



**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION**

**Strategic Water Quality Assessment Approach
for San Diego Bay**



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Executive Summary

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) is part of California's Environmental Protection Agency tasked with preserving and restoring the quality of waters throughout the region. Many factors stress the ability of water to support important uses of water by people and wildlife. San Diego Bay is no exception.

This document outlines an approach for assessments that provide focused information for a better understanding of whether we are achieving our goal of protecting and restoring the beneficial uses of the Bay's waters. The Strategic Water Quality Assessment Approach will allow the Board to assess the health of the entire water body and drive decisions for management actions and resource allocation.

A STRATEGIC APPROACH

This assessment approach builds on the Board's 2012 [*A Framework for Monitoring and Assessment in the San Diego Region*](#) (Framework) by identifying the assessment needs for the Bay's three most important beneficial uses of waters: Habitats and Ecosystems (i.e. Are habitats and ecosystems healthy?), Fish and Shellfish Consumption (i.e. Are fish and shellfish safe to eat?), and Recreation (Is water quality safe for swimming?). The Framework consists of monitoring and assessment to answer four questions about conditions, stressors impacting conditions, sources of stressors, and evaluating the performance of management actions. This identified what types of analysis are most helpful and then what data to monitor including where, when, and how frequently to collect this data. There is now a process for analyzing the data which will standardize the assessment of water quality. Primary and supplemental assessment and monitoring needs are identified to answer the Framework's questions for the three most important beneficial uses. The details of this Strategic Water Quality Assessment Approach are outlined in the tables provided in [Appendix C](#).

APPROACH APPLICATION

The Board will periodically assess each Framework question (conditions, stressors impacting conditions, sources of stressors, and performance of management actions) of San Diego Bay in accordance with the data analysis methods outlined in [Appendix C](#). The Board will use the information from the assessments to prioritize and focus its staff and resources on what is most important to achieve a healthy San Diego Bay.

The monitoring effort to implement these assessments are likely too big for any one agency or existing program. The Board will use its regulatory means, resources, and partnerships to collect data and encourage other parties to collect the data so that the whole community can truly understand whether the Bay's waters provide safe recreation, food, and habitats.

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The development of this Strategic Water Quality Assessment Approach for San Diego Bay was possible because of the discussions, guidance, input, and feedback from consultations and meetings with the following professionals who have been or are currently involved with monitoring and assessing San Diego Bay:

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1. Introduction

San Diego Bay (Bay) is the largest natural enclosed bay in southern California and the most intensively used water body in the San Diego region. The Bay's water plays a vital role in sustaining the local and regional economy, supporting national security, and providing a multitude of recreational opportunities. Similarly, the Bay's ecosystems are critical habitats for local and migratory wildlife. The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) is responsible for assessing the conditions of the Bay's waters and to ensure the quality of the water supports the many human and wildlife uses of its waters. Because of the Bay's importance, the Board since its inception has devoted significant resources toward protecting and restoring the water quality of the Bay.

The Board's efforts are focused on the Bay's three most important beneficial uses of waters: Habitats and Ecosystems, Fish and Shellfish Consumption, and Recreation.

The San Diego Water Board frequently makes regulatory decisions to protect or restore these uses of the Bay. Understanding the condition of the waters is critical

toward ensuring these decisions are the most efficient actions to effectively protect, restore, or enhance the quality of the Bay's waters. Yet, many historic decisions were mostly informed by limited, facility- or discharge-specific data. Fortunately, data collection, availability, and assessment continue to improve over time, such that today the most informative assessment methods are within reach.

This document, a Strategic Water Quality Assessment Approach, begins with and focuses on the assessment needs of the Bay, rather than individual facilities or discharges. It identifies the information necessary to assess if the Bay's habitats are healthy, fish and shellfish are safe to consume, and waters are safe for swimming. This approach provides guidelines for what, where, and when to collect the data and how to analyze the data to extract the information needed for assessments. Understanding what needs to be assessed informs the development, implementation, and evaluation of existing or future monitoring programs.

The information developed based on the assessments from this approach will allow the Board and engaged parties to make better informed and data-driven decisions on how to prioritize and focus staff and resources to achieve a healthy San Diego Bay.

Ultimately, this approach will produce the information that can answer the question: Are the waters of San Diego Bay healthy?

SAN DIEGO BAY

CONDITIONS ASSESSMENT QUESTIONS:



Are habitats and ecosystems healthy?



Are fish and shellfish safe to eat?



Is the water quality safe for swimming?

2. Building on Experience

In 2012, the San Diego Water Board recognized the limits of assessing water body conditions from the perspective of discharge-oriented monitoring and developed a more informative water body-oriented approach to assessment and monitoring when it supported [*A Framework for Monitoring and Assessment in the San Diego Region*](#) (Framework).¹ Figure 1, adapted from the Framework, shows the cycle of collecting and analyzing monitoring data for assessments to answer questions that will help the Board proactively direct and use resources to protect and restore the beneficial uses of San Diego Bay. The Framework consists of assessment and monitoring to answer questions about conditions, stressors impacting conditions, sources of stressors, and performance of management actions.

**A FRAMEWORK FOR
MONITORING AND ASSESSMENT
IN THE SAN DIEGO REGION**

A systematic, logical,
problem-solving water body-
oriented approach to
monitoring and assessment.

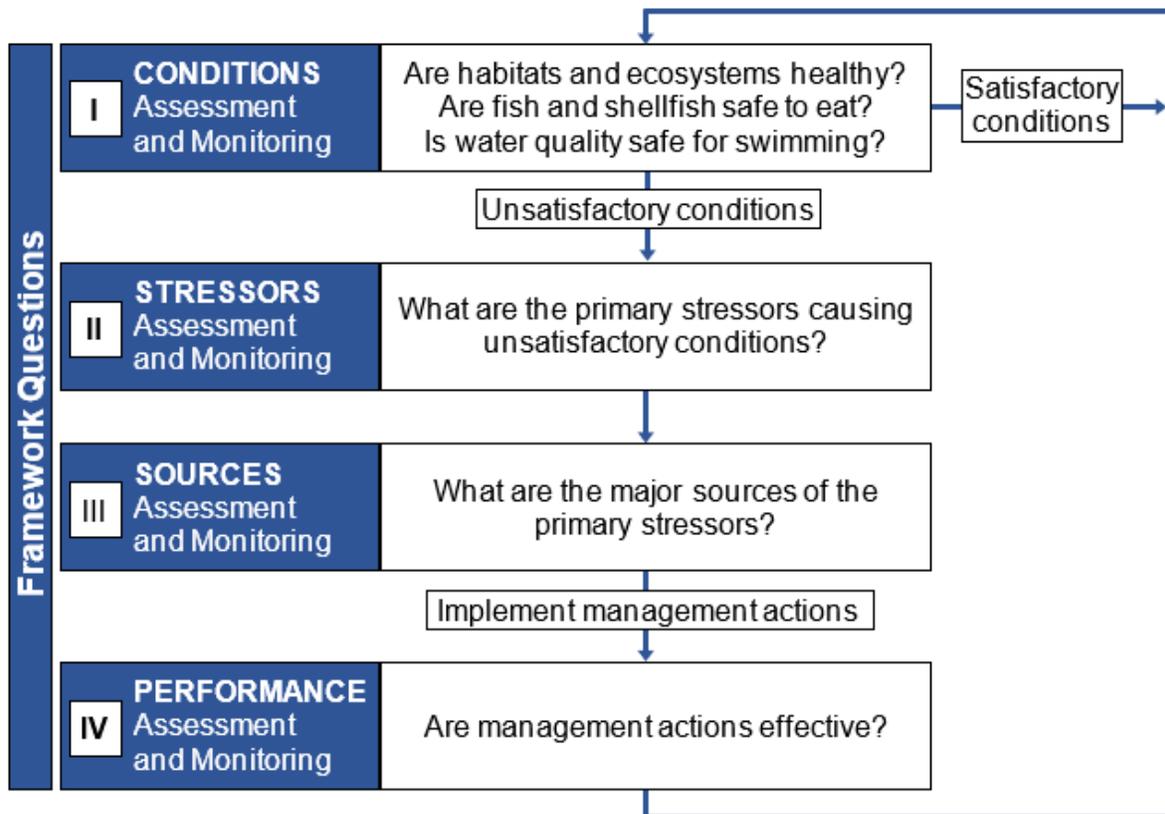


Figure 1. Water Body Oriented Assessment and Monitoring
(adapted from *A Framework for Monitoring and Assessment in the San Diego Region*)

¹ *A Framework for Monitoring and Assessment in the San Diego Region* was adopted on December 12, 2012, under Resolution No. R9-2012-0069.

With the adoption of the [Practical Vision](#) in 2013,² the Board committed to implementing the water body-oriented assessment and monitoring approach. As a pilot project, the [Strategy for a Healthy San Diego Bay](#) (Strategy)³ was adopted in 2015 to apply concepts from the Practical Vision to San Diego Bay.

The Strategy describes a seven-step implementation process:

- 1) Identify key beneficial uses
- 2) Assess conditions related to those key beneficial uses
- 3) Develop and implement priorities
- 4) Set meaningful goals
- 5) Realign and implement work
- 6) Track progress
- 7) Periodically reevaluate priorities, which may require revisions to the priorities, goals, and realignment of work

**STRATEGY FOR A HEALTHY
SAN DIEGO BAY**

A strategy to align the Board's work with the highest priorities and most important goals for the Bay.

The seven steps of the Strategy are concurrently and iteratively being implemented by Board staff. For many of the steps, better information about the conditions of San Diego Bay for the key beneficial uses are needed before they can be appropriately and adequately implemented. This Strategic Water Quality Assessment Approach for San Diego Bay is necessary for developing and collecting this information.

² The *Practical Vision* was adopted on November 13, 2013, under Resolution No. R9-2013-0153. See Chapter 1 (Strategizing for Healthy Waters) and Chapter 2 (Monitoring and Assessment).

³ The *Strategy for a Healthy San Diego Bay* was adopted on June 24, 2015, under Resolution No. R9-2015-0086.

3. Development Process for the Assessment Approach

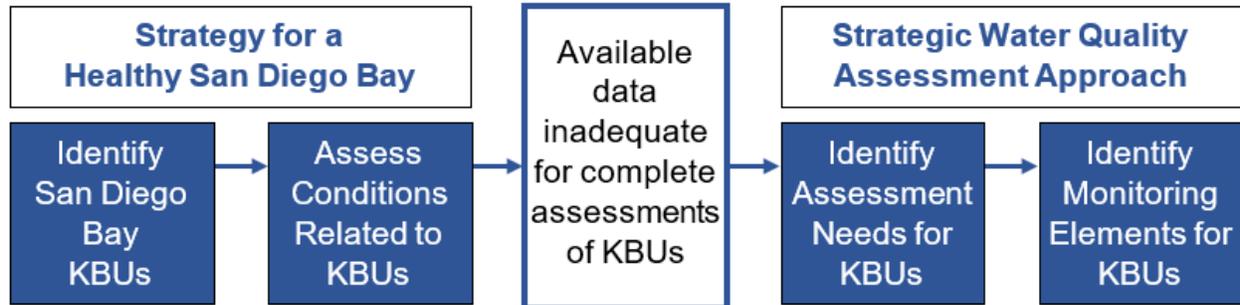


Figure 2. Strategic Water Quality Assessment Approach Development Process⁴

IDENTIFYING THE BAY’S KEY BENEFICIAL USES

In 2017, the San Diego Water Board endorsed the staff report entitled [*Key Beneficial Uses and Key Areas – Focusing on What Is Most Important*](#).⁵ This report identified four key beneficial uses for which the protection and integrity, or health, of waters in the San Diego region are most important.

The [Strategy for a Healthy San Diego Bay](#) began with identifying the Bay’s key beneficial uses. This was done by looking at the beneficial uses identified in the [Water Quality Control Plan for the San Diego Basin \(Basin Plan\)](#). There are 13 beneficial uses for San Diego Bay, which include:

KEY BENEFICIAL USES

The categories of water quality-dependent uses most critical to consider for the protection of human and environmental health.

- Preservation of Biological Habitats of Significance (BIOL)
- Commercial and Sport Fishing (COMM)
- Estuarine Habitat (EST)
- Industrial Service Supply (IND)
- Marine Habitat (MAR)
- Migration of Aquatic Organisms (MIGR)
- Navigation (NAV)
- Rare, Threatened or Endangered Species (RARE)
- Contact Water Recreation (REC-1)
- Non-Contact Water Recreation (REC-2)
- Shellfish Harvesting (SHELL)
- Spawning, Reproduction, and/or Early Development (SPWN)
- Wildlife Habitat (WILD)

⁴ KBUs: key beneficial uses

⁵ *Key Beneficial Uses and Key Areas – Focusing on What Is Most Important* was endorsed by the Board on March 15, 2017, under Resolution No. R9-2017-0030.

Several of the beneficial uses were grouped in the [Strategy for a Healthy San Diego Bay](#) around three key beneficial uses: Habitats and Ecosystems, Fish and Shellfish Consumption, and Recreation.

ASSESSING CONDITIONS OF SAN DIEGO BAY

The Strategy identifies the purpose of water quality assessments and monitoring for each of the three key beneficial uses for San Diego Bay:

- Are habitats and ecosystems healthy?
- Are fish and shellfish safe to eat (i.e., “fishable”)?
- Are waters suitable for recreation (i.e., “swimmable”)?

Initial assessments of the conditions of San Diego Bay for the key beneficial uses, step number two of the Strategy, were based on readily available data and information from the San Diego Water Board, State Water Resources Control Board, California Office of Environmental Health Hazard Assessment (OEHHA), San Diego County Department of Environmental Health (SDCDEH), Port of San Diego (Port), and U.S. Department of the Navy (Navy).

In 2017, the Board published a series of “Status Sheets” on the [Strategy for a Healthy San Diego Bay](#) webpage summarizing findings of the initial conditions assessments for the Recreation and Fish and Shellfish Consumption key beneficial uses ([Appendix A](#)). An assessment of San Diego Bay conditions for Habitats and Ecosystems could not be completed due to a lack of established parameters or indicators for assessing the health of the various habitats and ecosystems found in the Bay. The initial conditions assessments identified data gaps that prevent complete and adequate conditions assessment of the key beneficial uses.

The initial assessments showed that assessing conditions of a water body requires more than facility- or discharge-specific data. The most useful data and information for assessing San Diego Bay conditions came from outside of the Board’s regulatory-driven and discharge-oriented monitoring programs.

COORDINATING WITH THE PORT AND NAVY

Following the completion of the initial conditions assessments, Board staff organized a series of meetings with the Port and Navy to facilitate discussions about developing an approach to assessing and monitoring San Diego Bay from a more common understanding of assessment needs. The Port and Navy have responsibilities that overlap with the Board’s mission to protect and restore the KBUs of the Bay. They are also responsible for collecting and using much of the monitoring data that was reviewed for the initial conditions assessments.

The Port implements the Regional Harbor Monitoring Program (RHMP) in San Diego Bay pursuant to an Investigative Order issued by the San Diego Water Board, which is implemented in coordination with the Southern California Bight Regional Monitoring

Program (Bight RMP). The Navy implements several monitoring programs with discharge and receiving water monitoring for National Pollutant Discharge Elimination System (NPDES) permits issued by the Board to the Navy's bases located around the Bay. The Port and Navy also collaborate to collect data and information about the Bay's natural and wildlife resources to support the San Diego Bay Integrated Natural Resources Management Plan (INRMP). Because all these monitoring programs are taking place in San Diego Bay, there are opportunities to share resources, or coordinate the collecting, analyzing, and reporting of the monitoring data and information to satisfy multiple agency goals.

The Port and Navy have similar and overlapping needs as the Board for monitoring data. At meetings with staff, the Board, Port, and Navy shared information about the types of monitoring data they collect, the purpose and use of the data, and the resources for collecting the data. The meetings also allowed Board staff to develop and receive feedback on the types of data and information needed to assess the key beneficial uses.

Identifying the assessment needs for each key beneficial use of San Diego Bay in this document should help better communicate and coordinate with the Port, Navy, and other interested stakeholders.

4. Assessment Needs of Key Beneficial Uses

Establishing the assessment needs for each key beneficial use is the most important step in this water body-oriented approach, because it identifies the information necessary to assess if the Bay's habitats are healthy, fish and shellfish are safe to consume, and waters are safe for swimming. The Framework's four assessment questions provided the starting point for identifying assessment needs for the Habitats and Ecosystems, Fish and Shellfish Consumption, and Recreation key beneficial uses of the Bay as shown in [Figure 1](#).

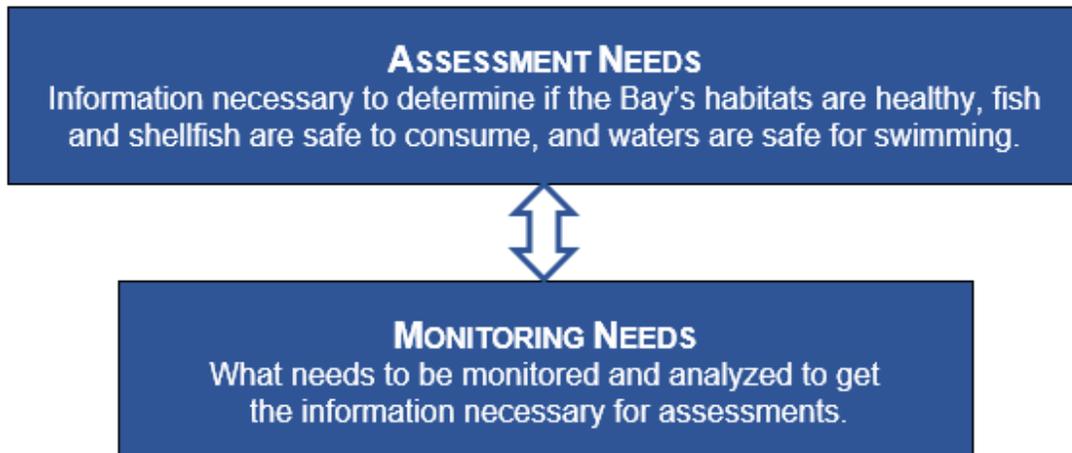


Figure 3. Assessment and Monitoring Needs

Understanding the information needed to answer those Framework questions determined the monitoring needs - the types of data to collect and analyze. Ideally, there is a single direct measurement to monitor. Direct measurements were identified for the Framework questions as they relate to each key beneficial use. Indirect measurements can answer the four Framework questions when a direct measurement is not available or practical to monitor.

When identifying monitoring needs, the information that is needed was compared with the data that is available or potentially available based on existing monitoring programs, special studies, or research that have collected, currently collect, or can potentially collect the necessary data. The potential direct and indirect measurements were evaluated to determine whether those types of data are feasible and practical to monitor and collect.

[Appendix B](#) summarizes the evaluations of the potential direct and indirect measurements for the assessment of conditions (Tables [B-1a](#) and [B-1b](#)), stressors impacting conditions (Tables [B-2a](#) and [B-2b](#)), sources of stressors (Tables [B-3a](#) and [B-3b](#)), and performance of management actions to improve conditions (Tables [B-4a](#) and [B-4b](#)) for the Habitats and Ecosystems, Fish and Shellfish Consumption, and Recreation key beneficial uses.

5. Strategic Water Quality Assessment Approach

A Strategic Water Quality Assessment Approach will produce the information necessary to best determine if the waters of San Diego Bay are healthy. Outlines provided in [Appendix C](#) are based on measurements that can be collected for the assessment needs for each of the three key beneficial uses and the four Framework questions. The outline for each of the monitoring elements (i.e., what needs to be monitored for analysis) provides the details about the monitoring components (i.e., what data need to be collected, and where and when data should be collected). The outlines also include a description of how each monitoring element data set will be analyzed. The description of the data analysis methods communicates in a transparent manner what information the monitoring data will provide the Board for assessment purposes.

[Appendix C](#) includes outlines for “primary” monitoring elements that can generally be collected and analyzed with currently available methods, metrics, and/or standards, or by comparing relative changes over time. Minor modifications or additions to existing monitoring programs may be necessary to fully implement all the components of the primary monitoring elements.

As applicable, [Appendix C](#) also includes outlines for “supplemental” monitoring elements that may not yet be collected and analyzed due to a lack of currently available methods, metrics, standards and/or resources for routine monitoring programs. As new methods, metrics, standards and/or resources become available, supplemental monitoring elements should be implemented to collect data that can be incorporated into assessments.

[Table 1](#) summarizes the primary and supplemental monitoring elements, with references and links to the corresponding Strategic Water Quality Assessment Approach outline in [Appendix C](#) where the details of the monitoring components and data analysis method for each monitoring element can be found.

Table 1. Summary of Primary and Supplemental Monitoring Elements for Key Beneficial Uses

Framework	 HABITATS AND ECOSYSTEMS	 FISH AND SHELLFISH CONSUMPTION	 RECREATION
I CONDITIONS Assessment and Monitoring	<p> Are habitats and ecosystems healthy? If not, are habits/ecosystems getting healthier?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-1a):</p> <ul style="list-style-type: none"> I - Habitats Physical Size and Area - Diversity and Abundance of Biology <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-1e):</p> <ul style="list-style-type: none"> I+ - Functionality of Habitats and Ecosystems 	<p> Are fish and shellfish safe to eat? (i.e., Can people eat fish/shellfish and not potentially get sick?) If not, are fish /shellfish getting safer to eat?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-2a):</p> <ul style="list-style-type: none"> I - Primary Indicator Fish and Shellfish Tissue Contaminants <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-2e):</p> <ul style="list-style-type: none"> I+ - Supplemental Indicator Fish and Shellfish Tissue Contaminants - Fish and Shellfish Consumption 	<p> Is water safe to swim? (i.e., Can people go in the water and not potentially get sick?) If not, is water quality getting safer for swimming?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-3a):</p> <ul style="list-style-type: none"> I - Primary Recreation Water Quality (Fecal Indicator Bacteria) <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-3e):</p> <ul style="list-style-type: none"> I+ - Supplemental Recreation Water Quality (Harmful Algal Blooms and Other Pollutants) - Recreator Health
II STRESSORS Assessment and Monitoring	<p> Are impacts to conditions for habitats and ecosystems from stressors (i.e., alterations to habitats/ ecosystems) increasing or decreasing?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-1b):</p> <ul style="list-style-type: none"> II - Synthetic Chemical Levels in Water, Soil, and Sediment - Habitats Physical Size and Area - Diversity and Abundance of Biology <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-1f):</p> <ul style="list-style-type: none"> II+ - Functionality of Habitats and Ecosystems 	<p> Are impacts to conditions for fish and shellfish consumption from stressors (i.e., pollutants in fish/ shellfish) increasing or decreasing?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-2b):</p> <ul style="list-style-type: none"> II - Primary Indicator Fish and Shellfish Tissue Contaminants <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-2f):</p> <ul style="list-style-type: none"> II+ - Supplemental Indicator Fish and Shellfish Tissue Contaminants 	<p> Are impacts to conditions for recreation from stressors (i.e., pollutants in water) increasing or decreasing?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-3b):</p> <ul style="list-style-type: none"> II - Primary Recreation Pollutants (Fecal Indicator Bacteria) <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-3f):</p> <ul style="list-style-type: none"> II+ - Supplemental Recreation Pollutants (Harmful Algal Blooms and Other Pollutants)
III SOURCES Assessment and Monitoring	<p> Are contributions from sources of stressors (i.e., discharges/alterations) impacting conditions for habitats and ecosystems increasing or decreasing?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-1c):</p> <ul style="list-style-type: none"> III - Synthetic Chemical Levels in Discharges - Habitat Alteration Projects - Habitats Physical Size and Area and Biological Changes <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-1g):</p> <ul style="list-style-type: none"> III+ - Functionality of Habitats and Ecosystems 	<p> Are contributions from sources of stressors (i.e., environment/food) impacting conditions for fish and shellfish consumption increasing or decreasing?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-2c):</p> <ul style="list-style-type: none"> III - Sediment Contaminants <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-2g):</p> <ul style="list-style-type: none"> III+ - Contaminants in Food for Fish and Shellfish 	<p> Are contributions from sources of stressors (i.e., discharges of pollutants) impacting conditions for recreation increasing or decreasing?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-3c):</p> <ul style="list-style-type: none"> III - Discharges of Sewage - Presence and Levels of Sewage at Beaches <p>SUPPLEMENTAL MONITORING ELEMENTS (Table C-3g):</p> <ul style="list-style-type: none"> III+ - Discharges of Other Pollutants at Beaches - Presence and Levels of Other Pollutants at Beaches
IV PERFORMANCE Assessment and Monitoring	<p> Are management actions improving conditions and reducing impacts by stressors and sources for habitats and ecosystems?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-1d):</p> <ul style="list-style-type: none"> IV - Implementation of Management Actions - Synthetic Chemical Levels in Discharges - Habitats Physical Size and Area - Diversity and Abundance of Biology 	<p> Are management actions improving conditions and reducing impacts by stressors and sources for fish and shellfish consumption?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-2d):</p> <ul style="list-style-type: none"> IV - Implementation of Management Actions - Primary Indicator Fish and Shellfish Tissue Contaminants 	<p> Are management actions improving conditions and reducing impacts by stressors and sources for recreation?</p> <p>PRIMARY MONITORING ELEMENTS (Table C-3d):</p> <ul style="list-style-type: none"> IV - Implementation of Management Actions - Presence and Levels of Sewage at Beaches

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6. Guidance for Applying Approach

Because the uses and habitats of San Diego Bay waters are spatially and temporally diverse, the monitoring effort to implement these assessments are likely too big for any one agency or existing program. The data collection and analyses for this effort will require a combination of regulatory and non-regulatory actions by the San Diego Water Board and others. The Board will use its regulatory means, resources, and partnerships to collect data and encourage other parties to collect the data so that the whole community can truly understand whether the Bay's waters provide safe recreation, food, and habitats.

Many of the components for the primary monitoring elements outlined in [Appendix C](#) are being implemented by existing monitoring programs (e.g., RHMP, INRMP, NPDES permits), but there are several primary monitoring components not currently or regularly included in existing monitoring programs. The components of the supplemental monitoring elements outlined in [Appendix C](#) require the development of new or additional methods, metrics, standards and/or resources before they can be implemented as part of routine monitoring programs.

SAN DIEGO WATER BOARD

To meet the goals of the Board's [Strategy for a Healthy San Diego Bay](#), staff will periodically assess each Framework question (conditions, stressors impacting conditions, sources of stressors, and performance of management actions) in accordance with the data analysis methods outlined in [Appendix C](#). The information from the assessments will be used by the Board, its management, and staff to prioritize and focus resources on what is most important to achieve a healthy San Diego Bay.

The San Diego Water Board has a variety of responsibilities and functions that can implement or encourage the implementation of the monitoring components of the Strategic Water Quality Assessment Approach.

Monitoring and Assessment - Where the Board has discretion, it can direct resources (i.e., staff, equipment, and funds) toward collecting and assessing data not otherwise required or collected by existing monitoring programs for San Diego Bay. Similarly, the Board can continue to help develop the science for new or improved methods, metrics, or standards needed for the supplemental monitoring elements. The Board will also use the assessments to determine the status of water bodies in accordance with the requirements of Clean Water Act sections 305(b) and 303(d) (a.k.a. the Integrated Report).

Permitting – The Board has the statutory responsibility to ensure that permitted discharges of waste are protective of beneficial uses in the receiving waters. So, permit-based monitoring programs included in NPDES permits, waste discharge requirements (WDRs), and Clean Water Action section 401 water quality certifications for San Diego Bay should incorporate the monitoring components outlined in [Appendix C](#) as applicable and appropriate to the facility, location, and/or discharge. This could involve flexible requirements to encourage and incentivize the collection of data needed for the primary

monitoring elements in coordination with and to leverage established programs such as the RHMP and INRMP.

Enforcement - Monitoring requirements associated with the Board's enforcement actions such as investigative orders and cleanup and abatement orders for San Diego Bay should incorporate the monitoring components outlined in [Appendix C](#) as applicable and appropriate to the facility, location, and/or discharge. Administrative civil liability (ACL) settlements could provide opportunities for Supplemental Environmental Projects (SEPs) to direct funds toward collecting data for the primary monitoring elements or toward developing the science for new or additional methods, metrics, or standards needed for the supplemental monitoring elements.

Planning and Standards – Each triennial Basin Plan review could evaluate whether water quality objectives in the Basin Plan should be updated with standards or metrics consistent with the assessment criteria from [Appendix C](#) to adequately determine whether key beneficial uses are attained. Similarly, total maximum daily loads (TMDLs) and TMDL alternatives required by Clean Water Act section 303(d) should identify numeric targets consistent with the assessment criteria from [Appendix C](#) for restoring affected key beneficial uses.

Public Outreach and Education - As recognized in the [Strategy for a Healthy San Diego Bay](#), effective communication of monitoring results is important to advancing stewardship and enjoyment of the Bay's waters. The Board will publish and distribute the results of assessments performed in accordance with this Strategic Water Quality Assessment Approach. At periodic "state of the Bay" public meetings or reports, the Board will also communicate how the results of the assessment are informing the Board's priorities. In addition, the Board will highlight outstanding data needs and opportunities when communicating, collaborating, and coordinating with the regulated community and other interested stakeholders.

REGULATED COMMUNITY

The Strategic Water Quality Assessment Approach outlines are intended to help the regulated community understand the purpose of monitoring requirements issued by the Board. The Strategic Water Quality Assessment Approach can also help to coordinate and maximize the use of existing resources and minimize redundancy between existing and future monitoring programs.

OTHER INTERESTED STAKEHOLDERS

The Strategic Water Quality Assessment Approach outlines are intended to help other interested non-regulated parties (e.g., research and academic institutions, volunteer organizations) understand both the data the Board desires and how the Board assesses the most important water quality conditions of San Diego Bay. This Strategic Water Quality Assessment Approach can help these stakeholders identify areas where their monitoring efforts may be able to collect data for assessing conditions or for developing the science for new or additional methods, metrics, or standards needed to advance the understanding of the Bay's waters.

APPENDICES

to

**Strategic Water Quality Assessment Approach
for San Diego Bay**

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APPENDIX A

2017 San Diego Bay Status Sheets

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This “status sheet” reports on current conditions of San Diego Bay in terms of its ability to support water-contact recreation (i.e., the “REC-1” beneficial use). Water quality standards are commonly used to determine if waters are safe for human contact. Fecal indicator bacteria such as *Enterococcus* have been linked to various pathogens commonly associated with sewage (or fecal matter). When *Enterococcus* levels in water exceed standards deemed safe for human water contact, the potential risk of contracting a water-borne illness increases.



Photo: J. Haas

**SAN DIEGO BAY:
A RESOURCE OF MANY USES**

San Diego Bay is an important water body in the San Diego region due to its ecological value and because it supports tourism; commercial, recreational, and subsistence fishing; and a variety of recreational, maritime, industrial, commercial, and military uses. For this reason, the San Diego Water Board endorsed a “[Strategy for a Healthy San Diego Bay](#)” via Resolution No. R9-2015-0086 in June 2015. The Strategy identified the key beneficial use categories of the Bay as:

- Recreation (water contact (“REC-1”) and non-water-contact (“REC-2”));
- Human consumption of fish and shellfish; and
- Habitats and ecosystems

A primary goal of the Strategy is to use monitoring data to assess attainment of these key beneficial uses, as well as changes in their status over time, and to communicate findings to the public.

Beach advisories are posted when bacteria levels are above the water quality standards and swimming is not advised. [SD County Department of Environmental Health](#) routinely monitors swimming areas to evaluate bacteria levels. In San Diego Bay, weekly samples are collected at six beaches between April 1st and October 31st of each year. In some cases (such as at Shelter Island Shoreline Park in 2015), monitoring continues through the winter months. This monitoring of bacteria levels allows for evaluation of how often each beach met or did not meet safe swimming water quality standards during the “dry” season (May through September) and “wet” season (October through April).



Photo: J. Anderson



Photo: E. Chan

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ASSESSING THE REC-1 BENEFICIAL USE IN SAN DIEGO BAY

For regulatory purposes, *Enterococcus* levels are expressed in two ways: The first is the one-time *Enterococcus* concentration detected in a single sample. The other is the average level of the *Enterococcus* concentrations detected in up to five samples collected during any 30-day period. Sample results are compared to *Enterococcus* REC-1 water quality standards. If concentrations in a given water body are greater than the REC-1 water quality standards more than 10 percent of the time, there is a greater risk for illness in humans from water contact. San Diego Bay *Enterococcus* data were compiled from a 2-year period (May 2014 through April 2016) to assess the bacteria conditions during the “dry” and “wet” seasons.

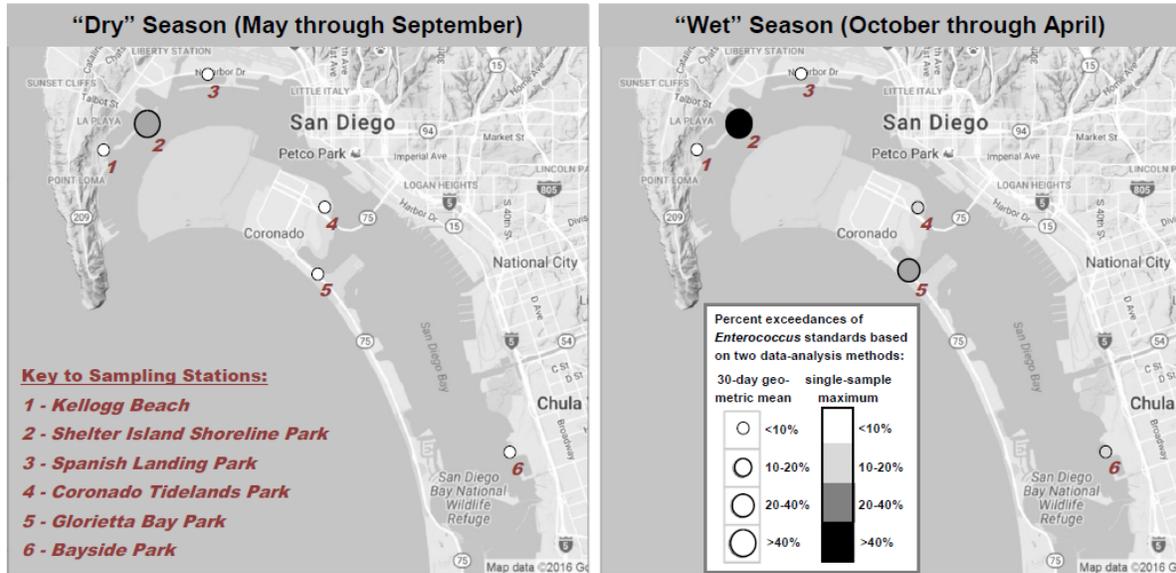


Figure 1. Frequencies at which contact-recreation standards for *Enterococcus* were exceeded, in the dry and wet seasons, reported in two ways, as: 1) 30-day geometric mean, and 2) single-sample maximum. For the former, increasing diameter of the data point, and for the latter, the shift from white toward black, represent higher percentages of exceedances of *Enterococcus* standards.

Enterococcus levels were found to be higher in the “wet” season, suggesting that the increased risk of illness in humans from water contact may be linked to storm water runoff.

ARE REC-1 STANDARDS BEING MET?

While *Enterococcus* results show water quality standards are being met and support water contact recreation much of the time, there were some variations by season and location. At Spanish Landing Park and Kellogg Beach, *Enterococcus* levels met REC-1 standards during both “dry” and “wet” seasons. At Glorietta Bay, Coronado Tidelands, and Bayside Parks, *Enterococcus* levels met REC-1 standards during the “dry” season, but did not meet REC-1 standards during the “wet” season. At Shelter Island Shoreline Park, where samples were collected throughout the year, *Enterococcus* levels did not meet REC-1 standards during both the “dry” and “wet” seasons.

BE PART OF THE SOLUTION

The San Diego Water Board and the Port of San Diego are working together to improve water quality throughout San Diego Bay. How can you be part of the solution?

- **KEEP YOURSELF INFORMED!** Visit the County of San Diego Beach Water Quality website to see the most up-to-date water quality data and closure information (<http://www.sdbeachinfo.com>).
- Avoid water contact in San Diego Bay following storm events and in areas where beach advisories are posted.
- Do your part to reduce human pathogens in San Diego Bay:
 - Properly pump out boat holding tanks.
 - Maintain your sewage lines to prevent leaks.
 - Report sewage spills to the local authorities.

SAN DIEGO WATER BOARD: <http://www.waterboards.ca.gov/sandiego/>

Healthy waters realized through collaborative, outcome-focused efforts that support both human uses and sustainable ecosystems.



Fishing is a key recreational and subsistence activity in San Diego Bay. Several contaminants exist in bay sediments that can become incorporated into fish and shellfish tissue, via bioaccumulation and biomagnification, potentially posing a threat to humans consuming the seafood.

The [California Office of Environmental Health Hazard Assessment \(OEHHA\)](#) conducts scientific evaluations of risks to public health. In 2013, OEHHA released an [advisory](#) for San Diego Bay identifying the weekly number of servings of select fish species considered safe to eat, based on contaminant levels measured in fish tissue that could affect human health. The 2013 OEHHA advisory relies on contaminant-concentration data in fish tissue collected from 1999 through 2010. Since that time, additional data from several efforts have become available.

**SAN DIEGO BAY:
A RESOURCE OF MANY USES**

San Diego Bay is an important water body in the San Diego region due to its ecological value and because it supports tourism; commercial, recreational, and subsistence fishing; and a variety of recreational, maritime, industrial, commercial, and military uses. For this reason, the San Diego Water Board endorsed a "[Strategy for a Healthy San Diego Bay](#)" via Resolution No. R9-2015-0086 in June 2015. The Strategy identified the key beneficial use categories of the Bay as:

- Recreation (water contact ("REC-1") and non-water-contact ("REC-2"));
- Human consumption of fish and shellfish; and
- Habitats and ecosystems

A primary goal of the Strategy is to use monitoring data to assess attainment of these key beneficial uses, as well as changes in their status over time, and to communicate findings to the public.

DATA AVAILABLE FOR ANALYSIS SINCE THE 2013 OEHHA ADVISORY

- SCCWRP Bight Regional and Regional Harbor Monitoring Programs and City of San Diego Shallow Water Habitat Survey (Fish Tissue, 2013-2014)
- San Diego Water Board Surface Water Ambient Monitoring Program (Lobster Tissue, 2014-2015)
- NOAA Mussel Watch Program (Mussel Tissue, 2010-2015)
- CDPH Marine Biotoxin Monitoring Program (Clam and Mussel Tissue, 2011-2016)
- San Diego County DEH Beach and Bay Monitoring Program (Water Quality, 2014-2016)

This "status sheet" presents analyses of more recent data collected by federal, state, and local agencies. Data analyzed included contaminant levels in fish, lobster, and mussel tissue, marine biotoxins in clam and mussel tissue, and levels of fecal indicator bacteria in water where bivalve shellfish may be harvested by the public. This information is not intended as a consumption advisory; rather, the goal is to evaluate whether the key beneficial use category of "safe to eat" is being met. This information can be used to educate the public and to prioritize efforts for achieving healthy waters in San Diego Bay.

Common Fish and Shellfish Analyzed



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Table 2. Chemical Contaminants Found Above Levels of Concern in Analyzed Fish and Shellfish Tissue

Species Analyzed	Key Contaminants of Concern
California Halibut	Mercury, PCBs
Pacific Chub Mackerel	Mercury, PCBs
Round Stingray	Mercury, PCBs
Spotted Sand Bass	Mercury, PCBs
Topsmelt	PCBs
California Spiny Lobster	Mercury
Mussel	PCBs, Pesticides (Dieldrin)

LEVELS OF OTHER CONTAMINANTS IN BIVALVE SHELLFISH

Bivalve shellfish (e.g. clams and mussels) may also contain biotoxins which can cause illness in humans if consumed. Levels of marine biotoxins were not found to be above Food and Drug Administration action levels at the two locations sampled in San Diego Bay. As an extra precaution, there is a statewide annual mussel quarantine limiting consumption from May 1 to October 31, the time of year when marine biotoxins tend to be most prevalent.

Levels of bacteria in the water can also indicate risk of human illness for shellfish consumption. Levels of total coliform indicator bacteria measured from water at six public beaches in San Diego Bay were analyzed and compared to the total coliform standards for shellfish harvesting in the [San Diego Basin Plan](#). Bacteria levels were elevated at all beaches analyzed, indicating that shellfish harvested from these areas may be unsafe to eat.



Photo: C. Loffen

PCBs and mercury are still present at levels of concern in fish from San Diego Bay. Contaminants in lobster and bivalve shellfish from San Diego Bay may also pose a risk.

CONTAMINANTS IN FISH AND SHELLFISH TISSUE

Tissue from fish, lobsters, and mussels were analyzed for several contaminants (e.g. heavy metals, PAHs, PBDEs, PCBs, pesticides) that can pose a risk to human health if consumed in seafood. Contaminant levels measured in fish, lobster, and mussel tissue were compared to OEHHA advisory concentrations (Table 2).

Tissue from all fish species analyzed contained levels of concern for PCBs. Most fish species analyzed also contained levels of concern for mercury. These findings support the OEHHA advisory for limiting the consumption of fish from San Diego Bay.

Lobster tissue samples were found to contain levels of concern for mercury. Tissue analyzed from mussels contained levels of concern for PCBs and pesticides (specifically dieldrin). Consumption of lobster and mussels in large enough quantities may pose a risk to human health.

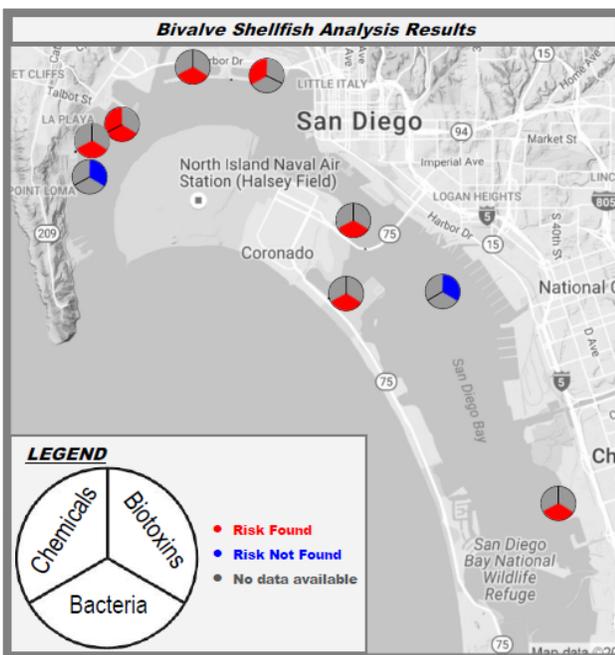


Figure 1. Sampling locations and analysis results for bivalve-shellfish tissue or water-column grabs. Depending upon the monitoring program, stations were sampled for either chemical constituents or marine biotoxins in tissue, or for total coliforms indicator bacteria in the water column. See legend for a key to what was measured at each station, and analysis results.

STAY INFORMED!

- Visit the OEHHA website for the latest consumption guidelines and advisories (<http://oehha.ca.gov/advisories/san-diego-bay>).
- Look for consumption guidelines and advisory signs posted at popular fishing piers throughout San Diego Bay.
- Visit the San Diego Water Board website for information about bioaccumulation studies and angler surveys conducted in San Diego Bay (<http://www.waterboards.ca.gov/sandiego>).

APPENDIX B

Evaluation of Assessment Needs of San Diego Bay

Table B-1a. Assessment Needs of CONDITIONS for Key Beneficial Uses in San Diego Bay (Part I)

Table B-1b. Assessment Needs of CONDITIONS for Key Beneficial Uses in San Diego Bay (Part II)

Table B-2a. Assessment Needs of STRESSORS Impacting Conditions for Key Beneficial Uses in San Diego Bay (Part I)

Table B-2b. Assessment Needs of STRESSORS Impacting Conditions for Key Beneficial Uses in San Diego Bay (Part II)

Table B-3a. Assessment Needs of SOURCES of Stressors for Key Beneficial Uses in San Diego Bay (Part I)

Table B-3b. Assessment Needs of SOURCES of Stressors for Key Beneficial Uses in San Diego Bay (Part II)

Table B-4a. Assessment Needs of PERFORMANCE of Management Actions to Protect and Restore Key Beneficial Uses in San Diego Bay (Part I)

Table B-4b. Assessment Needs of PERFORMANCE of Management Actions to Protect and Restore Key Beneficial Uses in San Diego Bay (Part II)

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Table B-1a. Assessment Needs of CONDITIONS for Key Beneficial Uses in San Diego Bay (Part I)

I	CONDITIONS	 RECREATION	 FISH AND SHELLFISH CONSUMPTION	 HABITATS AND ECOSYSTEMS
	Conditions Assessment Management Questions	Is San Diego Bay water quality safe for swimming? If conditions of San Diego Bay are unsatisfactory for swimming, are conditions improving?	Are fish and shellfish from San Diego Bay safe to eat? If conditions of San Diego Bay are unsatisfactory for fish and shellfish to be safe to eat, are conditions improving?	Are San Diego Bay habitats and ecosystems healthy? If conditions of San Diego Bay are unsatisfactory for healthy habitats and ecosystems, are conditions improving?
	Condition of Concern	Illness in humans that may be caused by contact (i.e., ingestion, inhalation, skin contact) with pollutants during recreational activities in San Diego Bay waters	Illness in humans that may be caused by consumption of fish and shellfish caught from San Diego Bay	Adverse impacts to ecological health of the habitats and ecosystems in and around San Diego Bay caused by alterations to the chemical, physical, and biological conditions of waters in San Diego Bay
	Potential Direct Measurements That Can Be Used to Assess Conditions	MEASUREMENTS: Survey of people who have recreated (i.e., swim or wade) in San Diego Bay waters correlated with adverse health effects LOCATIONS: San Diego Bay-wide	MEASUREMENTS: Survey of people who have consumed fish and shellfish caught from San Diego Bay correlated with adverse health effects LOCATIONS: San Diego Bay-wide	MEASUREMENTS: Measurements related to overall health or functionality of habitats and ecosystems of San Diego Bay and/or specific habitats and ecosystems (e.g., Sediment Quality Objectives (SQOs), California Rapid Assessment Method (CRAM) scores, or other indices as they are developed) LOCATIONS: San Diego Bay-wide
	Evaluation of Feasibility and Practicality of Potential Direct Measurements	FEASIBILITY: Feasible to conduct surveys of people adversely affected as a result of recreational activities in San Diego Bay. PRACTICALITY: Not practical. Very difficult to enlist consistent and regular participation of a significant number of people for surveys, and surveys would be needed at a relatively high frequency (weekly or monthly) for useful information. Collection of survey data at lower frequency may be practical but less useful.	FEASIBILITY: Feasible to conduct surveys of people adversely affected as a result of consumption of fish and shellfish caught from San Diego Bay. PRACTICALITY: Not practical. Very difficult to enlist consistent, regular, long-term participation of a significant number of people for surveys. Relating chronic or long-term health effects to consumption of fish and shellfish can also be very difficult. Collection of survey data at lower frequency may be practical but less useful.	FEASIBILITY: Infeasible to collect data about overall health of the habitats and ecosystems of San Diego Bay. Potentially feasible to collect data about health of specific habitats of San Diego Bay. PRACTICALITY: Not practical to collect data about overall health or functionality of habitats and ecosystems in San Diego Bay due to lack of established health indicators or parameters for overall Bay health. Potentially practical to collect data about health or functionality of specific habitats. Assessments may need to be based on relative changes in measurements until indices and thresholds are developed. Monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess conditions of San Diego Bay for habitats and ecosystems.

Table B-1b. Assessment Needs of CONDITIONS for Key Beneficial Uses in San Diego Bay (Part II)

I	CONDITIONS	 RECREATION	 FISH AND SHELLFISH CONSUMPTION	 HABITATS AND ECOSYSTEMS
	Conditions Assessment Management Questions	Is San Diego Bay water quality safe for swimming? If conditions of San Diego Bay are unsatisfactory for swimming, are conditions improving?	Are fish and shellfish from San Diego Bay safe to eat? If conditions of San Diego Bay are unsatisfactory for fish and shellfish to be safe to eat, are conditions improving?	Are San Diego Bay habitats and ecosystems healthy? If conditions of San Diego Bay are unsatisfactory for healthy habitats and ecosystems, are conditions improving?
	Condition of Concern	Illness in humans that may be caused by exposure (i.e., ingestion, inhalation, skin contact) to pollutants in San Diego Bay waters	Illness in humans that may be caused by consumption of fish and shellfish caught from San Diego Bay	Adverse impacts to ecological health of the habitats and ecosystems in and around San Diego Bay caused by alterations to the chemical, physical, and biological conditions of waters in San Diego Bay
	Potential Indirect Measurements That Can Be Used to Assess Conditions	MEASUREMENTS: Levels of pollution, contamination, and nuisance (e.g., pathogens from sewage, cyanotoxins) in San Diego Bay waters that can adversely affect human health LOCATIONS: San Diego Bay waters where people are known to regularly wade and swim (e.g., publicly accessible and swimmable beaches)	MEASUREMENTS: Levels of pollutants and contaminants (e.g., polychlorinated biphenyls [PCBs], mercury, pesticides, chemicals of emerging concern) in tissue from fish and shellfish in San Diego Bay that can adversely impact human health when consumed LOCATIONS: San Diego Bay-wide	MEASUREMENTS: Areal extent and distribution of aquatic dependent habitats in and around San Diego Bay. Diversity and abundance of native species in and around San Diego Bay. LOCATIONS: San Diego Bay-wide
	Evaluation of Feasibility and Practicality of Potential Indirect Measurements	FEASIBILITY: Feasible to collect data about levels of pollutants in San Diego Bay waters where persons are known to regularly wade or swim. PRACTICALITY: Practical. There are existing Board-related and external monitoring programs collecting data about levels of pollutants in water, and established thresholds that can be used to assess water quality conditions for swimming or wading. Existing Board-related monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess conditions of San Diego Bay for recreation.	FEASIBILITY: Feasible to collect data about levels of pollutants in tissue from fish and shellfish in San Diego Bay. PRACTICALITY: Practical. There are existing Board-related and external monitoring programs collecting data about pollutants in fish and shellfish tissue, and established thresholds that can be used to assess conditions. Existing Board-related and external monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess conditions of San Diego Bay for fish and shellfish consumption.	FEASIBILITY: Feasible to collect data about areal extent and distribution of aquatic dependent habitats and diversity and abundance of native species in and around San Diego Bay. PRACTICALITY: Potentially practical. There are existing external monitoring programs collecting areal and biological data for different habitats. Assessments may need to be based on relative changes in measurements until indices and thresholds are developed. Monitoring programs may require modifications to collect data that can fully assess conditions of San Diego Bay for habitats and ecosystems.

Table B-2a. Assessment Needs of STRESSORS Impacting Conditions for Key Beneficial Uses in San Diego Bay (Part I)

II	STRESSORS	 RECREATION	 FISH AND SHELLFISH CONSUMPTION	 HABITATS AND ECOSYSTEMS
	Stressors Assessment Management Questions	<p>Are stressors adversely impacting the conditions for San Diego Bay for recreation?</p> <p>Are impacts caused by stressors to conditions of San Diego Bay for recreation increasing or decreasing?</p>	<p>Are stressors adversely impacting the conditions for San Diego Bay for fish and shellfish consumption?</p> <p>Are impacts caused by stressors to conditions of San Diego Bay for fish and shellfish consumption increasing or decreasing?</p>	<p>Are stressors adversely impacting the conditions for San Diego Bay for habitats and ecosystems?</p> <p>Are impacts caused by stressors to conditions of San Diego Bay for habitats and ecosystems increasing or decreasing?</p>
	Stressors of Concern	Pollutants (e.g., pathogens from sewage, cyanotoxins, etc.) in water at levels that cause San Diego Bay waters to be unsafe for water contact recreational activities	Pollutants linked to elevated contaminant levels of concern (e.g., PCBs, mercury, pesticides) in fish and shellfish tissue that cause fish and shellfish from San Diego Bay to be unsafe for consumption	Alterations to the chemical, physical, and biological characteristics of San Diego Bay habitats and ecosystems
	Potential Direct Measurements That Can Be Used to Assess Stressors	<p>MEASUREMENTS: Levels of pollutants (e.g., pathogens from sewage, cyanotoxins from harmful algal blooms [HABs], etc.) in water that can adversely impact human health at the time when recreators are wading or swimming in San Diego Bay</p> <p>LOCATIONS: San Diego Bay-wide, including any location along the shore and within the Bay where people may enter the water to wade or swim</p>	<p>MEASUREMENTS: Levels of pollutants linked to elevated contaminant levels of concern (e.g., PCBs, mercury, pesticides) in tissue from fish and shellfish in San Diego Bay that can adversely impact human health when fish and shellfish consumed and linked to acute or chronic human health effects</p> <p>LOCATIONS: San Diego Bay-wide, and potentially any location where fish and shellfish from San Diego Bay are taken to be consumed</p>	<p>MEASUREMENTS: Levels of synthetic chemicals or pollutants (e.g., PCBs, polycyclic aromatic hydrocarbons [PAHs], pesticides, trash, microplastics, etc.) in the media of habitats and ecosystems (i.e., air, water, soil, and sediment), physical size/area of aquatic dependent habitats, and the diversity and abundance of the native species, as well as the levels of synthetic chemicals in the flora and fauna inhabiting aquatic dependent habitats and all correlated to conditions data within the same monitoring periods (e.g., day, week, month, season)</p> <p>LOCATIONS: San Diego Bay-wide</p>
	Evaluation of Feasibility and Practicality of Direct Measurements	<p>FEASIBILITY: Feasible to collect data about levels of pollutants (e.g., pathogens from sewage, cyanotoxins, etc.) in water at times and places when wading or swimming is taking place in San Diego Bay.</p> <p>PRACTICALITY: Not practical. Resources not available to determine when to collect and analyze samples from locations in San Diego Bay at the time swimming is taking place. Mobilization of resources to collect timely samples also very difficult. Methods not available to instantaneously or continuously analyze samples for immediately available results.</p>	<p>FEASIBILITY: Feasible to collect data about levels of pollutants in tissue of fish and shellfish caught from San Diego Bay at the time of consumption. Potentially feasible to collect data about acute and chronic health effects linked to consumption of fish and shellfish caught from San Diego Bay.</p> <p>PRACTICALITY: Not practical. Resources not available to locate and enlist consistent participation of a large enough sample size of people catching fish and shellfish from San Diego Bay to submit data about fish and shellfish caught and consumed from San Diego Bay and report acute and chronic health effects over several years or decades.</p>	<p>FEASIBILITY: Feasible to collect data about levels of synthetic chemicals or pollutants (e.g., PCBs, PAHs, trash, microplastics, etc.) in media (i.e., air, water, soil, and sediment) that support habitats and ecosystems, physical size/area of aquatic dependent habitats, and the diversity and abundance of the native species, as well as the levels of synthetic chemicals in the biology inhabiting aquatic dependent habitats. Potentially feasible to collect all data within the same monitoring period (e.g., month, season) and correlate to each other.</p> <p>PRACTICALITY: Not practical. Resources not available to collect chemical, physical, and biological stressor data within the same monitoring period and correlate data with each other.</p>

Table B-2b. Assessment Needs of STRESSORS Impacting Conditions for Key Beneficial Uses in San Diego Bay (Part II)

II	STRESSORS	 RECREATION	 FISH AND SHELLFISH CONSUMPTION	 HABITATS AND ECOSYSTEMS
	Stressors Assessment Management Questions	Are stressors adversely impacting the conditions for San Diego Bay for recreation? Are impacts caused by stressors to conditions of San Diego Bay for recreation increasing or decreasing?	Are stressors adversely impacting the conditions for San Diego Bay for fish and shellfish consumption? Are impacts caused by stressors to conditions of San Diego Bay for fish and shellfish consumption increasing or decreasing?	Are stressors adversely impacting the conditions for San Diego Bay for habitats and ecosystems? Are impacts caused by stressors to conditions of San Diego Bay for habitats and ecosystems increasing or decreasing?
	Stressors of Concern	Pollutants (e.g., pathogens from sewage, cyanotoxins, etc.) in water at levels that cause San Diego Bay waters to be unsafe for swimming	Pollutants linked to elevated contaminant levels of concern (e.g., PCBs, mercury, pesticides) in fish and shellfish tissue that cause fish and shellfish from San Diego Bay to be unsafe from for consumption	Alterations to the chemical, physical, and biological characteristics of San Diego Bay habitats and ecosystems
	Potential Indirect Measurements That Can Be Used to Assess Stressors	Presence and/or levels of pollutants (e.g., pathogens from sewage, cyanotoxins, etc.) in San Diego Bay waters where swimming is known to occur on a regular basis	Presence and/or levels of pollutants linked to elevated contaminant levels of concern (e.g., PCBs, mercury, pesticides) in tissue of fish and shellfish known to be caught in San Diego Bay and consumed on a regular basis	Presence and/or levels of synthetic chemicals or substances in water, soil and sediment, physical size/area of aquatic dependent habitats, and the diversity and abundance of the native species measured within a defined period a time
	Potential Indirect Measurements	MEASUREMENTS: Presence and/or levels of pollutants (e.g., pathogens from sewage, cyanotoxins, etc.) in San Diego Bay water that can adversely impact human health where swimming is known to occur on a regular basis LOCATIONS: Publicly accessible and swimmable beaches around San Diego Bay	MEASUREMENTS: Presence and/or levels of pollutants linked to elevated contaminant levels of concern (e.g., PCBs, mercury, pesticides) in tissue from fish and shellfish Bay known to be caught for consumption on a regular basis in San Diego LOCATIONS: San Diego Bay-wide	MEASUREMENTS: Presence and/or levels of synthetic chemicals or substances (e.g., PCBs, PAHs, pesticides, trash, microplastics) in media of habitats and ecosystems (i.e., air, water, soil, and sediment), physical size/area of aquatic dependent habitats, and the diversity and abundance of the native species, as well as the levels of synthetic chemicals in the flora and fauna inhabiting habitat within a defined period of time (e.g., 1, 2, 5, or 10 years) LOCATIONS: San Diego Bay-wide
	Evaluation of Feasibility and Practicality of Indirect Measurements	FEASIBILITY: Feasible to collect data about levels of pollutants in water where swimming is known to occur on a regular basis). PRACTICALITY: Practical. There are existing Board-related and external monitoring programs collecting data about levels of pollutants in water, and established thresholds that can be used to assess impacts from stressors. Existing Board-related and external monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess stressors impacting conditions of San Diego Bay for recreation.	FEASIBILITY: Feasible to collect data about levels of pollutants in tissues from fish and shellfish known to be caught for consumption on a regular basis in San Diego Bay. PRACTICALITY: Practical. There are existing Board-related and external monitoring programs collecting data about pollutants in fish and shellfish tissue, and established thresholds that can be used to assess conditions. Existing Board-related and external monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess stressors impacting conditions of San Diego Bay for fish and shellfish consumption.	FEASIBILITY: Feasible to collect data about levels of synthetic chemicals or pollutants (e.g., PCBs, PAHs, trash, microplastics, etc.) in media of habitats and ecosystems (i.e., air, water, soil, and sediment), physical size/area of aquatic dependent habitats, and the diversity and abundance of the native species, as well as the levels of synthetic chemicals in the flora and fauna inhabiting aquatic dependent habitats. Potentially feasible to collect chemical, physical, and biological data that can indicate changes to aquatic dependent habitats over defined periods of time (e.g., 1, 2, 5, or 10 years). PRACTICALITY: Potentially practical. There are existing Board-related and external monitoring programs collecting chemical, physical, and biological data. Assessments may need to be based on relative changes in measurements until indices and thresholds are developed. Monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess stressors impacting conditions of San Diego Bay for habitats and ecosystems.

Table B-3a. Assessment Needs of SOURCES of Stressors for Key Beneficial Uses in San Diego Bay (Part I)

III	SOURCES	 RECREATION	 FISH AND SHELLFISH CONSUMPTION	 HABITATS AND ECOSYSTEMS
	Sources Assessment Management Questions	Are contributions from sources of stressors that are adversely impacting conditions of San Diego Bay for recreation increasing or decreasing?	Are contributions from sources of stressors that are adversely impacting conditions of San Diego Bay for fish and shellfish consumption increasing or decreasing?	Are contributions from sources of stressors that are adversely impacting conditions of San Diego Bay for habitats and ecosystems increasing or decreasing?
	Sources of Concern	Discharges (e.g., sewage, harmful algal blooms) to waters where swimming is taking place in San Diego Bay that can cause or contribute to water that is unsafe for swimming	Historical and current discharges and/or accumulation of pollutants linked to elevated contaminant levels of concern in fish and shellfish tissue (e.g., PCBs, mercury, pesticides) in water, soil, sediment, and/or food (e.g., benthic macroinvertebrates [BMIs], plankton, other prey) in San Diego Bay that can be ingested and bioaccumulated and cause or contribute to fish and shellfish caught from San Diego Bay to be unsafe for consumption	Historical and current discharges of pollutants linked to elevated levels of synthetic chemicals of concern (e.g., PCBs, PAHs, pesticides, PFAS) in water, soil, and sediment, and bioaccumulating in the biology of habitats and ecosystems, anthropogenic activities that alter or impact aquatic dependent habitats (e.g., habitat conversion, development projects), and alterations to habitats and ecosystems (e.g., habitat conversion, water elevation, temperature, pH) related to climate change
	Potential Direct Measurements That Can Be Used to Assess Sources	<p>MEASUREMENTS: Levels of pollutants (e.g., pathogens, cyanotoxins) in every direct and indirect discharge (e.g., sewage from SSOs, boat and other sources, HABs) to San Diego Bay waters directly before or during the times where swimming is taking place.</p> <p>LOCATIONS: San Diego Bay-wide, including any location along the shore and within the Bay where people may enter the water to wade or swim</p>	<p>MEASUREMENTS: Levels of pollutants linked to elevated contaminant levels of concern (i.e., PCBs, mercury, pesticides) bioaccumulating in fish and shellfish tissue in sediment observed to be directly in contact or resuspended and ingested by fish and shellfish, or ingested by sources of food for fish and shellfish; and, levels of pollutants in food (i.e., benthic macroinvertebrates, plankton, other prey) observed to be consumed by fish and shellfish.</p> <p>LOCATIONS: San Diego Bay-wide</p>	<p>MEASUREMENTS: Levels of synthetic chemicals or substances synthetic chemicals of concern (e.g., PCBs, PAHs, pesticides, PFAS) in every discharge to San Diego Bay, changes to aquatic dependent habitats caused by habitat conversion or development, and changes in temperature, pH, and water level potentially caused by climate change.</p> <p>LOCATIONS: San Diego Bay-wide</p>
	Evaluation of Feasibility and Practicality of Direct Measurements	<p>FEASIBILITY: Potentially feasible to collect data about levels of pollutants (e.g., pathogens, cyanotoxins) in every direct and indirect discharge (e.g., sewage from SSOs, boat and other sources, harmful algal blooms) to San Diego Bay waters right before or during the times where swimming is taking place.</p> <p>PRACTICALITY: Not practical. Resources not available determine when to collect and analyze samples from locations in San Diego Bay at the time swimming is taking place. Mobilization of resources to collect timely samples also very difficult. Methods not available to instantaneously or continuously analyze samples for immediately available results.</p>	<p>FEASIBILITY: Potentially feasible to collect data about levels of pollutants in sediment observed to be directly in contact or resuspended and ingested by fish and shellfish, or ingested by sources of food for fish and shellfish; and, levels of pollutants in food (i.e. benthic macroinvertebrates, plankton, other prey) observed to be consumed by fish and shellfish.</p> <p>PRACTICALITY: Potentially practical. There are existing Board-related and external monitoring programs collecting data on pollutants in sediment, and sources of food for fish and shellfish. Assessments may need to be based on relative changes in measurements until indices and thresholds are developed for some sources of food. Monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess sources contributing stressors of San Diego Bay for fish and shellfish consumption.</p>	<p>FEASIBILITY: Feasible to collect data about levels of synthetic chemicals or substances synthetic chemicals of concern (e.g., PCBs, PAHs, pesticides, PFAS) in every discharge to San Diego Bay, changes to aquatic dependent habitats caused by habitat conversion or development, and changes in temperature, pH, and water level potentially caused by climate change.</p> <p>PRACTICALITY: Not practical. Resources not available and very difficult to collect and correlate data for every potential change to habitats and ecosystems to every potential discharge, every habitat conversion and development project, and every change related to climate change.</p>

Table B-3b. Assessment Needs of SOURCES of Stressors for Key Beneficial Uses in San Diego Bay (Part II)

III	SOURCES	 RECREATION	 FISH AND SHELLFISH CONSUMPTION	 HABITATS AND ECOSYSTEMS
	Sources Assessment Management Questions	Are contributions from sources of stressors that are adversely impacting conditions of San Diego Bay for recreation increasing or decreasing?	Are contributions from sources of stressors that are adversely impacting conditions of San Diego Bay for fish and shellfish consumption increasing or decreasing?	Are contributions from sources of stressors that are adversely impacting conditions of San Diego Bay for habitats and ecosystems increasing or decreasing?
	Sources of Concern	Discharges (e.g., sewage, harmful algal blooms) to waters where swimming is taking place in San Diego Bay that can cause or contribute to water that is unsafe for swimming	Historical and current discharges and/or accumulation of pollutants linked to elevated contaminant levels of concern in fish and shellfish tissue (e.g., PCBs, mercury, pesticides) in water, soil, sediment, and/or food (e.g., benthic macroinvertebrates [BMIs], plankton, other prey) in San Diego Bay that can be ingested and bioaccumulated and cause or contribute to fish and shellfish caught from San Diego Bay to be unsafe for consumption	Historical and current discharges of pollutants linked to elevated levels of synthetic chemicals of concern (e.g., PCBs, PAHs, pesticides, PFAS) in water, soil, and sediment, and bioaccumulating in the biology of habitats and ecosystems, anthropogenic activities that alter or impact aquatic dependent habitats (e.g., habitat conversion, development projects), and alterations to habitats and ecosystems (e.g., habitat conversion, water elevation, temperature, pH) related to climate change
	Potential Indirect Measurements That Can Be Used to Assess Sources	MEASUREMENTS: Presence and/or levels of pollutants (e.g., pathogens from sewage, cyanotoxins, etc.) in San Diego Bay water that can adversely impact human health where swimming is known to occur on a regular basis correlated with known or reported discharges LOCATIONS: Publicly accessible and swimmable beaches around San Diego Bay	MEASUREMENTS: Presence and/or levels of pollutants linked to elevated contaminant levels of concern (e.g., PCBs, mercury, pesticides) in tissue from fish and shellfish Bay known to be caught for consumption on a regular basis in San Diego correlated with available data about levels of pollutants in discharges to San Diego Bay, and water, soil, sediment, and/or food (e.g., BMIs, plankton, other prey) in San Diego Bay that can be ingested by fish and shellfish LOCATIONS: San Diego Bay-wide	MEASUREMENTS: Alterations to physical size/area of aquatic dependent areas correlated to anthropogenic activities (e.g., habitat conversions and development) and climate change, and presence and/or levels of pollutants linked to elevated contaminant levels of concern (e.g., PCBs, mercury, pesticides) in discharges to San Diego Bay correlated to changes in biology of habitats LOCATIONS: San Diego Bay-wide
	Evaluation of Feasibility and Practicality of Indirect Measurements	FEASIBILITY: Feasible to collect data about levels of pollutants in water where swimming is known to occur on a regular basis) and locations of known and reported discharges. PRACTICALITY: Practical. There are existing Board-related and Board-related and external monitoring programs collecting data about pollutants in water, and reported discharges. There are and established thresholds that can be used to assess contributions from sources. Existing Board-related and existing monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess sources contributing to stressors of San Diego Bay for recreation.	FEASIBILITY: Feasible to collect data about levels of pollutants in tissues from fish and shellfish known to be caught for consumption on a regular basis in San Diego Bay and correlate with available data about levels of pollutants in discharges to San Diego Bay, and water, soil, sediment, and/or food in San Diego Bay that can be ingested by fish and shellfish. PRACTICALITY: Potentially practical. There are existing Board-related and external monitoring programs collecting data about pollutants in fish and shellfish tissue and levels in some food sources. Thresholds need to be established to assess pollutant contributions from sources. Existing Board-related and external monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess stressors impacting conditions of San Diego Bay for fish and shellfish consumption.	FEASIBILITY: Feasible to collect data about alterations to physical size/area of aquatic dependent areas, habitat conversions and development projects, changes related to climate (e.g., water level, pH, and temperature), and presence and/or levels of pollutants of concern (e.g., PCBs, mercury, pesticides) in discharges to San Diego Bay. PRACTICALITY: Potentially practical. There are existing Board-related and external monitoring programs collecting data for discharges, changes to habitats from development, and climate change related data. Correlation of data may be difficult. Monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess sources contributing stressors of San Diego Bay for habitats and ecosystems.

Table B-4a. Assessment Needs of PERFORMANCE of Management Actions to Protect and Restore Key Beneficial Uses in San Diego Bay (Part I)

IV	PERFORMANCE		RECREATION		FISH AND SHELLFISH CONSUMPTION		HABITATS AND ECOSYSTEMS
	Performance Assessment Management Questions		<p>Are management actions improving conditions of San Diego Bay for recreation?</p> <p>Are management actions reducing adverse impacts from stressors on conditions of San Diego Bay for recreation?</p> <p>Are management actions reducing contributions from sources to stressors adversely impacting conditions of San Diego Bay for recreation?</p> <p>Water management actions are most effective for improving conditions of San Diego Bay for recreation?</p>		<p>Are management actions improving conditions of San Diego Bay for fish and shellfish consumption?</p> <p>Are management actions reducing adverse impacts from stressors on conditions of San Diego Bay for fish and shellfish consumption?</p> <p>Are management actions reducing contributions from sources to stressors adversely impacting conditions of San Diego Bay for fish and shellfish consumption?</p> <p>Water management actions are most effective for improving conditions of San Diego Bay for fish and shellfish consumption?</p>		<p>Are management actions improving conditions of San Diego Bay for habitats and ecosystems?</p> <p>Are management actions reducing adverse impacts from stressors on conditions of San Diego Bay for habitats and ecosystems?</p> <p>Are management actions reducing contributions from sources to stressors adversely impacting conditions of San Diego Bay for habitats and ecosystems?</p> <p>Water management actions are most effective for improving conditions of San Diego Bay for habitats and ecosystems?</p>
	Potential Direct Measurements That Can Be Used to Assess Performance		<p>MEASUREMENTS: Changes to conditions, impacts on conditions from stressors, and/or contributions from sources of stressors before and after the implementation of one or more management actions</p> <p>LOCATIONS: San Diego Bay-wide, including any location along the shore and within the Bay where people may enter the water to wade or swim</p>		<p>MEASUREMENTS: Changes to conditions, impacts on conditions from stressors, and/or contributions from sources of stressors before and after the implementation of one or more management actions</p> <p>LOCATIONS: San Diego Bay-wide</p>		<p>MEASUREMENTS: Changes to conditions, impacts on conditions from stressors, and/or contributions from sources of stressors before and after the implementation of one or more management actions</p> <p>LOCATIONS: San Diego Bay-</p>
	Evaluation of Feasibility and Practicality of Potential Direct Measurements		<p>FEASIBILITY: Potentially feasible to collect data about conditions, stressors, and sources before and after management actions.</p> <p>PRACTICALITY: Not practical. Very difficult to time collection of data on conditions, stressors, and sources to occur directly before and after implementation of management actions. Management actions may also require varying periods of time to become observable or measurable.</p>		<p>FEASIBILITY: Potentially feasible to collect data about conditions, stressors, and sources before and after management actions.</p> <p>PRACTICALITY: Not practical. Very difficult to time collection of data on conditions, stressors, and sources to occur directly before and after implementation of management actions. Management actions may also require varying periods of time to become observable or measurable.</p>		<p>FEASIBILITY: Potentially feasible to collect data about conditions, stressors, and sources before and after management actions.</p> <p>PRACTICALITY: Not practical. Very difficult to time collection of data on conditions, stressors, and sources to occur directly before and after implementation of management actions. Management actions may also require varying periods of time to become observable or measurable.</p>

Table B-4b. Assessment Needs of PERFORMANCE of Management Actions to Protect and Restore Key Beneficial Uses in San Diego Bay (Part II)

IV	PERFORMANCE		RECREATION		FISH AND SHELLFISH CONSUMPTION		HABITATS AND ECOSYSTEMS
	Performance Assessment Management Questions		<p>Are management actions improving conditions of San Diego Bay for recreation?</p> <p>Are management actions reducing adverse impacts from stressors on conditions of San Diego Bay for recreation?</p> <p>Are management actions reducing contributions from sources to stressors adversely impacting conditions of San Diego Bay for recreation?</p> <p>Water management actions are most effective for improving conditions of San Diego Bay for recreation?</p>		<p>Are management actions improving conditions of San Diego Bay for fish and shellfish consumption?</p> <p>Are management actions reducing adverse impacts from stressors on conditions of San Diego Bay for fish and shellfish consumption?</p> <p>Are management actions reducing contributions from sources to stressors adversely impacting conditions of San Diego Bay for fish and shellfish consumption?</p> <p>Water management actions are most effective for improving conditions of San Diego Bay for fish and shellfish consumption?</p>		<p>Are management actions improving conditions of San Diego Bay for habitats and ecosystems?</p> <p>Are management actions reducing adverse impacts from stressors on conditions of San Diego Bay for habitats and ecosystems?</p> <p>Are management actions reducing contributions from sources to stressors adversely impacting conditions of San Diego Bay for habitats and ecosystems?</p> <p>Water management actions are most effective for improving conditions of San Diego Bay for habitats and ecosystems?</p>
	Potential Indirect Measurements That Can Be Used to Assess Performance		<p>MEASUREMENTS: Changes to conditions, impacts on conditions from stressors, and/or contributions from sources of stressors correlated to the implementation of one or more management actions</p> <p>LOCATIONS: Publicly accessible and swimmable beaches around San Diego Bay</p>		<p>MEASUREMENTS: Changes to conditions, impacts on conditions from stressors, and/or contributions from sources of stressors correlated to the implementation of one or more management actions</p> <p>LOCATIONS: San Diego Bay-wide</p>		<p>MEASUREMENTS: Changes to conditions, impacts on conditions from stressors, and/or contributions from sources of stressors correlated to the implementation of one or more management actions</p> <p>LOCATIONS: San Diego Bay-</p>
	Evaluation of Feasibility and Practicality of Potential Indirect Measurements		<p>FEASIBILITY: Potentially feasible to collect data about conditions, stressors, and sources and correlate changes to one or more management actions.</p> <p>PRACTICALITY: Potentially practical. There are existing Board-related and external monitoring programs collecting data related to conditions, stressors, and sources, and established thresholds that can be used to assess improvements to conditions, stressors, and sources. Monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess performance of management actions to improve conditions, stressors, and sources contributing to stressors of San Diego Bay for recreation.</p>		<p>FEASIBILITY: Potentially feasible to collect data about conditions, stressors, and sources and correlate changes to one or more management actions.</p> <p>PRACTICALITY: Potentially practical. There are existing Board-related and external monitoring programs collecting data related to conditions, stressors, and sources. There are established thresholds that can be used to assess improvements to conditions and stressors. Thresholds need to be established to assess pollutant contributions from sources. Monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess performance of management actions to improve conditions, stressors, and sources contributing to stressors of San Diego Bay for fish and shellfish consumption.</p>		<p>FEASIBILITY: Potentially feasible to collect data about conditions, stressors, and sources and correlate changes to one or more management actions.</p> <p>PRACTICALITY: Potentially practical. There are existing Board-related and external monitoring programs collecting data related to conditions, stressors, and sources. Assessments may need to be based on relative changes in conditions, stressors and sources until indices and thresholds are developed. Monitoring programs may require modifications and/or additions of parameters, locations, and frequencies to collect data that can fully assess performance of management actions to improve conditions, stressors, and sources contributing to stressors of San Diego Bay for habitats and ecosystems.</p>

APPENDIX C

Strategic Water Quality Assessment Approach Outlines



HABITATS AND ECOSYSTEMS Water Quality Assessments



I

Table C-1a. PRIMARY HABITATS AND ECOSYSTEMS CONDITIONS
Water Quality Assessment for San Diego Bay



II

Table C-1b. PRIMARY HABITATS AND ECOSYSTEMS STRESSORS
Water Quality Assessment for San Diego Bay



III

Table C-1c. PRIMARY HABITATS AND ECOSYSTEMS SOURCES
Water Quality Assessment for San Diego Bay



IV

Table C-1d. PRIMARY HABITATS AND ECOSYSTEMS PERFORMANCE
Water Quality Assessment for San Diego Bay



I+

Table C-1e. SUPPLEMENTAL HABITATS AND ECOSYSTEMS CONDITIONS
Water Quality Assessment for in San Diego Bay



II+

Table C-1f. SUPPLEMENTAL HABITATS AND ECOSYSTEMS STRESSORS
Water Quality Assessment for San Diego Bay



III+

Table C-1g. SUPPLEMENTAL HABITATS AND ECOSYSTEMS SOURCES
Water Quality Assessment for San Diego Bay



FISH AND SHELLFISH CONSUMPTION Water Quality Assessments



I

Table C-2a. PRIMARY FISH AND SHELLFISH CONSUMPTION CONDITIONS
Water Quality Assessment for San Diego Bay



II

Table C-2b. PRIMARY FISH AND SHELLFISH CONSUMPTION STRESSORS
Water Quality Assessment for San Diego Bay



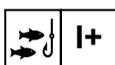
III

Table C-2c. PRIMARY FISH AND SHELLFISH CONSUMPTION SOURCES
Water Quality Assessment for San Diego Bay



IV

Table C-2d. PRIMARY FISH AND SHELLFISH CONSUMPTION PERFORMANCE
Water Quality Assessment for San Diego Bay



I+

Table C-2e. SUPPLEMENTAL FISH AND SHELLFISH CONSUMPTION CONDITIONS
Water Quality Assessment for in San Diego Bay



II+

Table C-2f. SUPPLEMENTAL FISH AND SHELLFISH CONSUMPTION STRESSORS
Water Quality Assessment for San Diego Bay



III+

Table C-2g. SUPPLEMENTAL FISH AND SHELLFISH CONSUMPTION SOURCES
Water Quality Assessment for San Diego Bay

APPENDIX C

Strategic Water Quality Assessment Approach Outlines (Continued)



RECREATION Water Quality Assessments



Table C-3a. PRIMARY RECREATION CONDITIONS
Water Quality Assessment for San Diego Bay



Table C-3b. PRIMARY RECREATION STRESSORS
Water Quality Assessment for San Diego Bay



Table C-3c. PRIMARY RECREATION SOURCES
Water Quality Assessment for San Diego Bay



Table C-3d. PRIMARY RECREATION PERFORMANCE
Water Quality Assessment for San Diego Bay



Table C-3e. SUPPLEMENTAL RECREATION CONDITIONS
Water Quality Assessment for in San Diego Bay



Table C-3f. SUPPLEMENTAL RECREATION STRESSORS
Water Quality Assessment for San Diego Bay



Table C-3g. SUPPLEMENTAL RECREATION SOURCES
Water Quality Assessment for San Diego Bay

I Table C-1a. PRIMARY HABITATS AND ECOSYSTEMS CONDITIONS Water Quality Assessment for San Diego Bay

PRIMARY CONDITIONS Monitoring Elements for HABITATS AND ECOSYSTEMS	PRIMARY CONDITIONS Monitoring Element Components for HABITATS AND ECOSYSTEMS	PRIMARY CONDITIONS Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	PRIMARY CONDITIONS Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Habitats Physical Size and Area Monitoring and Assessment	<p>WHAT: Areal extent and distribution of the following aquatic dependent habitats:*</p> <ul style="list-style-type: none"> - Eelgrass beds* - Saltmarsh* - Vegetated low marsh* - Mudflats/beaches* - Rocky intertidal* - Unvegetated subtidal* <p>WHERE: San Diego Bay-wide and separated into the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years*</p>	<p>i. Measure the areal extent and proportions of aquatic dependent habitats within each ecoregion and bay-wide. Lack of one or more aquatic dependent habitats in an ecoregion or bay-wide indicates unsatisfactory conditions of habitats and ecosystems.</p>	<p>i. Track areal extent and proportions of aquatic dependent habitats within each ecoregion and bay-wide from survey to survey and over time (including historical data/information, if available, for additional context). Increase in area of aquatic dependent habitats from survey to survey and/or over time by ecoregion or bay-wide indicates improvement to conditions for habitats and ecosystems. Increases to proportions of high value habitats from survey to survey and/or over time by ecoregion or bay-wide may indicate improvement to conditions for habitats and ecosystems.</p>
Diversity and Abundance of Biology Monitoring and Assessment	<p>WHAT: Diversity and abundance of native, aquatic dependent species for the following:</p> <ul style="list-style-type: none"> - Fish* - Birds* <p>Presence and distribution of rare/threatened/endangered aquatic dependent species*</p> <p>Presence and distribution of invasive species that can adversely impact one or more habitats or ecosystems*</p> <p>Observations of adverse impacts to aquatic dependent species, including but not limited to:</p> <ul style="list-style-type: none"> - Birth defects* - Low birth weights* <p>WHERE: Same locations as Habitats Physical Size and Area Monitoring and Assessment*</p> <p>WHEN: At least once every 5 years* Samples collected within 5-10 year period*</p>	<p>i. Count diversity and abundance of fish and bird species within each ecoregion and bay-wide. Lack of diversity or abundance of fish or bird species in an ecoregion or bay-wide indicates unsatisfactory conditions of habitats and ecosystems.</p> <p>ii. Count observations and/or numbers of rare/endangered/threatened species within each ecoregion and bay-wide. Lack of rare/endangered/threatened species in an ecoregion or bay-wide indicates unsatisfactory conditions of habitats and ecosystems.</p> <p>iii. Count observations and/or numbers of invasive species that adversely impact one or more habitats or ecosystems within each ecoregion and bay-wide. Presence of invasive species that can adversely impact one or more habitats or ecosystems in an ecoregion or bay-wide indicates unsatisfactory conditions of habitats and ecosystems.</p> <p>iv. Count observations and/or numbers of adverse impacts to aquatic dependent species (e.g., birth defects, low birth weights) within each ecoregion and bay-wide. Presence of adverse impacts to aquatic dependent species in an ecoregion or bay-wide indicates unsatisfactory conditions of habitats and ecosystems.</p>	<p>i. Track diversity and abundance of fish and bird species within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Increase in diversity and/or abundance from survey to survey and/or over time by ecoregion or bay-wide indicates improvement to conditions for habitats and ecosystems.</p> <p>ii. Track observations and/or numbers of rare/endangered/threatened species within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Increase in observations and/or numbers from survey to survey and/or over time by ecoregion or bay-wide indicates improvement to conditions for habitats and ecosystems.</p> <p>iii. Track observations and/or numbers of invasive species that can adversely impact one or more habitats or ecosystems within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Decrease in observations and/or numbers of invasive species from survey to survey and/or over time by ecoregion or bay-wide indicates improvement to conditions for habitats and ecosystems.</p> <p>iv. Track observations and/or numbers of adverse impacts to aquatic dependent species (e.g., birth defects, low birth weights) within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Decrease in observations and/or numbers from survey to survey and/or over time by ecoregion or bay-wide indicates improvement to conditions for habitats and ecosystems.</p>

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed

II Table C-1b. PRIMARY HABITATS AND ECOSYSTEMS STRESSORS Water Quality Assessment for San Diego Bay

PRIMARY STRESSORS Monitoring Elements for HABITATS AND ECOSYSTEMS	PRIMARY STRESSORS Monitoring Element Components for HABITATS AND ECOSYSTEMS	PRIMARY STRESSORS Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	PRIMARY STRESSORS Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Synthetic Chemical Levels in Water, Soil, and Sediment Monitoring and Assessment	<p>WHAT: Levels of synthetic chemicals and pollutants in water, soil, and sediment, including but not limited to:*</p> <ul style="list-style-type: none"> - Polychlorinated biphenyls (PCBs)* - Polycyclic aromatic hydrocarbons (PAHs)* - Pesticides* - Per- and polyfluoroalkyl substances (PFAS)* - Trash* - Microplastics* <p>WHERE: San Diego Bay-wide and separated into the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years*</p>	<p>i. Compare detected levels of synthetic chemicals in water, soil, and/or sediment from each ecoregion and bay-wide to available and applicable guidelines, thresholds, and/or standards (e.g., ERLs, ERMs, California Toxics Rule, etc.). Exceedances of available guidelines, thresholds, and/or standards indicate stressors are likely adversely impacting conditions of habitats and ecosystems.</p>	<p>i. Track levels of synthetic chemicals in water, soil, and sediment and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in levels of synthetic chemicals from year to year and/or over time indicates impacts to conditions for fish consumption caused by stressors may be decreasing</p>
Habitats Physical Size and Area Monitoring and Assessment	<p>WHAT: Areal extent and distribution of the following aquatic dependent habitats:*</p> <ul style="list-style-type: none"> - Eelgrass beds* - Saltmarsh* - Vegetated low marsh* - Mudflats/beaches* - Rocky intertidal* - Unvegetated subtidal* <p>WHERE: San Diego Bay-wide and separated into the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years*</p>	<p>i. Measure the areal extent and proportions of aquatic dependent habitats within each ecoregion and bay-wide. Lack of one or more aquatic dependent habitats in an ecoregion or bay-wide indicates stressors are likely adversely impacting conditions of habitats and ecosystems.</p>	<p>ii. Track areal extent and proportions of aquatic dependent habitats within each ecoregion and bay-wide from survey to survey and over time (including historical data/information, if available, for additional context). Increase in total area of aquatic dependent habitats from survey to survey and/or over time by ecoregion and bay-wide indicates impacts to conditions for habitats and ecosystems caused by stressors are decreasing. Changes to proportions of aquatic dependent habitats from survey to survey and/or over time by ecoregion or bay-wide may indicate impacts to conditions for habitats and ecosystems from stressors may be related to climate change and/or sea level rise.</p>

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed

II Table C-1b (Continued). PRIMARY HABITATS AND ECOSYSTEMS STRESSORS Water Quality Assessment for San Diego Bay

PRIMARY STRESSORS Monitoring Elements for HABITATS AND ECOSYSTEMS	PRIMARY STRESSORS Monitoring Element Components for HABITATS AND ECOSYSTEMS	PRIMARY STRESSORS Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	PRIMARY STRESSORS Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Diversity and Abundance of Biology Monitoring and Assessment	<p>WHAT: Diversity and abundance of native, aquatic dependent species for the following:</p> <ul style="list-style-type: none"> - Fish* - Birds* <p>Presence and distribution of rare/threatened/endangered aquatic dependent species*</p> <p>Presence and distribution of invasive species that can adversely impact one or more habitats or ecosystems*</p> <p>Observations of adverse impacts to aquatic dependent species, including but not limited to:</p> <ul style="list-style-type: none"> - Birth defects* - Low birth weights* <p>WHERE: Same locations as Habitats Physical Size and Area Monitoring and Assessment*</p> <p>WHEN: At least once every 5 years* Samples collected within 5-10 year period*</p>	<ul style="list-style-type: none"> i. Count diversity and abundance of fish and bird species within each ecoregion and bay-wide. Lack of diversity or abundance of fish or bird species in an ecoregion or bay-wide indicates stressors are likely adversely impacting conditions of habitats and ecosystems. ii. Count observations and/or numbers of rare/endangered/threatened species within each ecoregion and bay-wide. Lack of rare/endangered/threatened species in an ecoregion or bay-wide indicates stressors are likely adversely impacting conditions of habitats and ecosystems. iii. Count observations and/or numbers of invasive species that adversely impact one or more habitats or ecosystems within each ecoregion and bay-wide. Presence of invasive species that can adversely impact one or more habitats or ecosystems in an ecoregion or bay-wide indicates stressors are likely adversely impacting conditions of habitats and ecosystems. iv. Count observations and/or numbers of adverse impacts to aquatic dependent species (e.g., birth defects, low birth weights) within each ecoregion and bay-wide. Presence of adverse impacts to aquatic dependent species in an ecoregion or bay-wide indicates stressors are likely adversely impacting conditions of habitats and ecosystems. 	<ul style="list-style-type: none"> i. Track diversity and abundance of fish and bird species within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Increase in diversity and/or abundance from survey to survey and/or over time by ecoregion or bay-wide indicates impacts to conditions for habitats and ecosystems caused by stressors are decreasing. ii. Track observations and/or numbers of rare/endangered/threatened species within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Increase in observations and/or numbers from survey to survey and/or over time by ecoregion or bay-wide indicates impacts to conditions for habitats and ecosystems caused by stressors are decreasing. iii. Track observations and/or numbers of invasive species that can adversely impact one or more habitats or ecosystems within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Decrease in observations and/or numbers of invasive species from survey to survey and/or over time by ecoregion or bay-wide indicates impacts to conditions for habitats and ecosystems caused by stressors are decreasing. iv. Track observations and/or numbers of adverse impacts to aquatic dependent species (e.g., birth defects, low birth weights) within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Decrease in observations and/or numbers from survey to survey and/or over time by ecoregion or bay-wide indicates impacts to conditions for habitats and ecosystems caused by stressors are decreasing.

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed

III Table C-1c. PRIMARY HABITATS AND ECOSYSTEMS SOURCES Water Quality Assessment for San Diego Bay

PRIMARY SOURCES Monitoring Elements for HABITATS AND ECOSYSTEMS	PRIMARY SOURCES Monitoring Element Components for HABITATS AND ECOSYSTEMS	PRIMARY SOURCES Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	PRIMARY SOURCES Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Synthetic Chemical Levels in Discharges Monitoring and Assessment	<p>WHAT: Levels of synthetic chemicals and pollutants in discharges, including but not limited to:*</p> <ul style="list-style-type: none"> - Polychlorinated biphenyls (PCBs)* - Polycyclic aromatic hydrocarbons (PAHs)* - Pesticides* - Per- and polyfluoroalkyl substances (PFAS)* - Trash and microplastics* <p>WHERE: Locations with discharges to San Diego Bay</p> <p>WHEN: In accordance with monitoring requirements in permits and orders issued by the San Diego Water Board</p>	<p>i. Compare detected levels of synthetic chemicals in discharges to available and applicable guidelines, thresholds, and/or standards (e.g., ERLs, ERMs, California Toxics Rule, etc.). Exceedances of available guidelines, thresholds, and/or standards indicate discharges are potential sources contributing to stressors impacting conditions for habitats and ecosystems.</p>	<p>i. Track levels of synthetic chemicals in discharges and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in levels of synthetic chemicals from year to year and/or over time indicates contributions from discharges contributing to stressors impacting conditions for habitats and ecosystems may be decreasing.</p>
Habitat Alteration Projects Monitoring and Assessment	<p>WHAT: Timing and implementation of projects that have resulted in converting, creating, or eliminating aquatic dependent habitats*</p> <p>WHERE: San Diego Bay-wide and separated into the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: Based on review of available historical records and as habitat alteration projects are implemented*</p>	<p>i. Compare locations of historical and current habitat alteration projects with areas with aquatic dependent habitats. Locations with projects that have converted or eliminated aquatic dependent habitats are sources contributing to stressors impacting conditions for habitats and ecosystems.</p>	<p>i. Track locations of historical and current habitat alteration projects with areas with aquatic dependent habitats.</p> <p>ii. Areas where aquatic dependent habitats are converted and eliminated indicate sources contributing to stressors impacting conditions for habitats and ecosystems are increasing.</p> <p>iii. Areas where projects are creating, restoring, or preserving aquatic dependent habitats indicate sources contributing to stressors impacting conditions for habitats and ecosystems are decreasing.</p>

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed

III Table C-1c (Continued). PRIMARY HABITATS AND ECOSYSTEMS SOURCES Water Quality Assessment for San Diego Bay

PRIMARY SOURCES Monitoring Elements for HABITATS AND ECOSYSTEMS	PRIMARY SOURCES Monitoring Element Components for HABITATS AND ECOSYSTEMS	PRIMARY SOURCES Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	PRIMARY SOURCES Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Habitats Physical Size and Area and Biological Changes Monitoring and Assessment	<p>WHAT: Areal extent and distribution of the following aquatic dependent habitats:*</p> <ul style="list-style-type: none"> - Eelgrass beds* - Saltmarsh* - Vegetated low marsh* - Mudflats/beaches* - Rocky intertidal* - Unvegetated subtidal* <p>Adverse biological changes of the aquatic dependent habitats, including but not limited to:</p> <ul style="list-style-type: none"> - Presence and distribution of invasive species* - Decreases in sensitive species* - Birth defects* - Low birth weights* <p>WHERE: San Diego Bay-wide and separated into the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years*</p>	<p>i. Measure the areal extent and proportions of aquatic dependent habitats within each ecoregion and bay-wide. Decreases in one or more aquatic dependent habitats in an ecoregion or bay-wide indicates synthetic chemical discharges and/or habitat conversion projects may be contributing to stressors impacting conditions of habitats and ecosystems.</p> <p>ii. Track adverse biological changes within each ecoregion and bay-wide. Increased in biological changes in an ecoregion or bay-wide indicates synthetic chemical discharges and/or habitat conversion projects may be contributing to stressors impacting conditions of habitats and ecosystems.</p>	<p>i. Track areal extent and proportions of aquatic dependent habitats within each ecoregion and bay-wide from survey to survey and over time (including historical data/information, if available, for additional context). Increase in total area of aquatic dependent habitats from survey to survey and/or over time by ecoregion and bay-wide indicates contributions from synthetic chemical discharges and/or habitat conversion projects to stressors impacting conditions for habitats and ecosystems are decreasing. Changes to proportions of aquatic dependent habitats from survey to survey and/or over time by ecoregion or bay-wide may indicate climate change and/or sea level rise may be contributing to stressors impacting conditions for habitats and ecosystems.</p> <p>ii. Track adverse biological changes within each ecoregion and bay-wide from survey to survey and over time (including historical data/information, if available, for additional context). Decrease in adverse biological changes from survey to survey and/or over time by ecoregion and bay-wide indicates contributions from synthetic chemical discharges and/or habitat conversion projects to stressors impacting conditions for habitats and ecosystems are decreasing.</p>

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IV Table C-1d. PRIMARY HABITATS AND ECOSYSTEMS PERFORMANCE Water Quality Assessment for San Diego Bay

PRIMARY PERFORMANCE Monitoring Elements for HABITATS AND ECOSYSTEMS	PRIMARY PERFORMANCE Monitoring Element Components for HABITATS AND ECOSYSTEMS	PRIMARY PERFORMANCE Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	PRIMARY PERFORMANCE Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Implementation of Management Actions Monitoring and Assessment	<p>WHAT: Timing and implementation of management actions that have resulted in the following:*</p> <ul style="list-style-type: none"> - Reducing or eliminating discharges of synthetic chemicals or pollutants - Created, restored, or enhanced aquatic dependent habitats <p>WHERE: San Diego Bay-wide</p> <p>WHEN: Based on review of available historical records and as management actions are implemented*</p>	<p>i. Compare available data about discharges and conditions of habitats and ecosystems before, if possible, and after management actions are implemented. Improvement in conditions potentially impacted by synthetic chemicals indicates management actions are potentially effective at improving impacts on conditions from stressors, and/or contributions from sources of stressors to conditions for habitats and ecosystems.</p> <p>ii. Compare available data about the creation, restoration, or enhancement of habitats and ecosystems before, if possible, and after management actions are implemented. Increase in area and/or biological abundance and diversity indicates management actions are potentially effective at improving impacts on conditions from stressors, and/or contributions from sources of stressors to conditions for habitats and ecosystems.</p>	<p>i. Track locations of historical and current management actions to reduce pollutants in aquatic dependent habitats and create, restore, or enhance habitats and ecosystems. Increased number of locations of management actions may be linked to improvements in conditions, impacts from stressors on conditions, and/or contributions from sources on stressors to conditions for habitats and ecosystems.</p>
Synthetic Chemical Levels in Discharges Monitoring and Assessment	<p>WHAT: Levels of synthetic chemicals discharges, including but not limited to:*</p> <ul style="list-style-type: none"> - Polychlorinated biphenyls (PCBs)* - Polycyclic aromatic hydrocarbons (PAHs)* - Pesticides* - Per- and polyfluoroalkyl substances (PFAS)* <p>WHERE: Locations with discharges to San Diego Bay</p> <p>WHEN: In accordance with monitoring requirements in permits and orders issued by the San Diego Water Board</p>	<p>i. Track management actions that reduce or eliminate discharges of synthetic chemicals or create or enhance aquatic dependent habitats in San Diego Bay. Reduction or elimination of discharges of synthetic chemicals in one or more discharges to San Diego Bay indicates one or more management actions are effective.</p>	<p>i. Track levels of synthetic chemicals in discharges to San Diego Bay from monitoring event to monitoring event and over time. Decrease in levels and/or lack of detection of one or more synthetic chemicals in a discharge indicates management actions are potentially improving impacts on conditions from stressors, and/or contributions from sources of stressors conditions of San Diego Bay for habitats and ecosystems.</p>
Habitats Physical Size and Area Monitoring and Assessment	<p>WHAT: Areal extent and distribution of the following aquatic dependent habitats:*</p> <ul style="list-style-type: none"> - Eelgrass beds* - Saltmarsh* - Vegetated low marsh* - Mudflats/beaches* - Rocky intertidal* - Unvegetated subtidal* <p>WHERE: San Diego Bay-wide and separated into the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years*</p>	<p>i. Track changes to the areal extent and proportions of aquatic dependent habitats within each ecoregion and bay-wide. Increase in area of one or more aquatic dependent habitats and total area of aquatic dependent habitats in an ecoregion or bay-wide indicates one or more management actions may be effective at improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for habitats and ecosystems.</p>	<p>i. Track areal extent and proportions of aquatic dependent habitats and correlate with habitat conversion projects within each ecoregion and bay-wide from survey to survey and over time (including historical data/information, if available, for additional context). Increase in total area of aquatic dependent habitats from survey to survey and/or over time by ecoregion and bay-wide indicates management actions are potentially improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for habitats and ecosystems.</p>

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IV Table C-1d (Continued). PRIMARY HABITATS AND ECOSYSTEMS PERFORMANCE Water Quality Assessment for San Diego Bay

PRIMARY PERFORMANCE Monitoring Elements for HABITATS AND ECOSYSTEMS	PRIMARY PERFORMANCE Monitoring Element Components for HABITATS AND ECOSYSTEMS	PRIMARY PERFORMANCE Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	PRIMARY PERFORMANCE Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
<p>Diversity and Abundance of Biology Monitoring and Assessment</p>	<p>WHAT: Diversity and abundance of native, aquatic dependent species for the following: - Fish* - Birds* Presence and distribution of rare/threatened/endangered aquatic dependent species* Presence and distribution of invasive species that can adversely impact one or more habitats or ecosystems* Observations of adverse impacts to aquatic dependent species, including but not limited to: - Birth defects* - Low birth weights*</p> <p>WHERE: Same locations as Habitats Physical Size and Area Monitoring and Assessment*</p> <p>WHEN: At least once every 5 years* Samples collected within 5-10 year period*</p>	<p>i. Track diversity and abundance of fish and bird species within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Increase in diversity and/or abundance of fish and/or bird species indicates one or more management actions may be effective at improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for habitats and ecosystems.</p> <p>ii. Track observations and/or numbers of rare/endangered/threatened species within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Increase in observations and/or numbers of rare/endangered/threatened species indicates one or more management actions may be effective at improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for habitats and ecosystems.</p> <p>iii. Track observations and/or numbers of invasive species that can adversely impact one or more habitats or ecosystems within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Decrease in observations and/or numbers of invasive species that can adversely impact one or more habitats or ecosystems indicates one or more management actions may be effective at improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for habitats and ecosystems.</p> <p>iv. Track observations and/or numbers of adverse impacts to aquatic dependent species (e.g., birth defects, low birth weights) within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Decrease in observations and/or numbers of adverse impacts to aquatic dependent species indicates one or more management actions may be effective at improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for habitats and ecosystems.</p>	<p>i. Track diversity and abundance of fish and bird species within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Increase in diversity and/or abundance of fish and/or bird species from survey to survey and/or over time by ecoregion and bay-wide indicates management actions are potentially improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for habitats and ecosystems.</p> <p>ii. Track observations and/or numbers of rare/endangered/threatened species within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Increase in observations and/or numbers of rare/endangered/threatened species from survey to survey and/or over time by ecoregion or bay-wide indicates management actions are potentially improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for habitats and ecosystems.</p> <p>iii. Track observations and/or numbers of invasive species that can adversely impact one or more habitats or ecosystems within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Decrease in observations and/or numbers of invasive species from survey to survey and/or over time by ecoregion or bay-wide indicates impacts to conditions for habitats and ecosystems caused by stressors are decreasing.</p> <p>iv. Track observations and/or numbers of adverse impacts to aquatic dependent species (e.g., birth defects, low birth weights) within each ecoregion and bay-wide (including historical data/information, if available, for additional context). Decrease in observations and/or numbers from survey to survey and/or over time by ecoregion or bay-wide indicates impacts to conditions for habitats and ecosystems caused by stressors are decreasing.</p>

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 I+ **Table C-1e. SUPPLEMENTAL HABITATS AND ECOSYSTEMS CONDITIONS Water Quality Assessment for in San Diego Bay**

SUPPLEMENTAL CONDITIONS Monitoring Elements for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL CONDITIONS Monitoring Element Components for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL CONDITIONS Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL CONDITIONS Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Functionality of Habitats and Ecosystems Monitoring and Assessment	<p>WHAT: Measurements related to health or functionality of habitats and ecosystems, including but not limited to:</p> <ul style="list-style-type: none"> - Sediment Quality Objectives (SQOs) - California Rapid Assessment Method (CRAM) - Other indices or scores for health or functionality of one or more habitats or ecosystems* <p>WHERE: San Diego Bay-wide and separated into the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years*</p>	<p>i. Compare measurements related to health or functionality of habitats or ecosystems to available thresholds or standards. Measurements that do not achieve thresholds indicate unsatisfactory conditions for one or more habitats or ecosystems.</p>	<p>i. Track measurements related to health or functionality of habitats or ecosystems (including historical data/information, if available, for additional context) over time. Improvements in measurements indicate improvement to conditions for habitats and ecosystems.</p>

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II+ Table C-1f. SUPPLEMENTAL HABITATS AND ECOSYSTEMS STRESSORS Water Quality Assessment for San Diego Bay

SUPPLEMENTAL STRESSORS Monitoring Elements for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL STRESSORS Monitoring Element Components for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL STRESSORS Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL STRESSORS Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Synthetic Chemical Levels in Biology Monitoring and Assessment	<p>WHAT: Presence and/or levels of synthetic chemicals the following:*</p> <ul style="list-style-type: none"> - Fish tissue* - Bird eggs* - Plant tissue* <p>Synthetic chemicals concern, including but not limited to:*</p> <ul style="list-style-type: none"> - Polychlorinated biphenyls (PCBs)* - Polycyclic aromatic hydrocarbons (PAHs)* - Pesticides* - Per- and polyfluoroalkyl substances (PFAS)* <p>WHERE: San Diego Bay-wide and separated into the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years*</p>	<p>i. Measure levels of synthetic chemicals in biology of habitats and ecosystems within each ecoregion and bay-wide. Presence of synthetic chemicals in one or more species indicates stressors are likely adversely impacting conditions of habitats and ecosystems.</p>	<p>i. Track measurements levels of synthetic chemicals in biology of habitats and ecosystems within each ecoregion and bay-wide (including historical data/information, if available, for additional context) over time. Decreases in measurements indicate impacts to conditions for habitats and ecosystems caused by stressors are decreasing.</p>

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed

III+ Table C-1g. SUPPLEMENTAL HABITATS AND ECOSYSTEMS SOURCES Water Quality Assessment for San Diego Bay

SUPPLEMENTAL SOURCES Monitoring Elements for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL SOURCES Monitoring Element Components for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL SOURCES Status Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS	SUPPLEMENTAL SOURCES Trend Assessment Data Analysis Method for HABITATS AND ECOSYSTEMS
Water Parameters Monitoring and Assessment	WHAT: San Diego Bay water parameters, including:* - Elevation* - Temperature* - pH* WHERE: San Diego Bay-wide and separated into the following ecoregions: - North - North-Central - South-Central - South WHEN: At least weekly over 24-month periods*	i. Track water parameters data collected over 24 month period within each ecoregion and bay-wide. ii. Increase in average 12-month water elevation indicates potential sea level rise related to climate change. iii. Increase in average 12-month water temperature indicates potential warming of waters related to climate change. iv. Decrease in average 12-month pH indicates potential acidification related to climate change.	i. Track water parameters data collected over 5 year period within each ecoregion and bay-wide (including historical data/information, if available, for additional context) over time. ii. No change or decrease in average 12-month water elevation indicates climate change may not be contributing to stressors impacting conditions for habitats and ecosystems. iii. No change or increase in average 12-month pH indicates climate change may not be contributing to stressors impacting conditions for habitats and ecosystems. iv. No change or decrease in average 12-month temperature indicates climate change may not be contributing to stressors impacting conditions for habitats and ecosystems. v. Lack of habitat conversions related to changes in water elevation, temperature, and/or pH indicates climate change may not be contributing to stressors impacting conditions for habitats and ecosystems.

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Table C-2a. PRIMARY FISH AND SHELLFISH CONSUMPTION CONDITIONS Water Quality Assessment for San Diego Bay

PRIMARY CONDITIONS Monitoring Elements for FISH AND SHELLFISH CONSUMPTION	PRIMARY CONDITIONS Monitoring Element Components for FISH AND SHELLFISH CONSUMPTION	PRIMARY CONDITIONS Status Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION	PRIMARY CONDITIONS Trend Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION
Primary Indicator Fish and Shellfish Tissue Contaminants Monitoring and Assessment	<p>WHAT: Levels of contaminants of concern in the tissue of the following indicator fish and shellfish species:</p> <ul style="list-style-type: none"> - Spotted Sand Bass (filet) - Chub Mackerel (filet) - Topsmelt (without head and guts) - Pacific Oyster* - California Spiny Lobster (legal size tails from males)* <p>Contaminants of concern include:</p> <ul style="list-style-type: none"> - Total polychlorinated biphenyls (PCBs) - Metals (mercury) - Pesticides (chlordane) - Emerging contaminants of concern* <p>Aging of fish collected for analysis (otoliths or scales if old enough)*</p> <p>WHERE: San Diego Bay-wide with samples from the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years Samples collected within 12 month period</p>	<p>i. Compare fish tissue contaminant levels for indicator fish species (Spotted Sand Bass, Chub Mackerel, Topsmelt) collected within 12 month period from each ecoregion and bay-wide to Office of Environmental Health Hazard Assessment (OEHHA) Fish Contaminant Goals (FCGs) and Advisory Tissue Levels (ATLs) and/or other appropriate standards. Exceedances of FCGs or ATLs and/or other appropriate standards in one or more indicator fish species indicates unsatisfactory conditions for fish consumption.</p> <p>ii. Compare bivalve tissue contaminant levels for indicator bivalve species (Pacific Oyster) collected within 12 month period from each ecoregion and bay-wide to OEHHA FCGs and ATLs and/or other appropriate standards. Exceedances of FCGs or ATLs and/or other appropriate standards indicates unsatisfactory conditions for bivalves (shellfish) consumption.</p> <p>iii. Compare crustacean tissue contaminant levels for indicator crustacean species (California Spiny Lobster) collected within 12 month period from each ecoregion and bay-wide to OEHHA FCGs and ATLs and/or appropriate other standards. Exceedances of FCGs or ATLs and/or other appropriate standards indicates unsatisfactory conditions for crustaceans (shellfish) consumption.</p>	<p>i. Track fish tissue contaminant levels based on species and age and compare each species in the same age group year to year and over time (including historical data/information, if available, for additional context). Decrease in fish tissue contaminant levels from year to year and/or over time indicates improvement of conditions for fish consumption.</p> <p>ii. Track fish tissue contaminant levels based on species from different age groups within each year and compare year to year and over time (including historical data/information, if available, for additional context). Lower contaminant levels in younger fish relative to older fish taking into account age and time for bioaccumulation of contaminants may indicate improvement of conditions for fish consumption.</p> <p>iii. Track bivalve tissue contaminant levels and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in bivalve contaminant tissue levels from year to year and/or over time indicates improvement of conditions for bivalve (shellfish) consumption.</p> <p>iv. Track crustacean tissue contaminant levels and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in crustacean tissue contaminant levels from year to year and/or over time indicates improvement of conditions for crustacean (shellfish) consumption.</p>

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II Table C-2b. PRIMARY FISH AND SHELLFISH CONSUMPTION STRESSORS Water Quality Assessment for San Diego Bay

PRIMARY STRESSORS Monitoring Elements for FISH AND SHELLFISH CONSUMPTION	PRIMARY STRESSORS Monitoring Element Components for FISH AND SHELLFISH CONSUMPTION	PRIMARY STRESSORS Status Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION	PRIMARY STRESSORS Trend Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION
<p>Primary Indicator Fish and Shellfish Tissue Contaminants Monitoring and Assessment</p>	<p>WHAT: Levels of contaminants of concern in the tissue of the following indicator fish and shellfish species: - Spotted Sand Bass (filet) - Chub Mackerel (filet) - Topsmelt (without head and guts) - Pacific Oyster* - California Spiny Lobster (legal size tails from males)* Contaminants of concern include: - Total polychlorinated biphenyls (PCBs) - Metals (mercury) - Pesticides (chlordane) - Emerging contaminants of concern* Aging of fish collected for analysis (otoliths or scales if old enough)*</p> <p>WHERE: San Diego Bay-wide with samples from the following ecoregions: - North - North-Central - South-Central - South</p> <p>WHEN: At least once every 5 years Samples collected within 12 month period</p>	<p>i. Compare fish tissue contaminant levels for indicator fish species (Spotted Sand Bass, Chub Mackerel, Topsmelt) collected within 12 month period from each ecoregion and bay-wide to Office of Environmental Health Hazard Assessment (OEHHA) Fish Contaminant Goals (FCGs) and Advisory Tissue Levels (ATLs) and/or other appropriate standards. Exceedances of FCGs or ATLs and/or other appropriate standards in one or more indicator fish species indicates stressors are adversely impacting conditions for fish consumption.</p> <p>ii. Compare bivalve tissue contaminant levels for indicator bivalve species (Pacific Oyster) collected within 12 month period from each ecoregion and bay-wide to OEHHA FCGs and ATLs and/or other appropriate standards. Exceedances of FCGs or ATLs and/or other appropriate standards indicates stressors are adversely impacting conditions for bivalve (shellfish) consumption.</p> <p>iii. Compare crustacean tissue contaminant levels for indicator crustacean species (California Spiny Lobster) collected within 12 month period from each ecoregion and bay-wide to OEHHA FCGs and ATLs and/or other appropriate standards. Exceedances of FCGs or ATLs and/or other appropriate standards indicates stressors are adversely impacting conditions for crustaceans (shellfish) consumption.</p>	<p>i. Track fish tissue contaminant levels based on species and age and compare each species in the same age group year to year and over time (including historical data/information, if available, for additional context). Decrease in fish tissue contaminant levels from year to year and/or over time indicates impacts to conditions for fish consumption caused by stressors are decreasing.</p> <p>ii. Track fish tissue contaminant levels based on species from different age groups within each year and compare year to year and over time (including historical data/information, if available, for additional context). Lower contaminant levels in younger fish relative to older fish taking into account age and time for bioaccumulation of contaminants may indicate impacts to conditions for fish consumption caused by stressors are decreasing.</p> <p>iii. Track bivalve tissue contaminant levels and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in bivalve contaminant tissue levels from year to year and/or over time indicates impacts to conditions for bivalves (shellfish) consumption caused by stressors are decreasing.</p> <p>iv. Track crustacean tissue contaminant levels and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in crustacean tissue contaminant levels from year to year and/or over time indicates impacts to conditions for crustaceans (shellfish) consumption caused by stressors are decreasing.</p>

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III Table C-2c. PRIMARY FISH AND SHELLFISH CONSUMPTION SOURCES Water Quality Assessment for San Diego Bay

PRIMARY SOURCES Monitoring Elements for FISH AND SHELLFISH CONSUMPTION	PRIMARY SOURCES Monitoring Element Components for FISH AND SHELLFISH CONSUMPTION	PRIMARY SOURCES Status Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION	PRIMARY SOURCES Trend Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION
Sediment Contaminants Monitoring and Assessment	<p>WHAT: Levels of contaminants of concern in sediments that can be directly in contact or resuspended and ingested by fish and shellfish, or ingested by food for fish and shellfish, including:</p> <ul style="list-style-type: none"> - Total polychlorinated biphenyls (PCBs) - Metals (mercury) - Pesticides (chlordane) - Emerging contaminants of concern* <p>WHERE: San Diego Bay-wide with samples from the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years</p>	<ul style="list-style-type: none"> i. Compare sediment concentrations for each sample location with effects range low (ERL) and effects range median (ERM) sediment quality guidelines and/or other appropriate standards. ii. Correlate sample locations with sediment concentrations that exceed ERLs and ERMs and/or other appropriate standards and current and historical discharge locations known to contain pollutants of concern (i.e., PCBs, mercury, pesticides). iii. Exceedances of ERLs and/or other appropriate standards indicate sediments from a sample location are a potential source contributing to stressors impacting conditions for fish consumption. Exceedances of ERMs and/or other appropriate standards indicate sediments from a sample location are a likely source contributing to stressors impacting conditions for fish consumption. Correlate historical or current discharges with exceedances of ERLs and ERMs. iv. Sediments that exceed ERLs or ERMs and/or other appropriate standards collected from the surface (0-5 cm) indicates sources are likely from recent discharges or deposition of contaminated resuspended sediments. Sediments that exceed ERLs or ERMs and/or other appropriate standards collected from below the surface (greater than 5cm) indicates sources are likely from historical discharges and/or legacy sources 	<ul style="list-style-type: none"> i. Track sediment concentrations for each ecoregion and bay-wide (including historical data/information, if available, for additional context). ii. Track areas within each ecoregion with current and historical discharge locations known to contain pollutants of concern (i.e., PCBs, mercury, pesticides) where sediment cleanups have been implemented or discharges reduced or eliminated. iii. Decrease in median sediment contaminant levels for an ecoregion from year to year and/or over time indicates sources in the ecoregion contributing to stressors impacting conditions for fish consumption may be decreasing. iv. Decrease in bay-wide median sediment contaminant levels from year to year and/or over time indicates bay-wide sources contributing to stressors impacting conditions for fish consumption may be decreasing.

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IV Table C-2d. PRIMARY FISH AND SHELLFISH CONSUMPTION PERFORMANCE Water Quality Assessment for San Diego Bay

PRIMARY PERFORMANCE Monitoring Elements for FISH AND SHELLFISH CONSUMPTION	PRIMARY PERFORMANCE Monitoring Element Components for FISH AND SHELLFISH CONSUMPTION	PRIMARY PERFORMANCE Status Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION	PRIMARY PERFORMANCE Trend Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION
Implementation of Management Actions Monitoring and Assessment	<p>WHAT: Timing and implementation of management actions associated with the following:*</p> <ul style="list-style-type: none"> - Cleanup and abatement orders - Clean Water Act section 401 water quality certifications - Department of Navy maintenance dredging - Voluntary and non-regulatory programs/projects <p>Contaminants of concern in sediment before and after management actions:*</p> <ul style="list-style-type: none"> - Total polychlorinated biphenyls (PCBs)* - Metals (mercury)* - Pesticides (chlordane)* - Emerging contaminants of concern* <p>WHERE: San Diego Bay-wide</p> <p>WHEN: Based on review of available historical records and as management actions are implemented*</p>	<ul style="list-style-type: none"> i. Compare available sediment concentrations data collected from a dredging or cleanup action area before, if possible, and after the action is completed with ERLs and ERMs and/or other appropriate standards, as well as background concentrations, if available. Reduction of median or average sediment concentration, whichever is higher, for the dredging or cleanup area to below ERLs or background, whichever is lower, indicates sediment dredging or cleanup action is effective. ii. Analyze sediment concentration data for 5 year period by ecoregion and bay-wide before and after sediment dredging and cleanup actions to determine median sediment contaminant levels for an ecoregion. A reduction in median sediment contaminant levels for the ecoregion and bay-wide indicates sediment dredging or cleanup actions are potentially effective at improving impacts on conditions from stressors, and/or contributions from sources of stressors to conditions for fish and shellfish consumption. iii. Compare available concentrations data for food that may be consumed by fish and shellfish collected before, if possible, and after a management action is implemented with ERLs and ERMs and/or other appropriate standards. Reduction of ERL and ERM and/or other appropriate standards exceedances indicate management actions potentially effective. 	<ul style="list-style-type: none"> i. Track locations of historical and current management actions to reduce pollutants in sediments and food for fish and shellfish. Increased number of locations of management actions may be linked to improvements in conditions, impacts from stressors on conditions, and/or contributions from sources on stressors to conditions for fish and shellfish consumption. ii. Track sediment concentrations for each ecoregion and bay-wide (including historical data/information, if available, for additional context) from year to year and over time. A reduction in median sediment contaminant levels for the ecoregion and bay-wide indicates management actions are potentially improving impacts on conditions from stressors, and/or contributions from sources of stressors conditions of San Diego Bay for fish and shellfish consumption.

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IV Table C-2d (Continued). PRIMARY FISH AND SHELLFISH CONSUMPTION PERFORMANCE Water Quality Assessment for San Diego Bay

PRIMARY PERFORMANCE Monitoring Elements for FISH AND SHELLFISH CONSUMPTION	PRIMARY PERFORMANCE Monitoring Element Components for FISH AND SHELLFISH CONSUMPTION	PRIMARY PERFORMANCE Status Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION	PRIMARY PERFORMANCE Trend Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION
<p>Primary Indicator Fish and Shellfish Tissue Contaminants Monitoring and Assessment</p>	<p>WHAT: Levels of contaminants of concern in the tissue of the following indicator fish and shellfish species:</p> <ul style="list-style-type: none"> - Spotted Sand Bass (filet) - Chub Mackerel (filet) - Topsmelt (without head and guts) - Pacific Oyster* - California Spiny Lobster (legal size tails from males)* <p>Contaminants of concern include:</p> <ul style="list-style-type: none"> - Total polychlorinated biphenyls (PCBs) - Metals (mercury) - Pesticides (chlordane) - Emerging contaminants of concern* <p>Aging of fish collected for analysis (otoliths or scales if old enough)*</p> <p>WHERE: San Diego Bay-wide with samples from the following ecoregions:</p> <ul style="list-style-type: none"> - North - North-Central - South-Central - South <p>WHEN: At least once every 5 years Samples collected within 12 month period</p>	<p>i. Analyze fish and shellfish tissue contaminant concentrations data for 5 year period by ecoregion and bay-wide correlated to before and after management actions, if possible, to determine median fish and shellfish tissue concentrations by species for bay-wide and each ecoregion. A reduction in median contaminant levels for the bay-wide and/or ecoregion indicate management actions are potentially effective at improving impacts on conditions from stressors, and/or contributions from sources of stressors to conditions for fish and shellfish consumption.</p>	<p>i. Track fish tissue contaminant levels based on species and age and compare each species in the same age group year to year and over time (including historical data/information, if available, for additional context). Decrease in fish tissue contaminant levels from year to year and/or over time indicates management actions are improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors to conditions of San Diego Bay for fish consumption.</p> <p>ii. Track bivalve tissue contaminant levels and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in bivalve tissue contaminant levels from year to year and/or over time indicates management actions are improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors to conditions of San Diego Bay for bivalve (shellfish) consumption.</p> <p>iii. Track crustacean tissue contaminant levels and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in crustacean tissue contaminant levels from year to year and/or over time indicates management actions are improving conditions, impacts on conditions from stressors, and/or contributions from sources of stressors of San Diego Bay for crustacean consumption.</p>

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed

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Table C-2e. SUPPLEMENTAL FISH AND SHELLFISH CONSUMPTION CONDITIONS Water Quality Assessment for San Diego Bay

SUPPLEMENTAL CONDITIONS Monitoring Elements for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL CONDITIONS Monitoring Element Components for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL CONDITIONS Status Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL CONDITIONS Trend Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION
Supplemental Indicator Fish and Shellfish Tissue Monitoring and Assessment	<p>WHAT: Levels of contaminants of concern in the tissue of the following species with OEHHA advisories:</p> <ul style="list-style-type: none"> - Barred Sand Bass (whole/filet)* - Spotted Sand Bass (whole/filet)* - Yellow Croaker (whole/filet)* - Shovelnose Guitarfish (whole/filet)* - Chub Mackerel (whole/filet)* - Black Perch (whole/filet)* - Pile Perch (whole/filet)* - Shiner Perch (whole/filet)* - Rainbow Surfperch (whole/filet)* - Gray Smoothhound Shark (whole/filet)* - Leopard Shark (whole/filet)* - Round Stingray (whole/filet)* - Diamond Turbot (whole/filet)* - Spotted Turbot (whole/filet)* <p>Contaminants of concern same as Primary Fish and Shellfish Tissue Monitoring and Assessment</p> <p>Aging of fish collected for analysis (otoliths or scales if old enough)*</p> <p>WHERE: Same locations as Primary Fish and Shellfish Tissue Monitoring and Assessment</p> <p>WHEN: At least once every 5 years* Samples collected within 5-10 year period*</p>	<ul style="list-style-type: none"> i. Compare fish tissue contaminant levels for fish species with OEHHA advisories collected within 5 to 10 year period from each ecoregion and bay-wide to OEHHA FCGs and ATLS and/or other appropriate standards. Exceedances of FCGs or ATLS and/or other appropriate standards in one or more fish species indicates unsatisfactory conditions for fish consumption. ii. OEHHA advisories for the consumption of one or more fish or shellfish species indicates unsatisfactory conditions for fish consumption. 	<ul style="list-style-type: none"> i. Track fish tissue contaminant levels based on species and age and compare each species in the same age group year to year and over time (including historical data/information, if available, for additional context). Decrease in fish tissue contaminant levels from year to year and/or over time indicates improvement of conditions for fish consumption. ii. Track fish tissue contaminant levels based on species from different age groups within each year and compare year to year and over time (including historical data/information, if available, for additional context). Lower contaminant levels in younger fish relative to older fish taking into account age and time for bioaccumulation of contaminants may indicate improvement of conditions for fish consumption. iii. Revision of OEHHA fish consumption advisories to allow more consumption or removal of consumption limitations for one or more fish species indicates improvement of conditions for fish and shellfish consumption.
Fish and Shellfish Consumption Monitoring and Assessment	<p>WHAT: Survey of anglers who have caught and consumed fish and shellfish from San Diego Bay*</p> <p>WHERE: San Diego Bay-wide*</p> <p>WHEN: At least once every 5 years*</p>	<ul style="list-style-type: none"> i. Track number of people consuming different species of fish and shellfish caught from San Diego Bay and frequency of consumption. ii. Compare fish and shellfish species reported to be consumed and frequency consumed to allowable frequency of consumption in advisories issued by OEHHA. Exceedances of consumption frequencies of one or more specific from OEHHA advisories indicates unsatisfactory conditions. 	<ul style="list-style-type: none"> i. Track number of people consuming different species of fish and shellfish caught from San Diego Bay and frequency of consumption from survey to survey and over time. ii. Compare fish and shellfish species reported to be consumed and frequency consumed to allowable frequency of consumption in advisories issued by OEHHA. Reduction of reported exceedances of consumption frequencies of one or more species from OEHHA advisories indicates improving conditions.

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed

II+ Table C-2f. SUPPLEMENTAL FISH AND SHELLFISH CONSUMPTION STRESSORS Water Quality Assessment for San Diego Bay

SUPPLEMENTAL STRESSORS Monitoring Elements for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL STRESSORS Monitoring Element Components for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL STRESSORS Status Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL STRESSORS Trend Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION
<p>Supplemental Fish and Shellfish Tissue Contaminants Monitoring and Assessment</p>	<p>WHAT: Levels of contaminants of concern in the tissue of the following species with OEHHA advisories:</p> <ul style="list-style-type: none"> - Barred Sand Bass (whole/filet)* - Spotted Sand Bass (whole/filet)* - Yellow Croaker (whole/filet)* - Shovelnose Guitarfish (whole/filet)* - Chub Mackerel (whole/filet)* - Black Perch (whole/filet)* - Pile Perch (whole/filet)* - Shiner Perch (whole/filet)* - Rainbow Surfperch (whole/filet)* - Gray Smoothhound Shark (whole/filet)* - Leopard Shark (whole/filet)* - Round Stingray (whole/filet)* - Diamond Turbot (whole/filet)* - Spotted Turbot (whole/filet)* <p>Contaminants of concern same as Primary Fish and Shellfish Tissue Monitoring and Assessment</p> <p>Aging of fish collected for analysis (otoliths or scales if old enough)*</p> <p>WHERE: Same locations as Primary Fish and Shellfish Tissue Monitoring and Assessment</p> <p>WHEN: At least once every 5 years* Samples collected within 5-10 year period*</p>	<p>i. Compare fish tissue contaminant levels for fish species with OEHHA advisories collected within 5 to 10 year period from each ecoregion and bay-wide to OEHHA FCGs and ATLS and/or other appropriate standards. Exceedances of FCGs or ATLS and/or other appropriate standards in one or more fish species indicates stressors are adversely impacting conditions for fish consumption.</p>	<p>i. Track fish tissue contaminant levels based on species and age and compare each species in the same age group year to year and over time (including historical data/information, if available, for additional context). Decrease in fish tissue contaminant levels from year to year and/or over time indicates impacts to conditions for fish consumption caused by stressors are decreasing.</p> <p>ii. Track fish tissue contaminant levels based on species from different age groups within each year and compare year to year and over time (including historical data/information, if available, for additional context). Lower contaminant levels in younger fish relative to older fish taking into account age and time for bioaccumulation of contaminants may indicate impacts to conditions for fish consumption caused by stressors are decreasing.</p> <p>iii. Revision of OEHHA fish consumption advisories to allow more consumption or removal of consumption limitations for one or more fish species indicates impacts to conditions for fish consumption caused by stressors are decreasing.</p>

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III+ Table C-2g. SUPPLEMENTAL FISH AND SHELLFISH CONSUMPTION SOURCES Water Quality Assessment for San Diego Bay

SUPPLEMENTAL SOURCES Monitoring Elements for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL SOURCES Monitoring Element Components for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL SOURCES Status Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION	SUPPLEMENTAL SOURCES Trend Assessment Data Analysis Method for FISH AND SHELLFISH CONSUMPTION
<p>Contaminants in Food for Fish and Shellfish Monitoring and Assessment</p>	<p>WHAT: Levels of contaminants of concern in the following foods that may be ingested by fish and shellfish, including the following: - Plankton* - Benthic macroinvertebrates* - Other prey* Contaminants of concern include: - Total polychlorinated biphenyls (PCBs)* - Metals (mercury)* - Pesticides (chlordane)* - Emerging contaminants of concern*</p> <p>WHERE: San Diego Bay-wide with samples from the following ecoregions:* - North* - North-Central* - South-Central* - South*</p> <p>WHEN: At least once every 5 years* Samples collected within 5-10 year period*</p>	<p>i. Compare contaminant levels in food sources for fish and shellfish (i.e., plankton, benthic macroinvertebrates, other prey) with ERLs and ERMs and/or other appropriate standards.</p> <p>ii. Exceedances of ERLs and/or other appropriate standards indicate one or more food sources are a potential source contributing to stressors impacting conditions for fish consumption. Exceedances of ERMs and/or other appropriate standards indicate one or more food sources are a likely source contributing to stressors impacting conditions for fish and shellfish consumption.</p>	<p>i. Track contaminant levels in food sources over time (including historical data/information, if available, for additional context). Decrease in contaminant levels in food sources over time indicates contributions from food sources to stressors impacting conditions for fish and shellfish consumption are decreasing.</p>

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 I Table C-3a. PRIMARY RECREATION CONDITIONS Assessment for San Diego Bay

PRIMARY CONDITIONS Monitoring Elements for RECREATION	PRIMARY CONDITIONS Monitoring Element Components for RECREATION	PRIMARY CONDITIONS Status Assessment Data Analysis Method for RECREATION	PRIMARY CONDITIONS Trend Assessment Data Analysis Method for RECREATION
<p>Primary Recreation Water Quality Monitoring and Assessment</p>	<p>WHAT: Fecal indicator bacteria (FIB), including: - Enterococcus - Fecal coliforms Human source markers (e.g., HF183)*</p> <p>WHERE: Waters at publicly accessible and swimmable beaches by San Diego Bay, including: - NTC Boat Channel* - Kellogg Beach* - Shelter Island Shoreline Park - Spanish Landing Park* - Coronado Ferry Landing* - Tidelands Park - Glorietta Bay Park* - Grand Caribe Park* - Chula Vista Bayside Park</p> <p>WHEN: April-September weekly October-March monthly or bi-weekly* Within 24-hours after all storm events with 0.1 inches or greater rainfall*</p>	<p>i. Compare FIB levels for each sampling event at each station to statistical threshold value (STV) and geometric mean (GM) water quality objectives (WQOs) in Basin Plan and/or other appropriate standards.</p> <p>ii. Only analyze samples for human source markers (e.g., HF183) if FIB levels exceed STVs and/or GMs and/or other appropriate standards to determine if exceedances are attributed to human sources (i.e., sewage). Samples with HF183 exceeding levels of concern, determined by the San Diego Water Board, State Water Board, and/or USEPA, indicates FIB exceedances likely attributed to human sources (i.e., sewage).</p> <p>iii. Annually analyze STV and GM and/or other appropriate standards exceedance frequencies attributed to human sources at each location for dry weather conditions (days with less than 0.1 inches rainfall). STV or GM and/or other appropriate standards exceedance frequencies greater than 10 percent for all dry weather days analyzed indicates unsatisfactory conditions for recreation by location.</p> <p>iv. Annually analyze STV and/or other appropriate standards exceedance frequencies attributed to human sources at each location for wet weather conditions (days with 0.1 inches or greater rainfall and the following 72 hours). STV and/or other appropriate standards exceedance frequencies greater than 10 percent for all wet weather days analyzed indicates unsatisfactory conditions for recreation by location.</p>	<p>i. Track number of STV and GM and/or other appropriate standards exceedances attributed to human sources at each location for dry weather conditions (days with less than 0.1 inches rainfall) and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in dry weather days with STV and GM and/or other appropriate standards exceedances from year to year and/or over time indicates conditions improving during dry weather days by location.</p> <p>ii. Track number of FIB levels that exceed STVs and/or other appropriate standards attributed to human sources at each location for wet weather conditions (days with 0.1 inches or greater rainfall and the following 72 hours) and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in wet weather days with STV and/or other appropriate standards exceedances from year to year and/or over time indicates conditions improving during wet weather days by location.</p>

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Table C-3b. PRIMARY RECREATION STRESSORS Water Quality Assessment for San Diego Bay

PRIMARY STRESSORS Monitoring Elements for RECREATION	PRIMARY STRESSORS Monitoring Element Components for RECREATION	PRIMARY STRESSORS Status Assessment Data Analysis Method for RECREATION	PRIMARY STRESSORS Trend Assessment Data Analysis Method for RECREATION
Primary Recreation Pollutants Monitoring and Assessment	<p>WHAT: Fecal indicator bacteria (FIB), including:</p> <ul style="list-style-type: none"> - Enterococcus - Fecal coliforms <p>Human source markers (e.g., HF183)*</p> <p>WHERE: Waters at publicly accessible and swimmable beaches by San Diego Bay, including:</p> <ul style="list-style-type: none"> - NTC Boat Channel* - Kellogg Beach* - Shelter Island Shoreline Park - Spanish Landing Park* - Coronado Ferry Landing* - Tidelands Park - Glorietta Bay Park* - Grand Caribe Park* - Chula Vista Bayside Park <p>WHEN: April-September weekly October-March monthly or bi-weekly* Within 24-hours after all storm events with 0.1 inches or greater rainfall*</p>	<p>i. Compare FIB levels for each sampling event at each station to statistical threshold value (STV) and geometric mean (GM) water quality objectives (WQOs) in Basin Plan and/or other appropriate standards.</p> <p>ii. Only analyze samples for human source markers (e.g., HF183) if FIB levels exceed STVs and/or GMs and/or other appropriate standards to determine if exceedances are attributed to human sources (i.e., sewage). Samples with HF183 exceeding levels of concern, determined by the San Diego Water Board, State Water Board, and/or USEPA, indicates FIB exceedances likely attributed to human sources (i.e., sewage).</p> <p>iii. Annually analyze STV and GM and/or other appropriate standards exceedance frequencies attributed to human sources at each location for dry weather conditions (days with less than 0.1 inches rainfall). STV or GM and/or other appropriate standards exceedance frequencies greater than 10 percent for all dry weather days analyzed indicates stressors are adversely impacting conditions for recreation by location.</p> <p>iv. Annually analyze STV and/or other appropriate standards exceedance frequencies attributed to human sources at each location for wet weather conditions (days with 0.1 inches or greater rainfall and the following 72 hours). STV and/or other appropriate standards exceedance frequencies greater than 10 percent for all wet weather days analyzed indicates stressors are adversely impacting conditions for recreation by location.</p>	<p>i. Track number of STV and GM and/or other appropriate standards exceedances attributed to human sources at each location for dry weather conditions (days with less than 0.1 inches rainfall) and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in dry weather days with STV and GM and/or other appropriate standards exceedances from year to year and/or over time indicates impacts to conditions for recreation caused by stressors are decreasing during dry weather days by location.</p> <p>ii. Track number of FIB levels that exceed STVs and/or other appropriate standards attributed to human sources at each location for wet weather conditions (days with 0.1 inches or greater rainfall and the following 72 hours) and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in wet weather days with STV and/or other appropriate standards exceedances from year to year and/or over time indicates impacts to conditions for recreation caused by stressors are decreasing during wet weather days by location.</p>

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III Table C-3c. PRIMARY RECREATION SOURCES Water Quality Assessment for San Diego Bay

PRIMARY SOURCES Monitoring Elements for RECREATION	PRIMARY SOURCES Monitoring Element Components for RECREATION	PRIMARY SOURCES Status Assessment Data Analysis Method for RECREATION	PRIMARY SOURCES Trend Assessment Data Analysis Method for RECREATION
Discharges of Sewage Monitoring and Assessment	<p>WHAT: Track sewage discharges from sources, including:</p> <ul style="list-style-type: none"> - Sanitary sewer overflows (SSOs) - Reported boat sewage spills/ discharges* <p>WHERE: San Diego Bay-wide</p> <p>WHEN: Weekly</p>	<p>i. Track reports of SSOs and/or boat spills/discharges of sewage in San Diego Bay. Reported sewage discharges and/or boats spill/discharges within one mile of publicly accessible and swimmable beaches by San Diego Bay indicate sewage may be a source of pollutants contributing to stressors impacting conditions for recreation.</p>	<p>i. Track number of reported SSOs and boat sewage spills/discharges within a one mile of publicly accessible and swimmable beaches by San Diego Bay and compare year to year and over time (including historical data/information, if available, for additional context). Decrease or lack of reported SSOs or discharges indicates sources of sewage contributing to stressors causing impacts to conditions are decreasing.</p>
Presence and Levels of Sewage at Beaches Monitoring and Assessment	<p>WHAT: Fecal indicator bacteria (FIB), including:</p> <ul style="list-style-type: none"> - Enterococcus - Fecal coliforms <p>Human source markers (e.g., HF183)*</p> <p>WHERE: Waters at publicly accessible and swimmable beaches by San Diego Bay, including:</p> <ul style="list-style-type: none"> - NTC Boat Channel* - Kellogg Beach* - Shelter Island Shoreline Park - Spanish Landing Park* - Coronado Ferry Landing* - Tidelands Park - Glorietta Bay Park* - Grand Caribe Park* - Chula Vista Bayside Park <p>WHEN: April-September weekly October-March monthly or bi-weekly* Within 24-hours after all storm events with 0.1 inches or greater rainfall*</p>	<p>i. Compare FIB levels for each sampling event at each station to statistical threshold value (STV) and geometric mean (GM) water quality objectives (WQOs) in Basin Plan and/or other appropriate standards.</p> <p>ii. Only analyze samples for human source markers (e.g., HF183) if FIB levels exceed STVs and/or GMs and/or other appropriate standards to determine if exceedances are attributed to human sources (i.e., sewage). Samples with HF183 exceeding levels of concern, determined by the San Diego Water Board, State Water Board, and/or USEPA, indicates FIB exceedances likely attributed to human sources (i.e., sewage).</p> <p>iii. Correlate known and reported SSOs and boat sewage spills/discharges within a one mile of publicly accessible and swimmable beaches by San Diego Bay with STV exceedances attributed to human sources.</p> <p>iv. Annually analyze STV and GM and/or other appropriate standards exceedances attributed to human sources at each location for dry weather conditions (days with less than 0.1 inches rainfall). STV and GM and/or other appropriate standards exceedances with known or reported discharges of sewage from SSOs or boats indicates sewage sources that contribute to the stressors adversely impacting conditions for recreation by location.</p> <p>v. Annually analyze STV and/or other appropriate standards exceedance frequencies attributed to human sources at each location for wet weather conditions (days with 0.1 inches or greater rainfall and the following 72 hours). STV and/or other appropriate standards exceedances with known or reported discharges of sewage from SSOs or boats indicates sewage sources that contribute to the stressors adversely impacting conditions for recreation by location. STV and/or other appropriate standards exceedances without known or reported discharges of sewage from SSOs or boats, but have storm drain outfalls in close proximity may have potential sewage in storm water runoff that contributes to the stressors adversely impacting conditions for recreation by location.</p>	<p>i. Track number of STV and GM exceedances attributed to human sources at each location for dry weather conditions (days with less than 0.1 inches rainfall) and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in dry weather days with STV and GM exceedances from year to year and/or over time indicates sources contributing to stressors causing impacts to conditions are decreasing during dry weather days by location.</p> <p>ii. Track number of FIB levels that exceed STVs and GMs attributed to human sources at each location for wet weather conditions (days with 0.1 inches or greater rainfall and the following 72 hours) and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in wet weather days with STV exceedances from year to year and/or over time indicates sources contributing to stressors causing impacts to conditions are decreasing during wet weather days by location.</p>

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 **IV** Table C-3d. PRIMARY RECREATION PERFORMANCE Water Quality Assessment for San Diego Bay

PRIMARY PERFORMANCE Monitoring Elements for RECREATION	PRIMARY PERFORMANCE Monitoring Element Components for RECREATION	PRIMARY PERFORMANCE Status Assessment Data Analysis Method for RECREATION	PRIMARY PERFORMANCE Trend Assessment Data Analysis Method for RECREATION
Implementation of Management Actions Monitoring and Assessment	<p>WHAT: Timing and implementation of structural and non-structural management actions to reduce pollutants in discharges and by publicly accessible and swimmable beaches associated with the following:*</p> <ul style="list-style-type: none"> - NPDES permits - Cleanup and abatement orders - Clean Water Act section 401 water quality certifications - Voluntary and non-regulatory programs/projects <p>WHERE: San Diego Bay-wide</p> <p>WHEN: Based on review of available historical records and as management actions are implemented*</p>	<p>i. Compare available water pollutant levels data collected from publicly accessible and swimmable beaches before, if possible, and after a management action is implemented with statistical threshold value (STV) and geometric mean (GM) water quality objectives (WQOs) in Basin Plan and/or other appropriate standards. Reduction in exceedances of STVs and/or GMs and/or other appropriate standards indicates management actions may be effective.</p>	<p>i. Track locations of historical and current structural and non-structural management actions to reduce pollutants in discharges and by publicly accessible and swimmable beaches. Increased number of locations of structural and non-structural management actions may be linked to improvements in conditions, impacts from stressors on conditions, and/or contributions from sources on stressors to conditions for recreation.</p>

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IV Table C-3d (Continued). PRIMARY RECREATION PERFORMANCE Water Quality Assessment for San Diego Bay

PRIMARY PERFORMANCE Monitoring Elements for RECREATION	PRIMARY PERFORMANCE Monitoring Element Components for RECREATION	PRIMARY PERFORMANCE Status Assessment Data Analysis Method for RECREATION	PRIMARY PERFORMANCE Trend Assessment Data Analysis Method for RECREATION
<p>Presence and Levels of Sewage at Beaches Monitoring and Assessment</p>	<p>WHAT: Fecal indicator bacteria (FIB), including: - Enterococcus - Fecal coliforms Human source markers (e.g., HF183)*</p> <p>WHERE: Waters at publicly accessible and swimmable beaches by San Diego Bay, including: - NTC Boat Channel* - Kellogg Beach* - Shelter Island Shoreline Park - Spanish Landing Park* - Coronado Ferry Landing* - Tidelands Park - Glorietta Bay Park* - Grand Caribe Park* - Chula Vista Bayside Park*</p> <p>WHEN: April-September weekly October-March monthly or bi-weekly* Within 24-hours after all storm events with 0.1 inches or greater rainfall*</p>	<p>i. Compare FIB levels for each sampling event at each station to statistical threshold value (STV) and geometric mean (GM) water quality objectives (WQOs) in Basin Plan and/or other appropriate standards.</p> <p>ii. Only analyze samples for human source markers (e.g., HF183) if FIB levels exceed STVs and/or GMs and/or other appropriate standards to determine if exceedances are attributed to human sources (i.e., sewage). Samples with HF183 exceeding levels of concern, determined by the San Diego Water Board, State Water Board, and/or USEPA, indicates FIB exceedances likely attributed to human sources (i.e., sewage).</p> <p>iii. Correlate timing and implementation of management actions that may improve conditions, stressors impacting conditions, or sources contributing to stressors at publicly accessible and swimmable beaches by San Diego Bay with STV and GM and/or other appropriate standards exceedances attributed to human sources.</p> <p>iv. Annually analyze STV and GM and/or other appropriate standards exceedances attributed to human sources at each location for dry weather conditions (days with less than 0.1 inches rainfall). Decreases to STV and GM and/or other appropriate standards exceedances attributed to human sources on dry weather days that can be correlated to the implementation of one or more management actions improving conditions, stressors impacting conditions, or sources contributing to stressors at publicly accessible and swimmable beaches by San Diego Bay indicates a potentially effective management action during dry weather days.</p> <p>v. Annually analyze STV and/or other appropriate standards exceedance frequencies attributed to human sources at each location for wet weather conditions (days with 0.1 inches or greater rainfall and the following 72 hours). Decreases to STV and/or other appropriate standards exceedances attributed to human sources on wet weather days that can be correlated to the implementation of one or more management actions improving conditions, stressors impacting conditions, or sources contributing to stressors at publicly accessible and swimmable beaches by San Diego Bay indicates a potentially effective management action during wet weather days.</p>	<p>i. Track number of STV and GM and/or other appropriate standards exceedances attributed to human sources at each location for dry weather conditions (days with less than 0.1 inches rainfall) and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in dry weather days with STV and GM and/or other appropriate standards exceedances from year to year and/or over time indicates management actions are effective at improving conditions for dry weather days by location.</p> <p>ii. Track number of FIB levels that exceed STVs and/or other appropriate standards attributed to human sources at each location for wet weather conditions (days with 0.1 inches or greater rainfall and the following 72 hours) and compare year to year and over time (including historical data/ information, if available, for additional context). Decrease in wet weather days with STV and/or other appropriate standards exceedances from year to year and/or over time indicates management actions are effective at improving conditions for wet weather days by location.</p>

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 I+ **Table C-3e. SUPPLEMENTAL RECREATION CONDITIONS Water Quality Assessment for San Diego Bay**

SUPPLEMENTAL CONDITIONS Monitoring Elements for RECREATION	SUPPLEMENTAL CONDITIONS Monitoring Element Components for RECREATION	SUPPLEMENTAL CONDITIONS Status Assessment Data Analysis Method for RECREATION	SUPPLEMENTAL CONDITIONS Trend Assessment Data Analysis Method for RECREATION
Supplemental Recreation Water Quality Monitoring and Assessment	<p>WHAT: Harmful algal blooms (HABs)* Other indicators/pollutants potentially linked to illness in humans from exposure to San Diego Bay waters*</p> <p>WHERE: Same locations as Primary Recreation Water Quality Monitoring and Assessment*</p> <p>WHEN: April-September weekly*</p>	<p>i. Annually analyze number of times HABs detected for each sampling event at each location. Any detection of HABs indicates potentially unsatisfactory conditions for recreation by location.</p> <p>ii. Annually analyze number of times other indicators/pollutants that may be linked to illness in humans by exposure to waters detected for each sampling event at each location. Any detection of other indicators/pollutants that may be linked to illness in humans by exposure to waters indicates potentially unsatisfactory conditions for recreation by location.</p>	<p>i. Track number of times HABs detected and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in number or lack of detections for HABs from year to year and/or over time indicates conditions improving by location.</p> <p>ii. Track number of times other indicators/pollutants detected and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in number or lack of detections for other indicators/pollutants from year to year and/or over time indicates conditions improving by location.</p>
Recreator Health Monitoring and Assessment	<p>WHAT: Survey of recreators who have contracted illnesses after swimming or wading in waters at publicly accessible and swimmable beaches by San Diego Bay*</p> <p>WHERE: San Diego Bay-wide*</p> <p>WHEN: At least once every 5 years*</p>	<p>i. Track number of people with illnesses attributed to ingestion of water from contact water recreation in San Diego Bay. Recreators experiencing illnesses attributed to ingestion of water from contact water recreation in San Diego Bay at a rate greater than 32 per 1000 recreators indicates unsatisfactory conditions for recreation.</p> <p>ii. Track number people with respiratory or skin illnesses that may be attributed to exposure and/or contact with HABs or other indicators/pollutants that may be linked to illness in humans by exposure to waters in San Diego Bay. Any respiratory or skin illnesses attributed to exposure and/or contact with HABs or other indicators/pollutants in San Diego Bay indicates potentially unsatisfactory conditions for recreation.</p>	<p>i. Compare number of people with illnesses attributed to ingestion of water from contact water recreation in San Diego Bay from survey to survey and over time (including historical data/information, if available, for additional context). Decrease in number of people with illnesses attributed to ingestion of water from contact water recreation in San Diego Bay from survey to survey and/or over time indicates conditions improving.</p> <p>ii. Compare number people with respiratory or skin illnesses that may be attributed to exposure and/or contact with HABs and other indicators/pollutants that may be linked to illness in humans by exposure to waters in San Diego Bay from survey to survey and over time (including historical data/information, if available, for additional context). Decrease in number of people with respiratory or skin illnesses that may be attributed to exposure and/or contact with HABs and other indicators/pollutants in San Diego Bay from survey to survey and/or over time indicates conditions improving.</p>

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed

 II+ **Table C-3f. SUPPLEMENTAL RECREATION STRESSORS Water Quality Assessment for San Diego Bay**

SUPPLEMENTAL STRESSORS Monitoring Elements for RECREATION	SUPPLEMENTAL STRESSORS Monitoring Element Components for RECREATION	SUPPLEMENTAL STRESSORS Status Assessment Data Analysis Method for RECREATION	SUPPLEMENTAL STRESSORS Trend Assessment Data Analysis Method for RECREATION
Supplemental Recreation Pollutants Monitoring and Assessment	<p>WHAT: Presence and/or levels of neurotoxins/cyanotoxins from harmful algal blooms (HABs)* Presence and/or levels of other indicators/pollutants potentially linked to illness in humans from exposure to San Diego Bay waters*</p> <p>WHERE: Same locations as Primary Recreation Pollutants Monitoring and Assessment*</p> <p>WHEN: April-September weekly*</p>	<p>i. Annually analyze number of times HABs detected for each sampling event at each location. Any detection of HABs indicates neurotoxins/cyanotoxins may be adversely impacting conditions for recreation by location. Comparison of levels of neurotoxins/cyanotoxins to available thresholds and/or other appropriate standards may provide additional context for potential impact to conditions.</p> <p>ii. Annually analyze number of times other indicators/pollutants that may be linked to illness in humans by exposure to waters detected for each sampling event at each location. Any detection of other indicators/pollutants that may be linked to illness in humans by exposure to waters indicates other pollutants may be adversely impacting conditions for recreation by location. Comparison of levels of other pollutants to available thresholds and/or other appropriate standards may provide additional context for potential impact to conditions.</p>	<p>i. Track number of times HABs detected and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in number or lack of detections for HABs from year to year and/or over time indicates potential impacts to conditions caused by neurotoxins/cyanotoxins are decreasing by location.</p> <p>ii. Track number of times other indicators/pollutants detected and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in number or lack of detections for other indicators/pollutants from year to year and/or over time indicates potential impacts to conditions caused by other pollutants are decreasing by location.</p>

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 III+ **Table C-3g. SUPPLEMENTAL RECREATION SOURCES Water Quality Assessment for San Diego Bay**

SUPPLEMENTAL SOURCES Monitoring Elements for RECREATION	SUPPLEMENTAL SOURCES Monitoring Element Components for RECREATION	SUPPLEMENTAL SOURCES Status Assessment Data Analysis Method for RECREATION	SUPPLEMENTAL SOURCES Trend Assessment Data Analysis Method for RECREATION
Discharges of Other Pollutants at Beaches Monitoring and Assessment	<p>WHAT: Track discharges of pollutants from other sources, including: - Harmful algal blooms (HABs)* - Other discharges of concern with pollutants of concern for recreation*</p> <p>WHERE: San Diego Bay-wide*</p> <p>WHEN: Weekly*</p>	<p>i. Track reports of HABs and other discharges of concern. Reported HABs and/or discharges of concern within one mile of publicly accessible and swimmable beaches by San Diego Bay indicate HABs and/or other discharges of concern may be a source of pollutants contributing to stressors impacting conditions for recreation.</p>	<p>i. Track number of reported HABs and other discharges of concern within a one mile of publicly accessible and swimmable beaches by San Diego Bay and compare year to year and over time (including historical data/information, if available, for additional context). Decrease or lack of reported HABs or discharges of concern indicates sources of neurotoxins/cyanotoxins and/or other pollutants of concern contributing to stressors causing impacts to conditions are decreasing.</p>
Presence and Levels of Other Pollutants at Beaches Monitoring and Assessment	<p>WHAT: HABs that may release neurotoxins/cyanotoxins* Presence and/or levels of other indicators/pollutants potentially linked to illness in humans from exposure to San Diego Bay waters*</p> <p>WHERE: Same locations as Presence and Levels of Sewage at Beaches Monitoring and Assessment*</p> <p>WHEN: April-September weekly*</p>	<p>i. Correlate reported HABs and other discharges of concern within a one mile of publicly accessible and swimmable beaches by San Diego Bay with detected levels of neurotoxins/cyanotoxins and other pollutants of concern.</p> <p>ii. Annually analyze number of times neurotoxins/cyanotoxins and other pollutants of concern are detected and correlated with known or reported HABs and other discharges of concern within a one mile of publicly accessible and swimmable beaches indicates sources that contribute to the stressors are adversely impacting conditions for recreation by location. Detections of neurotoxins/ cyanotoxins and other pollutants of concern with known or reported HABs and other discharges of concern indicates these are potential sources that contribute to the stressors adversely impacting conditions for recreation by location. Detections of neurotoxins/cyanotoxins and other pollutants of concern without known or reported HABs and other discharges of concern, but have storm drain outfalls in close proximity may have potential storm water runoff that contributes to the stressors adversely impacting conditions for recreation by location.</p>	<p>i. Track number of times HABs reported and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in number or lack of detections for HABs from year to year and/or over time indicates the potential contribution of impacts from neurotoxins/ cyanotoxins to conditions for recreation are decreasing by location.</p> <p>ii. Track number of times other discharges of concern reported and compare year to year and over time (including historical data/information, if available, for additional context). Decrease in number or lack of detections for other indicators/pollutants from year to year and/or over time indicates potential contribution of impacts from other pollutants of concern to conditions for recreation are decreasing by location.</p>

* Component not currently included or regularly included in Board-related monitoring programs but may be included or partially/occasionally included in other monitoring programs or needs to be developed