

San Diego Water Board Practical Vision

Practical Vision – Monitoring and Assessment

To be strategic and effective in carrying out its mission of protecting and restoring the health of waters in the San Diego Region, the San Diego Water Board needs information that cannot be produced without appropriate monitoring and assessment.

Practical Vision Statement

Monitoring and assessment programs will produce information that (a) enables the work of protecting and restoring the health of San Diego Region waters to be strategic and effective and (b) provides for meaningful evaluation of the success of that work.

Mission Statement

The mission is to ensure that monitoring and assessment programs (a) determine the status and trends of conditions in San Diego Region waters, (b) identify the causes of unsatisfactory conditions, (c) determine the effectiveness of management actions, and (d) Effectively communicate key findings to the public, stakeholders, and decision-makers.

Values Statement

The San Diego Water Board values leadership, stewardship, communication and good transparency.

Where Are We in 2013

In the past, the San Diego Water Board's approach to monitoring and assessment focused largely on individual discharges. With this approach, much of the monitoring done by or required by the Board was devoted to determining whether individual discharges were in compliance with regulatory requirements. This discharge-oriented approach used in the past has largely continued to the present. The most fundamental shortcoming of a discharge-oriented approach to monitoring and assessment is that important basic information is not produced, including information about conditions in water bodies, the causes of unsatisfactory conditions, and the effectiveness of management actions. The lack of such information severely limits the ability of the San Diego Water Board to carry out its mission strategically and effectively.

Because of the importance of monitoring and assessment, the Board has created a new unit, the Monitoring, Assessment, and Research Unit (MARU) to provide leadership, guidance, and assistance in improving monitoring and assessment, assigned one senior staff person to coordinate Surface Water Monitoring Program

Monitoring and Assessment

(SWAMP) activities, and assigned another senior staff person to coordinate monitoring and assessment activities in general.

The Board has also recognized that, in order to carry out its mission more strategically and more effectively, a new approach to monitoring and assessment is needed. Accordingly, it has prepared a draft document entitled “Framework for Monitoring and Assessment in the San Diego Region” that outlines a new systematic, logical, problem-solving approach that is water body-oriented rather than discharge-oriented. The Board’s MARU, SWAMP coordinator, and monitoring and assessment coordinator will all be at the forefront of implementing this new approach.

We are in the framework planning Part and pilot project Part, which is nearing completion. The framework monitoring and assessment document was presented to the board for approval on June 13, 2012, and Resolution No. R9-2013-0069 to endorse the Framework for Monitoring and Assessment for the San Diego Region was adopted at the December 12, 2012 board meeting. At this point MARU staff members need to become more involved to work on specific implementation plans that must be developed for priority projects associated with this program in order for the program to move at a pace that will allow the action Part to progress at the projected pace.

Why this Practical Vision is a Priority

The state Porter-Cologne Act (PCA) and the federal Clean Water Act (CWA) are the primary water quality statutes in California and the nation, respectively. The desired outcome of these statutes can be expressed in various ways, such as:

- Waters with chemical, physical and biological integrity;
- Waters that are free of degradation and impairment;
- Waters that are healthy; or
- Waters that fully support beneficial uses.

Regardless of how it is expressed, this desired outcome is about conditions in waters.

Since the desired outcome of the PCA and CWA is about conditions in waters (e.g., chemical, physical, and biological integrity), information about those conditions is essential to help guide the work of protection and restoration. Where conditions are unsatisfactory, information about the causes of those conditions is needed so that appropriate management actions can be taken. Where management actions are taken, information about the effectiveness of those actions is needed. None of this information can be produced without appropriate monitoring and assessment.

Monitoring and Assessment

The mission of the San Diego Water Board is to achieve the desired outcome of the PCA and CWA in the San Diego Region. Work to achieve this mission involves both protecting and restoring water bodies.

The San Diego Water Board has recognized that, in order to carry out its mission more strategically and effectively, it needs to take a new approach to monitoring and assessment. Therefore, the framework document outlines a new systematic, problem-solving approach that is water body-oriented, rather than discharge-oriented. The monitoring and assessment program must restructure the ongoing monitoring programs and develop new monitoring and assessment programs to fulfill our mission. Therefore, we have stressed that a major portion of the new monitoring program will focus on not just determining conditions and trends of water bodies, but also sources, causes and loads from the watersheds to water bodies. Note that the new program does not override essential traditional monitoring, such as discharge monitoring at outfalls, as these data are very important for compliance and determining loading to water bodies. This shift in monitoring focus shall not compromise the ability to determine compliance for permits to discharge, as this is a requirement of the NPDES permit regulations.

Projects for Practical Vision Success

Projects to implement the “Framework for Monitoring and Assessment in the San Diego Region”(Framework) include:

1. Completion of the Framework which has been completed and endorsed by the Board.
2. Development of a plan for implementation of the Framework, includes defining MARU activities, tasks, responsibilities, and roles.
3. Implementation of the Framework, including:
 - a. Improving and coordinating monitoring and assessment programs
 - b. Groundwater monitoring and assessment
 - c. San Diego Bay bioaccumulation monitoring and assessment, as part of the San Diego Bay Strategy, and Bays and Estuaries monitoring and assessment.

1. FRAMEWORK FOR MONITORING AND ASSESSMENT

a. Project Description or Purpose

As indicated above, the desired outcome of the Porter-Cologne Act and Clean Water Act is about conditions in water bodies (e.g., chemical, physical and biological integrity); thus, meaningful and reliable information about conditions in water bodies is essential.

Monitoring and Assessment

The San Diego Water Board is planning to use staff and funding resources to support development, implementation, management, and oversight of water body-oriented monitoring and assessment programs. Water body-oriented monitoring and assessment is already being implemented to some degree in the San Diego Region, however, the level of effort devoted to monitoring and assessment conducted by the San Diego Water Board is far less than that devoted to monitoring and assessment required by the San Diego Water Board. Therefore, converting monitoring and assessment required by the San Diego Water Board from discharge-oriented to water body-oriented will be critical to implementing the new approach to monitoring and assessment. Figure 1 outlines the basic components the monitoring strategy.

In order to successfully make this transition a detailed ten-step process for developing and implementing monitoring and assessment programs has been formulated. The purpose of this process is to collaboratively develop and implement useful water body-oriented monitoring and assessment programs that are question-driven and scientifically and statistically sound. Several different monitoring and assessment programs will need to be developed and implemented, e.g. for different types of water bodies and/or for different categories of beneficial uses. Figure 2, below, gives an illustration of the ten-step process.

The process for implementing monitoring and assessment includes:

- i. Monitoring and assessment programs designed to answer specific questions (see Figure 1). With a water body-oriented approach, the first and most basic questions address the conditions in water bodies as they relate to public concerns about beneficial uses:
 - Is water safe to drink?
 - Are fish and shell fish safe to eat?
 - Is water quality safe for swimming?
 - Are habitats and ecosystems healthy?

- ii. Monitoring and assessment to answer questions can be referred to as “conditions monitoring,” or “M1”.

M1 needs to be conducted on an ongoing basis to determine whether and how conditions have changed, even in waters where unsatisfactory conditions have not previously been found.

- iii. If conditions monitoring finds “unsatisfactory conditions”, then the next question is: What are the primary stressors causing unsatisfactory conditions?

- iv. Monitoring and assessment to answer this question can be referred to as “stressor identification monitoring” or “M2”.

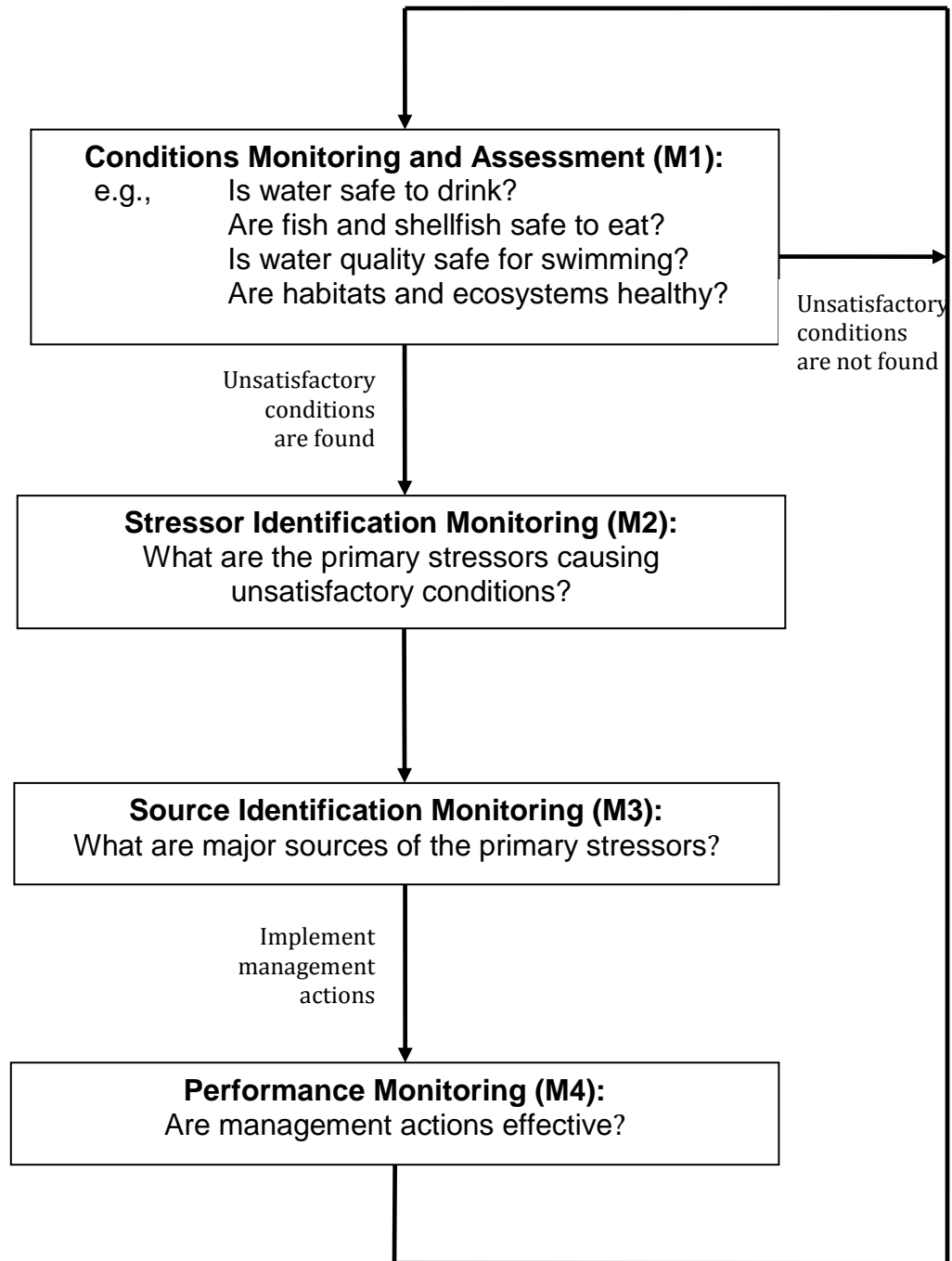


Figure 1: Water Body-Oriented Monitoring and Assessment.

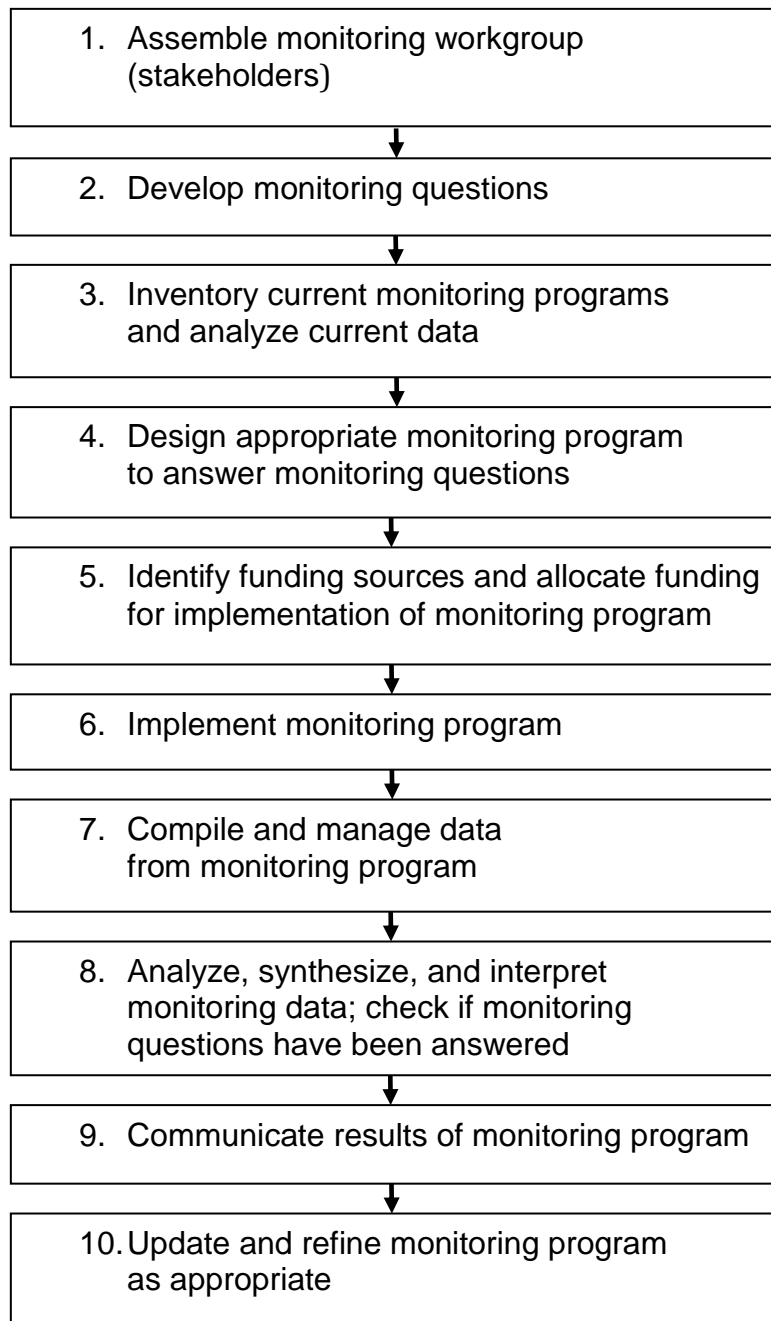


Figure 2: The Ten-Step Process.

Monitoring and Assessment

- v. Once the primary stressors have been identified, the next question is: What are the major sources of the primary stressors?
- vi. Monitoring and assessment to answer this question can be referred to as “source identification monitoring” or “M3”.
- vii. Once the major sources have been identified, and management actions have been taken to address the primary stressors and the major sources, the next question is: Are management actions effective?
- viii. Monitoring and assessment to answer this question can be referred to as “performance monitoring” or “M4”.

b. **Project Goals**

To have monitoring and assessment programs that is:

- i. Question-driven
- ii. Scientifically and statistically sound
- iii. Pertinent to beneficial uses (fishable, swimmable, drinkable, healthy *ecosystems*)
- iv. Focused on areas of special importance or concern
- v. Coordinated, comparable, and consistent across all boundaries
- vi. Developed and implemented collaboratively with others
- vii. Updated and refined over time

c. **Desired Outcomes**

- i. Determine the status and trends of conditions in San Diego Region waters;
- ii. Identify the causes of impacted conditions and their sources;
- iii. Determine the effectiveness of management actions; and
- iv. Effectively communicate key finding to the public, stakeholders, and decision makers.

d. **Values and Underlying Contradictions**

The values embodied by this project include:

- i. Quality (QA/QC)
- ii. Honesty & Integrity
- iii. Passion, commitment, and dedication
- iv. Knowledge, professionalism, hard data/ facts, truth
- v. Systematic organization
- vi. Efficiency
- vii. Communication, educate public
- viii. Effectiveness
- ix. Leadership

Monitoring and Assessment

Some underlying contradictions presented by the project include:

- i. Sometimes it is difficult for us to interpret data, and there is always a greater or lesser degree of uncertainty due to limitations in technology. In addition, our interpretations can be based on our different expertise, scientific backgrounds, and statistical soundness of the data – we must acknowledge the uncertainty of the data.
- ii. There are different schools of thought on monitoring – water body vs. discharge monitoring. If some want to stay with discharge monitoring, then there won't be much money for ambient water body monitoring.
- iii. Obtaining resources and momentum for anything new can be very difficult (such as, money for PYs, administration, data entry, and, of course, monitoring and assessment).
- iv. Monitoring and assessment work is subject to limitations on funding resources. We can only go as fast and as far as resources allow.
- v. Although people often want to see short term results, monitoring and assessment needs to have both shorter term and longer term goals. Certain aspects of monitoring and assessment may not provide short term results.

e. Contribution to the Practical Vision

The linkage takes us back to: Why is monitoring and assessment a priority? Monitoring and assessment provides information the San Diego Water Board to fulfill its mission – and to evaluate the effectiveness of work to achieve that mission. We need a systematic, comprehensive approach that will:

- i. Provide us with status and trends data to determine what water bodies and watersheds need our focus, or when our management actions in an area are or are not working.
- ii. Act as a sentinel to alert us when there is a problem.
- iii. Determine whether the water bodies are safe for use.
- iv. Help us determine the causes or stressors for water body impairments.
- v. Locate the sources of primary stressors.

f. Schedule/Milestones

Implementation milestones over the short term (the next one to five years) are to:

- i. Start the collaborative ten-step process to develop water body-oriented monitoring and assessment programs for selected types of water bodies and selected categories of beneficial uses;
- ii. Begin implementation of newly developed programs;
- iii. Communicate the preliminary results of those new programs as they are produced; and
- iv. Develop and implement performance monitoring and assessment programs (M4) as management actions are implemented.

Monitoring and Assessment

Implementation milestones over the long term (five to twenty years) are to:

- i. Complete development and implementation of water body-oriented monitoring and assessment programs;
- ii. Regularly and frequently communicate the results from all such programs on an ongoing basis, including the results of performance monitoring and assessment (M4);
- iii. Have the programs reviewed periodically by independent outside experts;
- iv. Periodically update and refine the programs, as appropriate; and
- v. Periodically review and refine the approach to monitoring and assessment, as appropriate.

g. Resources Needed

The following resources are needed:

- i. The Monitoring and Assessment Program will need MARU staff members' time to develop the implementation plan for several individual projects over the next year or two. Development of the implementation plans is dependent upon Board action, upper management approval, and availability of the MARU staff.
- ii. We also expect that a small percentage of staff time from other units (Core Regulatory, Land Discharge, and Watershed Units) will be needed as MARU, Lilian, and Bruce work to understand the current monitoring in each of these programs, and to develop a new monitoring plan within each program at the San Diego Water Board. Once the re-working of the monitoring sections of each program is completed, minimal time should be required from each program.
- iii. A PY estimate for completion of the framework document is 0.5 PYs; and for development of the implementation plan associated with the Monitoring and Assessment Program are 1.5 PYs.
- iv. Resource estimates for the action Part of implementation are beyond this scope and will not be available until the implementation plan is completed. Regardless, significant staff time from the MARU unit is recommended.

h. Tasks that Might Not be Done in Order to do this Project

- i. Tasks that might not be completed, or which might be delayed includes specific TMDLs, the 303(d) List, and monitoring planning and enforcement of monitoring requirements associated with the Agricultural Waiver, all of which are the majority of the work load presently for MARU staff.
- ii. Other tasks that might not be completed, or which might be delayed include the percentage of the work load that staff members in other units

will not be able to meet while they are educating and assisting the MARU staff with the monitoring for their specific programs. This may include, but not be limited to NPDES permits, storm water permit development, storm water inspections, 401 certifications, WDRs, and reviewing monitoring reports.

i. Aspirational Goals

- i. The San Diego Water Board has clear, correct, and up-to-date understandings of the existing conditions as well as their changes with time [i.e., improving, unchanged, or (hopefully not) degrading] of all water bodies in our Region.
- ii. For each impaired water body in our region, all sources and stressors that truly are the principal causes for the impairment are correctly and successfully identified.

Ongoing Projects:

PROJECTS TO IMPROVE AND COORDINATE MONITORING AND ASSESSMENT PROGRAMS

2. COLLABORATIVE MONITORING APPROACH

a. Project Description

Meet with stakeholders to develop improved and better coordinated monitoring and assessment programs for waters in the San Diego Region.

b. Project Goals

Ensure that monitoring and assessment programs in the same watershed, the same water body, and the same types of water bodies are coordinated and produce comparable and useful results, in keeping with the Framework for Monitoring and Assessment in the San Diego Region.

c. Desired Outcomes

In keeping with the Framework for Monitoring and Assessment in the San Diego Region, monitoring and assessment programs will produce important basic information about the status and trends of conditions in water bodies as they relate to key beneficial use categories and enable meaningful comparison of those conditions in keeping with the Framework for Monitoring and Assessment in the San Diego Region.

d. Values And Underlying Contradictions

In keeping with the Framework for Monitoring and Assessment in the San Diego Region, it behooves the San Diego Water Board to ensure that monitoring and assessment within the same watershed, water body, and/or type of water body, particularly monitoring and assessment required by the Board:

- i. Is appropriate, reasonable, and equitable;
- ii. Is coordinated and comparable;
- iii. Answers important questions;
- iv. Makes good use of the scarce resources available for monitoring and assessment; and
- v. Includes effective communication of results.

This is not always the case currently.

e. Linkage To The Practical Vision

This project includes the first several steps of the “ten-step process” for making the transition from discharge-oriented monitoring and assessment to water body-oriented monitoring and assessment, as outlined in the Framework for Monitoring and Assessment in the San Diego Region. This project is the first Part of implementation of the Framework. As such, this project is where “the rubber meets the road” for the practical vision.

f. Schedule / Milestones

First year:

- i. Assemble monitoring workgroup (stakeholders);
- ii. Develop monitoring questions;
- iii. Inventory current monitoring programs and analyze current data.

Beyond first year:

- i. Design appropriate monitoring program to answer monitoring questions;
- ii. Identify funding sources and allocate funding for implementation of monitoring program.

The schedule / milestones outlined above may vary depending on the scope of the individual effort.

g. Resources Needed

Approximately 2.0 PY and approximately \$50,000 each year

h. Tasks That Might Not Get Done In Order To Do This Project

- i. Minimize staff and funding devoted to inconsequential and low threat facilities, activities, and discharges
- ii. Don't produce beans for the sake of bean counts; don't count beans
- iii. Lower customer service expectations

3. SWAMP and SCCWRP

a. Project Description

The San Diego Water Board has initiated three efforts to improve and better coordinate monitoring and assessment of San Diego Region waters. SWAMP funding has been used to contract with the Southern California Coastal Water Research Project and Dr. Brock Bernstein to help guide the first two of these efforts through the initial steps of the ten-step process for implementation of a water body-oriented approach to monitoring and assessment. These efforts are outlined below. Similar efforts for other watersheds, other types of water bodies, other areas, and other beneficial uses would be initiated in future years, as staff and funding allow.

i. San Diego River Watershed Waters

The first effort, which started in December 2010, is focused on monitoring and assessment in the San Diego River watershed. A workgroup, which includes representatives of regulated entities, water supply agencies, fish and wildlife and land management agencies, NGOs, San Diego Water Board member Strawn, San Diego Water Board staff, and others, has met several times, as have smaller workgroups focused on specific topics. Smaller workgroups focused on specific tasks have met since then. A report from this project is in preparation.

ii. Enclosed Coastal Waters

The second effort, which started early in 2012, is focused on monitoring and assessment in coastal estuaries, lagoons, bays, and harbors. A number of individuals from a variety of organizations attended the first two workgroup meetings in February and May 2012. The workgroup is expected to resume meeting in 2014 and develop a plan for coordinating monitoring of enclosed coastal waters in the San Diego Region.

iii. South Orange County Beaches

The third effort, which began in mid-2012, is focused on monitoring and assessment of beach water quality in south Orange County. San Diego Water Board staff has convened a workgroup to address concerns expressed by members of the San Diego Water Board at the April 2012 Board meeting. The goal of this effort is to develop a protective, reasonable, equitable, and coordinated beach water quality monitoring program for south Orange County. The workgroup has met several times, and a report from this project is in preparation.

FUTURE PROJECT

4. BIOACCUMULATION STUDY IN SAN DIEGO BAY

a. Project Description

The entirety of San Diego Bay (the Bay) is on the Clean Water Act 303(d) List of Impaired Water Bodies for PCBs in fish tissue. The data used for the listing was collected for the California Department of Fish and Game's Coastal Fish Contamination Program in 1999 and 2000. To prepare a Total Maximum Daily Load (TMDL)¹ for PCBs in the Bay, the first step is to verify the impairment. Considering the age of the data used for the 303(d) listing, a newer data set should be considered. At this time, the San Diego Water Board wants to determine whether newer bioaccumulation data exists and could be used to determine whether the impairment for PCBs in fish tissue still exists in the Bay, or whether additional data collection is needed. This document addresses a set of questions related to bioaccumulation of pollutants (discussed below) in the Bay, so that necessary corrective actions (e.g., sediment cleanup and TMDLs) can be prioritized, coordinated, and managed for the Bay.

This study addresses the Conditions Monitoring and Assessment question regarding beneficial uses (M1): Are fish and shellfish safe to eat?

The study takes the question a step further by determining at what level the fish are safe to eat for recreational fishers: Two meals per week? Three meals per week? No consumption? This is determined using the OEHHA threshold concentrations for evaluation of bioaccumulating pollutants (Klasing and Brodberg, 2008). Once the results are known, management actions must be determined to correct expected impairments. Questions in Part I and Part II below will be used to address possible management actions.

b. Study Goals and Objectives

The goal of this study is to assess bay-wide contaminant bioaccumulation conditions in San Diego Bay to develop a better understanding of contaminant transfer through the food webs in San Diego Bay and thereby determine the risk to humans and wildlife from consuming contaminated fish in the bay. The objectives for data collection include data to calculate Biota Sediment Accumulation Factors (BSAFs) and Trophic Magnification Factors, as well as determine the health risks to humans and wildlife consuming seafood from San Diego Bay, and develop data analysis tools for assessing sediment quality related to bioaccumulation risks. These data are needed to answer the following questions, in a phased approach as necessary, before any action is taken to address bay-wide bioaccumulating pollutants in the Bay.

¹ A TMDL describes a value of the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

Part I:

- i. What should the OEHHA advisory tissue levels (ATL) have been when looking only at the previous data for mercury and PCBs San Diego Bay? When viewing data collected from this study, do the results indicate a different ATL for mercury, PCBs, and other select bioaccumulants, if any?
- ii. Have PCB concentrations in fish tissue (and other bioaccumulating pollutants of concern) significantly declined in recent years compared to studies from past years for San Diego Bay? Is it appropriate to compare these datasets considering that samples were not collected in the same locations using the same composition of species? Do the answers of the above questions indicate that natural attenuation of pollutants in sediment will be of benefit as a management tool?

Part II:

- i. At what bioaccumulant concentrations in fish tissues and in sediments are humans and wildlife at risk?
- ii. What are the selected bioaccumulant concentrations of the fish collected in San Diego Bay and how do they compare to the OEHHA fish contaminant goals (FCG) and advisory tissue levels (ATL) for risks to human health.
- iii. What are the risk assessment values for the selected bioaccumulants found in fish tissues in San Diego Bay? Do the concentrations risk assessment values chosen indicate that there is risk to humans or wildlife?
- iv. How do bioaccumulants transfer up the food web of the Bay? Is there a pattern? Can any mechanism be proposed for any pattern seen?
- v. If sediment sampling has occurred at multiple locations throughout the bay, what is the bay-wide distribution of these bioaccumulating pollutants of concern? Can we define where in the Bay pollutants of concern are entering the food web including fish tissues in significant amounts? In other words: Where are sources and are these areas where the fish or their prey feed? How are the pollutants of concern being transported from sources to other locations and to the biota and the food web?

c. Results of Cursory Review

Based on an initial review of available literatures, it has been found that newer bay-wide data sets include Bight '08 data and a large data collection from the 2003 study by Exponent that was limited to the BAE and NASSCO Shipyards area. Additional bioaccumulation study results were also obtained from Bight '98.

The Office of Environmental Health and Hazard Assessment (OEHHA) developed fish contaminant goals (FCG) and advisory tissue levels (ATL)² to represent standards for risks to human health. The Bight '98 and '08 Study of San Diego Bay revealed levels of PCBs and mercury in fish tissue that exceeded the FCG and ATL across all studies and all years of collection. See Table 1 below for bay-wide PCB results from these studies.

Table 1. Exceedences of PCB Concentrations in Fish Tissue.

Advisory Level	Bight '98 Study	*Coastal Fish Study	Bight '08 Study
FCG (3.6 ng/g ww)	14 of 14 fillet (100%); 7 of 7 whole fish	11 of 11 fillet	10 of 10 fillet (100%)
ATL 3 meals/week (21 ng/g ww)	10 of 14 fillet (71%); 7 of 7 whole fish	11 of 11 fillet	9 of 10 fillet (90%)
ATL 2 meals/week (42 ng/g ww)	10 of 14 fillet (71%); 7 of 7 whole fish	10 of 11 fillet	6 of 10 fillet (60%)
ATL no consumption (120 ng/g ww)	2 of 14 fillet; 6 of 7 whole fish	4 of 11 fillet	None

*Data from 1999 and 2000 used for 303(d) listing for PCBs Bay-wide in San Diego Bay.

More detailed review and evaluation of these recent studies is necessary to answer the phased questions above. As a result, for the effective use of staff and funding resources, it has been determined that these more recent studies, and any other appropriate and relevant studies of the Bay that's available, should be thoroughly reviewed and considered before further data collection is pursued.

APPROACHES OF STUDY

PROJECT I – LITERATURE REVIEW

a. Project Description

The first step (or project) of this study is to compile all available data pertaining to bioaccumulation studies in San Diego Bay, with a focus on the more recent data of Bight '08 and Exponent 2003, and maybe other data that have not be identified. All relevant data including and not be limited to, sediment chemistry, sediment toxicity, and bioaccumulation studies, etc. will be evaluated to see whether they can provide answers to the phased questions above (not necessarily limited to Part I questions), and to what extent.

² OEHHA FCGs and ATLs are available for PCBs, mercury, chlordane, DDT, toxaphene, and dieldrin (Klasing and Brodberg, 2008).

b. **Outcomes**

Results of this evaluation will be summarized in a report – *“Pollutant Bioaccumulation in San Diego Bay - results of literature review”*. Any remaining data gaps will also be identified during the evaluation and summarized in the report. These data gaps will be used for the design of future projects for additional data collection.

c. **Timeframe And Resources Needed**

It is estimated that approximately 0.3 PYs will be needed to complete this first step in six to nine months.

PROJECT II – ADDITIONAL DATA COLLECTION AND ANALYSIS

a. **Project Description**

If additional data are determined to be needed³, a phased data-collection approach will be employed based on availabilities of staff and funding resources, with the Part I questions being addressed first. As stated previously, the data gaps identified from Project 1 will be used to streamline the collection of additional data. Additionally, the following factors will also be considered in the design of data collection for Part I:

b. **Requirements For Project II Part I Study**

- i. Develop a San Diego Bay-wide assessment.
- ii. Target sport fish commonly consumed by humans for a human health risk study and fish that forage on benthic invertebrates for a study of food web transfer of bioaccumulating pollutants. Fish species used in the Bight '08 and/ or Bight '98 San Diego Bay bioaccumulation surveys included: Shiner Surfperch, Spotted Sand Bass, Barred Sand Bass, Pacific Chub Mackerel, Gray Smooth-hound Shark, Yellowfin Croaker, Calico Bass (1998 only), and California Halibut (1998 only).
- iii. Limit fish samples collected to locations where species are found and where people can gain access for fishing or within a TMDL site or a San Diego Water Board Site Cleanup Program (SCP) site. Collecting methods may include both hook and line, and trawls.
- iv. Analyze sport fish tissues that are consumed by humans. Consider analyzing fish fillets as well as whole fish. People are known to eat the whole fish, not just the fillets.
- v. Analyze pollutants in the forage fish tissues.

³ Results of the cursory review indicate that the number and density of samples may need to be increased to draw conclusions that are more statistically sound.

- vi. Analyze pollutants in fish tissue that represent risks to human health. A review of past bioaccumulation studies for San Diego Bay will provide an indication of what pollutants should be analyzed. A cursory review of three bioaccumulation studies on San Diego Bay indicate that PCBs and mercury in fish tissue are of concern.
- vii. Compare the results to the OEHHA thresholds (the FCG and the ATL) for evaluation of bioaccumulating pollutants.

c. **Requirements For Project II Part II Study**

It has been acknowledged that in addition to studies on fish tissues, it is very likely that investigations on sediment contamination conditions and pollutant bioaccumulation in benthic fauna (crustacean and/or mollusk) will be needed to aid in answering Part II questions. Moreover, addressing the second question will require a conceptual model, including and not be limited to, a map of sediment concentrations at source sites throughout the Bay as well as locations of source inputs from the watersheds (creek mouths, storm drains). Data gap identified in Part 1 and the conceptual model will be utilized to streamline the design of data collection; results of the additional data will be used to modify the conceptual model and identify further investigation needs, as necessary. This process will be reiterated until Part II questions are answered successfully. Part II data will be analyzed using a bioaccumulation model discussed in the "Phase II Sediment Quality Objectives for Enclosed Bays and Estuaries" (SWRCB, 2010).

Below factors should also be included in the design of Part II data collection:

- i. Collect sediment contaminant samples at the same stations where fish samples are collected, in representative areas of north and central San Diego Bay as well as at reference stations. Consider collecting sediment samples at specifically-known contaminated sites (TMDL or San Diego Water Board Site Cleanup Program (SCP) sites).
- ii. Collect representative invertebrates, fish that forage on invertebrates, and sport fish tissue samples from the selected north and central bay stations and reference stations to look for any relationships between sediment contamination and pollutant bioaccumulation through a benthic-based food web to a top fish predator that humans would consume.
- iii. Determine whether the sediment sample bioaccumulant concentrations at known contaminated sites continue to be of concern. At a minimum, sample for mercury, PCBs, PBDEs, and chlorinated pesticides.
- iv. Determine whether fish tissue sample bioaccumulant concentrations from the bay are changing over time. Determine the current level of contamination of fish tissue with regard to human health advisory levels.
- v. Follow the Draft State Board Policies on the Phase II Sediment Quality Objectives (SQO) for the study. Use the bioaccumulation model (model is

Monitoring and Assessment

for organics only) and evaluation of sediment contamination condition for human health, if any draft guidelines are available for use at this time.

d. **Outcomes**

Sampling and Analysis Work Plans (including Quality Assurance Project Plans) for each Part will be appropriately prepared and peer reviewed prior to the commencement of field sampling activities. Sampling results will be summarized in reports as appropriate (e.g., one report for each study Part), and used to guide future sampling needs and frequencies.

e. **Timeframe And Resources Needed**

Depending on available funding resources including staff time, portions (or all) of Part II sampling may be conducted simultaneously with Part I. It has been estimated that 0.3 PY will be needed to complete the project tasks with sampling completed in a total of two to four years. Monitoring and assessment activities are currently being planned with SCCWRP and the USFWS, which will accelerate the timeline, leverage funding, and provide scientific expertise.

References:

Bight '98 Study Report: *Bioaccumulation of Contaminants in Fish Tissues*, 2004, Southern California Coastal Water Research Project

Bight '08 Study Report: *Contaminants in Sport Fish Two-Year Statewide Survey Begins with Focus on Urban Coastal Areas*, May 2011, Surface Water Ambient Monitoring Program

California Department of Fish and Game. CDFG Fish and Wildlife Water Pollution Control Data, 1999 and March 2000. Coastal Fish Contamination Program (CFCP Year 1 and 2).

Klasing, S. and R. Brodberg. 2008. *Development of Fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Chlordane, DDTs, Dieldrin, Methylmercury, PCBs, Selenium, and Toxaphene*. California Office of Environmental Health Hazard Assessment, Sacramento, CA.

SWRCB, 2010. Staff CEQA Scoping Informational Document: Phase II Sediment Quality Objectives for Enclosed Bays and Estuaries. State Water Resources Control Board, Sacramento, CA.

5. FUTURE PROJECT GROUNDWATER MONITORING IN THE SAN DIEGO REGION

Groundwater resources are very important to the lives of many San Diegans. According to the California Department of Public Health (CDPH) database⁴, at least 14 communities that serve more than 1,300,000 people within the San Diego Region (the Region) rely on polluted groundwater⁵, either partially or completely, as a primary source of drinking water⁶.

In order to better protect human health and maintain sustainable groundwater supply within our Region, regional-scale groundwater-quality monitoring projects are necessary to better assess the quality of groundwater as well as its changes with time and space. The projects will address the following questions:

- a. What is the current groundwater quality in different basins of our Region and are the conditions supportive of their beneficial uses?
- b. Are there any early warning signs that imply potential threats to groundwater supplies, e.g., the detection of emerging contaminants, or pollutants at levels close to the applicable drinking water standards?
- c. What are the trends, if any, of the changes in groundwater quality in different basins within our Region?

These monitoring projects are expected to take place in the next five to ten years, and repeat as necessary. As the first step of these projects, a thorough literature review of historical and current groundwater quality data of the groundwater basins to be studied⁷ that is available from all relevant agencies should be conducted to evaluate whether they provide answers to above questions and to what extent. Data gaps identified during this primary literature review will be used to streamline the design of future groundwater monitoring activities. In those activities, untreated/raw groundwater samples will be collected from wells of different types and analyzed for naturally-occurring and man-made chemicals. The test results will be compiled with existing groundwater quality data to provide answers to the above questions.

Considering the potential limitation of funding resources, a prioritization process should be employed during the selection of groundwater basins that

⁴ The CDPH Division of Drinking Water and Environmental Management Water Quality Monitoring Database.

⁵ Polluted groundwater is groundwater that contains natural and/or manmade pollutants at concentrations above applicable Maximum Contaminant Levels on two or more occasions within the most recent CDPH compliance cycle of January 1, 2002 through December 31, 2010.

⁶ Polluted groundwater requires treatment to meet applicable drinking water standards before being consumed.

⁷ Depending on the availability of funding resources and staff time, a region-wide groundwater quality inventory of all groundwater basins in the San Diego Region may be performed prior to the commencement of any groundwater monitoring projects.

Monitoring and Assessment

should be included in the initial monitoring projects, with higher priority being given to basins that support greater numbers of residents and/or support communities which depend exclusively on the groundwater basins of concerns for drinking water supply. Results of the initial study should be used, with other existing data as appropriate, to identify the needs and focus of future groundwater monitoring projects.

Additionally, the monitoring projects may also be tailored to address particular concerns in our Region. As an example, the monitoring project may be targeted at, and designed as appropriate to, investigating the potential impacts of salt and nutrients on groundwater quality within our Region. The answers will shed light on the necessary and proper monitoring requirements of the Waste Discharge Requirements for Discharges from Agricultural and Nursery Operations in our Region.