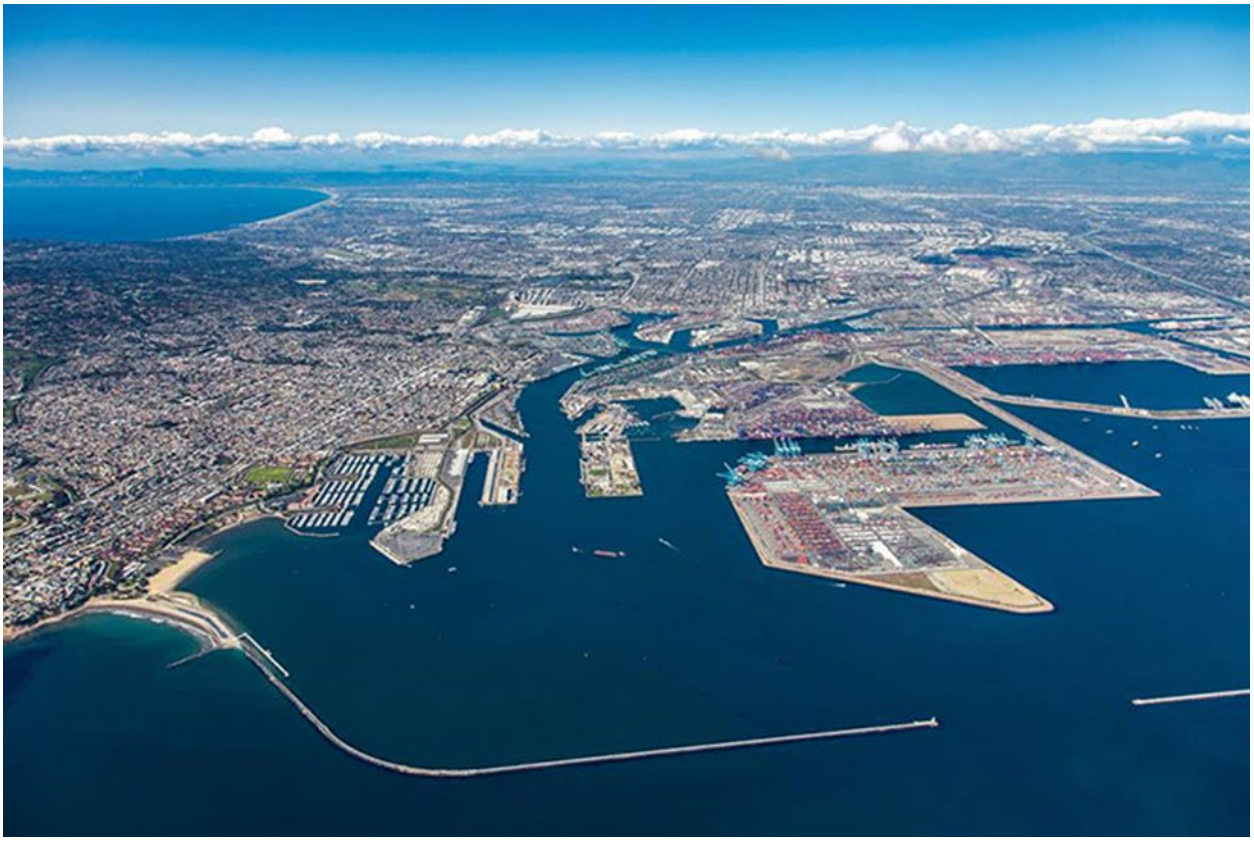
RECONSIDERATION OF THE DOMINGUEZ CHANNEL AND GREATER LOS ANGELES AND LONG BEACH HARBOR WATERS TOXIC POLLUTANTS TMDL- STAFF REPORT



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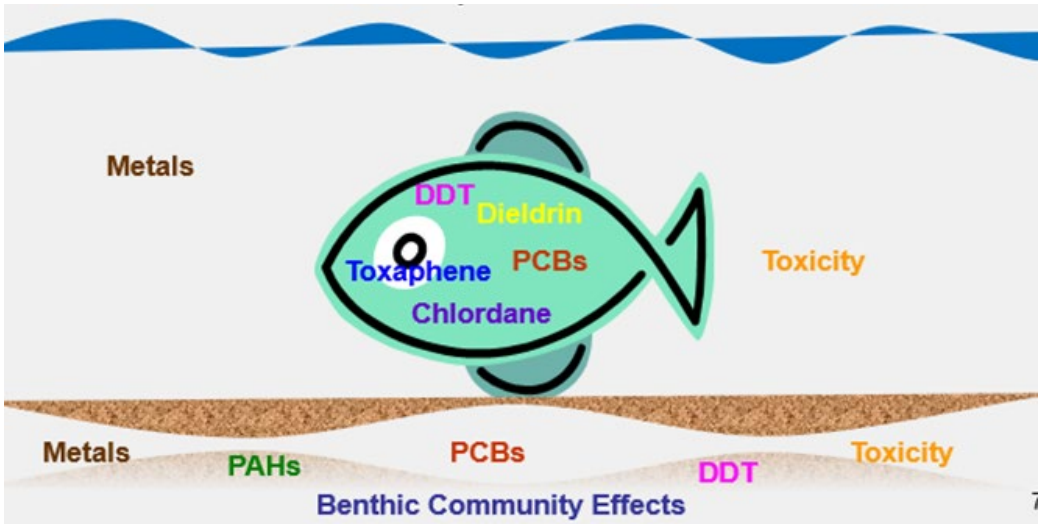
1 Executive Summary

This Staff Report includes recommendations for revisions to the Total Maximum Daily Load (TMDL) for Toxic Pollutants in Dominguez Channel and the Greater Los Angeles and Long Beach Harbor Waters (DC and Greater Harbor Waters TMDL).

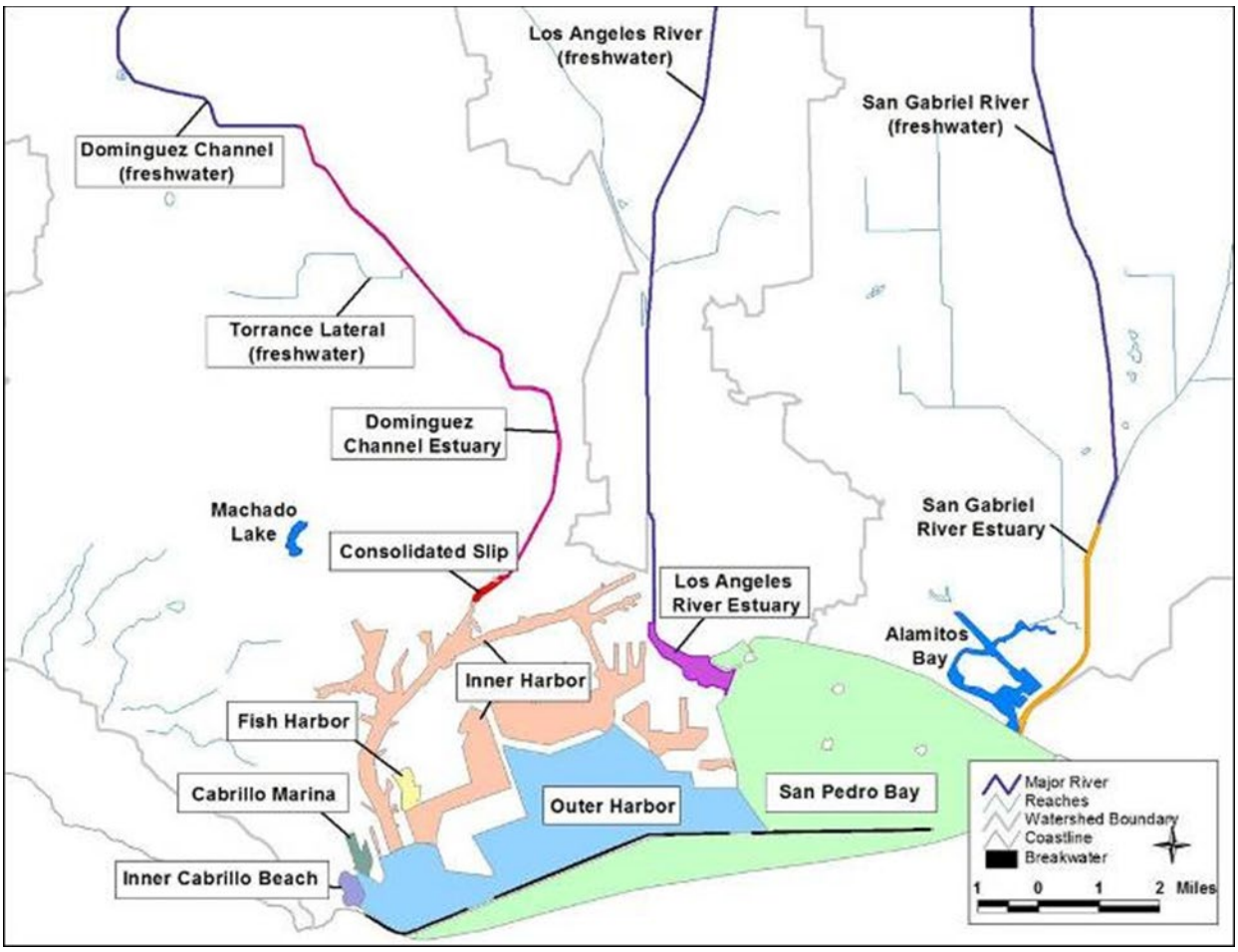
The DC and Greater Harbor Waters TMDL was originally established in 2012 (2012 DC and Greater Harbor Waters TMDL). It addressed 79 impairments in waterbodies of the Dominguez Channel and Los Angeles and Long Beach Harbors watersheds (RWQCB and USEPA, 2011). The TMDL addressed impairments in the water column, sediment, and fish tissue; impairments included metals, PAHs and chlorinated organic compounds. The most significant impairments addressed were the chlorinated organic compounds, DDT and PCBs, in sediments and fish tissue.

Figure 1 Impairments in the Greater Harbor Waters



The 2012 DC and Greater Harbor Waters TMDL included waterbodies in the Dominguez Channel and Los Angeles and Long Beach Harbors watersheds, including Dominguez Channel, the Dominguez Channel Estuary, Torrance Lateral Channel, Inner and Outer Harbor, Main Channel, Consolidated Slip, Southwest Slip, Fish Harbor, Cabrillo Marina, Inner Cabrillo Beach, Los Angeles River Estuary, and San Pedro Bay. The TMDL identified two 'hot spots' of contamination in the Los Angeles Harbor, Consolidated Slip and Fish Harbor.

Figure 2 Waters included in the 2 012 DC and Greater Harbor Waters TMDL



Many species of fish in the Los Angeles region are contaminated with DDT and PCBs. The State of California's Office of Environmental Health and Hazard Assessment (OEHHA) 2009 fish consumption advisory (OEHHA, 2009) recommends restricting the consumption of several fish species from local waters. OEHHA added more species of fish to the *do not eat* list in 2011. Per OEHHA, no white croaker, black croaker, topsmelt, barred sand bass, and barracuda caught in the Greater Harbor Waters should be eaten. The contaminated fish may also negatively affect the health of marine mammals and fish-eating birds.

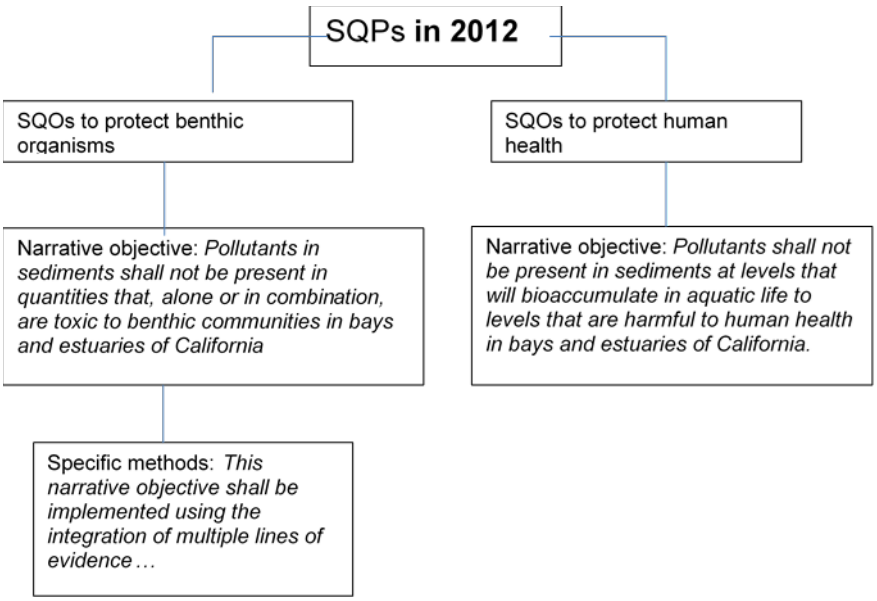
Figure 3 Public Health Warning Based on OEHHA Fish Advisory

The current effective Sediment Quality Provisions of the Water Quality Control Plan for Enclosed Bays and Estuaries of California (SQPs) include two separate types of Sediment Quality Objectives (SQOs):

1. SQOs to protect benthic organisms living in the sediment which use three lines of evidence (chemistry, toxicity, and benthic community structure) to determine if the sediment quality meets the objective, and
2. SQOs to protect human health by determining if pollutant concentrations in fish tissue are acceptable for human consumption and relating those concentrations to fish exposure to the pollutant in the sediment to determine if the sediment quality meets the objective (SWRCB, 2018).

When the 2012 DC and Greater Harbor Waters TMDL was adopted, the SQPs effective at the time included a narrative objective and specific methods to determine numeric SQOs to protect benthic organisms. However, while the established SQPs did include narrative SQOs to protect human health, specific methods to determine the SQOs to protect human health were not yet established.

Figure 4 Sediment Quality Provision in 2012



When the State Water Resources Control Board (State Water Board) approved the 2012 DC and Greater Harbor Waters TMDL, it also directed State Water Board staff to update the SQPs effective at the time, particularly for the protection of human health through fish consumption. The updated SQPs, including methods to determine the SQO to protect human health and additional implementation guidance for the benthic organism SQOs were adopted by the State Water Board in 2018 and became effective in 2019.

The 2012 DC and Greater Harbor Waters TMDL incorporated the benthic organism SQOs, per the methods in the SQPs, with several 'compliance options' allowing responsible parties to demonstrate compliance with the TMDL by demonstrating they are meeting their assigned allocations, *or* the sediments are meeting the SQOs.

The 2012 DC and Greater Harbor Waters TMDL incorporated the human health SQOs, using a fish-sediment bioaccumulation model, with several 'compliance options' allowing responsible parties to demonstrate compliance with the TMDL by demonstrating they are meeting their assigned allocations, *or* the fish tissue is meeting fish contaminant goals.

During the years since the State Water Board approved the 2012 DC and Greater Harbor Waters TMDL, the Port of Los Angeles and Port of Long Beach, coordinating closely with Los Angeles Water Board staff and State Water Board staff and other stakeholders, conducted several special studies to develop information to support revisions to the TMDL and to support the State Water Board's update of the SQPs.

This TMDL revision incorporates the updated, currently effective SQPs, including the updated methods for the SQOs to protect human health, and makes several other updates to the TMDL based on results of special studies conducted by the Port of Los Angeles and Port of Long Beach. Specifically, the revisions include:

- Update of the options for demonstrating TMDL compliance with human health SQOs;

- Update of the method for demonstrating compliance with the benthic organism SQO by specifying the spatial requirements;
- Expansion of the source assessment and linkage analysis;
- Revision of the implementation schedule in order to add specific requirements for the human health SQOs;
- Revision of the implementation schedule to include a specified schedule for remediation of identified contaminant hot spots; and
- Other changes for clarification and editorial corrections.

However, most of the elements of the 2012 TMDL are not proposed for changes. Because the fundamental technical elements of the TMDL are not recommended for change, additional peer review (California Health and Safety Code section 57004) is not required.

This Staff Report:

- Reviews TMDLs and the development of this TMDL, including regulatory history and key elements of the 2012 TMDL; current conditions; and implementation progress (section 2);
- Reviews the updates to the SQPs and the Greater Harbor Waters-specific methods for implementing the SQPs in the Los Angeles and Long Beach Harbors (section 3); and
- Reviews proposed changes to the 2012 TMDL (section 4).

2 TMDL Background

2.1 TMDLs

Section 303(d) of the Clean Water Act (CWA) requires that "Each State shall identify those waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality standard applicable to such waters." The CWA also requires states to establish a priority ranking for waters on the 303(d) list of impaired waters and establish TMDLs for such waters.

The elements of a TMDL are described in 40 CFR 130.2 and 130.7 and Section 303(d) of the CWA, as well as in the U.S. Environmental Protection Agency guidance (U.S. EPA, 2002). A TMDL is defined as the "sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background" (40 CFR 130.2) such that the capacity of the waterbody to assimilate pollutant loadings (the Loading Capacity) is not exceeded. TMDLs are also required to account for seasonal variations and include a margin of safety to address uncertainty in the analysis.

States must develop water quality management plans to implement the TMDL (40 CFR 130.6). The U.S. EPA has oversight authority for the 303(d) program and is required to review and either approve or disapprove the TMDLs submitted by states. If the U.S. EPA disapproves a TMDL submitted by a state, U.S. EPA is required to establish a TMDL for that waterbody.

2.1.1 Element of a TMDL

There are eight elements of a TMDL. The elements are:

1. Problem Identification. This element identifies those beneficial uses that are not supported by the waterbody; the water quality objectives (WQOs) designed to protect those beneficial uses; and summarizes the evidence supporting the decision to list each reach, such as the number and severity of exceedances observed. The Problem Identification, review of data used to add the waterbodies to the 303(d) list, beneficial uses to be protected, and detailed environmental setting are described in the 2012 DC and Greater Harbor Waters TMDL staff report and respective amendment to the Los Angeles Region's Water Quality Control Plan (Basin Plan) (RWQCB and U.S. EPA, 2011a) (RWQCB and U.S. EPA, 2011b) at (Los Angeles Water Quality Control Board TMDL Program) and are not repeated, herein.

2. Numeric Targets. This element expresses the desired condition of the water body to protect beneficial uses and defines target(s) necessary to meet numeric or narrative water quality standards. The numeric targets for this TMDL are discussed in detail in the 2012 DC and Greater Harbor Waters TMDL staff report and are reviewed briefly in Section 2.3.

3. Source Assessment. This element assesses the relative contributions of different pollutant sources or causes. The source assessment for this TMDL is discussed in detail in the 2012 DC and Greater Harbor Waters TMDL staff report and an additional source assessment for PCBs is included in Section 4.3.

4. Linkage Analysis. This element describes the relationship between numeric target(s) and sources and estimates the ability of the water body to assimilate the pollutant. The linkage analysis for this TMDL is discussed in detail in the 2012 DC and Greater Harbor Waters TMDL staff report and the Linkage Analysis is further developed with additional water quality modeling conducted by the Port of Los Angeles and Long Beach discussed in Appendices A and B.

5. Pollutant Allocations. This element allocates responsibility for pollutant reduction. Allocations may be specific to municipalities, agencies or persons, or general by source category or sector. The sum of individual allocations must equal the total allowable pollutant level. Allocations are designed such that the waterbody will not exceed numeric targets for any of the compounds or related effects. Allocations are based on critical conditions, so that the allocated pollutant loads may be expected to correct the impairments at all times. Allocations may be Waste Load Allocations (WLA) for point sources or Load Allocations (LA) for non-point sources. The allocations for this TMDL are discussed in detail in the 2012 DC and Greater Harbor Waters TMDL staff report and Section 2.4. Allocations are not proposed for revision, but methods of demonstrating compliance with some allocations are proposed for revision and discussed in Section 3.

6. Margin of Safety. This element accounts for uncertainty associated with calculating pollutant loads and their impact on water quality. The margin of safety may be implicit (e.g., through use of conservative assumptions) or explicit (e.g., by assigning a margin of safety such as 10% to a specific allocation). The margin of safety for this TMDL is achieved through conservative assumptions and is discussed in detail in the 2012 DC and Greater Harbor Waters TMDL staff report.

7. Implementation. This element details pollution prevention, control, and restoration actions, responsible parties; and schedules necessary to attain water quality standards. The implementation strategy describes the plans, regulatory tools, or other mechanisms by which the allocations are to be achieved. The implementation for this TMDL is discussed in detail in the 2012 DC and Greater

Harbor Waters TMDL staff report. No revisions to implementation methods will be required due to the proposed revisions to the TMDL, but additional suggested actions for PCB control are discussed in Section 4.2 and proposed revisions to the implementation schedule are in Section 4.6.

8. Monitoring. This element describes the monitoring strategy that will be used to evaluate the effectiveness of the TMDL and a schedule for reviewing and, if necessary, revising the TMDL and associated implementation elements. Monitoring for this TMDL is discussed in detail in the 2012 DC and Greater Harbor Waters TMDL staff report and updates to the monitoring requirements are included in Section 4.5.

2.1.2 TMDL Reconsiderations

While the Los Angeles Water Board has the authority to amend the Basin Plan to revise a TMDL at any time, TMDLs adopted by the Los Angeles Water Board have often included scheduled "reconsiderations" at a specific point during implementation. Specific reconsiderations are included so that aspects of the TMDL can be re-evaluated and adjusted based on anticipated new data and information. The 2012 DC and Greater Harbor Waters TMDL provided for a scheduled reconsideration of certain portions of the TMDL based on information collected in several special studies and monitoring that were part of the TMDL implementation. This allowed the Los Angeles Water Board to establish the 2012 DC and Greater Harbor Waters as required, including all necessary elements, while acknowledging and planning for the potential benefit to refining certain elements of the TMDL after additional studies and data collection were completed.

2.2 Regulatory History of SQOs and the 2012 DC and Greater Harbor Waters TMDL

2.2.1 2009 and 2011 Sediment Quality Objectives

In 2003, the State Water Board initiated a program to develop SQOs for toxic pollutants in enclosed bays and estuaries. The State Water Board adopted the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality on September 16, 2008, that became effective on August 25, 2009. This was referred to as the "SQO Part 1". The adopted SQOs used multiple lines of evidence to integrate chemistry, toxicity, and the condition of the benthic community to determine sediment quality for benthic organisms. The adopted SQOs also established a narrative SQO for human health.

On April 6, 2011, the State Water Board adopted amendments to the SQOs to add a narrative SQO for the protection of wildlife and resident finfish and other minor revisions which became effective on June 8, 2011.

2.2.2 2012 DC and Greater Harbor Waters TMDL and State Board Directions

The 2012 DC and Greater Harbor Waters was developed by the Los Angeles Water Board and U.S. EPA and adopted by the Los Angeles Water Board on May 5, 2011. The TMDL was subsequently approved by the State Water Board on February 7, 2012, the Office of Administrative of Law on March 21, 2012, and the U.S. EPA on March 23, 2012. The effective date of the TMDL is March 23, 2012.

The 2012 DC and Greater Harbor Waters TMDL was developed to address impairments in Dominguez Channel and Greater Harbor Waters[1] due to heavy metals and organic pollutants in one or more

[1] Dominguez Channel includes the Dominguez Channel Estuary and Torrance Lateral Channel, and Greater Los Angeles/Long Beach Harbor waters include Inner and Outer Harbor, Main Channel, Consolidated Slip, Southwest Slip, Fish Harbor, Cabrillo Marina, Inner Cabrillo Beach, Los Angeles River Estuary, and San Pedro Bay.

environmental media - water, sediments, or fish tissue. These water bodies are included on the State's Clean Water Act 303(d) impaired waters list for one or more of the following pollutants: cadmium, chromium, copper, mercury, lead, zinc, chlordane, dieldrin, toxaphene, DDT, PCBs, certain PAH compounds, benthic community effects and toxicity. The implementation schedule of the TMDL included a TMDL reconsideration in year 6 of implementation based on new policies, data or special studies. The 2012 DC and Greater Harbor Waters TMDL incorporated the 2008 and 2011 SQOs.

When the State Water Board approved the TMDL on February 7, 2012, the State Water Board also directed State Water Board staff to prioritize development of the assessment methodology to support implementation of the SQOs to protect human health as Part 2 of the State's SQOs, for consideration by the State Water Board (State Water Board Resolution No. 2012-0008). This was referred to as "SQO Part 2". The State Water Board also directed the Los Angeles Water Board to carefully review and evaluate the results of special studies on foraging ranges of resident species and the linkages between pollutant concentrations in targeted species and sediment concentrations, including bioaccumulation dynamics, before reconsidering the waste load allocation and load allocations (including allocations assigned to existing bed sediments) necessary to achieve fish tissue targets.

2.2.3 2018 Sediment Quality Provisions Update

State Water Board staff, as directed, worked closely with the Los Angeles Water Board, the Southern California Coastal Water Research Project (SCWRP), a Sediment Quality Objectives Advisory Committee made up of stakeholders throughout the state, and the Harbor Technical Working Group made up of Los Angeles Region local stakeholders to revise the SQPs that were effective at the time. The collaborative work resulted in the development of site-specific data and an analysis of the Greater Harbor Waters as a 'test case' for the application and implementation of the SQO for human health protection. A detailed description of the SQO application and implementation for the Greater Harbor Waters is included in Section 3.

On June 5, 2018, the State Water Board adopted the Amendment to the Water Quality Control Plan for Enclosed Bays and Estuaries –Sediment Quality Provisions under Resolution No. 2018-0028 (2018 SQPs) to address the application and implementation of the two SQOs. This includes the application and implementation of the SQO protecting benthic organisms from direct exposure to pollutants in sediment which was included in the 2008 SQO Part 1; and the application and implementation of the SQO protecting human consumers of resident sportfish from contaminants that bioaccumulate from sediment into fish tissue (SWRCB, 2018). The SQPs became effective upon approval by U.S. EPA on March 11, 2019. The nomenclature of "SQO Part 1" and "SQO Part 2" was dropped.

Unlike most objectives, the benthic organism SQOs and the human health SQOs do not establish a numeric objective. Both the benthic organism SQOs and the human health SQOs establish methods for determining sediment *condition* and require that the sediment is in the condition of 'unimpacted' or 'likely unimpacted' as defined in the SQPs. The conditions of 'possibly impacted', 'likely impacted', 'clearly impacted' or 'inconclusive' as defined in the SQPs do not meet the SQOs.

2.3 Review of 2012 Numeric Targets

The 2012 DC and Greater Harbor Waters TMDL includes three types of numeric targets:

1. Water column targets for dissolved metals, organic compounds, and toxicity were determined using the Water Quality Control Plan for the Los Angeles Region (Basin Plan) and the California Toxic Rule (CTR).

2. Fish tissue targets were determined from *Fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Chlordane, DDTs, Dieldrin, Methylmercury, PCBs, Selenium, and Toxaphene*, developed by the Office of Environmental Health Hazard Assessment (OEHHA) in 2008.

3. Sediment numeric targets were determined, per the narrative standards of the Basin Plan, using the sediment quality guidelines of Long et al. (1998) and MacDonald et al. (2000). The freshwater sediment numeric targets for Dominguez Channel were based on the freshwater Threshold Effect Concentration (TEC) sediment guidelines compiled by the National Oceanic and Atmospheric Administration (NOAA) in the Screening Quick Reference Tables (SQuiRTs). The marine sediment numeric targets were based on the guidelines of Effect Range Low (ERL) also from NOAA SQuiRTs. These TEC- and ERL-based targets protect benthic organisms.

Sediment targets were also developed using OEHHA's FCGs and a bioaccumulation model to determine contaminant levels in sediment which would support fish tissue levels below the FCGs or using studies linking sediments to fish tissue contaminant concentrations[2]. The FCG-associated sediment targets protect human health.

In addition, sediments determined to be Unimpacted and Likely Unimpacted per the 2008 and 2011 SQOs were also considered to be meeting targets even if TECs or ERLs or fish-tissue derived sediment targets were exceeded as further discussed in Section 3.

2.4 Review of 2012 Allocations

Waste Load Allocations (WLA) for point sources of pollutants and Load Allocations (LA) for non-point sources of pollutants were assigned to identified responsible parties. In some cases, interim allocations were also established.

Separate allocations for the Dominguez Channel freshwater portion including the Torrance Lateral, the Dominguez Channel estuary and the Greater Harbor Waters of the Port of Los Angeles and Port of Long Beach were established.

2.4.1 Interim Allocations

Interim allocations were assigned and intended to prohibit any increase in pollutant levels or decrease in facility performance while the responsible parties undertook the actions necessary to reach the final allocations. Interim allocations were to be met upon the effective date of the TMDL (March 23, 2012). Interim allocations were assigned to stormwater dischargers (Municipal Separate Storm Sewer (MS4), Caltrans, general construction and general industrial stormwater dischargers) and other NPDES dischargers.

[2]Total PAHs in fish from EPA screening value. Chlordane and total DDT associated sediment values from SFEI (2007) "Indicator development and framework for assessing indirect effects of sediment contaminants", SFEI Contribution #524. Total PCBs - associated sediment target from Gobas, F. and J. Arnot (2010) "Food Web Bioaccumulation Model for Polychlorinated Biphenyls in San Francisco Bay, California, USA", ET&C **29**:6, 1385-95. Toxaphene value from New York State (1999).

Interim water allocations for the Dominguez Channel freshwater portion included toxicity allocations and metal allocations. Interim metal allocations were based on the 95th percentile of total metals data collected from January 2006 to January 2010 using a log-normal distribution.

Interim sediment allocations for metals and chlorinated hydrocarbons (DDT, PCBs) and PAHs for the Dominguez Channel Estuary and Greater Harbor Waters were assigned to stormwater dischargers (MS4, Caltrans, general construction and general industrial stormwater dischargers) and other NPDES dischargers. Interim sediment allocations were based on the 95th percentile of sediment data collected from 1998-2006. The use of 95th percentile values to develop interim allocations is consistent with NPDES permitting methodology. For waterbodies where the 95th percentile value had been equal to, or lower than, the numeric target, then the interim allocation was set equal to the final allocation.

2.4.2 Final Allocations

Final allocations were assigned to stormwater dischargers (MS4, Caltrans, general construction and general industrial stormwater dischargers) and other NPDES dischargers. Final allocations were to be met 20 years after the effective date of the TMDL (March 23, 2032).

No exceedances had been observed in dry weather; therefore no dry weather metals TMDLs were required for Dominguez Channel freshwater. The final allocations for the Dominguez Channel freshwater portion for toxicity and metals apply during wet weather conditions only.

For the Dominguez Channel Estuary and Greater Harbor Waters, final WLAs were assigned to point sources including wastewater treatment plants, stormwater discharges (MS4, Caltrans, general construction and general industrial stormwater dischargers), power generating stations, and other NPDES discharges for metals and chlorinated hydrocarbons (DDT, PCBs) and PAHs. LAs for metals and chlorinated hydrocarbons (DDT, PCBs) and PAHs were also assigned to non-point sources including to existing bed sediments and atmospheric deposition (RWQCB and U.S. EPA, 2011a) (RWQCB and U.S. EPA, 2011b).

2.5 Review of 2012 Compliance Options for Dominguez Channel and Greater Harbor Waters

Numeric targets and allocations are expressed as *numeric* concentrations or loads. However, the SQOs, both for benthic organisms and human health, are expressed as a sediment *condition*. The SQOs for benthic organisms and human health require that the sediment is in the condition of 'unimpacted' or 'likely unimpacted'. The conditions of 'possibly impacted', 'likely impacted', 'clearly impacted' or 'inconclusive' do not meet the SQOs.

Therefore, for sediment allocations, compliance options were designed to give responsible parties multiple ways to demonstrate compliance, including direct demonstration of compliance with the SQOs.

Compliance with the *interim* concentration-based sediment allocations for Cu, Pb, Zn, Cd, Cr, Hg and total PAHs may be demonstrated via any one of three different means:

1. Responsible parties may demonstrate that the sediment quality condition of **Unimpacted** or **Likely Unimpacted** as defined in the SQO Part 1, the SQOs to protect benthic organisms, is met; or

2. Responsible parties may demonstrate that the interim allocations in bed sediment are met over a three-year averaging period; or

3. Responsible parties may meet the interim allocations in their discharge over a three-year averaging period.

Compliance with *final* sediment TMDLs for Cu, Pb, Zn, Cd, Cr, Hg and total PAHs may be demonstrated via any one of three different means:

1. Responsible parties may demonstrate that final sediment allocations are met; or

2. Responsible parties may demonstrate that the qualitative sediment condition of **Unimpacted** or **Likely Unimpacted** as defined in the SQO Part 1, the SQOs to protect benthic organisms, is met, with the exception of Cr, which is not included in the SQO Part 1; or

3. Responsible parties may demonstrate that sediment numeric targets are met in bed sediments over a three-year averaging period.

Compliance with *final* sediment TMDLs for PCBs, DDT, chlordane, dieldrin, and toxaphene (bioaccumulative compounds) may be demonstrated via any of four different means:

1. Responsible parties may demonstrate that fish tissue targets are met in species resident to the TMDL waterbodies; or

2. Responsible parties may demonstrate that final sediment allocations are met; or

3. Responsible parties may demonstrate that sediment numeric targets to protect fish tissue are met in bed sediments over a three-year averaging period; or

4. Responsible parties may demonstrate that that the sediment quality condition protective of fish tissue is achieved per the Statewide Enclosed Bays and Estuaries Plan, as amended to address contaminants in resident finfish and wildlife.

2.6 Current Condition

Available data was examined to assess current condition and implementation progress in the Greater Harbor Waters, Dominguez Channel and Torrance Lateral; the Los Angeles River Estuary; and the San Gabriel River Estuary. A detailed assessment of current conditions for Dominguez Channel and the Greater Harbors Waters is provided in Appendix C of this Staff Report.

2.6.1 Greater Harbor Waters

Water samples were collected under TMDL-required compliance monitoring and as part of special studies since 2014 to date for the Greater Harbor Waters. In general, DDT and PCBs often exceeded WLAs when low detection methods were used in all Greater Harbor Waters except for DDT in Fish Harbor, Outer Harbor, and Los Angeles River Estuary. Copper exceeded the WLAs in 60 out of 285 samples. Of the 60 samples that were above the WLAs, 51 were sampled during wet-weather events.

As reviewed in Section 2.3, the sediment targets include the Effects Range Low (ERL) and the Fish Contaminant Goal (FCG)-derived target. Sediment chemistry data, summarized by TMDL waterbody and compared to the targets showed that sediments in the Greater Harbor Waters in general are

contaminated. Metals and chlorinated hydrocarbons frequently exceed targets. There are fewer, but still some, exceedances of PAHs.

The benthic community SQO assessment was performed for the Greater Harbor Waters using the methods provided in the SQPs and as discussed in Section 3.2.2. The benthic assessment of the Greater Harbor Waters included samples taken from 64 sampling stations. Sixteen stations were assessed as Possibly Impacted or Likely Impacted. None of the sampled stations were assessed as Clearly Impacted. Los Angeles Inner Harbor, Los Angeles Outer Harbor, Long Beach Inner Harbor, Long Beach Outer Harbor, and Los Angeles River Estuary currently meet the 85% threshold as established in the SQPs and discussed in Section 3.2.2. Fish Harbor, Consolidated Slip, and Eastern San Pedro Bay do not meet the 85% threshold.

The human health SQO assessment was performed using the methods provided in the SQPs and as discussed in Section 3.2.3. The human health assessment process for the Greater Harbor Waters included a three-tiered site assessment process for evaluating whether site sediments' conditions are protective of human consumers of locally caught seafood. In general, while fish tissue concentrations remain above the FCGs, the Greater Harbor Waters sediments meet the human health SQOs for DDT and for PCBs in most Fish Movement Zones (FMZs) including Los Angeles Inner Harbor, Seaplane Lagoon, Los Angeles Outer Harbor, Long Beach Inner Harbor North, Long Beach Inner Harbor South, and Long Beach Outer Harbor. Consolidated Slip and Eastern San Pedro Bay do not meet the human health SQOs for PCBs. The determination of FMZs is discussed in section 3.2.3 and Greater Harbor Waters FMZs are shown in Figure 3.2.

Fish tissue sampling for TMDL compliance occurs once every two years in four areas as required in the TMDL: Los Angeles Outer Harbor, Long Beach Outer Harbor, Consolidated Slip, and East San Pedro Bay. Average fish tissue concentrations are compared to the both the FCGs and a consumption advisory threshold established by OEHHA, the Advisory Tissue Level for consumption of three servings of fish per week (ATL3). FCGs provide the fish tissue and sediment targets for the TMDL, but the ATL3 is incorporated into the human health SQO, as discussed in Section 3.2.3.

Average fish tissue concentrations for total DDT were above the FCG but below the ATL3 in 2014 and 2016 in all compliance sampling areas. Average fish tissue concentrations for total PCBs were above both the FCG and the ATL3 in 2014 and 2016. Dieldrin and toxaphene were not detected in 2014. In 2016, dieldrin was not detected in fish tissue but toxaphene was detected at average concentrations between the FCG and ATL3 target in the Consolidated Slip. For total chlordane, the average concentration was above the FCG, but below the ATL3 in the Consolidated Slip in 2014. Total chlordane was not detected in the 2016 samples for both Consolidated Slip and East San Pedro Bay.

2.6.2 Dominguez Channel/Torrance Lateral, Los Angeles River Estuary, and San Gabriel River Estuary

The monitoring data reviewed are from 2015 to 2017 for Dominguez Channel/Torrance Lateral and San Gabriel River Estuary, and from 2013 to 2017 for Los Angeles River Estuary.

For Dominguez Channel/Torrance Lateral, dry weather data were analyzed and compared to chronic CTR criteria for freshwater[3]. Copper concentrations were above the CTR criterion and ranged from 13 to 32.7 ug/L. Lead and zinc concentrations in receiving water met the CTR criteria. For wet weather, copper, lead, and zinc met the interim allocations except for one data point for copper and zinc. Lead concentrations in all samples were below the final allocation while both copper and zinc concentrations were above the final allocations and ranged from 14.8-222 ug/L for copper and 103-318.1 ug/L for zinc.

Since the 2012 DC and Greater Harbor Waters TMDL did not include specific water column numeric targets for the Los Angeles River, water column data were analyzed and compared to CTR criteria for freshwater and saltwater. Copper, lead, and zinc met the targets in dry weather. In wet weather, only lead met the criteria, copper and zinc did not. Metals and PAHs concentrations in suspended sediment were above the interim allocations. Total PCBs and DDTs were below the interim allocations.

For San Gabriel River Estuary, available wet weather data for metals were compared to numeric targets specified in the San Gabriel River Metals TMDL for two sampling events. The data show exceedances for copper during both sampling events while other constituents met the targets. Dry weather data for the water column were not available. For sediment, all metals, PAHs, PCBs and DDTs concentrations in suspended sediment were above the interim allocations.

2.7 Implementation Progress

2.7.1 TMDL monitoring

The Greater Los Angeles and Long Beach Harbor Responsible Parties (California Department of Transportation; cities of Bellflower, Lakewood, Long Beach, Los Angeles, Paramount, Ranch Palos Verdes, Rolling Hills, Rolling Hills Estates, and Signal Hill; Los Angeles County; Los Angeles County Flood Control District) conducted the Coordinated Compliance, Monitoring, and Reporting Plan (CCMRP) for the Greater Harbor Waters. The monitoring program includes collection of water and sediment samples at 22 stations and the collection of fish tissue samples within four waterbodies. The plan coordinates sampling efforts with the Bight coordinated monitoring overseen by SCCWRP. The CCMRP was approved on June 6, 2014. The first annual monitoring report for 2014-2015 was submitted to the Los Angeles Water Board in December 2015.

Coordinated monitoring plans were also submitted to the Los Angeles Water Board for Dominguez Channel, Los Angeles River Estuary, and San Gabriel River Estuary under the Watershed Management Area Group Coordinated Integrated Monitoring Programs (WMAG CIMPs). Monitoring for these CIMPs was initiated after the CIMP workplans were approved in June 2015.

The Dominguez Channel Watershed Management Group, which includes the cities of Carson, El Segundo, Hawthorne, Inglewood, Lawndale, and Lomita, and the County of Los Angeles, conducted monitoring in the Dominguez Channel.

The Lower Los Angeles River Watershed Management (LLAR WMP) Group, which includes the cities of Downey, Long Beach, Lakewood, Lynwood, Paramount, Pico Rivera, Signal Hill, and South Gate, and the

[3] The total recoverable metal targets were calculated using the hardness data collected at the time the samples were collected.

Los Angeles County Flood Control District (LACFCD), conducted monitoring in the lower portion of the Los Angeles River.

The Lower San Gabriel River Watershed Management Group, including the cities of Artesia, Bellflower, Cerritos, Diamond Bar, Downey, Hawaiian Gardens, La Mirada, Lakewood, Long Beach, Norwalk, Pico Rivera, Santa Fe Springs, and Whittier, and LACFCD, is conducting the monitoring for the lower San Gabriel River.

2.7.2 TMDL Implementation Status

The 2012 TMDL has been implemented by the Port of Long Beach, Port of Los Angeles, and incorporated into individual and general NPDES permits, the Los Angeles County MS4 permit in December 2012, the City of Long Beach MS4 permit in March 2014, and the subsequent Regional MS4 permit for the entire Los Angeles Region issued in July 2021. The following group and individual watershed management programs (WMPs), enhanced watershed management programs (EWMPs), and associated integrated monitoring programs (IMPs) and coordinated IMPs (CIMPs), were submitted to, and approved by, the Los Angeles Water Board:

- 12 EWMPs
- 7 Group WMPs
- 4 Individual WMPs
- 19 CIMPs
- 5 IMPs
- 2 Directed monitoring and reporting programs (MRPs) for municipalities

NPDES and MS4 permittees are implementing stormwater best management practices (BMPs) or control measures included in EWMPs and WMPs to achieve compliance with required permit limits. The main BMPs were proposed and planned in the EWMPs and WMPs either on a regional or distributed scale, and include surface and subsurface infiltration/detention basins, constructed wetlands, treatment facilities, low-flow diversions, bioretention and biofiltration, bioswales, permeable pavement, flow through treatment, and source control BMPs.

The Port of Long Beach has been implementing the following key programs to improve both sediment and water quality in the Long Beach Harbor. A detailed description of implementation actions is provided in the letter from the Port of Long Beach submitted to the Los Angeles Water Board on January 29, 2019 (Port of Long Beach, 2019) (Appendix D).

- Water Resources Action Plan (WRAP) Implementation
- Inspection Program
- Structural BMP Implementation
- Community Partnering
- Stormwater Capture and Reuse

- Sediment Management Activities

The City of Los Angeles Harbor Department (LA Harbor Department) has been implementing control measures and BMPs to reduce pollutant loading and improve the water and sediment quality in the harbor. A detailed description of the actions implemented is provided in the letter submitted by the LA Harbor Department to the Los Angeles Water Board on February 25, 2019 (Port of Los Angeles, 2019) (Appendix E) and is listed below.

- Water Resources Action Plan (WRAP) Measures and NPDES Permit Compliance
- Tenant outreach program
- 14001-2015 ISO-certified Environmental Management System
- Low Impact Development
- Stormwater/Dust Control for Orphan Sites
- Public Sweeping/Litter Control
- Port Activities under MS4
- Vessel Guidance
- Clean Marina Program
- Used Oil Recycling Centers
- Pile Replacement Process
- Cathodic Protection
- Trash Skimmers

2.7.3 Contaminated Sediment Management Plans

The 2012 DC and Greater Harbor Waters TMDL required responsible agencies to submit Contaminated Sediment Management Plans (CSMP) to the Los Angeles Water Board to include concrete milestones for remediating identified areas of high contamination or, hot spots, including the Dominguez Channel Estuary, Consolidated Slip in the Port of Los Angeles and Fish Harbor in the Port of Los Angeles. TMDL monitoring since the TMDL adoption also confirmed the impairments in the identified hot spots.

Three separated CSMPs were submitted including:

i) Los Angeles Harbor CSMP including Consolidated Slip and Fish Harbor submitted by the City of Los Angeles;

ii) Dominguez Channel Estuary CSMP submitted by the California Department of Transportation, City of Long Beach, City of Los Angeles, City of Torrance, Los Angeles County, and Los Angeles County Flood Control District; and

iii) Long Beach Harbor, Eastern San Pedro Bay, and Los Angeles River Estuary CSMP submitted by the City of Long Beach.

Los Angeles Water Board staff reviewed the submitted CSMPs and provided comments to the responsible agencies. However, the submitted CSMPs did not include specific, concrete milestones for hotspot remediation as required in the TMDL and were, thus, not approved by the Los Angeles Water Board.

Los Angeles Water Board staff, through this reconsideration, have proposed revisions to the implementation schedule to include a specified schedule for remediation of identified hot spots including Consolidated Slip and Fish Harbor (see Section 4.8 for detail).

2.7.3 Additional Hot Spot Investigation

In addition to the known hot spots, an investigation of a single benthic community "Likely Impacted" SQO result has recently been conducted in Channel 2 of Inner Long Beach Harbor in accordance with the Port of Long Beach's CSMP. Results from a single benthic health SQO sample from the 2016 compliance year indicated that the Channel 2 area was Likely Impacted. The Port of Long Beach conducted an investigation in the vicinity of the sample to confirm those results. A confirmation sample was taken in the location of the original sample and five additional SQO samples were collected in the vicinity to fully characterize the area. The Port of Long Beach reported on the investigation results in the Confirmation and Supplemental Benthic Quality Objectives Sampling and Analysis Report in October 2019 (Anchor QEA 2019) (Channel 2 Confirmation Study).

The Channel 2 Confirmation Study assessment of the site does not confirm a severe impairment (that is, no Clearly Impacted assessments were made) but additional assessments in the Likely Impacted and Possibly Impacted assessment categories were confirmed. The Port of Long Beach is planning to implement sediment remediation actions to address the sediment contamination in Channel 2. Proposed revisions to monitoring requirements are included in Section 4.6 Revisions to Monitoring Requirements.

2.8 Special Studies Completed Since 2012

Per the State Water Board's direction when approving the 2012 DC and Greater Harbor Waters TMDL in 2012, staff from the Los Angeles Water Board, the State Water Board, the Cities of Los Angeles and Long Beach, primarily through their Ports, and SCCWRP formed the Harbor Technical Working Group (HTWG) to support State Board efforts in updating the SQP, and to oversee the implementation of the special studies performed by the Ports to support the TMDL reconsideration.

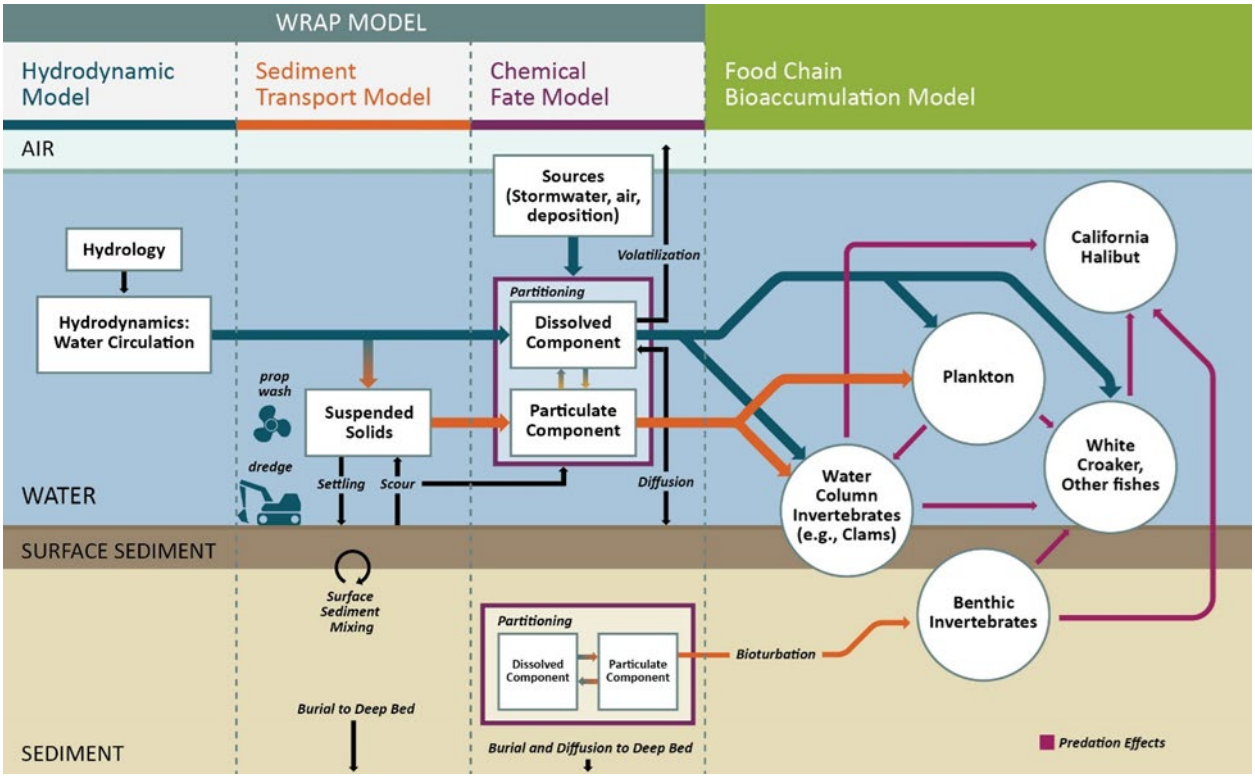
In order to implement human health SQO assessments and to determine effective management strategies to reduce fish tissue contaminant concentrations, it was important to more accurately define the linkage between total PCBs and total DDT in the environment (water, sediment, and fish food sources) and fish tissue accumulation. The following special studies and site-specific modeling were conducted in the Harbor to more accurately determine this linkage.

The HTWG oversaw the development of site-specific models and the data collection to inform the model processes. The resulting site-specific model, referred to as the linked model, integrates hydrodynamic, sediment transport, chemical fate of organic pollutants, and bioaccumulation processes (Figure 5).

- *The Chemical Fate Conceptual Site Model for the Greater Los Angeles and Long Beach Harbor Waters* (Anchor QEA and Everest, 2015). The conceptual site model (CSM) for the Harbor was developed for PCBs and DDT documenting the primary physical, chemical, and biological processes that affect the

transport, migration, and potential impacts of contamination to receptors in the Greater Harbor Waters.

Figure 5 Processes Simulated in the Linked WRAP and Bioaccumulation Models (Anchor QEA and Everest, 2018)



- *The Water Resources Action Plan (WRAP) Model* (Everest, 2017). The WRAP model uses the Environmental Fluid Dynamics Code (EFDC) modeling platform with dynamically coupled hydrodynamic, sediment, and contaminant transport capabilities. The extensive data collection and supplemental special studies enabled updates of model inputs and enhancements of the WRAP model capabilities for generating long-term organic chemical (total PCB and total DDT) water column and sediment bed concentrations as input to the bioaccumulation model. Development and calibration of this model was overseen by the HTWG and independently peer-reviewed (Wu, 2016).
- *The Bioaccumulation Model for Greater Los Angeles and Long Beach Harbor Waters* (Anchor QEA, 2017). The bioaccumulation model was used in conjunction with the WRAP model to establish a site-specific link between contaminant sources (i.e., water, sediment, and food) and the contaminant levels in fish. This bioaccumulation model was designed to represent the Harbor food web structure for target fish species and fish migration throughout the Harbor and movement to and from the Palos Verdes Shelf. Development and calibration of the bioaccumulation model was conducted with oversight from the HTWG and independently peer-reviewed (Arnot, 2016).

The Linked WRAP and Bioaccumulation Model was developed to better understand how compliance with the Harbor Toxics TMDL may be achieved. The models' calibration studies were performed with sensitivity and uncertainty analyses and independently peer-reviewed. The linked model has been used to evaluate the impact of ongoing sources and the relative contribution of water column and sediment sources to the fish receptors of concern, estimate recovery time, and assess the effectiveness of specific remedial actions. The model provides a tool for evaluating the relative effectiveness of different management alternatives at reducing fish tissue concentrations and can be used to evaluate the link

between sources and fish tissue concentrations of PCBs and DDT (Anchor QEA and Everest, 2018). The model was used to determine the approximate number of years that it would take for PCB and DDT concentrations in fish tissue to reach the TMDL fish-associated sediment targets for PCBs and DDT for different management scenarios. A total of nine management scenarios were evaluated. The evaluation of the relative effectiveness of different management alternatives at reducing fish tissue concentrations is detailed in Appendix A. For this TMDL revision, the model-estimated number of years based on a 100% watershed load reduction and hot spot removal with a 20-year decline rate was used to support the final deadline of 2040 for compliance with the Human Health SQOs (see Section 4.6 for detail).

In addition to the model studies listed above, other supplemental studies were conducted in support of model development or calibration. These special studies were designed to fill the data gaps in support of the development of the conceptual site model and bioaccumulation model to characterize sources of contaminants to fish tissue and define the linkage between organic contaminants in the environment and fish tissue accumulation. The special studies conducted are listed below and also discussed in more detail in Appendix B:

- *Stormwater PCBs and DDT for Watershed Loading Estimate Study*. (Amec Foster Wheeler, 2016a) This special study was designed to provide high-resolution data of PCB and DDT concentrations in stormwater and dry weather flows into the Greater Harbor Waters from the Los Angeles River and the Dominguez Channel watersheds. The results of this study were used to refine boundary conditions for the Harbor Toxics TMDL model.
- *Surface Sediment Characterization and Polychaete Tissue Collection Program* (Anchor QEA, 2014c). This study was designed to fill chemistry data gaps associated with surface sediment and polychaetes (an important organism in the food web) that were necessary to support the parameterization and calibration of the WRAP and bioaccumulation models.
- *Low Detection Limit Water Column Sampling Program* (Anchor QEA, 2014d). This low detection limit (LDL) water column study was designed to address data gaps in detectable water column PCBs and DDT concentrations in the Harbor in support of the development of the conceptual site model and bioaccumulation models. The first phase of this study included comparing methods to determine the most reliable method for collecting water column PCB and DDT concentrations. The second phase of this study included using the selected method to assess the spatial variability of water column PCB and DDT concentrations throughout the Greater Harbor Waters during different seasons and across depths.
- *Fish Movement Study* (Lowe, C.G., B. Ahr, M. Farris, and A. Barilloti, 2015a). This special study characterized the longer-term movements and site fidelity of California halibut and white croaker in the Los Angeles and Long Beach Harbors over a multi-year period, identified emigration of white croaker from the Harbor and onto the Palos Verdes Shelf, and determined the degree of association and site fidelity of California halibut and white croaker to fishing piers within the Harbor.
- *Food Web Sampling Program* (Amec Foster Wheeler, 2016b). This special study was designed to fill food web tissue chemistry data gaps specifically targeting fish and mussel PCB and DDT concentrations. Food web structure and fish diet were informed through determining the age structure of fish populations via fish otoliths and by conducting stable isotope analyses on collected fish. Otoliths are hard, calcium carbonate structures located directly behind the brain of fish which can be used to age fish and nitrogen isotope compositions and nitrogen-to-carbon ratios in fish can be used as an indicator of trophic level.

3 Sediment Quality Provisions and Greater Harbor Water-Specific Assessment Methods for SQPs

This section reviews the Sediment Quality Provisions (SQPs) and sediment quality objectives (SQOs), examines some aspects of the 2012 DC and Greater Harbor Waters TMDL and sets out the changes to the 2012 DC and Greater Harbor Waters TMDL proposed in this TMDL revision due to the modifications to the SQPs.

3.1 Summary of the Sediment Quality Provisions

The SQPs adopted by the State Water Board in 2009 contain two *narrative* sediment quality objectives (SQOs):

i) benthic community SQOs for the protection of benthic organisms due to the direct effects of exposure to sediment contaminants, and
ii) human health SQOs for the protection of human health from indirect effects through the consumption of seafood.

Assessment frameworks to evaluate sediment for attainment of these SQOs were adopted by the State Water Board for:

i) protection of benthic community organisms in 2009; and

ii) protection of human health in 2018.

The assessment framework for the SQOs for the protection of benthic organisms requires the integration of multiple lines of evidence (MLOE) as described in Chapter IV.A.1 of the SQPs (SWRCB, 2018). The SQPs established a method to assess sediment quality that integrates chemical and biological measures to determine if the benthic organisms within ambient sediment are protected from, or harmed by, exposure to toxic pollutants in sediment. The SQO for benthic organisms is based on three lines of evidence (LOE) including sediment chemistry (which contains 25 different chemicals that may impact benthic organisms), sediment toxicity, and benthic community condition. These three lines of evidence are sometimes called the sediment 'triad'.

The assessment framework for the SQOs for the protection of human health is described in Chapter IV.A.2 of the SQPs. The SQPs adopted in 2018 added detailed methods to assess sediment quality that: 1) assess whether pollutant concentrations in sportfish pose an unacceptable risk of chemical exposure to human consumers, and 2) assess whether sediment contamination at a site is a significant contributor to the sportfish contamination. Human health assessments focus on DDT, PCBs, chlordane and dieldrin because they bio-magnify within food webs. This framework relies on two indicators to address these components: the chemical exposure indicator compares sportfish contamination measurements from the site to consumption advisory thresholds (ATL3, established by OEHHA (OEHHA, 2008)); and the site linkage indicator compares sportfish contamination measurements to estimated sportfish concentrations that would result from site exposure. These indicators are applied within a tiered assessment framework:

- Tier 1 is an optional screening assessment to determine whether contaminants in sediments or fish at a site pose a risk of potential chemical exposure that warrants further evaluation.

Essentially, if the fish and sediment are not above any sediment or fish thresholds, assessors can conclude that there is no risk and there is no reason to continue with further tier assessments;

- Tier 2 is a complete site assessment of sediment quality using established models included in the SQPs; and
- Tier 3 is a more complex site-specific assessment intended to supplement a Tier 2 evaluation. In Tier 3, assessors develop a site-specific model.

3.2 Greater Harbor Waters-Specific Assessment Methods for SQPs

The SQPs do not provide detailed approaches to determine appropriate assessment areas at a specific site, or for determining compliance (i.e. answering the question "does this waterbody meet the SQOs?"). This section proposes approaches specific for the Greater Harbor Waters.

3.2.1 Benthic Community SQO Greater Harbor Waters-Specific Assessment Methods - Assessment Units

To determine if waterbodies, as a whole, are meeting the benthic community SQOs as described in Section 3.2.2, the assessment areas must be determined. For example: should the Greater Harbor Waters be one waterbody which meets or does not meet the SQOs for benthic organisms? Or, should the Port of Long Beach and the San Pedro Bay be one waterbody and the Port of Los Angeles be a different waterbody, each of which meets or does not meet the SQOs for benthic organisms on their own?

For the Greater Harbor Waters, Water Board staff and the HTWG considered several options. There is no specific guidance for determining the number and distribution of sediment stations when conducting benthic community SQO assessments in the SQPs. However, there is guidance provided in the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, Section 4 "Program Specific Implementation", "d. Sediment Monitoring and Assessment", "5) Design" which includes:

> b) Sediment monitoring programs shall be designed to ensure that the aggregate stations are spatially representative of the sediment within the water body
>
> e) Identification of appropriate strata shall consider a number of characteristics of the waterbody including sediment transport, hydrodynamics, depth, salinity, land uses, inputs (both natural and anthropogenic) and other factors that could affect the physical, chemical, or biological condition of the sediment.

Five alternatives/options for assessment areas were considered and evaluated by considering the existing waterbody boundaries defined by the 303(d) listing, city and county jurisdictional boundaries, hydrodynamic connectedness, and similarity of habitat features. The number of required stations for assessing a designated area was also considered.

1. 303(d) listed waterbodies:
    a) Consolidated Slip
    b) Fish Harbor
    c) Cabrillo Marina

d) Inner Cabrillo Beach

e) Los Angeles/Long Beach Inner Harbors

f) Los Angeles/Long Beach Outer Harbors

g) San Pedro Bay

h) Los Angeles River Estuary (includes Queensway Bay)

The definition of the 303(d) list waterbodies is more historical (that is, waterbodies were added to the list as data was available and early in list development the extent of the listed waterbody was not precisely defined) than developed with an understanding of ecology or circulation; and therefore, are not consistent with the fate and effect of some of the contaminants included in the Harbor Toxics TMDL.

2. Basin Plan waterbody boundaries

    a. Los Angeles-Long Beach Harbor

        i. Outer Harbor

        ii. Marinas

        iii. Public Beach Areas

        iv. All Other Inner Areas

        v. Dominguez Channel Estuary

        vi. Los Angeles River Estuary

    b. Long Beach Marina

        i. Public Beach Areas

        ii. All other areas

The geographical limits of the waterbodies as named in the Basin Plan are not precisely defined; therefore, definition of areas for TMDL purposes would still be necessary.

3. Regional assessment areas that lump many smaller waterbodies into three regions

    a. LA/LB Outer Harbor (including Inner Cabrillo Beach)

    b. LA/LB Inner Harbor (including Consolidated Slip and Fish Harbor)

    c. Eastern San Pedro Bay (includes Queensway Bay)

These three areas are defined by similarity of habitat. Additionally, with larger areas, monitoring requirements (i.e. the number of samples required to characterize the area) may be lessened. However, larger areas may introduce the possibility of a “false negative” assessment; failing to identify an area that would require remedial action because that area is averaged in with many other less impacted or unimpacted areas.

4. Fish movement zone boundaries

a. Dominguez Channel Estuary

b. Consolidated Slip

c. LA Inner Harbor

d. Fish Harbor

e. Seaplane Lagoon

f. LA Outer Harbor

g. LB Inner Harbor North

h. LB Inner Harbor South

i. LB Outer Harbor

j. LA River Estuary

k. Eastern San Pedro Bay

l. Outside Harbor

These areas will be used for the human health SQO assessment, as discussed in Section 3.2.3, so using them also for benthic organism SQOs would be simplifying (i.e. one set of assessment areas as opposed to two: one for benthic organisms and one for human health). However, the defined areas for the human health SQO assessment were developed considering how fish accumulate contaminants and do not relate to benthic organism habitat use.

5. A functional approach that groups waterbodies to facilitate potential implementation strategies

a. Dominguez Channel Estuary

b. Consolidated Slip

c. Fish Harbor

d. Los Angeles Outer Harbor (inclusive of Inner Cabrillo Beach)

e. Los Angeles Inner Harbor (inclusive of Cabrillo Marina)

f. Long Beach Inner Harbor

g. Long Beach Outer Harbor

h. Eastern San Pedro Bay

i. Los Angeles River Estuary

This functional approach sets boundaries to best represent the circulation and ecological differences of the Harbor Toxic TMDL area, but also includes municipal jurisdictional boundaries, i.e. separates Los Angeles and Long Beach.

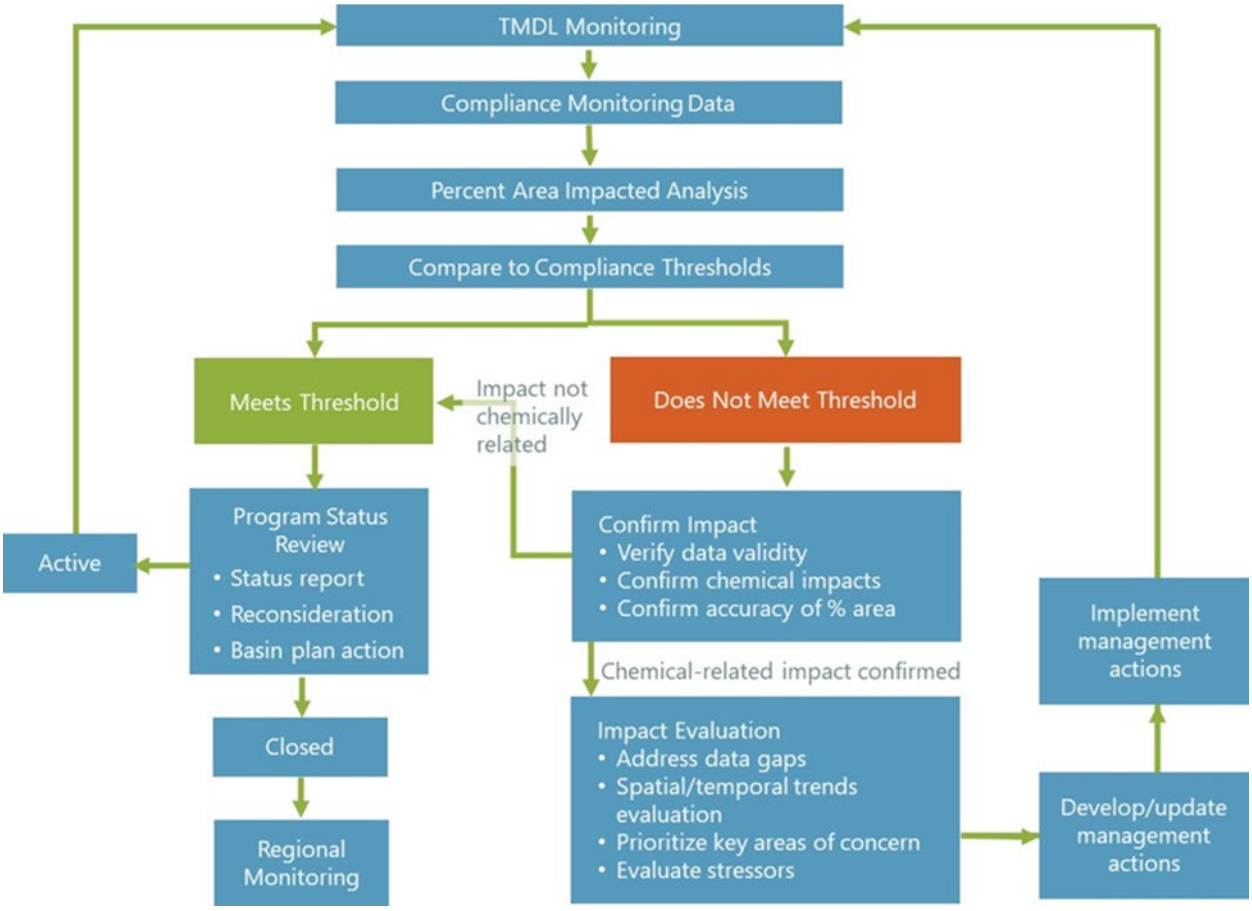
Los Angeles Water Board staff and the HTWG recommend Option 5, Functional Approach. This option supports the use of nine Assessment Units for benthic community SQOs in the Harbor Toxics TMDL. This approach allows for implementation actions to be aligned with Assessment Unit determination and separates the City of Los Angeles and City of Long Beach waterbodies. As these two cities have different infrastructure, funding mechanisms, and governing bodies, it is appropriate to separate the waterbodies for TMDL implementation planning. This option also separates the TMDL defined hot spots (Consolidated Slip and Fish Harbor) to support the planning and implementing of remedial actions. In addition, this option aligns waterbodies (Inner Cabrillo Beach and Cabrillo Marina) with other waterbodies with similar characteristics.

3.2.2 Benthic Community SQO Greater Harbor Waters-Specific Assessment Methods - Determination of Compliance

Los Angeles Water Board staff and the HTWG have developed procedures specific to the Dominguez Channel and Greater Harbor waters to determine if the waters are in compliance with the sediment WLAs using benthic community SQOs. This benthic community SQO assessment procedure was designed to provide guidance for the assessment, evaluation, and documentation required to demonstrate compliance with the TMDL for benthic community protection in the Greater Harbor Waters.

The benthic community SQO assessment procedure uses monitoring data to determine the percent of seafloor area which is impacted (i.e. assessed as Likely Impacted or Possibly Impacted or Clearly Impacted) in a specific assessment unit (described in section 3.2.1, above). If the percent of seafloor area which is impacted does not meet the threshold, the procedure provides implementation steps to follow; if the percent of seafloor area which is impacted does meet the threshold, the procedure provides steps to follow to ensure continued review of sediment status. The benthic community SQO assessment procedure to demonstrate compliance with the benthic community protection portion of the TMDL is illustrated in the flowchart in Figure 6. (Harbor Technical Work Group, 2018).

Figure 6 Benthic Community Evaluation Procedure Flow Chart for Compliance



The benthic community SQO assessment procedure to determine the percent of seafloor area which is impacted (i.e. assessed as Likely Impacted or Possibly Impacted or Clearly Impacted) uses a *Thiessen Polygon Area-Weighted Assessment* to calculate the percent of the waterbody which is meeting the benthic community SQO.

A Thiessen Polygon Area-Weighted Assessment divides the sampled area into numerous polygons, each of which is defined by the location of a single sampling site, therefore a single data point. The borders of the polygons are set halfway between adjacent data points (creating the Thiessen polygons), so all areas are represented by the data point which is closest. Then a weighted average of the measurements is calculated based on the size of each polygon. This is a non-statistical and widely used method for estimating impact areas using discrete sampling sites.

For a waterbody to meet the threshold for the benthic community SQO, no assessment in the waterbody can be Clearly Impacted and no more than 15% of the area can be assessed as Likely Impacted or Possibly Impacted.

Compliance with the sediment WLAs under the benthic organism SQO was assessed following these procedures. Much of the Greater Harbor Waters meets the benthic community SQO with the exception of Fish Harbor, Consolidated Slip, and a section of Eastern San Pedro Bay. The evaluation is discussed in more detail in Appendix C.

3.2.3 Human Health SQO for Greater Harbor Waters-Specific Assessment Methods – Tier Assessment

The human health SQO assessment procedure was designed to provide guidance for the assessment and documentation required to demonstrate compliance with the TMDL for the protection of human consumers of fish. The procedures and approaches to demonstrate compliance with the human health SQO specific for the Dominguez Channel and Greater Harbor Waters TMDL are described in this section.

Per the SQPs, the human health SQO is assessed via one of three tiers.

Tier 1 is an optional screening assessment to address whether contaminants in sediments and/or fish tissue at a site pose a potential chemical exposure that warrants further evaluation. A Tier 1 assessment may be performed using either sportfish tissue contaminant concentrations or sediment contaminant concentrations and total organic carbon, depending on what data are available. If both sediment and tissue contamination data are available, the Tier 1 assessment is performed using both data types. A Tier 1 assessment can lead to a determination of Unimpacted sediments and fish tissue or, if sediments and fish tissue are not determined to be Unimpacted, to a further assessment under Tier 2.

Tier 2 is an evaluation of tissue data and sediment data to assess chemical exposure to human consumers and to evaluate the link between contaminants in sediment associated with the site and fish. Chemical exposure is evaluated based on comparison to fish contaminant thresholds established by OEHHA. Evaluation of sediment linkage utilizes a mechanistic food web model to estimate tissue concentrations derived from measured sediment concentrations. Tier 2 may determine if sediments are Unimpacted, Possibly Impacted, Likely Impacted or Clearly Impacted.

A Tier 3 assessment may be performed to address unique situations or evaluate additional factors affecting the assessment not considered in Tier 2. Tier 3 may be performed to

- Improve accuracy and precision of the Tier 2 assessment
- Evaluate different risk related assumptions
- Incorporate spatial and temporal factors into the assessment
- Evaluate specific subareas, contaminant gradients or potential hotspots

A determination of which tier is appropriate for the Greater Harbor Waters was made using guidance in the SQPs, a companion Microsoft Excel-based mechanistic food web model called the Decision Support Tool for Tier 2 assessments (SCCWRP 2017b) and special studies conducted by the Ports. The special study most significant to this effort was the study on fish movement which is described in more detail in the Fish Tracking Special Study Reports (Lowe, C.G., B. Ahr, M. Farris, and A. Barilloti, 2015a) (Lowe, C.G., B. Ahr, M. Farris, and A. Barilloti, 2015b).

A. <u>Tier 1 and Tier 2 Assessment</u>

Tier 1 initial screening assessment, and Tier 2 complete site assessment were conducted at four assessment areas specified in the 2012 TMDL: Consolidated Slip, Los Angeles Harbor, Long Beach Harbor, and San Pedro Bay following the SQP guidelines. The Tier 1 and Tier 2 assessments were conducted using data collected between 2013-2014 and 2010-2014 respectively.

Per the SQPs, the 95% upper confidence limit (UCL) for sediment concentrations in each area were compared to sediment screening thresholds. The calculated sediment values were compared to the

95% UCL for each contaminant. If the 95% UCL value is higher than the biota-sediment accumulation factor (BSAF) calculated threshold value, there is the potential for unacceptable chemical exposure and a Tier 2 evaluation is required. If the 95% UCL value is equal to or less than the BSAF screening threshold, the chemical exposure is acceptable, and the site is assessed as Unimpacted. The Tier 1 assessment for each of the four areas is summarized in Table 1.

Table 1 Tier 1 Overall Assessment for Each Evaluated Area

Assessment Area	**DDT**	**PCBs**	**Chlordane**	**Dieldrin**
LA Outer Harbor	Unimpacted	Tier 2 Assessment Required	Tier 2 Assessment Required	Tier 2 Assessment Required
LB Outer Harbor	Unimpacted	Tier 2 Assessment Required	Tier 2 Assessment Required	Tier 2 Assessment Required
Consolidated Slip	Tier 2 Assessment Required	Tier 2 Assessment Required	Tier 2 Assessment Required	Tier 2 Assessment Required
Eastern San Pedro Bay	Unimpacted	Tier 2 Assessment Required	Tier 2 Assessment Required	Tier 2 Assessment Required

The Microsoft Excel-based model called the Decision Support Tool for Tier 2 assessments (SCCWRP 2017b) was used to evaluate the indirect effects of sediment contamination in the four areas listed in Table 1, above. Consumption risk results and sediment linkage results were categorized in accordance with the SQP Tier 2 effects assessment. The Tier 2 assessment results are shown in Table 2 for three areas, Outer Los Angeles Harbor, Outer Long Beach Harbor, and Eastern San Pedro Bay. A Tier 2 assessment was not conducted on Consolidated Slip because the size of the site is less than 1 square kilometer.

Detailed discussion and results for Tier 1 and Tier 2 assessments are provided in Appendix F.

Table 2 Tier 2 Overall Assessment for Each Evaluated Area

Assessment Area	**DDT**	**PCBs**
LA Outer Harbor	Likely Impacted	Likely Impacted
LB Outer Harbor	Likely Impacted	Clearly Impacted
Eastern San Pedro Bay	Likely Impacted	Clearly Impacted

B. Tier 3 Assessment Justification and Framework

Per the SQPs, the use of a Tier 3 assessment must be justified. If factors or processes are present at a site that affect contaminant bioaccumulation from sediment, but are not considered in the Tier 2 models, resulting in a change in the sediment linkage category, the site may proceed with Tier 3

assessment. The SQPs identify the following factors to determine if the site meets the requirement to proceed with Tier 3 assessment:

- Differences in food web or forage range of target species
- Measured sediment concentrations not representative of actual fish forage area due to spatial or temporal variations in sediment contaminant distribution, fate, or transport
- Differences in the relationship between geochemical characteristics and contaminant bioavailability
- Differences in physiological processes affecting bioaccumulation model performance, such as growth rate or assimilation efficiency

The following is a discussion of the site-specific conditions, which affect the relationship between sediment and fish tissue, that were used to determine if a Tier 3 assessment should be conducted for the Greater Harbor Waters.

i. Differences in Food Web or Forage Range of Target Species

The Tier 2 model assumes fish spend 100% of their time the assessment area. However, studies conducted by USEPA on the Palos Verdes Shelf (Teesdale et al, 2015) indicate that this is not the case in this site, as movement of white croaker was tracked between the Harbors and the Palos Verdes Shelf. To further evaluate fish movement, two studies were conducted by California State University at Long Beach for the Ports to characterize movement patterns of two target species, California halibut and white croaker (Anchor QEA, 2017). The goals of these studies were to better understand the movements of white croaker (Lowe, C.G., B. Ahr, M. Farris, and A. Barilloti, 2015a) and California halibut (Lowe, C.G., B. Ahr, M. Farris, and A. Barilloti, 2015b), as well as other fishes, and their potential exposure to sediment contaminants in San Pedro Bay, Palos Verdes Shelf, and adjacent coastal areas. These studies identified significant movement patterns of the study species, indicating differences in exposure sources throughout the Greater Harbor Area.

The Tier 2 Decision Support Tool limits the size of the assessment area to a minimum of 1 square kilometer because of default fish movement settings in the model; however, this limit would prevent areas like Fish Harbor, Consolidated Slip, and Cabrillo Marina from being included in the human health SQO assessment.

From the special studies conducted, fish movement patterns were used to establish FMZs. The time fish spend in each of the FMZs was incorporated into the Tier 3 assessment to define fish exposure to localized sources for each identified FMZ.

ii. Measured Sediment Concentrations Might Not Be Representative of Actual Fish Forage Area due to Spatial or Temporal Variations in Sediment Contaminant Distribution, Fate, or Transport

As mentioned previously, the Tier 2 model assumes fish spend 100% of their time in each assessment unit and are exposed to only the food and sediment sources within the assessment unit. The Greater Harbor Area is highly diverse (e.g., deep shipping channels, shallow quiescent areas, and high depositional zones). As a result, fish are exposed to different bioaccumulative sources through the selection of prey and/or direct sediment exposure as they move throughout the Harbor. Harbor fish

cannot realistically be directly linked to the Harbor area in which they are caught and thus the sediment within the area they are caught may not be relevant to their actual exposure areas (Anchor QEA, 2017). Therefore, representation of exposure conditions and time of exposure within each FMZ for each species within a Tier 3 model can more accurately estimate sediment to fish tissue linkage.

iii. Differences in the Relationship Between Geochemical Characteristics and Contaminant Bioavailability

The Excel-based model for the Tier 2 Decision Support Tool relies on a biota-sediment accumulation factor (BSAF) to relate the concentration of contaminant in the sediment to the concentration in the fish. This relationship is related to the concentration of organic carbon in the sediment. The Tier 2 Decision Support Tool uses one average value for sediment organic carbon. However, both the organic carbon content and grain size are highly variable throughout the Harbor (Anchor QEA, 2014b) and result in different species residing or feeding in different areas, as well as differences in contaminant BSAF throughout the Harbor.

From the special studies conducted, multiple trophic levels of organisms were evaluated and included in the Tier 3 assessment and location specific BSAFs were developed to more accurately estimate bioaccumulation to fish within each FMZ.

iv. Differences in Physiological Processes Affecting Bioaccumulation Model Performance, such as Growth Rate or Assimilation Efficiency

The Tier 2 Decision Support Tool assumes an average age for model fish and thus does not incorporate age-specific physiological or exposure differences in fish when assessing bioaccumulation. However, fish bioaccumulation rates vary with age and the fish uses of the Harbor vary by age. The results of the fish movement studies, as well as the literature for California halibut, indicate that only juveniles reside year-round in the Harbor, with adults migrating outside the Harbor for most of the year. The Tier 3 assessment simulates different migration patterns and fish bioaccumulation for individual age classes (Anchor QEA, 2017) for each fish species and thus is able to represent expected fish tissue concentrations based on both growth and exposure.

The factors and processes described above for the Tier 2 assessment process might result in inaccuracy and lack of resolution in sediment-fish contaminant linkage within and outside the Harbor. As a result, the Tier 3 assessment was found to be more appropriate in order to improve the accuracy and precision of the sediment-fish contaminant linkage by incorporating additional site-specific data, local spatial and temporal factors, and fish migration information, and is recommended for use in future assessments of human health risks in the Greater Harbor waters.

C. Tier 3 Site Specific Assessment for Greater Harbor Waters

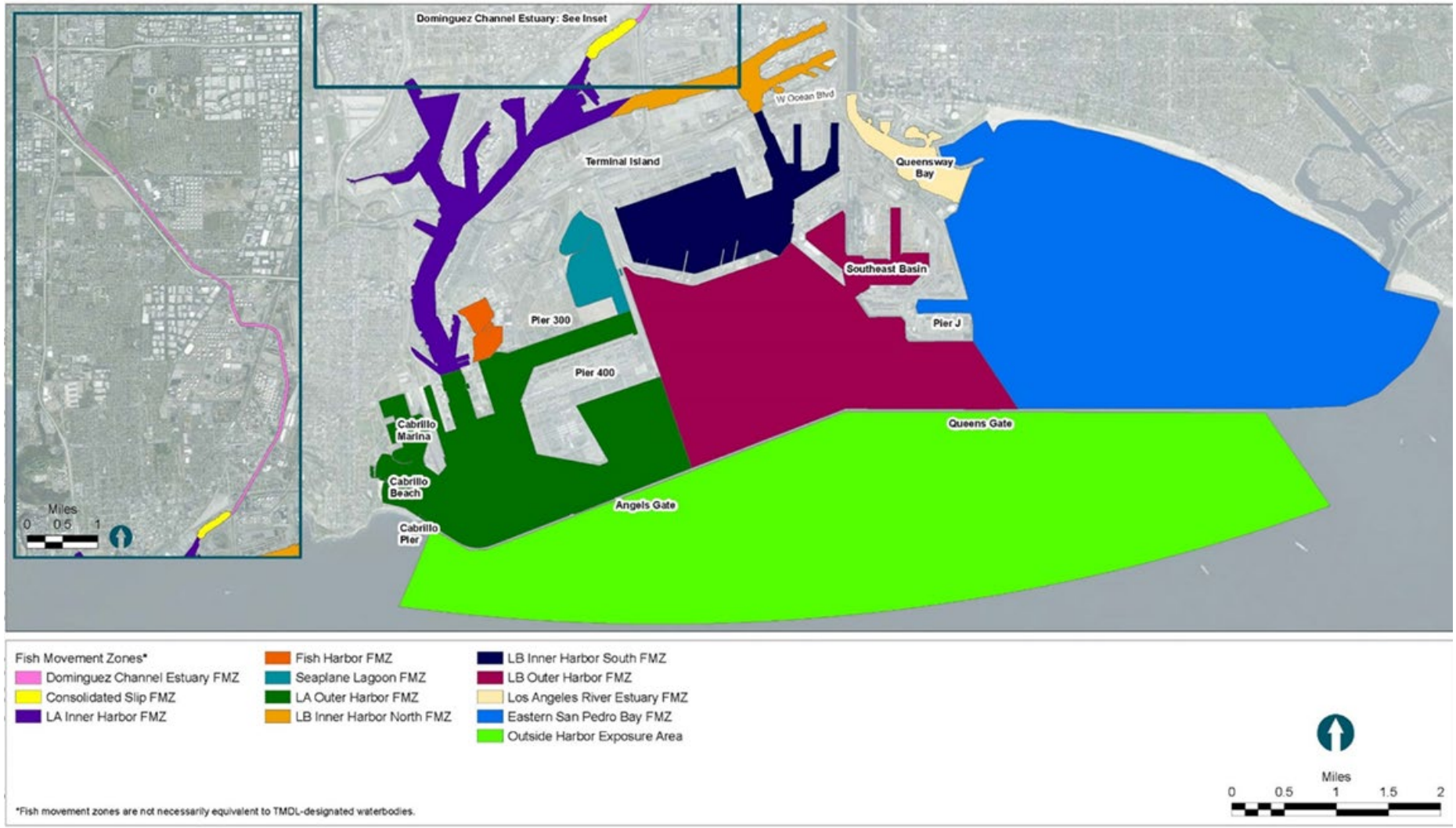
i. Fish Movement Zones: Tier 3 Assessment Unit Selection

Because of the size and complexity of the Greater Harbor Area, subareas of the Harbor were designated to perform the modeling and assessments. Special studies have been conducted in the Greater Harbor area to examine fish usage patterns and to determine the FMZs. The FMZs were developed with data and information regarding habit quality, including aquatic habitat data, benthic infaunal abundance data, and Harbor bathymetry (Anchor QEA, 2014a). Additionally, the movement of two species, white

croaker and California halibut, evaluated as part of regional fish tracking studies conducted by California State University at Long Beach (Lowe, C.G., B. Ahr, M. Farris, and A. Barilloti, 2015a) (Lowe, C.G., B. Ahr, M. Farris, and A. Barilloti, 2015b), was also considered. Based on these studies, the Harbor was divided into nine FMZs listed below (Figure 7). The use of the same FMZs is recommended for future assessments.

- Consolidated Slip
- Los Angeles Inner Harbor
- Fish Harbor
- Seaplane Lagoon
- Los Angeles Outer Harbor
- Long Beach Inner Harbor-North
- Long Beach Inner Harbor-South
- Long Beach Outer Harbor
- Eastern San Pedro Bay

Figure 7 Fish Movement Zones in the Greater Harbor Waters



ii. Tier 3 Site Specific Assessment Approach

A Tier 3 site assessment was conducted using a site-specific bioaccumulation model developed for the Greater Harbor to quantify the contribution of sediment and other sources of contaminants to fish tissue concentrations and then to integrate those findings with an evaluation of chemical exposure of human seafood consumers. Results of this assessment are summarized in Section 2.6 and presented in more detail in Appendix C. The Tier 3 site specific assessment for Greater Harbor Waters included chemical exposure and site linkage components as summarized below.

a. Sediment Linkage Determination

The sediment linkage was estimated by running the model with two different sediment conditions, one with current elevated levels and one with reduced (TMDL target) levels. The difference in predicted fish tissue concentrations between the two model runs was then calculated. The concentration difference represents the sediment contribution to the fish. Thus, stronger linkage between sediment and fish tissue is indicated by a greater difference in predicted fish tissue concentrations between these two model simulations. This analysis was completed for each individual fish species separately and then averaged to estimate a 'market basket' sediment linkage. The analysis was performed for each of the nine FMZs listed above in section 3.2.3.C. A sediment linkage category was assigned by determining the portion of the data distribution that was less than (or more than) the sediment linkage threshold as described in the SQP (SWRCB, 2018).

b. Chemical Exposure

Chemical exposure associated with human consumption of fish is determined by calculating the weighted-average contaminant concentration in fish tissue within each individual FMZ and then comparing these values to the fish tissue advisory thresholds specified in Table 19 of the SQP. Results are then categorized based on which threshold they fall within as described in the SQP.

The Los Angeles Water Board recommends using the same or equivalent model and evaluation methods for future assessments. For example, a Tier 3 assessment may be conducted as part regular monitoring requirements to assess ongoing conditions and can also be used as a compliance option for bioaccumulation compounds (see Section 4.5 for detail).

3.2.4 Human Health SQO Greater Harbor Waters-Specific - Determination of Compliance

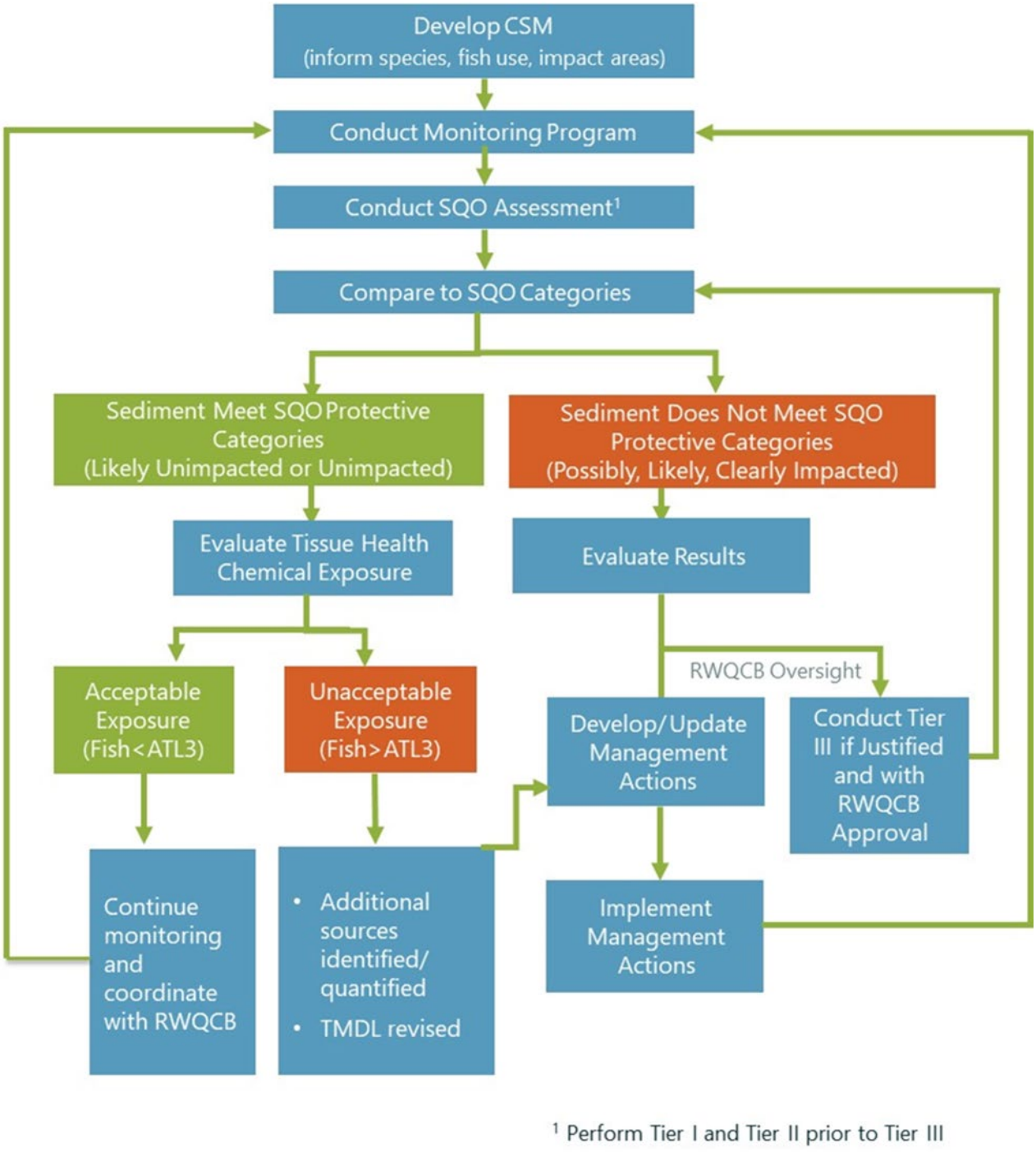
Los Angeles Water Board staff and the HTWG have developed procedures specific to the Dominguez Channel and Greater Harbor waters to determine if the waters are in compliance with the SQOs and the TMDL. The human health SQO tiered assessment procedure was designed to provide guidance for the assessment, evaluation, and documentation required to demonstrate compliance with the TMDL for human health protection.

For human health SQO assessment, staff recommend the sediment linkage determination be conducted based on updated monitoring data every five years to confirm if the sediment linkage determinations are consistently estimated. Adjustment/modification to the sediment linkage modeling and analysis might be required based upon the consistency of the sediment linkage determination results.

The human health SQO assessment procedure uses monitoring data to determine the which areas, or FMZs, are impacted (i.e. assessed as Likely Impacted or Possibly Impacted or Clearly Impacted)

(described in section 3.2.3, above). If an area does not meet the SQO threshold, the procedure requires management actions to reduce chemical exposures; if an area does meet the threshold, the procedure provides steps to follow to ensure continued review of fish and sediment status. The human health SQO assessment procedure to demonstrate compliance with the human health protection portion of the TMDL is illustrated in the flowchart in Figure 8 (Harbor Technical Work Group, 2018).

Figure 8 Evaluation Procedure Flow Chart for Human Health Protection Compliance



Compliance with the sediment WLAs under the human health SQO was assessed following these procedures. The HTWG found that Greater Harbor Waters sediments meet the human health SQOs for DDT and for PCBs in most FMZs, including Los Angeles Inner Harbor, Seaplane Lagoon, Los Angeles Outer Harbor, Long Beach Inner Harbor North, Long Beach Inner Harbor South, and Long Beach Outer Harbor. The HWTG found that the Consolidated Slip and Eastern San Pedro Bay do not meet the human health SQOs for PCBs. The evaluation is discussed in more detail in Appendix C.

4 Proposed Revisions to the TMDL

Proposed revisions to the Dominguez Channel and Greater Harbor Waters Toxic Pollutants TMDL are included in subsections below.

4.1 Incorporation of the Sediment Quality Provisions

Throughout the proposed Basin Plan amendment, staff have updated references to the SQPs and updated the reference to "SQO Part 1" or "SQO Part 2" to "benthic community SQO" or "human health SQO."

The incorporation of the revised SQPs, as described in Section 3 of this Staff Report are included in the Waste Load and Load Allocations section, Monitoring Plan section, and the Implementation section of the TMDL in the proposed Basin Plan amendment and the specific recommendations are included, here, in Waste Load and Load Allocations, Section 4.4; Monitoring, Section 4.5 and Implementation schedule, Section 4.7.

4.2 Additional Source Assessment for PCBs

A source assessment for PCBs in the Harbor was completed in 2011 for the May 5, 2011, Staff Report (2011 Staff Report) (LARWQCB, 2011) and remains valid. In this section, some additional information on PCBs is included.

PCBs are of special concern in this TMDL for two reasons: 1) the current levels of PCBs in fish tissue and sediments are elevated, and the human health SQO for PCBs is exceeded but is not for DDT; and 2) modeling shows PCBs levels will take longer than DDT to decrease to levels that will attain the numeric targets for the sediments and fish (Appendix A).

This TMDL revision provides additional source assessment for PCBs as described below to the Sources Analysis Section and the Implementation Section of the TMDL in the Basin Plan.

4.2.1 Review of PCBs

Polychlorinated biphenyls (PCBs) are man-made chemicals that are stable at high temperatures and pressures. Each variety of PCB is comprised a two-ring, carbon chain molecule (biphenyl) with 1 to 10 chlorine atoms attached.

The number of chlorine atoms and their location in a PCB molecule determine its physical and chemical properties. PCBs are generally non-flammable, chemically stable, and have a high boiling point and electrical insulating properties. Due to those characteristics, PCBs have been used in hundreds of industrial and commercial applications including as insulation, coolants and lubricants in electrical equipment such as transformers and capacitors.

Because of the high chemical stability of PCBs, they are also long lasting in the environment.

PCBs are lipophilic, accumulating in fatty tissues, and are not excreted by living organisms. This means that, like DDT, PCBs biomagnify or accumulate at greater concentrations in higher trophic levels. Consequently, higher trophic level animals feeding in a water-associated food web such as fish-eating birds and humans who consume fish-eating fish, are at risk of accumulating PCBs to levels which are a health risk.

High levels of PCBs harm the liver, digestive tract, and nerves and affect development, reproduction, and the immune system. PCBs are a probable human carcinogen.

The persistent nature of PCBs, their distribution through the food webs and concentration in higher trophic levels results in continuing human exposure.

In 1979, Congress banned the manufacture and most uses of PCBs due to an increasing understanding of their harmful effects (U.S. EPA, 1979). While manufacture, sale, and use of PCBs was generally banned, EPA regulations authorize their continued use in certain equipment manufactured prior to the ban such as some transformers.

High levels of PCBs and DDT in fish along the Southern California coast prompted state health officials to advise the public to limit their consumption of ocean fish. In 1985, interim limits for sport fish (e.g., avoid eating white croaker, limits for other fish) were introduced and in the early 1990s, additional advisories were added including more species and more specific guidelines (e.g., do not eat white croaker, limits to meals per week by age and gender). The most recent comprehensive fish advisories were issued in 2009 (OEHHA, 2009).

4.2.2 PCBs Sources, Fate, and Transport

As discussed in the 2011 TMDL Staff Report, DDT and PCBs are “legacy” pollutants. They have been banned for the most part, yet, they remain ubiquitous in the environment, bound to fine-grained particles. Urban runoff and rainfall higher in the watersheds mobilize the particles, which are then washed into storm drains and channels that discharge to the Dominguez Channel and Greater Harbor waters where they enter the food web.

While much of the PCB pollution in the Greater Harbor waters happened decades ago when PCBs were still in wide use, a smaller amount of PCBs still enters the Greater Harbor waters from land-based sources. Unlike DDT, PCBs remain in use today. In Los Angeles County, for example, there are transformers with over 17,000 kg of PCBs currently in use (USEPA 2019).

PCBs are also found in many buildings, which were built or renovated from 1950 to 1979. Potential sources of PCBs in those buildings include caulking used around windows, door frames, building joints, masonry columns and other masonry building materials. PCB-containing caulk may be present inside and on the exterior of the building as well as in surrounding surfaces. PCBs have been used in paints, mastics and other adhesives, fireproofing materials, and in the manufacture of some ceiling tiles and acoustic boards, among other products. PCBs may also be present in high intensity discharge (HID) lamp ballast capacitors and in the capacitors of fluorescent light ballasts (FLBs) manufactured before 1979 (USEPA 2019).

Building materials where PCBs were intentionally added during manufacture or application (called manufactured sources or primary sources) can lead to PCBs in indoor air. PCBs in the indoor air can then adsorb onto surfaces and dust, which become secondary sources of PCBs. PCBs from manufactured

sources such as caulk may also contaminate adjoining materials, such as masonry or wood, through direct contact and create secondary sources.

Statewide, mussel watch data suggest large declines in PCBs during the past 20 years. Long-term State Mussel Watch monitoring sites in Southern California that exhibited very high initial PCB concentrations (> 5000 ppb lipid weight) have significantly declined. Two stations in the Port of Long Beach declined about 4% in total PCB Aroclors between 1982 and 2010. However, declines in PCBs are much lower than declines in DDT (Melwani et al, 2013).

The Watershed Loading Estimation (Amec Foster Wheeler, 2016a) special study conducted by the Port of Los Angeles and Port of Long Beach was designed to provide high-resolution data of PCB and DDT concentrations in stormwater and dry weather flows into the Ports' jurisdictions from the watersheds of the Los Angeles River and the Dominguez Channel. This study confirmed that PCBs and DDTs are still being sourced to San Pedro Bay from watershed sources.

4.2.3 Potential Action for MS4 Permittees

Municipalities and agencies can reduce PCBs loads in stormwater runoff by 1) reducing the amount of contaminated sediment discharged to waterways and 2) preventing PCBs sources from contaminating sediment before it is discharged.

1. MS4 permittees have, and are, undertaking many projects to limit the amount of sediment discharged to waterways, such as planting vegetative buffers around impervious surfaces, and infiltration basins. Many of these actions also have the potential benefit of reducing other particle-associated pollutant loads in addition to PCBs.

2. Methods to reduce or prevent PCBs sources from contaminating sediment include remediation of on-land PCBs contaminated soils and control of releases of PCBs from electrical or other equipment, building materials and waste during demolition/remodeling.

Due to the current status of PCBs in sediments and fish tissue and because recovery rates for PCBs are anticipated to be long, remediation of on-land PCB contaminated soils or other sources of PCBs such as transformers and 1950-1979 building stock must be a priority. Remediation of on-land PCBs-contaminated soils and effective PCBs prevention or removal infrastructure improvements will take several years to pilot test, evaluate, and then plan, design, and implement on a scale sufficient to substantially reduce PCBs loads.

There are already efforts underway to gain insights regarding opportunities for load reductions in other Water Board Regions including the San Francisco Water Board Region.

Staff recommend adding a PCBs recommendations section to the Implementation Requirements.

PCB Recommendations for MS4 Permittees

MS4 permittees/responsible parties in all the watersheds which drain to the Greater Los Angeles and Long Beach Harbor Waters (Including Dominguez Channel, Los Angeles River, San Gabriel River and nearshore watersheds) should reduce PCB loadings by taking the following actions listed below:

a. Investigate on-land PCBs contaminated soils and/or sediments. PCBs are a known historical contaminant in soils and sediments throughout the region, both in private and public properties,

and public rights-of-ways. Although many contaminated sites have undergone remediation, it is likely that PCBs contaminated sites remain and continue to contribute PCBs to stormwater.

An identification of on-land sites with PCBs contamination, such as private properties, public rights-of-ways, and stormwater conveyances with reporting of investigation results, including identification of potentially contaminated properties and/or responsible parties to the Los Angeles Water Board and, if appropriate, the Department of Toxic Substances Control (DTSC), as well as in some instances to local agencies with authority to conduct oversight of hazardous materials would create opportunities for clean-up and reduction of PCB discharges. The Los Angeles Water Board may consider investigative orders in the future.

b. Implement BMPs to abate PCBs in runoff from all areas

i. MS4 permittees currently take actions to improve system design, operation, and maintenance to decrease fine sediment releases from stormwater systems and ensure the systems are sufficient to attain PCB WLAs. Many routine maintenance BMPs exist and are currently in use by MS4 permittees to control the discharge of sediments from urban stormwater runoff, such as detention basins and street sweeping.

ii. Strategic runoff treatment retrofits - There are many sediment control BMPs, such as sand (or other media) filtration devices or multi-chamber treatment trains that may be able to reduce PCBs loads in urban environments. MS4 permittees/responsible parties may implement strategic runoff treatment retrofits per existing, or updated, Watershed Management Programs in accordance with the Regional MS4 permit that will result in increased reduction of PCBs loads.

iii. Control/oversee removal and disposal of PCBs-containing equipment – PCBs-containing equipment remains in use with varying degrees of regulatory oversight depending on equipment type and PCBs concentration. Containment of the PCBs varies depending on equipment uses and regulatory oversight. These materials may therefore be released to the environment and enter stormwater conveyances. MS4 permittees/responsible parties may conduct industrial inspections to identify and cause replacement of PCBs-containing equipment remaining in the urban environment.

iv. Control/manage the removal and disposal of PCBs from building materials and waste during demolition/remodeling – PCBs-containing building materials remain in use with little regulatory oversight. With aging, construction or demolition activities, these materials may be released to the environment and enter stormwater conveyances. MS4 permittees/responsible parties may conduct or direct the implementation of inspection programs to manage PCBs in building materials.

4.3 Additional Fish and Sediment Linkage Analysis for Greater Los Angeles and Long Beach Harbor Waters Focusing on Fish Tissue

A linkage analysis connects pollutant loads to the numeric targets and to the protection of beneficial uses in a waterbody. A linkage analysis was completed in 2011 for the May 5, 2011 Staff Report (2011 Staff Report) (RWQCB and U.S. EPA, 2011a), which remains valid.

The numeric targets for pollutants in fish tissue, water, and sediment define acceptable levels to restore habitat conditions and protect benthic infauna, other aquatic organisms including fish and marine

mammals, wildlife, and human health. To improve the understanding of the linkage between organic contaminants in the environment and fish tissue accumulation, a conceptual site model and a bioaccumulative contaminant model were developed and linked for the Greater Harbor Waters area, as described in more detail in section 2.8 and Appendices A and B.

The linked model integrates two site-specific models: the WRAP model, which describes PCB and DDT movement in the environment, and the bioaccumulation model which simulates the transfer of organic contaminants through key trophic levels of the Greater Harbor Waters food web. Both models have been updated and calibrated to site-specific conditions in the Greater Harbor Waters. Linking those two models expands our understanding of the fate and transport process of PCBs and DDTs in the Greater Harbor Waters and how these chemicals move through the food web to fish tissue.

The linked model was used to support the Tier 3 Human Health SQO assessment of the Greater Los Angeles and Long Beach Harbor Waters. Site-specific sediment linkage analyses must be performed and re-evaluated every five years with updated information including but not limited to monitoring data, fish movement, and site-specific diet and fish consumption.

The linked model was used to develop a series of scenarios to characterize the fate and transport of PCBs and DDT in water, sediment and fish tissue and evaluate the efficiency of additional source control measures. More detailed information can be found in Appendix A.

This TMDL revision includes the additional linkage analysis for Greater Harbor Waters in Section E. Additional Fish and Sediment Linkage Analysis of the TMDL in the Basin Plan.

4.4 Revisions to the Waste Load Allocations Section

The Waste Load and Load Allocations Sections of 2012 DC and Greater Harbor Waters TMDL include several options for compliance by demonstrating the sediment quality targets are met or by demonstrating that the SQOs are met (see section 2.4). Staff recommend revising the Waste Load and Load Allocations, as follows, to incorporate the revised SQPs into the allocation compliance options.

4.4.1 Sediment WLAs and LAs for the Dominguez Channel Estuary and Greater Los Angeles and Long Beach Harbor Waters Metals and PAHs

These changes clarify that the determination of compliance with allocations for metals and PAHs will follow the SQPs and the compliance flowcharts developed by the HTWG. These changes update the TMDL compliance options to include the requirement that less than 15% of the assessment site area can be assessed as Likely Impacted or Possibly Impacted and no station within the site is assessed as Clearly Impacted as discussed in section 3.2.2.

This change also ensures the determination of compliance will use the Assessment Units as discussed in section 3.2.1.

Interim sediment WLA for metals and PAHs were established in the 2012 DC and Greater Harbor Waters TMDL for the Dominguez Channel Estuary and Greater Harbor Waters and included three compliance options.

The 2012 DC and Greater Harbor Waters TMDL, for interim WLAs for metals and PAHs, reads:

Compliance with the interim concentration-based sediment allocations may be demonstrated via any one of three different means:

1. Demonstrate that the sediment quality condition of **Unimpacted** or **Likely Unimpacted** via the interpretation and integration of multiple lines of evidence as defined in the SQO Part 1, is met; or
2. Meet the interim allocations in bed sediment over a three-year averaging period; or
3. Meet the interim allocations in the discharge over a three-year averaging period.

The proposed TMDL, for interim WLAs for metals and PAHs, will read:

1. *Demonstrate that the sediment quality condition is such that aquatic life is assessed as Unimpacted, Likely Unimpacted and the total percent area categorized as Possibly Impacted and/or Likely Impacted is less than 15% of the assessment site area and no station within the site is assessed as Clearly Impacted, as defined in the SQP. The demonstration shall be made with Assessment Units as specified in section J, Monitoring Plan; or*
2. *Meet the interim allocations in bed sediment over a three-year averaging period; or*
3. *Meet the interim allocations in the discharge over a three-year averaging period.*

Final Sediment WLAs and LAs for metals and PAHs were established in the 2012 DC and Greater Harbor Waters TMDL for the Dominguez Channel Estuary and Greater Harbor Waters and included three compliance options.

The 2012 DC and Greater Harbor Waters TMDL reads:

a. Final sediment allocations, as presented above, are met.

b. The qualitative sediment condition of Unimpacted or Likely Unimpacted via the interpretation and integration of multiple lines of evidence as defined in the SQO Part 1, is met, with the exception of Cr, which is not included in the SQO Part 1.

c. Sediment numeric targets are met in bed sediments over a three-year averaging period.

The proposed TMDL will read:

Compliance with the mass-based and concentration-based allocations for Cu, Pb, Zn, Cd, Cr, Hg and total PAHs in sediment may be demonstrated via any one of three different means:

a. Final sediment allocations, as presented in Table G.8, are met.

b. The qualitative sediment condition is assessed as i) Unimpacted, Likely Unimpacted, andno station within the site is assessed as Clearly Impacted and ii) the total percent area is categorized as Possibly Impacted and/or Likely Impacted is less than 15% of the assessment site area to protect aquatic life as defined in the SQP, with the exception of Cr, which is not included in the SQP. The demonstration shall be made with Assessment Units as specified in section J, Monitoring Plan

c. Sediment numeric targets are met in bed sediments over a three-year averaging period.

For the Greater Los Angeles and Long Beach Harbor Waters, the site-specific benthic community assessment procedures are provided in Section 3.2.1

4.5.2 Revised Compliance Options for Final Sediment WLAs and LAs for Bioaccumulative Compounds

This change clarifies that the determination of compliance with allocations for bioaccumlative compounds (DDT and PCBs) will follow the SQPs and the compliance flowcharts developed by the HTWG.

This change also ensures the determination of compliance will use the most recent site-specific sediment linkage and bioaccumulation model developed for the Greater Harbor Waters as discussed in section 3.2.3.

Final Sediment WLAs and LAs for bioaccumulative compounds were established in the 2012 DC and Greater Harbor Waters TMDL for the Dominguez Channel Estuary and Greater Harbor Waters and included three compliance options.

The 2012 DC and Greater Harbor Waters TMDL reads:

Compliance with these bioaccumulative TMDLs may be demonstrated via any of four different means:

a. Fish tissue targets are met in species resident to the TMDL waterbodies[3].

b. Final sediment allocations, as presented above, are met.

c. Sediment numeric targets to protect fish tissue are met in bed sediments over a three-year averaging period.

d. Demonstrate that the sediment quality condition protective of fish tissue is achieved per the Statewide Enclosed Bays and Estuaries Plan, as amended to address contaminants in resident finfish and wildlife

Footnote 3 reads: A site-specific study to determine resident species shall be submitted to the Executive Officer for approval.

The proposed TMDL will read:

Compliance with these bioaccumulative TMDLs may be demonstrated via any of four different means:

a. Fish tissue targets are met in species resident to the TMDL waterbodies.

b. Final sediment allocations, as presented above, are met.

c. Sediment numeric targets to protect fish tissue are met in bed sediments over a three-year averaging period.

d. The sediment quality condition to protect human health is assessed as Unimpacted, or Likely Unimpacted as defined in the SQP. The demonstration shall be made with the most recent site-specific sediment linkage and bioaccumulation model developed for the Greater Harbor Waters as specified in section J, Monitoring Plan.[3]

Footnote 3 will be removed because the resident species have been determined to be the market basket target species of white croaker, California halibut and surfperch. A new footnote 3 will read: *It is assumed that when the sediment condition to protect human health is met, the fish tissue targets will be met. The TMDL may be reconsidered if the fish tissue targets are not met.*

For the Greater Los Angeles and Long Beach Harbor Waters, the site-specific human health SQO assessment procedures are provided in Section 3.2.3.

4.5.3 Compliance Option for Intermittent Dischargers

Interim sediment allocations are assigned to stormwater dischargers (MS4, Caltrans, general construction and general industrial stormwater dischargers) and other NPDES dischargers including intermittent dischargers. Interim sediment allocations are based on the 95th percentile of sediment data collected from 1998-2006.

Staff recommend a change to provide an alternative compliance option for intermittent dischargers, to address the infrequent nature of discharge from intermittent dischargers, and the resulting difficulty in collecting sufficient sediment to measure contaminant concentrations in these discharges. Intermittent dischargers can comply with interim sediment limits by complying with performance-based water column effluent limits determined at the time of permit renewal. This change does not allow any decrease in current facility performance.

The 2012 DC and Greater Harbor Waters TMDL reads:

" Compliance with the interim concentration-based sediment allocations may be demonstrated via any one of three different means:

1. Demonstrate that the sediment quality condition of **Unimpacted** or **Likely Unimpacted** via the interpretation and integration of multiple lines of evidence as defined in the SQO Part 1, is met; or
2. Meet the interim allocations in bed sediment over a three-year averaging period; or
3. Meet the interim allocations in the discharge over a three-year averaging period."

The proposed TMDL will read:

"Compliance with the interim concentration-based sediment allocations may be demonstrated via any one of three different means:

1. *Demonstrate that the sediment quality condition is such that aquatic life is assessed as Unimpacted, Likely Unimpacted and the total percent area categorized as Possibly Impacted and/or Likely Impacted is less than 15% of the assessment site area and no station within the site is assessed as Clearly Impacted, as defined in the SQP. The demonstration shall be made with Assessment Units as specified in section J, Monitoring Plan; or*
2. *Meet the interim allocations in bed sediment over a three-year averaging period; or*
3. *Meet the interim allocations in the discharge over a three-year averaging period.*

Intermittent dischargers can demonstrate compliance with interim sediment limits by complying with performance-based water column effluent limits determined at the time of permit renewal."

4.5 Revisions to Monitoring Requirements

Several revisions to monitoring requirements will be incorporated into the revised TMDLs for clarity, consistency across programs, or improved efficiency.

4.5.1 Fish Tissue Monitoring Frequency

For improved efficiency and coordination of sampling events, staff recommend fish tissue sampling to be required twice per 5 years (no more than 3 years between sampling events) instead of every two years for Dominguez Channel Estuary, San Pedro Bay, Los Angeles Harbor, and Long Beach Harbor to be consistent with the sediment sampling and reporting program.

4.5.2 Responses to Clearly Impacted and Likely Impacted Assessments of the Benthic Community SQO

In order to ensure an appropriate management response to any newly discovered hot spots or areas special concern, such as the Port of Long Beach channel 2 discussed in section 2.7.4, staff recommend a requirement for supplemental monitoring for a new benthic community SQO assessment of Clearly Impacted or Likely Impacted.

The proposed TMDL will read:

When a benthic community SQO assessment finds a site is Clearly Impacted or Likely Impacted, the responsible parties shall ensure the site will be investigated via an addendum to a TMDL coordinated monitoring plan and the responsible parties shall determine if remedial actions are appropriate. If an existing, approved, Contaminated Sediment Management Plan, or a Cleanup and Abatement Order sufficiently addresses the site, an addendum to a TMDL coordinated monitoring plan will not be necessary.

The addendum to a TMDL coordinated monitoring plan, or substitution of the existing, approved, Contaminated Sediment Management Plan, or a Cleanup and Abatement Order and proposed remedial actions shall be submitted to the Los Angles Water Board within 6 months of the Clearly Impacted or Likely Impacted assessment for Executive Officer approval.

4.5.3 New Monitoring Language for Human Health SQO

In order to ensure that the human health SQOs will use an appropriate site-specific model for tier 3, human health SQO Assessments, the TMDL will require the most recent *site-specific sediment linkage and bioaccumulation model* as developed by HTWG or, with appropriate modifications due to such updates as improved scientific understanding of the fish-sediment linkage or changing environmental setting with Executive Officer approval.

The proposed TMDL will read:

For human health SQO assessments, the sediment linkage determination shall be conducted based on updated monitoring data using the most recent site-specific sediment linkage and bioaccumulation model developed for the Greater Harbor Waters. Adjustments or modifications to the site-specific sediment linkage and bioaccumulation model shall be specified in the MRP to be approved by the Executive Officer.

4.5.4 PCBs Measurements

PCBs can be measured as Congeners, Homologs, or Arochlors and different Water Board programs have specified different measurement requirements. In order to provide greater consistency between programs, this section provides a discussion of the different ways to measure PCBs and proposes revisions to the TMDL to be consistent with improved PCB methods and MS4 requirements.

- Congener:

  PCBs contain from 1 to 10 chlorine atoms on the biphenyl molecule, making possible 209 different PCB chemical structures, called congeners. The number and placement of the chlorine atoms on the biphenyl molecule governs its toxicity and environmental fate. The more chlorinated mixtures are generally the most persistent and toxic. While there may be as many as 209 PCB congeners, a smaller number of them are found in manufactured PCB mixtures.

- Homolog:

  Homologs are subsets of congeners. Each homolog subset is comprised of all the PCB congeners with the same number of chlorine atoms regardless of where on the biphenyl the chlorines are attached.

- Aroclors:

  PCBs generally occur as mixtures of congeners and the most common commercial mixtures are called Aroclors. Aroclor names reflect the percent chlorine (by weight) of the mixture (e.g., Aroclor 1242 is 42% chlorine by weight)

Congener analysis gives the most complete and useful information. However, some congeners are not common and requiring the assessment of those congeners would increase monitoring costs without adding information.

The approved MS4 Coordinated Integrated Monitoring Program (CIMP) for the Dominguez Channel Watershed Management Area Group currently assesses 44 congeners. The PCB Congeners list is a hybrid list derived from the 41 PCB Congeners listed in the Bight ’13 QA Manual issued by SCCWRP in 2013 and the 18 PCB Congeners in the SQO List for a total of 44 Congeners. Total PCBs are reported as the sum of the 44 Congeners.

Monitoring for more than 44 congeners may have advantages. A California Surface Water Ambient Monitoring Program (SWAMP) study on contaminants in fish in the California coast (2009-2010) used 55 congeners and added those for a total PCB number (Davis et al 2010). Using more than 80 congeners, a study to assess sources in Los Angeles Harbor (1990) was able to identify a unique local source (a scrap metal facility) even with the very high reporting limits in place at that time (Eganhouse et al. 1990).

For this TMDL revision, taking into account cost, consistency, and the breadth of information needed for an accurate assessment, staff recommends requiring monitoring of the 44 PCB congeners currently assessed as part of the CIMP for all monitoring in support of the TMDL including in the Los Angeles River estuary and San Gabriel River estuary. An expanded list of congeners may be advisable for special studies.

There are several analytical methods to measure PCBs which can determine total PCBs, up to 9 PCB Aroclors, PCB Homologs, or up to 209 individual PCB Congeners. In addition, several gas chromatography (GC) methods are available for the determination of PCBs using different analytical detectors such as Electron Capture Detector (ECD), Mass Spectrometer (MS) or High-Resolution Mass Spectrometer (HRMS). Methods using GC/ECD instrumentation have generally determined PCBs as Aroclors. Methods using GC/MS or HRGC/HRMS instrumentation can determine PCB Homologs and individual PCB Congeners.

Two common methods to measure congeners are EPA methods 8270 and 1668. EPA 1668 (HRGC/HRMS) is a high-resolution method, capable of determining the concentration of all 209 individual PCB congeners.

Both methods 1668 and 8270 are used by MS4 permittees for congeners. Use of the more sensitive 1668 may be advisable. In any case, the 44 congeners should be reported with a target Reporting Limit of 10 to 20 pg/l.

It is possible to get very low reporting limits (~ 1 pg/L) by using high-volume sampling in conjunction with 1668 (as used in the Stormwater PCBs and DDT for Watershed Loading Estimate Study). This may be advisable for special studies.

The proposed TMDL will include in the monitoring section:

PCBs monitoring shall be required for 44 congeners using recommended EPA methods 8270 and 1668 and should be reported with a target reporting limit of 10 to 20 pg/L.

4.6 Revisions to the Implementation Schedule

Several tasks are proposed for revision in the TMDL Implementation Schedule in order to add clarity and to add a final date for the attainment date for bioaccumulative compounds, which may be demonstrated by the attainment of the human health SQO.

Tasks 1 - 4, and 6 - 13 retain the same requirements and attainment dates.

Task 5 has been split into two tasks. The history of the CSMPs, including the difficulty of approving a final CSMP as discussed in Section 2.7.2, may make a Cleanup and Abatement Order necessary to compel clean-up of the identified hotspots. Because responsible parties have had sufficient time to develop a CSMP with specific, concrete milestones, staff recommend only a short period (by January 31, 2023) for responsible parties to develop and submit a revised CSMPs with specific, concrete milestones. Staff anticipate that a Cleanup and Abatement Order will be necessary.

5a retains the same requirement and attainment date and

5b is a new task to revise the CSMPs by January 31, 2023, for the identified hot spots, and, for newly identified hotspots, 16 months after hot spot(s) are identified and confirmed in the future unless the timeframe is modified in a Cleanup and Abatement Order.

Table 3 Schedule Task 5

Task Number	Task	Responsible Party	Deadline
5a	Submit an Implementation Plan and Contaminated Sediment Management Plan (CSMP). The Implementation Plan and CSMP shall be circulated for public review for 30 days. The CSMP shall include concrete milestones with numeric estimates of load reductions or removal, including milestones for remediating hot spots, including but not limited to Dominguez Channel Estuary, Consolidated Slip and Fish Harbor, for Executive Officer approval. The Executive Officer shall consider the Consent Decree for the Montrose Superfund site in determining whether to approve the CSMPs.	Dominguez Channel Responsible parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup	March 23, 2014
5b	*Submit a revised CSMP to include milestones with specific plans and associated completion dates for remediating identified hot spots (including but not limited to Dominguez Channel Estuary, Consolidated Slip, and Fish Harbor). A Cleanup and Abatement Order may be issued if responsible parties for identified hot spots submit an insufficient CSMP for remediation of the hot spots.*	*Dominguez Channel Responsible parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup*	January 31, 2023, for identified hot spots*, and 16 months after hot spot(s) are identified and confirmed in the future*

Task 14 has been split in two in order to specify a final date for water column WLAs which was inadvertently not specified in the 2012 TMDL.

14a specifies the final attainment date for water column WLAs.

14b retains the same requirement and attainment date

Table 4 Schedule Task 14

Task Number	Task	Responsible Party	Deadline
14a	*Demonstrate attainment of water column WLAs.*	*All Responsible parties*	*March 23, 2032*
14b	Demonstrate attainment of LAs and WLAs using the means identified under Waste Load and Load Allocations for Benthic Community Protection in Table 7-40.1	All Responsible parties	March 23, 2032

New Task 15 Staff recommend that the attainment date for WLA and LA for bioaccumulative compounds, which may be demonstrated by the attainment of the human health SQO, to be set at March 23, 2040. Because the methods to assess the human health SQO were not available during development of the 2012 DC and Greater Harbor Waters TMDL, it was difficult to set a specific date for attainment. Now that assessment methods are available for the human health SQOs and because the fish will take a period of time to recover after bioaccumulative compounds are reduced in the environment, a specific date for the attainment of the human health SQOs after the attainment of the benthic community SQOs can be set.

The modeling, as detailed in Appendix A, demonstrates that, in fish, PCBs will take longer to meet targets than DDT. For PCBs, the model-estimated time for fish to reach ATL3, as required by the SQO for human health will take between 5 and 48 years in the various FMZ established in the Greater Harbor Waters. However, even with fish not meeting the ATL3 yet in the Greater Harbor Waters, the human health SQO is being met in most FMZ. The difference is because the SQO also includes site linkage. When the sediment/fish linkage is weaker, the SQO is more likely to be met. While the fish in the Greater Harbor Waters show sufficient fidelity to specific areas that it is possible to develop reasonable FMZs, the fidelity is never absolute and the sediment/fish linkage will never be 1:1. As such, the SQO will be met prior to the fish tissue returning to a level at or below the ATL3.

Table 5 Schedule New Task 15

Task Number	Task	Responsible Party	Deadline
15	*Demonstrate attainment of LAs and WLAs using the means identified under Waste Load and Load Allocations for Human Health Protection in Table 7-40.1*	*All Responsible parties*	*March 23, 2040*

The attainment date for Cu, Pb, Zn, Cd, Cr, Hg and total PAHs, which may be demonstrated by attainment of the benthic community SQO, (task 14) remains March 23, 2032.

The full proposed schedule is listed below.

Table 6 Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL: Implementation Schedule

Task Number	Task	Responsible Party	Deadline
1	Interim allocations are achieved.	All Responsible Parties	March 23, 2012

Task Number	Task	Responsible Party	Deadline
2	Submit a Monitoring Plan to the Los Angeles Water Board for Executive Officer approval.	Dominguez Channel Responsible Parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup; Los Angeles and San Gabriel River Responsible Parties	November 23, 2013
3	Implement Monitoring Plan	Dominguez Channel Responsible Parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup; Los Angeles and San Gabriel River Responsible Parties	6 months after monitoring plan approved by Executive Officer.
4	Submit annual monitoring reports to the Los Angeles Water Board.	All Responsible Parties	15 months after monitoring starts and annually thereafter
5a	Submit an Implementation Plan and Contaminated Sediment Management Plan (CSMP). The Implementation Plan and CSMP shall be circulated for public review for 30 days. The CSMP shall include concrete milestones with numeric estimates of load reductions or removal, including milestones for remediating hot spots, including but not limited to Dominguez Channel Estuary, Consolidated Slip and Fish Harbor, for Executive Officer approval. The Executive Officer shall consider the Consent Decree for the Montrose Superfund site in determining whether to approve the CSMPs.	Dominguez Channel Responsible Parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup	March 23, 2014

Task Number	Task	Responsible Party	Deadline
5b	Submit a revised CSMP to include milestones with specific plans and associated completion dates for remediating identified hot spots (including but not limited to Dominguez Channel Estuary, Consolidated Slip, and Fish Harbor). A Cleanup and Abatement Order may be issued if responsible parties for identified hot spots submit an insufficient CSMP for remediating of the hot spots	Dominguez Channel Responsible Parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup	January 23, 2023, for identified hot spots, and 16 months after hot spot(s) are identified and confirmed in the future
6	Submit Report of Implementation to the Los Angeles Los Angeles Water Board.	Los Angeles and San Gabriel River Responsible Parties	March 23, 2014
7	Submit annual implementation reports to the Los Angeles Los Angeles Water Board. Report on implementation progress and demonstrate progress toward meeting the assigned LAs and WLAs.	All Responsible Parties	March 23, 2015, and annually thereafter
8	Complete Phase I of TMDL Implementation Plan and Sediment Management Plan.	Dominguez Channel Responsible Parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup	March 23, 2017
9	Submit updated Implementation Plan and CSMP.	Dominguez Channel Responsible Parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup	March 23, 2017
10	Los Angeles Water Board will reconsider targets, WLAs, and LAs based on new policies, data or special studies. The Los Angeles Water Board will consider requirements for additional implementation or TMDLs for Los Angeles and San Gabriel Rivers and interim targets and allocations for the end of Phase II.	Regional Water Board	March 23, 2018
11	Report on status of implementation and scope and schedule of remaining Phase II implementation actions to Los Angeles Water Board.	All Responsible Parties	March 23, 2022

Task Number	Task	Responsible Party	Deadline
12	Complete Phase II of TMDL Implementation Plan and CSMP.	Dominguez Channel Responsible parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup	March 23, 2027
13	Complete Phase III of TMDL Implementation Plan and CSMP.	Dominguez Channel Responsible Parties; Greater Harbors Responsible Parties; Consolidated Slip Responsible Parties subgroup	March 23, 2032
14a	Attain water column LA and WLAs.	All Responsible Parties	March 23, 2032
14b	Attain LAs and WLAs for Benthic Community Protection in	All Responsible Parties	March 23, 2032
15	Attain LAs and WLAs for Human Health Protection	All Responsible Parties	March 23, 2040

4.7 Future Reconsiderations

The Los Angeles Water Board may reconsider the WLAs, LAs, and implementation schedule based on new data, special studies, and implementation progress toward meeting the assigned LAs and WLAs. Additional special studies may be conducted to support the TMDL reconsideration. The results of any such Executive Officer-approved studies shall be evaluated at the time of TMDL reconsideration to refine the TMDL as appropriate. Potential revisions to the TMDL for reconsideration include but are not limited to the followings:

- Time schedule for hotspot removal
- Waste Load Allocation methodology
- Upstream sources determination and associated allocations
- Air deposition
- Regional sources evaluation

4.8 Other Revisions for Clarifications and Editorial Corrections

- Corrected targets
    - 2-methylnapthalene adjusted from Probable Effects Level (PEL) of 201 ug/kg to Effect Range Low (ERL) of 70 ug/L to be consistent with the Screening Quick Reference Tables (SQuiRTs) guideline used for other constituents

    - Dibenzo[a,h] anthracene adjusted from Probable Effects Level (PEL) of 260 ug/kg to Effect Range Low (ERL) of 63.4 ug/L to be consistent with the Screening Quick Reference Tables (SQuiRTs) guideline used for other constituents

- Added “Water Column” or “Sediment” to the appropriate sub-section titles in the Waste load and Load Allocation Section to clearly identify water column and sediment allocations
- Minor revisions to correct typos or for clarification.
- Clarified and made consistent use of the term “Greater Harbor Waters”
- Removed extraneous information from the Water Column Targets section
- Formatting changes for clarity

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