

## Biological Survey of Los Angeles and Long Beach Harbors - Scope of Work

**Task 1 Physical Characteristics:** Temperature, salinity dissolved oxygen, pH, and transparency will be sampled at 16 stations in each harbor (32 in total) during spring, summer and winter sampling events to correspond with other sampling activities.

**Task 2 Benthos:** Benthic data will be collected in concert with the Greater Harbor Waters Toxics TMDL Regional Monitoring Coalition (RMC) monitoring efforts that will occur under separate contract in 2018. Under this contract, results from these other efforts will be incorporated into the final report. Coordination and QC efforts are necessary to incorporate a benthos chapter from a third party consultant.

**Task 3 Riprap Biota:** Riprap biota, including invertebrates and algae, will be sampled via scraped quadrats at three tide levels. Four locations in each harbor (eight in total) will be sampled. Sampling locations will be a subset of kelp transect stations. Analyses will include, at a minimum, abundance and biomass per square meter, appropriate measures of biodiversity, and taxonomic composition of the biota. Photo quadrat sampling will be used prior to scrape sampling.

**Task 4 Fish:** Pelagic and demersal fish will be sampled at 13 stations/zones in each harbor (26 in total) using lampara net and otter trawl, respectively. Samples will be collected at both night and day. Sampling and measurement protocols should be equivalent to those used in the 2013-2014 Biological Surveys of Long Beach and Los Angeles Harbors (2013-14 Surveys) which can be found at the following link: [https://www.portoflosangeles.org/environment/wildlife\\_habitat.asp](https://www.portoflosangeles.org/environment/wildlife_habitat.asp). In addition, beach seine will be used at two beach locations in the Port of Los Angeles (see Task 5). In some cases, fish sampled from these efforts may be supplied to the RMC sampling effort.

**Task 5 Beach Seines:** Beach seine sampling will be conducted at two stations in the Port of Los Angeles: Cabrillo Beach north of the boat launch ramp and the Pier 300 shallow-water habitat. Beach seine sampling will be conducted during the day and include two hauls per station. Sampling should include any juvenile fish and small forage fish, present at the time of sampling. Presence of other organisms should be noted.

**Task 6 Ichthyoplankton:** Ichthyoplankton sampling will occur in spring, summer and winter at 13 stations in each harbor (26 in total). Samples will be collected in coordination with other sampling efforts at neuston, mid-water, and epibenthic levels. Ichthyoplankton should be collected at night only and should be identified to the lowest taxonomic level possible.

**Task 7 Kelp and Macroalgae:** The distribution of kelp and macroalgal communities throughout the harbor area will be measured using aerial photographs. Diver surveys will occur at 10 stations per harbor (20 in total) and provide a characterization of the species composition and vertical distribution of macroalgal communities. In addition, fish and macroinvertebrate species observed in the kelp beds will be noted and reported. Kelp and macroalgae analyses will describe abundance and aerial extent by species. At the 8 stations concurrent with riprap sampling, photo quadrat sampling will be used to identify additional sessile species (native and non-native).

**Task 8 Eelgrass:** The extent of eelgrass beds will be determined at the start and end of the growing season using methods equivalent to those used in the 2013-2014 Survey and consistent with regional monitoring efforts. Sampling surveys will be conducted to capture initiation of the growing season. Acoustic surveys of all shorelines and waters shallower than -30 feet MLLW within the Port Complex shall be conducted during both surveys. Acoustic records of eelgrass should be confirmed by diver and Remotely Operated Vehicle (ROV) surveys.

**Task 9 Birds:** The harbor will be divided into areas similar to those in the 2013-14 Surveys. Surveys will be completed once a month and at a minimum include number of individuals, activity (e.g., feeding, roosting, etc.) and location of activity (e.g., water, riprap, piling, etc.).

Analyses will include number of species, breeding birds, and seasonal and spatial distribution.

**Task 10 Marine Mammals:** During bird surveys of the harbor (Task 9), data will be collected on sightings of marine mammals. Methods used in the 2013-14 Surveys should be employed and include species identification, survey zone, count of individuals, and incidental observations regarding activity, specific habitat use, gender, etc.

**Task 11 Non-Native Species:** The data produced by this survey will be evaluated to identify the presence of non-native species in the harbor complex and will be presented in its own chapter. These data will be placed into historical context through comparison to previous surveys.

**Task 12 Photography:** Above and underwater photographs will be taken during sampling events in both harbors by an experienced photographer. The primary goal is to focus on the biota, in situ when possible, for use in public outreach efforts by the ports. Photographs will also document the sampling process and be used in the report. All photographs will be provided to both ports in high-resolution electronic format.

**Task 13 Habitat Comparison:** Statistical comparisons (cluster analyses, etc.) will be made to determine whether patterns exist among stations with similar characteristics; for example, shallow-water habitats, inner and outer harbor areas, slips, and the main channels. Data collected as part of the proposed study will be placed into context with data and historic summary presented in previous surveys. Comparisons should address, at a minimum, abundance and diversity of fish, ichthyoplankton, and benthic community samples.

**Task 14 Reporting:** Develop Sampling and Analysis Plan for all sampling tasks; Present data and analyses in a spatial context; Data and report QA/QC; Interim reports: a brief summary of the results of each sampling event, provided within 1 week of completing the sampling event; Administrative draft report (text must be provided in Word); Draft Report (text must be provided in Word); Screen-check draft (text must be provided in Word); Final report: 2 hard copies per port (4 in total), and electronic files in Word and PDF format; All final reports, text files, graphics, maps (including shape files compatible with GIS), photographs and data, including raw data and output of statistical analyses, will be provided in native format to both ports on an external hard drive or similar; and summary presentation in PowerPoint.

**Task 15. Meetings:** All meetings will be conducted with the project manager from each port present. Assume 10 meetings with attendance of the Consultant project manager and key task leaders for post-award, pre-survey, post-analyses, pre-writing, report review, agency summary and wrap-up meetings.