

CHAPTER 6: SURVEILLANCE AND MONITORING

6.1 REGIONAL MONITORING PROGRAM

The effectiveness of a water quality control program requires information supplied by comprehensive surveillance and monitoring of water, sediment, aquatic resources, and the human activities that have the potential to impact beneficial uses. The following section describes the monitoring programs that together provide high quality, comprehensive scientific information on water quality in the Region. The Water Board uses information produced by the programs described below to satisfy the requirements of Sections 104, 106, 208, 301, 303, 304, 307, 308, 314, and 402 of the federal Clean Water Act and applicable portions of the state's Porter-Cologne Water Quality Control Act.

The Regional Monitoring Program forms the core of water quality, sediment quality, and tissue (including bivalves and fish) monitoring in the Estuary. Historically, water quality in the Region was tracked by Water Board and State Water Board research and monitoring programs and numerous studies carried out by other interested state, federal, and local agencies.

From 1989 to 1992, the Water Board developed and implemented pilot programs for the San Francisco Estuary Regional Monitoring Program (RMP), through the Bay Protection and Toxic Cleanup Program (BPTCP) and U.S. EPA grants. In 1993, the RMP was formally established to provide integrated, comprehensive, and systematic information on water quality in the Region. Its goal is to evaluate the effectiveness of the Water Board's water quality program in meeting Basin Plan objectives, including protection of beneficial uses in the Estuary.

The Regional Monitoring Program's specific objectives are to:

1. Describe the distribution and trends of pollutant concentrations in the Estuary;
2. Project future contaminant status and trends using best understanding of ecosystem processes and human activities;
3. Describe sources, pathways, and loading of pollutants entering the Estuary;
4. Measure pollution exposure and effects on selected parts of the Estuary ecosystem (including humans);
5. Compare monitoring information to relevant benchmarks, such as total maximum daily load (TMDL) targets, tissue screening levels, water quality objectives, and sediment quality objectives; and
6. Effectively communicate information from a range of sources to present a more complete picture of the sources, distribution, fate, and effects of pollutants and beneficial use attainment or impairment in the Estuary ecosystem.

Every five years, an outside group of scientific experts reviews the RMP to assure it is fulfilling its objectives and providing useful and timely information regarding the Estuary. In 2002, the RMP status and trends component was revised to incorporate probabilistic monitoring. The 2002-2004 sample locations shown in Figure 6-1 were selected according to a probabilistic design. Each year sites are randomly selected and will be in different locations than shown in Figure 6-1. The list of parameters is presented in Table 6-1.

The RMP participants, including dredgers, stormwater agencies, and municipal and industrial dischargers that hold Water Board permits for waste discharge into the Estuary, fund the RMP as a

requirement of their permits. The San Francisco Estuary Institute (SFEI), an independent nonprofit organization, administers and manages the program under a Memorandum of Understanding with the Water Board.

The RMP, through SFEI, produces an Annual Monitoring Report that summarizes the current state of the Estuary with regard to pollution, a summary report (Pulse of the Estuary), a quarterly newsletter, technical reports that document specific studies and synthesize information from diverse sources, and journal publications that disseminate RMP results to the world's scientific community.

6.2 SURFACE WATER AMBIENT MONITORING PROGRAM

In January 2000, the Surface Water Ambient Monitoring Program (SWAMP) was proposed in a Report to the Legislature to integrate existing water quality monitoring activities of the State and Regional Water Boards, and to coordinate with other monitoring programs. Water Code Section 13192 required the State Water Board to assess and report on the state monitoring programs and prepare a proposal for a comprehensive monitoring program. Water Code Section 13191 requires the State Water Board to convene an Advisory Group to assist in the evaluation of program structure and effectiveness, as it relates to the implementation of the requirements of Clean Water Act Section 303 (d), applicable federal regulation, and monitoring and assessment programs.

Ambient monitoring refers to any activity in which information about the status of the physical, chemical and biological characteristics of the environment is collected to answer specific questions about the status and trends in those characteristics. For the purposes of SWAMP, ambient monitoring refers to these activities as they relate to the characteristics of water quality.

SWAMP is a statewide monitoring effort designed to assess the conditions of surface waters throughout the state of California. The State Water Board administers the program. Responsibility for implementation of monitoring activities resides with the nine Regional Water Boards that have jurisdiction over their specific geographical areas of the state.

In the Region, SWAMP is targeted to water bodies not monitored by the RMP. The numerous water bodies of the Region are listed in Table 2-1. SWAMP includes physical, chemical, and biological monitoring. SWAMP's focus is on water quality assessment in watersheds. SWAMP is intended to fulfill water quality assessment reporting requirements under Clean Water Act Section 305(b), and to support Clean Water Act Section 303(d) impairment decisions in cases where there is adequate information available to meet data requirements in the State Water Board's 303(d) Listing Policy, established in September 2004. The 305b and 303d requirements for the Estuary are met through the RMP, described in Section 6.1 Regional Monitoring Program.

In 1976, the state initiated the State Mussel Watch and State Toxic Substances Monitoring Programs to regularly monitor the concentration of pollutants in the tissue of aquatic organisms. Tissue levels reflect exposure over much longer periods of time than instantaneous water column samples and provide a field-based estimate for exposure of people, fish, and wildlife to pollutants in the food chain.

The Mussel Watch Program uses resident and transplanted bivalves to monitor pollutant levels at coastal reference stations and selected sites in bays and estuaries to confirm potential toxic substance pollution. The location of bivalve sampling stations in the Region are summarized in Figure 6-2 and Table 6-2. Periodic monitoring of bivalve tissue conducted by the National Mussel Watch administered by the National Oceanic and Atmospheric Association (NOAA) and international surveys complements information from the State Mussel Watch Program.

The Toxic Substances Monitoring Program used resident fish and other aquatic organisms to monitor pollutant levels in freshwater systems throughout the state. The location and sampling history of Toxic Substances Monitoring stations in the region are summarized in Figure 6-3 and Table 6-3.

The State Mussel Watch and State Substances Monitoring Programs have been incorporated into SWAMP. The Toxicity Testing Program and Coast Fish Contamination Program have also been incorporated into SWAMP.

6.3 SACRAMENTO-SAN JOAQUIN RIVERS AND NORTHERN SAN FRANCISCO BAY ESTUARY WATER QUALITY SURVEILLANCE

Water flowing into the San Francisco Estuary from the Sacramento and San Joaquin rivers is regularly monitored by numerous agencies and programs, including the Sacramento Coordinated Water Quality Monitoring Program (in the Sacramento metropolitan area), the Department of Water Resources, the Central Valley Regional Water Quality Control Board, and the Interagency Ecological Studies Program. Conventional water quality parameters, water and suspended material chemistry, and toxicity are sampled at a network of stations located throughout the Delta and into San Pablo Bay. In addition, phytoplankton, benthic community, and beneficial use surveys are regularly conducted in this area.

The primary goals of these efforts are to: (a) assure riverine water quality meets applicable standards; (b) identify changes in water quality potentially related to the operation of the State Water Project; and (c) develop technical information that can be used to estimate mass loading of pollutants to the Estuary from riverine sources.

6.4 GROUNDWATER MONITORING NETWORKS

Groundwater monitoring networks are established in several basins in the Region. At present, there are monitoring networks in the Livermore-Amador Valley by Zone 7, Niles Cone by the Alameda County Water District (ACWD), Santa Clara Valley by the Santa Clara Valley Water District (SCVWD), Half Moon Bay Terrace by the Coastside County Water District and the Montara Water and Sanitation District, San Francisco's Westside Basin by the San Francisco Public Utilities District (SFPUC), and Napa Valley by the Napa Valley Flood Control and Water Conservation District. In order to find out the most current status of these networks, local water management agencies should be contacted directly.

In addition, the U.S. Geological Survey (USGS) and the Department of Water Resources (DWR) maintain regional monitoring networks. Typically, monitoring is conducted at least annually for general mineral quality and water levels. This well data may be of use to determine the general potability of groundwater and the status of sea water intrusion control.

The Water Board is integrating the locations of monitoring well networks into its groundwater geographic information system. The water quality data generated from the networks will assist Water Board staff in the refinement of beneficial use designations for groundwater basins.

The State Water Board has contracted the USGS and Lawrence Livermore National Laboratory (LLNL) to implement the Groundwater Ambient Monitoring and Assessment (GAMA) Program. The primary objective of the GAMA Program is to comprehensively assess statewide groundwater quality and gain an understanding about contamination risk to specific groundwater resources. The Groundwater Quality Monitoring Act of 2001 (Sections 10780-10782.3 of the Water Code) resulted in a publicly accepted plan to monitor and assess the quality of all priority groundwater basins that

account for over 90 percent of all groundwater used in the state. The plan prioritizes groundwater basins assessment based on groundwater use.

The GAMA Program monitors groundwater from public supply wells for a broad suite of chemicals at very low detection limits, including exotic chemicals such as wastewater chemicals and pharmaceuticals. Monitoring and assessments for priority groundwater basins will be completed every ten years, with trend monitoring every three years. Monitoring reports for data collected in the Region are available at the State Water Board website.

6.5 COMPLIANCE MONITORING

A second component of the state's water quality surveillance and monitoring program relates specifically to discharges of pollutants at individual point and nonpoint sources. All entities holding Water Board discharge permits must conduct regular sampling and analysis of waste released to surface and groundwaters. They must also analyze material to be dredged. The specific chemical and physical parameters, types (i.e., toxicity tests, bioaccumulation studies, waste stream sampling, etc.), frequency, and other information requirements are determined on a case-by-case basis according to the nature of the discharge and potential environmental effects. Each permit issued by the Water Board describes the specific compliance monitoring requirements for that permit holder. Monitoring data collected by point source dischargers and nonpoint pollution control programs are used to:

- Determine compliance with and provide documentation to support enforcement of permit conditions;
- Support derivation of effluent limitations and wasteload allocations; and
- Provide information needed to relate receiving water quality to mass emissions of pollutants by dischargers.

Self-monitoring data are often supplemented by information obtained by Water Board staff during site inspections (including waste analyses) and through special studies, such as those characterizing the variability of the discharge, pollutant levels in nearby receiving water and biota, and characterization of pollutant loads attributable to urban runoff.

6.5.1 Compliance Monitoring – San Francisco Bay Mercury Human Health Objective

Compliance with the human health marine water quality objective for mercury in San Francisco Bay ([Table 3-3B](#)) will be evaluated in fish at the lengths shown below ([Table 6-4](#)). The mercury concentration in the edible portion of these five species will be averaged and compared to the human health water quality objective.

6.6 COMPLAINT INVESTIGATION

The Water Board encourages members of the public to alert it to pollutant discharge or nuisances that may impact water quality. Staff respond to each complaint, document the observed conditions, and take any necessary follow-up actions to institute appropriate corrective measures.

6.7 BIENNIAL WATER QUALITY INVENTORY

The Water Board prepares a biennial report on water quality (as required under Section 305(b) of the Clean Water Act, PL 92-500). This report includes (a) a description of the water quality of major navigable waters in the state during the preceding years; (b) an analysis of the extent to which significant navigable waters provide for the protection and propagation of a balanced population of

shellfish, fish, and wildlife and allow recreational activities in and on the water; (c) an analysis of the extent to which elimination of the discharge of pollutants is being employed or will be needed; and (d) an estimate of the environmental impact and the economic and social costs necessary to achieve the “no discharge” objective of PL 92-500, the economic and social benefits of such achievement, and an estimate of the date of such achievement. Recommendations as to the programs that must be undertaken are provided, along with estimates of the cost.

6.8 OTHER MONITORING PROGRAMS

In addition to the state’s surveillance and monitoring program, several other agencies in the Bay Area monitor water quality, including local city and county offices, federal agencies, and water supply districts. Local universities also conduct research and monitoring activities. All of these programs provide additional information and data that enhance the state’s efforts.

FIGURES

[Figure 6-1: Regional Monitoring Program Sampling Stations](#)

[Figure 6-2: State Mussel Watch Program Monitoring Network](#)

[Figure 6-3: Toxic Substances Monitoring Network](#)

TABLES

[Table 6-1: Parameters Analyzed for in the Regional Monitoring Program](#)

[Table 6-2: Key to Figure 6-2: State Monitoring Network](#)

[Table 6-3: Key to Figure 6-3: State Monitoring Network](#)

[Table 6-4: Five Most Commonly Consumed Bay Fish](#)