 | 2.79 | 60 | Q_RL |
| Aldrin | 11.1 | 8.0 | ug/kg | 16.7 | ND | 66.7 | 23.1-110 | 1.82 | 60 | |
| b-BHC | 16.7 | 16 | ug/kg | 16.7 | ND | 100 | 5-134 | 11.2 | 60 | |
| d-BHC | 7.88 | 28 | ug/kg | 16.7 | ND | 47.3 | 5-106 | 6.84 | 54 | Q_RL |
| Dieldrin | 11.5 | 12 | ug/kg | 16.7 | ND | 69.2 | 28-137 | 0.627 | 60 | Q_RL |

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| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 9 of 10 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J2724** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes Temp: 1 °C |

## Organochlorine Pesticides and PCBs by EPA 8000 Series - Batch Quality Control

| Analyte(s) | Result | RDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Flag |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 13J3007 - EPA 3550B** | | | | | | | | | | |
| **Matrix Spike Dup (13J3007-MSD1)** | | **Source: B3J2724-02** | | Prepared: 10/30/13 | | Analyzed: 10/31/13 | | | | |
| Endosulfan I | 11.9 | 12 | ug/kg | 16.7 | ND | 71.3 | 17.1-147 | 1.07 | 59 | Q_RL |
| Endosulfan II | 12.5 | 16 | ug/kg | 16.7 | ND | 74.7 | 15.9-132 | 0.612 | 60 | Q_RL |
| Endrin | 12.8 | 12 | ug/kg | 16.7 | ND | 77.0 | 32.1-150 | 2.73 | 60 | |
| Endrin Aldehyde | 12.7 | 28 | ug/kg | 16.7 | ND | 75.9 | 5-102 | 3.55 | 60 | Q_RL |
| Heptachlor | 12.0 | 12 | ug/kg | 16.7 | ND | 72.2 | 26.4-126 | 2.12 | 60 | |
| Heptachlor Epoxide | 11.7 | 12 | ug/kg | 16.7 | ND | 70.1 | 28.3-122 | 0.0103 | 60 | Q_RL |
| Lindane | 12.0 | 16 | ug/kg | 16.7 | ND | 71.8 | 6.65-134 | 5.29 | 60 | Q_RL |
| *Surrogate: Decachlorobiphenyl* | *17* | | ug/kg | *20.0* | | *83.5* | *10-158* | | | |

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Environmental Laboratories est 1906

| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 10 of 10 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J2724** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes    Temp: 1 °C |

## Notes and Definitions

| | |
|---|---|
| N_HTa | Sample analyzed outside of the EPA recommended holding time. |
| N_RLm | Due to sample matrix, the reporting limit has been raised. |
| Q_RL | Due to sample matrix, the reporting limit for this analyte in this QC sample has been raised. |
| ND: | Analyte NOT DETECTED at or above the Method Detection Limit **(if MDL is reported)**, otherwise at or above the Reportable Detection Limit (RDL) |
| NR: | Not Reported |
| RDL: | Reportable Detection Limit |
| MDL: | Method Detection Limit |
| * / "' : | NELAP does not offer accreditation for this analyte/method/matrix combination |

## Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted. Babcock Laboratories and its officers and employees assume no responsibility and make no warranty, express or implied, for uses or interpretations made by any recipients, intended or unintended, of this report.

cc:

e-Standard.rpt

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Environmental Laboratories est 1906

| | | | |
|---|---|---|---|
| Client Name: | FGL Environmental, Inc. | Analytical Report: | Page 1 of 1 |
| Contact: | Cindy Aguirre | Project Name: | No Project |
| Address: | 853 Corporation Street<br>Santa Paula, CA 93060 | Project Number: | CC1383751-(8-769) |
| | | **Work Order Number:** | **B3J2724** |
| Report Date: | 06-Nov-2013 | Received on Ice (Y/N): | Yes   Temp: 1 °C |

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Environmental Laboratories est 1906

# RELOG Request

Client: FGL Environmental

Person Requesting Relog: Lorenzo

Previous Work Order #: B3J1321 -01 & -02

Analysis Requested: 8081 -01 CC1383751-(8-769) 1 PSL-1 10.11.13 0951 by TE
SOLID -02 CC1383751-(8-769) 2 PSL-2

TAT: 3 day OK per FK/Scott. 10.11.13 1023 by TE

Notes: R: 10.12.13 @ 1105 by David Kelley
Carrier ONTRAC

Date/Signature: [signature] 10.09.13

**NEW WORK ORDER #** B3J2724 KW

OCT 29 2013

FGL ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

**Special**

# CHAIN OF CUSTODY
www.fglinc.com
Laboratory Copy (1 of 3)

80777:10/07/2013

TEST DESCRIPTION - See Reverse side for Container, Preservative and Sampling information

Client: Tenera Environmental
Address: 141 Suburban Rd., Suite A2
San Luis Obispo, CA 93401

Phone: (805)541-0310 Fax:
Contact Person: Fred Steinert
Project Name: Port San Luis Sediment
Purchase Order Number:
Quote Number: CC 20130220-01

Sampler(s) Tenera Environmental

Sampling Fee: ________ Pickup Fee: ________
Compositor Setup Date: ___/___/___ Time: ___/___

Lab Number: CC 1383751 8-769

| Samp Num | Location Description | Date Sampled | Time Sampled | Method of Sampling: Composite(C) Grab(G) | Type of Sample **SEE REVERSE SIDE** | Potable(P) Non-Potable(NP) Ag Water(AgW) | Bacti Type: Other(O) System(SYS) Source(SR) Waste(W) | Bacti Reason: Routine(ROUT) Repeat(RPT) Replace(RPL) Other(O) Special(SPL) | Metals, Total-As,Cd,Cr,Cu,Pb,Hg,Ni,Se,Ag,Zn 8oz(G) | EPA 8270 8oz(G) | Sub Inorganic-H2S 8oz(G) → ASSOCIATED MQ | Sub Organic-EPA 8081 8oz(G) → BABCOCK MQ | Sub Contracted-Oil & Grease - SGT by EPA 9071B 8oz(G) → ASSOCIATED MQ | Sub Contracted-Oil & Grease - HEM by EPA 9071B 8oz(G) → ASSOCIATED MQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PSL - 1 | 10/1/13 | 0951 | G | Sld | | | | 1 | 1 | Sub-1 | Sub-1 | Sub-1 | Sub-1 |
| 2 | PSL - 2 | 10/1/13 | 1023 | G | Sld | | | | 1 | 1 | Sub-1 | Sub-1 | Sub-1 | Sub-1 |

Remarks:

| Relinquished | Date: | Time: | Relinquished | Date: | Time: | Relinquished | Date: | Time: |
|---|---|---|---|---|---|---|---|---|
| [signature] | 10/1/13 | 1150 | K. Middlekauff | 10/1/13 | 1330 ~~1700~~ | M. Janson | 10/1/13 | 1700 |
| **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** |
| K. Middlekauff | ↓ | ↓ | M. Janson ~~OnTrac~~ | ↓ | ↓ | ON TRAC | ↓ | ↓ |

[signature] 10/8/13 1410 [signature] 10/2/13 14:[illegible]

FGL **ENVIRONMENTAL**

**Special Subcontract to Babcock & Sons, Inc.**

www.fglinc.com

# CHAIN OF CUSTODY

Field Copy (3 of 3)

80777:03/04/2013

**TEST DESCRIPTION** - See Reverse side for Container, Preservative and Sampling information

Client: Fruit Growers Laboratory, Inc.
Address: FGL Environmental, Inc.
853 Corporation St.
Santa Paula, CA 93060-3005

Phone: (805)392-2039 Fax: (805)525-6264

Contact Person:

Project Name: CC1353751 - (8-769)

Purchase Order Number:

Quote Number: CC 20130220-01

Sampler(s): TE

Sampling Fee: ____ Pickup Fee: ____

Compositor Setup Date: __/__/__ Time: __/__

Lab Number:

| Samp Num | Location Description | Date Sampled | Time Sampled | Method of Sampling: Composite(C) Grab(G) | Type of Sample **SEE REVERSE SIDE** | Potable(P) Non-Potable(NP) Ag Water(AgW) | Bacti Type: Other(O) System(SYS) Source(SR) Waste(W) | Bacti Reason: Routine(ROUT) Repeat(RPT) Replace(RPL) Other(O) Special(SPL) | Sub Organic-EPA 8081 8oz(G) | | → ASSOCIATED W/ | ASSOCIATED W/ | ASSOCIATED W/ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PSL-1 | 10/11 | 0951 | G | Sld | | | | 1 | | | | | | | | |
| 2 | PSL-2 | V | 1025 | G | Sld | | | | 1 | | | | | | | | |
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Remarks:

| Relinquished | Date: | Time: | Relinquished | Date: | Time: | Relinquished | Date: | Time: |
|---|---|---|---|---|---|---|---|---|
| M Janson | 10/11/13 | 1700 | | | 1330 | M Janson | 10/11/13 | 1700 |
| **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** |
| ONTRAC | | | M Janson | | | ONTRAC | | |

10/12/13 1400

10/12/13 1400

FGL **ENVIRONMENTAL**

**Special Subcontract to Babcock & Sons, Inc.** www.fglinc.com

# CHAIN OF CUSTODY
Customer Copy (2 of 3)

80777:03/04/2013

Client: Fruit Growers Laboratory, Inc.
Address: FGL Environmental, Inc.
853 Corporation St.
Santa Paula, CA 93060-3005

Phone: (805)392-2039 Fax: (805)525-6264

Contact Person:

Project Name: CC1383751 - (8-769)

Purchase Order Number:

Quote Number: CC 20130220-01

Sampler(s) TE

Sampling Fee: ______ Pickup Fee: ______

Compositor Setup Date: __/__/__ Time: __/__

Lab Number:

TEST DESCRIPTION - See Reverse side for Container, Preservative and Sampling information

| Samp. Num | Location Description | Date Sampled | Time Sampled | Method of Sampling: Composite(C) Grab(G) | Type of Sample **SEE REVERSE SIDE** | Potable(P) Non-Potable(NP) Ag Water(AgW) | Bacti Type: Other(O) System(SYS) Source(SR) Waste(W) | Bacti Reason: Routine(ROUT) Repeat(RPT) Replace(RPL) Other(O) Special(SPL) | Sub Organic-EPA 8081 8oz(G) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PSL-1 | 10/11 | 0951 | G | Sld | | | | 1 | | | | | | | | | | |
| 2 | PSL-2 | ✓ | 1023 | G | Sld | | | | 1 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
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Remarks:

| Relinquished | Date: | Time: | Relinquished | Date: | Time: | Relinquished | Date: | Time: |
|---|---|---|---|---|---|---|---|---|
| R Dawson | 10/11/13 | 1700 | | | | | | |
| **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** | **Received By:** | **Date:** | **Time:** |
| ONTRAC | ✓ | ✓ | | | | | | |

[illegible] 10/11/13 1400 [illegible] 10/12/13 1400

**Corporate Offices & Laboratory**
853 Corporation Street
Santa Paula, CA 93060
TEL: 805/392-2000
FAX: 805/525-4172

**Office & Laboratory**
2500 Stagecoach Road
Stockton, CA 95215
TEL: 209/942-0182
FAX: 209/942-0423

**Office & Laboratory**
563 E. Lindo Avenue
Chico, CA 95926
TEL: 530/343-5818
FAX: 530/343-3807

**Office & Laboratory**
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: 805/783-2940
FAX: 805/525-4172

**Field Office**
Visalia, California
TEL: 559/734-9473
Mobile: 559/737-2399
FAX: 559/734-8435

# Santa Paula - Condition Upon Receipt (Attach to COC)

**Sample Receipt:**

1. Number of ice chests/packages received: 1
   Note as OTC if received over the counter unpackaged.
2. Were samples received in a chilled condition? Temps: 1 / ____ / ____ / ____ / ____
   Acceptable is 2° to 6° C. Also acceptable is received on ice (ROI) for the same day of sampling or received at room temperature (RRT) if sampled within one hour of receipt. Client contact for temperature failures must be documented below. If many packages are received at one time check for tests/H.T.'s/rushes/Bacti's to prioritize further review. Please notify Microbiology personnel immediately of bacti samples received.
3. Do the number of bottles received agree with the COC? Yes No N/A
4. Were samples received intact? (i.e. no broken bottles, leaks etc.) Yes No
5. Were sample custody seals intact? N/A Yes No

Sign and date the COC, obtain LIMS sample numbers, select methods/tests and print labels.

**Sample Verification, Labeling and Distribution:**

1. Were all requested analyses understood and acceptable? Yes No
2. Did bottle labels correspond with the client's ID's? Yes No
3. Were all bottles requiring sample preservation properly preserved? Yes No N/A FGL
4. VOAs checked for Headspace? Yes No N/A
5. Were all analyses within holding times at time of receipt? Yes No
6. Have rush or project due dates been checked and accepted? N/A Yes No

Attach labels to the containers and include a copy of the COC for lab delivery.

Sample Receipt, Login and Verification completed by (initials): CLD

**Discrepancy Documentation:**

Any items above which are "No" or do not meet specifications (i.e. temps) must be resolved.

1. Person Contacted: ______________________ Phone Number: ____________
   Initiated By: ______________________ Date: ____________
   Problem:

   Resolution:

2. Person Contacted: ______________________ Phone Number: ____________
   Initiated By: ______________________ Date: ____________
   Problem:

   Resolution:

(8-769)
Tenera Environmental
CC 1383751
IV-10/14/2013-10:45:11

# Appendix B

## Particle Size Analysis

### Copies of Original Laboratory Data Reports

Mr. Fred Steinert
Tenera Environmental
141 Suburban Road, Suite A-2
San Luis Obispo, CA 93401

October 17, 2013
File No.: SL-11150-TA
Doc. No.: 1310-034.LAB

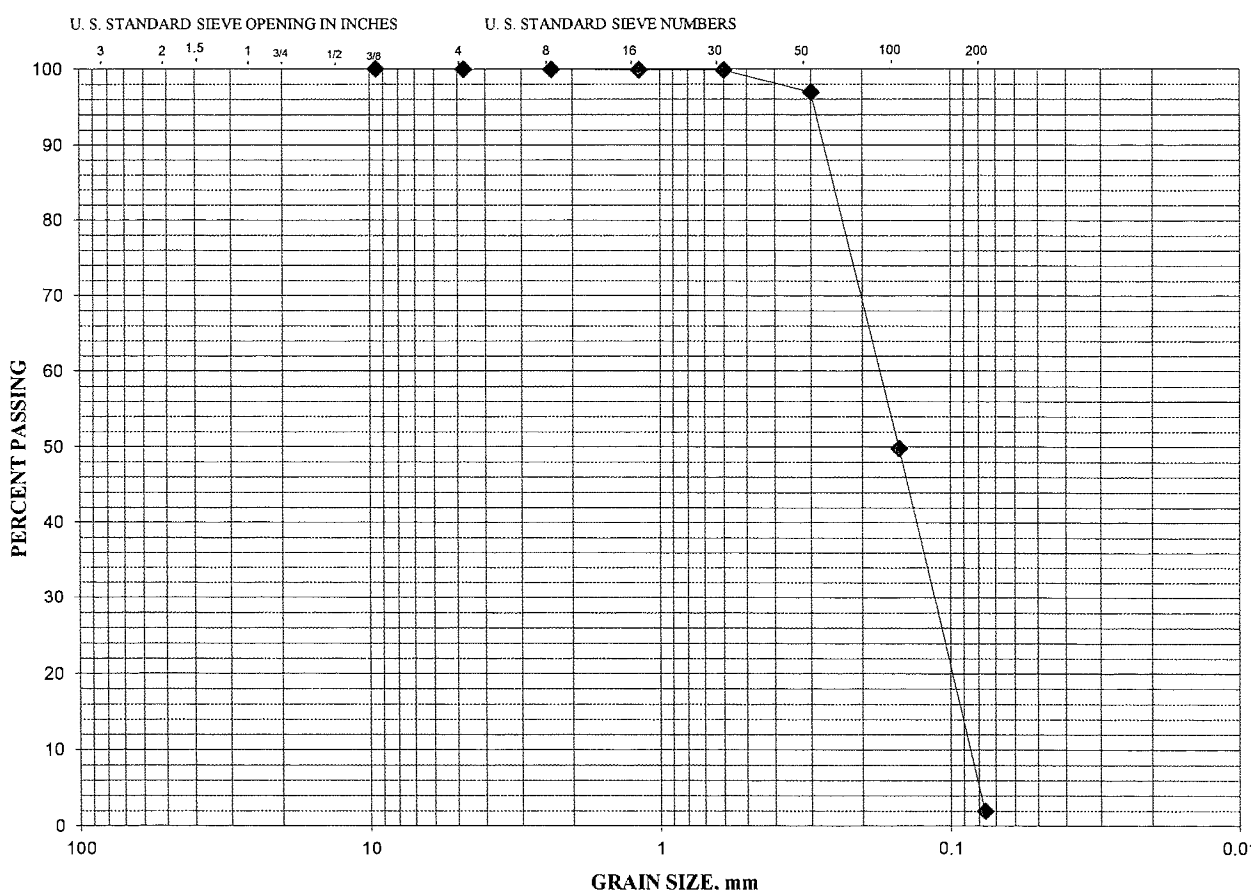
PROJECT: Project No. 122076-03

SAMPLE I.D.: DSP1

## PARTICLE SIZE ANALYSIS

ASTM D 422-63/07; D 1140-00/06

| Sieve size | % Retained | % Passing |
|---|---|---|
| 3/8" | 0 | 100 |
| #4 | 0 | 100 |
| #8 | 0 | 100 |
| #16 | 0 | 100 |
| #30 | 0 | 100 |
| #50 | 3 | 97 |
| #100 | 50 | 50 |
| #200 | 98.0 | 2.0 |



Mr. Fred Steinert
Tenera Environmental
141 Suburban Road, Suite A-2
San Luis Obispo, CA 93401

October 17, 2013
File No.: SL-11150-TA
Doc. No.: 1310-035.LAB

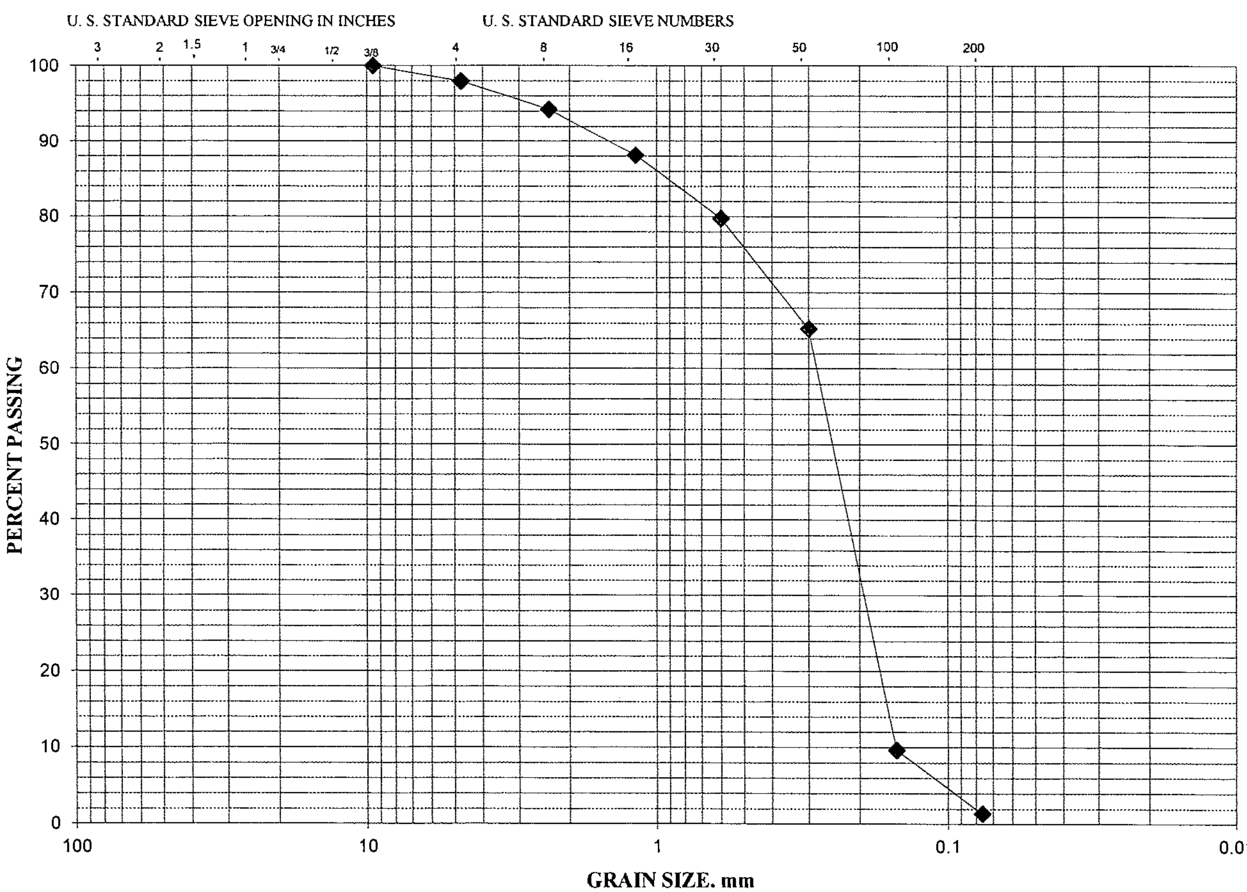
PROJECT: Project No. 122076-03

SAMPLE I.D.: DSP2

## PARTICLE SIZE ANALYSIS

ASTM D 422-63/07; D 1140-00/06

| Sieve size | % Retained | % Passing |
|---|---|---|
| 3/8" | 0 | 100 |
| #4 | 2 | 98 |
| #8 | 6 | 94 |
| #16 | 12 | 88 |
| #30 | 20 | 80 |
| #50 | 35 | 65 |
| #100 | 90 | 10 |
| #200 | 98.6 | 1.4 |



Mr. Fred Steinert
Tenera Environmental
141 Suburban Road, Suite A-2
San Luis Obispo, CA 93401

October 17, 2013
File No.: SL-11150-TA
Doc. No.: 1310-036.LAB

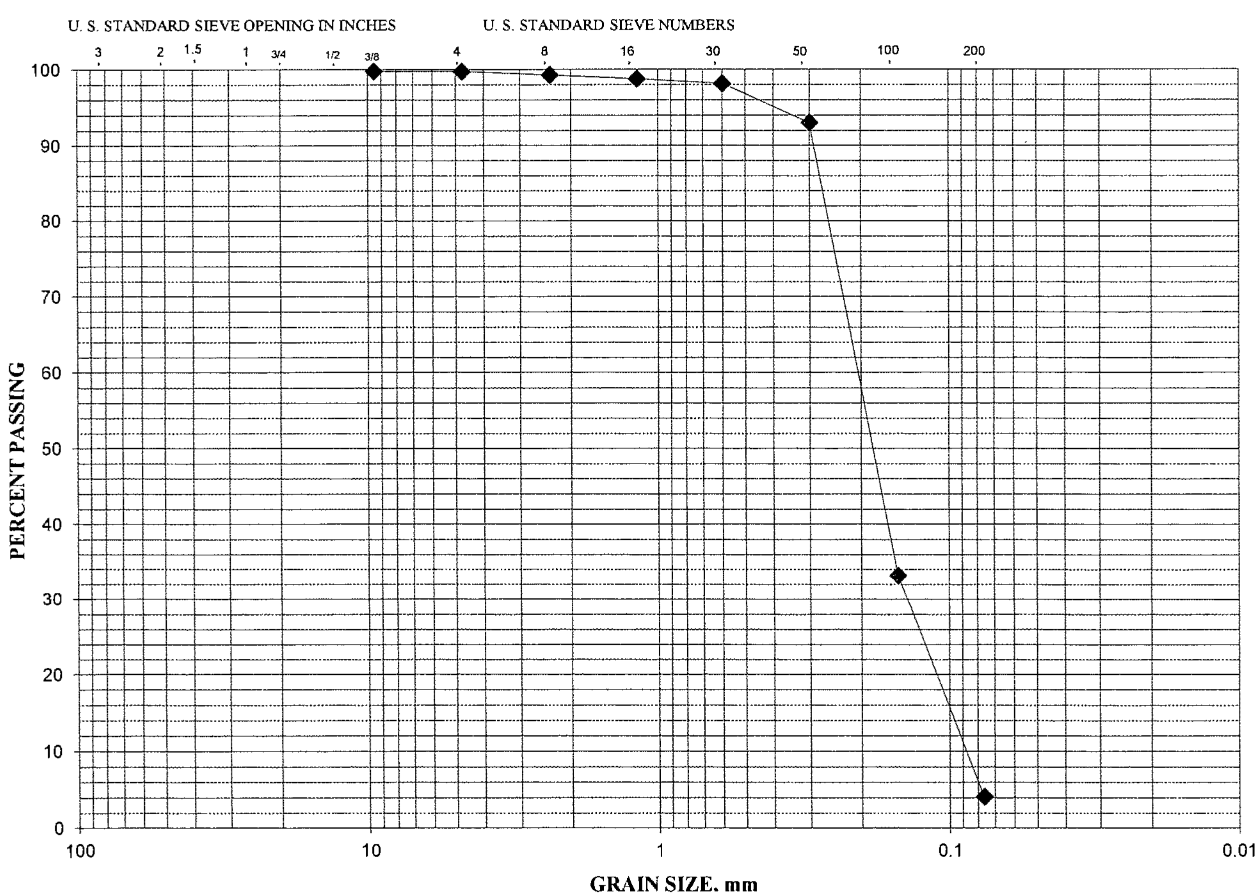
PROJECT: Project No. 122076-03

SAMPLE I.D.: PSL1

## PARTICLE SIZE ANALYSIS

**ASTM D 422-63/07; D 1140-00/06**

| Sieve size | % Retained | % Passing |
|---|---|---|
| 3/8" | 0 | 100 |
| #4 | 0 | 100 |
| #8 | 1 | 99 |
| #16 | 1 | 99 |
| #30 | 2 | 98 |
| #50 | 7 | 93 |
| #100 | 67 | 33 |
| #200 | 95.9 | 4.1 |



Mr. Fred Steinert
Tenera Environmental
141 Suburban Road, Suite A-2
San Luis Obispo, CA 93401

October 17, 2013
File No.: SL-11150-TA
Doc. No.: 1310-037.LAB

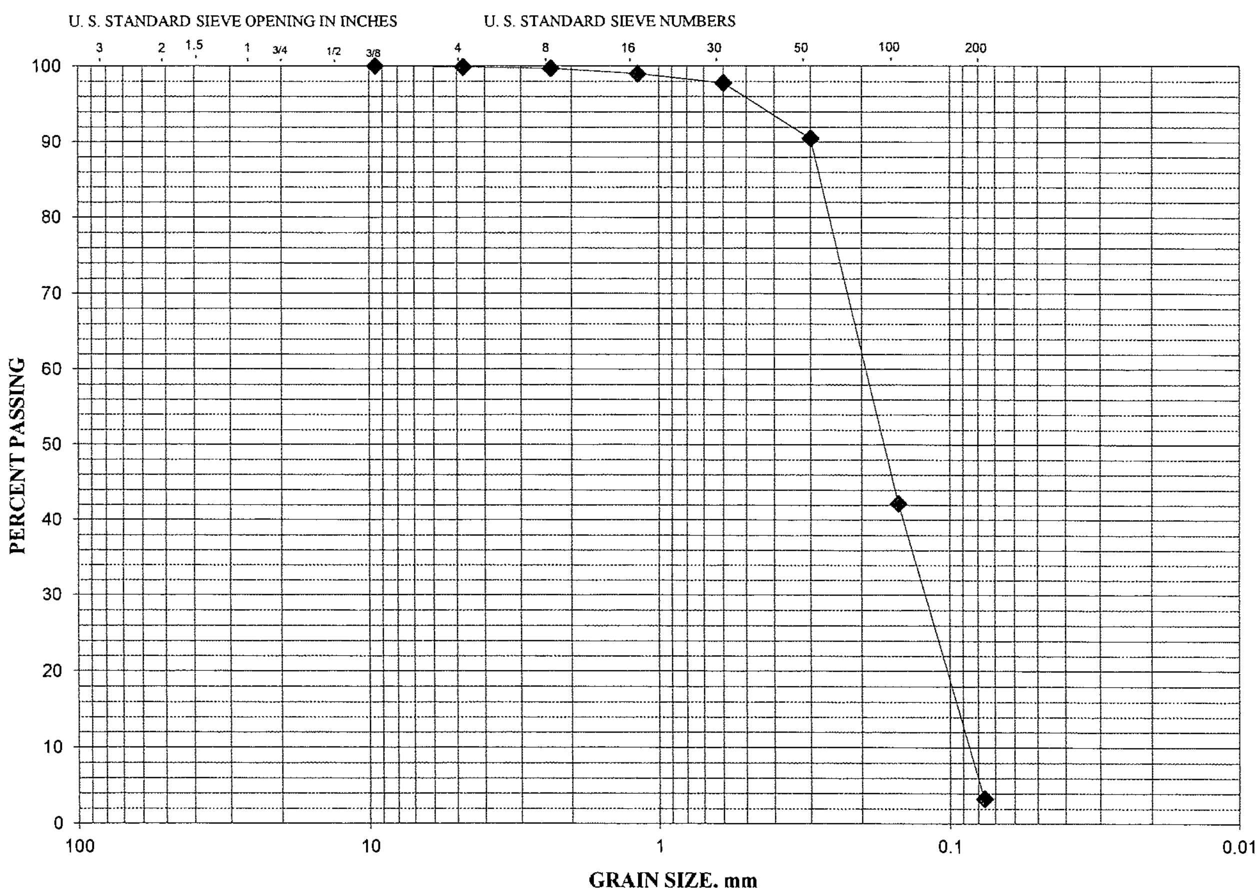
PROJECT: Project No. 122076-03

SAMPLE I.D.: PSL2

## PARTICLE SIZE ANALYSIS

ASTM D 422-63/07; D 1140-00/06

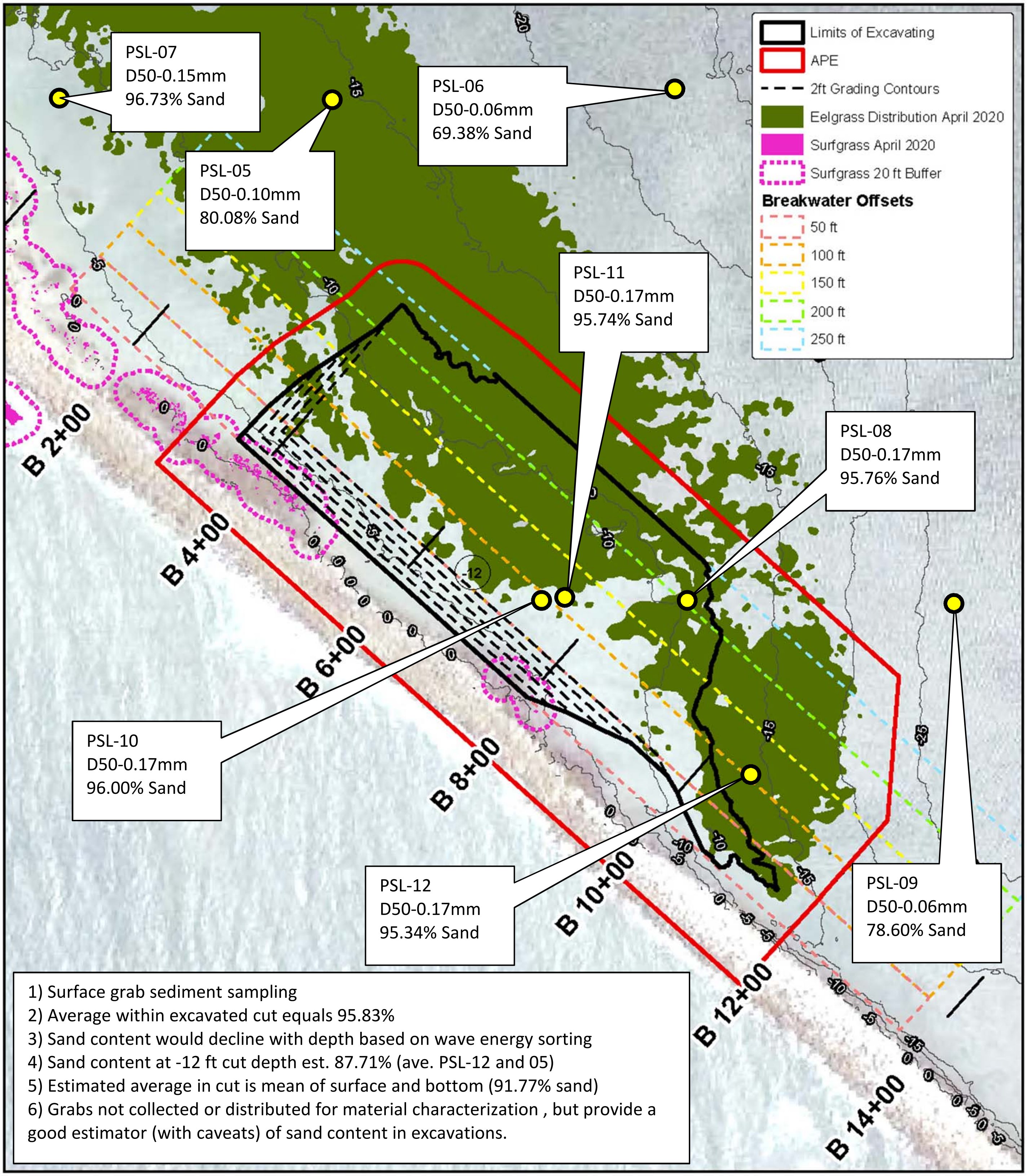
| Sieve size | % Retained | % Passing |
|---|---|---|
| 3/8" | 0 | 100 |
| #4 | 0 | 100 |
| #8 | 0 | 100 |
| #16 | 1 | 99 |
| #30 | 2 | 98 |
| #50 | 9 | 91 |
| #100 | 58 | 42 |
| #200 | 96.7 | 3.3 |



2020 Discount Grain Size Analyses and Figure, Port San Luis Harbor Breakwater O&M Repair
(Source: Eelgrass Mitigation and Monitoring Plan In Support Of The Port San Luis Breakwater Repairs Port San Luis, San Luis Obispo County, California, Merkel and Associates, 2020)

The data from surface grab samples that were gathered from within the eelgrass can be used to perform a ***discount*** weighted average grain size analysis. The results, when coupled with all other factors of littoral sediment source, lack of contaminant sources in the area, a general knowledge of the driver of accumulation being the breakwater, and the planned immediate area reuse, and believe it would support a Tier 1. To make use of the surface grab data to estimate the weighted sand percentage it is necessary to consider the energetics of the environment as part of the accumulation process and note that the sand content at depth will be lower than that at the surface of the dredge area. This is because the surface sediments in shallower water are exposed to greater swell and overtopping wave energy than would be the case if the site were deeper. Since the site was deeper and has filled with sand over time, it is expected that grain size and percent sand has risen with accumulation. To develop a volume based average sand content, Keith Merkel (Merkel and Associates) averaged the surface percent sand for the three samples taken within the dredge footprint (PSL 08, 10, and 11 = 95.83%) [Figure 2]. Keith Merkel then averaged the westerly sample PSL-12 (-14.65 ft) and the easterly PSL-05 (-14.33 ft) deeper samples as surrogates of what the percent sand may look like at the bottom of the cut (87.71%). This is expected to be a low percent sand estimate for two reasons. First both samples were taken deeper than the design cut and second, PSL-05 is much more protected and within eelgrass that would retain fines than would be the case in the proposed dredge footprint. This results in an estimated (91.77%) for volume weighting.

M&A #05-024-42




1) Surface grab sediment sampling
2) Average within excavated cut equals 95.83%
3) Sand content would decline with depth based on wave energy sorting
4) Sand content at -12 ft cut depth est. 87.71% (ave. PSL-12 and 05)
5) Estimated average in cut is mean of surface and bottom (91.77% sand)
6) Grabs not collected or distributed for material characterization , but provide a good estimator (with caveats) of sand content in excavations.

**Project Impact Area Seagrass**
Port San Luis Breakwater Repair Sections
San Luis Obispo County, California

**Figure 2**

Merkel & Associates, Inc.

# APPENDIX E

Cultural Resources

State of California • Natural Resources Agency
Gavin Newsom, *Governor*

**DEPARTMENT OF PARKS AND RECREATION**
**OFFICE OF HISTORIC PRESERVATION**
Armando Quintero, *Director*
Julianne Polanco, State Historic Preservation Officer
1725 23rd Street, Suite 100, Sacramento, CA 95816-7100
Telephone: (916) 445-7000 FAX: (916) 445-7053
calshpo.ohp@parks.ca.gov www.ohp.parks.ca.gov

March 25, 2021

In reply refer to: COE_2017_1221_001

Mr. Eduardo De Mesa
Chief, Planning Division
U.S. Army Corps of Engineers
Los Angeles District
915 Wilshire Boulevard, Suite 930
Los Angeles, California 90017-3489

Via Email

RE: Section 106 Consultation—Port of San Luis Breakwater Repair Project

Dear Mr. De Mesa,

The State Historic Preservation Officer (SHPO) is in receipt of your consultation letter dated March 3, 2021 regarding the above referenced project. The United States Army Corps of Engineers (COE) consults pursuant to Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 300101), as amended, and its implementing regulation found at 36 CFR § 800. The COE is consulting on a revision to the above referenced project that the SHPO consulted on previously via letters dated January 9, 2018 and February 20, 2018. The SHPO did not object to a finding of no historic properties affected in those letters.

The project that the COE proposes would reset and replace stones along the approximately 2,400-foot-long San Luis Breakwater located in San Luis Obispo Bay near the City of Pismo Beach, San Luis Obispo County, California. The project has since been revised to include eelgrass mitigation. To create the re-planting areas of eelgrass that would be disturbed, excavated project materials would be redeposited on recently established sediments and would not disturb original seafloor. No additional staging areas are necessary as the additional mitigation work will be conducted from a barge. No comments or concerns were received during consultation with Native American Tribes.

The COE provided a revised Area of Potential Effects (APE) map in Attachment A. No historic properties have been identified within the APE following a review of records at the Central Coast Information Center

The COE determines that no historic properties will be affected because of this undertaking and included the following document in support of its finding

Following review of your submittal, I offer the following comments:

- Pursuant to 36 CFR § 800.4(a)(1), **I do not object** to the APE as defined;
- Pursuant to 36 CFR § 800.4(b)(1), I find the efforts to identify historic properties within the APE to be reasonable and in good faith;
- Pursuant to 36 CFR § 800.4(d)(1), **I do not object** to a finding of no historic properties affected;

If you have any questions or concerns, please contact Associate State Archaeologist Brendon Greenaway at Brendon.Greenaway@parks.ca.gov.

Sincerely,

Julianne Polanco
State Historic Preservation Officer

# APPENDIX F

**Environmental Justice**

# EJSCREEN Report (Version 2020)

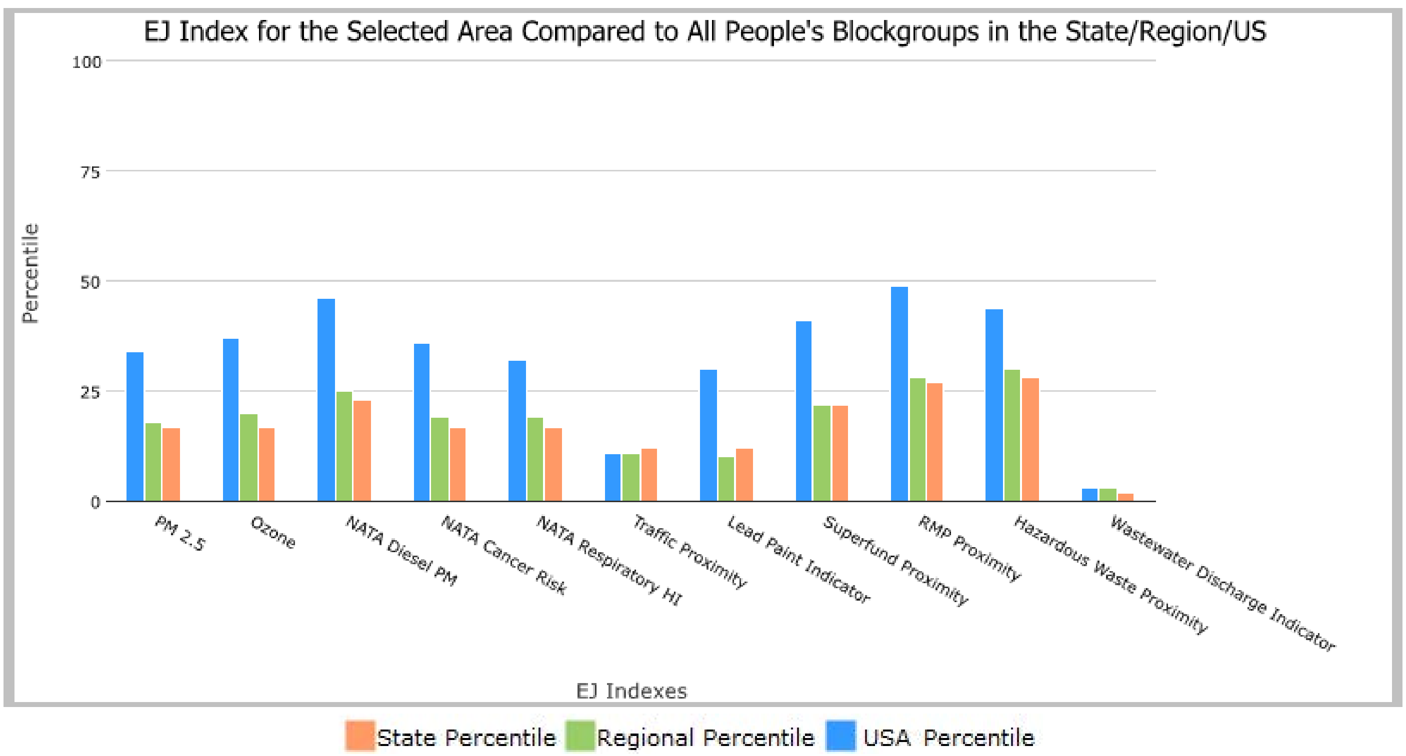
**3 miles Ring around the Corridor, CALIFORNIA, EPA Region 9**

**Approximate Population: 1,311**

**Input Area (sq. miles): 33.26**

**Port San Luis Breakwater Repair (The study area contains 1 blockgroup(s) with zero population.)**

| Selected Variables | State Percentile | EPA Region Percentile | USA Percentile |
|---|---|---|---|
| **EJ Indexes** | | | |
| EJ Index for PM2.5 | 17 | 18 | 34 |
| EJ Index for Ozone | 17 | 20 | 37 |
| EJ Index for NATA* Diesel PM | 23 | 25 | 46 |
| EJ Index for NATA* Air Toxics Cancer Risk | 17 | 19 | 36 |
| EJ Index for NATA* Respiratory Hazard Index | 17 | 19 | 32 |
| EJ Index for Traffic Proximity and Volume | 12 | 11 | 11 |
| EJ Index for Lead Paint Indicator | 12 | 10 | 30 |
| EJ Index for Superfund Proximity | 22 | 22 | 41 |
| EJ Index for RMP Proximity | 27 | 28 | 49 |
| EJ Index for Hazardous Waste Proximity | 28 | 30 | 44 |
| EJ Index for Wastewater Discharge Indicator | 2 | 3 | 3 |




This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

# EJSCREEN Report (Version 2020)

**3 miles Ring around the Corridor, CALIFORNIA, EPA Region 9**

**Approximate Population: 1,311**

**Input Area (sq. miles): 33.26**

**Port San Luis Breakwater Repair (The study area contains 1 blockgroup(s) with zero population.)**


| Sites reporting to EPA | |
|---|---|
| Superfund NPL | 0 |
| Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) | 0 |

# EJSCREEN Report (Version 2020)

**3 miles Ring around the Corridor, CALIFORNIA, EPA Region 9**

**Approximate Population: 1,311**

**Input Area (sq. miles): 33.26**

**Port San Luis Breakwater Repair (The study area contains 1 blockgroup(s) with zero population.)**

| Selected Variables | Value | State Avg. | %ile in State | EPA Region Avg. | %ile in EPA Region | USA Avg. | %ile in USA |
|---|---|---|---|---|---|---|---|
| **Environmental Indicators** | | | | | | | |
| Particulate Matter (PM 2.5 in µg/m$^3$) | 7.4 | 10.6 | 5 | 9.99 | 13 | 8.55 | 18 |
| Ozone (ppb) | 34.2 | 49.2 | 11 | 50.1 | 8 | 42.9 | 8 |
| NATA* Diesel PM (µg/m$^3$) | 0.124 | 0.467 | 5 | 0.479 | <50th | 0.478 | <50th |
| NATA* Cancer Risk (lifetime risk per million) | 24 | 36 | 6 | 35 | <50th | 32 | <50th |
| NATA* Respiratory Hazard Index | 0.37 | 0.55 | 7 | 0.53 | <50th | 0.44 | <50th |
| Traffic Proximity and Volume (daily traffic count/distance to road) | 720 | 2000 | 42 | 1700 | 51 | 750 | 75 |
| Lead Paint Indicator (% Pre-1960 Housing) | 0.13 | 0.29 | 42 | 0.24 | 50 | 0.28 | 44 |
| Superfund Proximity (site count/km distance) | 0.026 | 0.17 | 13 | 0.15 | 18 | 0.13 | 23 |
| RMP Proximity (facility count/km distance) | 0.06 | 1.1 | 1 | 0.99 | 4 | 0.74 | 6 |
| Hazardous Waste Proximity (facility count/km distance) | 0.13 | 6.2 | 4 | 5.3 | 6 | 5 | 18 |
| Wastewater Discharge Indicator (toxicity-weighted concentration/m distance) | 0.58 | 18 | 87 | 18 | 88 | 9.4 | 93 |
| **Demographic Indicators** | | | | | | | |
| Demographic Index | 12% | 47% | 1 | 46% | 2 | 36% | 11 |
| People of Color Population | 16% | 62% | 4 | 60% | 6 | 39% | 32 |
| Low Income Population | 7% | 33% | 7 | 33% | 7 | 33% | 7 |
| Linguistically Isolated Population | 0% | 9% | 17 | 8% | 20 | 4% | 45 |
| Population With Less Than High School Education | 1% | 17% | 6 | 16% | 6 | 13% | 7 |
| Population Under 5 years of age | 1% | 6% | 5 | 6% | 6 | 6% | 6 |
| Population over 64 years of age | 47% | 14% | 99 | 14% | 98 | 15% | 98 |

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

For additional information, see: www.epa.gov/environmentaljustice

# APPENDIX G

**Distribution List**

National Marine Fisheries Service

U.S. Fish and Wildlife Service, Ventura Field Office

California Department of Fish & Wildlife

United States Coast Guard (USCG), 11th Coast Guard District

US Environmental Protection Agency, Region 9

National Park Service, Channel Islands National Park

California Coastal Commission

California Regional Water Quality Control Board, Central Coast, Region 3

State Lands Commission

State Historic Preservation Officer

California State Parks (Parks and Recreation)

County of San Luis Obispo Parks and Recreation

California Natural Resources Agency

California State Clearinghouse

California Division of Boating and Waterways

Native American Heritage Commission

California Department of Transportation (CALTRANS)

Santa Barbara County Air Pollution Control District

San Luis Obispo County Air Pollution Control Board

San Luis Obispo County Public Works Department

Port San Luis Harbor District

Coastal Band of the Chumash Nation

Santa Ynez Band of Chumash Indians

Barbareno/Ventureno Band of Mission Indians

Salinan Tribe of Monterey

Salinan Tribe of Monterey and San Luis Obispo Counties

Xolon-Salinan Tribe

Chumash Tribe

Northern Chumash Tribal Council

Barbareno/Ventureno Band of Mission Indians

Xolon-Salinan Tribe

Diablo Canyon Power Plant

San Luis Obispo Board of Supervisors

City of Morro Bay

Mojave Desert Air Quality Management District

South Coast Air Quality Management District

Ventura County Air Pollution Control District

Sea Otter Savvy

The Marine Mammal Center

Surfrider Foundation San Luis Obispo Chapter