

# CHAPTER 6. SURVEILLANCE AND MONITORING

The effectiveness of a water quality control program cannot be judged without the information supplied by a comprehensive surveillance and monitoring program.

Historically, a wide variety of interested State, federal, and local agencies have sampled, analyzed, and tracked water quality. The State Board monitoring program coordinates existing information, gathering and supplementing it where necessary to meet data needs.

The State Board is the lead agency in California directing surveillance and monitoring of water quality. A routine program of systematic sampling of the State's waters is now in existence. The activity is coordinated through and assisted by the California Department of Water Resources (DWR) and Health Services (DOHS) as well as the United States Geologic Survey (USGS) and the Environmental Protection Agency (EPA).

This chapter contains a discussion of the objectives and various elements of the State and Regional Boards' programs.

## I. PROGRAM OBJECTIVES

The overall objectives of an adequate surveillance and monitoring program are:

1. To measure the achievement of water quality goals and objectives specified in this plan.
2. To measure specific effects of water quality changes on the established beneficial uses.
3. To measure background conditions of water quality and long-term trends in water quality.
4. To locate and identify sources of water pollution that pose an acute, accumulative, and/or chronic threat to the environment.

5. To provide information needed to correlate receiving water quality to mass emissions of pollutants by waste dischargers.
6. To provide data for determining waste discharger compliance with permit conditions.
7. To measure waste loads discharged to receiving waters and to identify the limits of their effect, and in water quality segments, prepare waste load allocations necessary to achieve water quality control.
8. To provide documentation necessary to support enforcement of permit conditions and waste discharge requirements.
9. To provide data needed to carry on the continuing planning process.
10. To measure the effects of water rights decisions on water quality and to guide the State Board in its responsibility to regulate unappropriated water for the control of quality.
11. To provide a clearinghouse for the collection and dissemination of water quality data gathered by other agencies and private parties cooperating in the program.
12. To prepare reports on water quality conditions as required by federal and State regulations and other users requesting water quality data.

## II. QUALITY CONTROL AND DATA MANAGEMENT

Federal regulations and State policy require the preparation and implementation of Quality Assurance/Quality Control Plans for most monitoring carried out by the Regional Board's staff or its

contractors. Dischargers must use laboratories approved by the Regional Board's Executive Officer and/or Regional Board's laboratory. The laboratory must have an approved Quality Assurance/Quality Control program.

Discharger monitoring reports are kept in the Regional Board's files; older files are microfiched. The Board has increasingly sophisticated computer facilities for analysis of data collected in special studies. "Raw" data are periodically made available to the State Board for entry into the statewide Water Quality Information System database for use by other agencies.

The results of special studies are generally summarized in the Regional Board staff reports and are discussed at public meetings of the Regional Board. The results of complaint monitoring are provided to the person or agency submitting the complaint. Copies of the Regional Board planning documents and special studies reports are provided to public and university libraries.

### **III. STATE WATER RESOURCES CONTROL BOARD PROGRAM TASKS**

#### **III.A. STATE-WIDE SURFACE WATER MONITORING PROGRAM**

Section 13160 of the Porter-Cologne Water Quality Control Act delegates primary responsibility for coordination and control of water quality in California to the State Board. Section 13163 of the Act states that in conducting this mission, the State Board is to coordinate water quality investigations, recognizing that other State agencies have primary statutory responsibility for such investigations.

Pursuant to these mandates, the State Board developed and in April 1976 established a coordinated Primary Water Quality Monitoring Network for California. Participants in the Coordinated Network included the California Departments of Health, Water Resources, and Fish and Game and the United States Department of the Interior, Federal Bureau of Reclamation; the U.S. Geological Survey; and, the Environmental Protection Agency.

The goal of the Primary Network is to provide an overall, continuing assessment of water quality in the State. This goal is to be achieved by statewide monitoring of water quality parameters that can affect beneficial uses of State waters. Among such parameters, toxic substances have received increasing attention in federal and State water pollution control activities; accordingly, Toxic Substances Monitoring and the State Mussel Watch program are included in the Primary Network.

#### **III.A.1. TOXIC SUBSTANCE MONITORING**

One alternative in monitoring for toxic substances (toxic elements and organic compounds) is to collect and analyze water samples. A major problem with this approach is that toxic discharges are likely to occur in an intermittent fashion and are thus likely to be missed with "grab" sampling of the water. Another limitation to analyzing water samples is that, generally, harmful toxicants are present in low concentrations in the water.

The process of bioaccumulation acts to concentrate toxicants through the aquatic food web. Therefore, in the Toxic Substances Monitoring Program the flesh of fish and other aquatic organisms is analyzed for toxic metals and synthetic organic compounds.

The Toxic Substances Monitoring (TSM) portion of the Primary Network has been integrated with other Primary Network Monitoring. Streams and lakes were ranked according to various criteria established to indicate their importance to the State in terms of water quality. From this process, the water bodies ranked Priority 1, or highest priority, were included in the Primary Network; routine chemical and biological water monitoring is performed by DWR and/or the USGS; and toxic substances monitoring of resident organisms is performed by the Department of Fish and Game.

The objectives of the Primary Network TSM program are:

1. To develop statewide baseline data and to demonstrate trends in the occurrence of toxic elements and organic substances in the aquatic biota.
2. To assess impacts of accumulated toxicants upon the usability of State waters by man.
3. To assess impacts of accumulated toxicants upon the aquatic biota.

4. Where problem concentrations of toxicants are detected, to attempt to identify sources of toxicants and to relate concentrations found in the biota to concentrations found in the water.

The samples collected in the TSM program are benthic invertebrates and predator fish. Tissue is analyzed for important metals, including arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc: fish flesh is analyzed for mercury. In addition, both invertebrate and fish flesh samples are analyzed for 55 synthetic organic compounds, most of which are pesticides (Table VI-1). TSM reports have been published annually since 1977.

TABLE VI-1

SYNTHETIC ORGANIC COMPOUNDS ANALYZED IN THE  
TOXIC SUBSTANCES MONITORING AND STATE MUSSEL WATCH PROGRAMS

<u>COMPOUND</u>	<u>COMPOUND</u>	<u>COMPOUND</u>
Aldrin	DDMU pp	Nitrofen (TOK)
Benefin	DDT pp	Oxychlor dance
BHC $\alpha$	Dialifor	Parathion, ethyl
BHC $\beta$	Diazinon	Parathion, methyl
BHC $\gamma$ (lindane)	Dichlofenthion	PCB 1248
BHC $\delta$	Dicofol (Kelthane)	PCB 1254
Carbophenothion	Dieldrin	PCB 1260
CDEC (Vege dex)	Endosulfan I (Thiodan I)	PCNB (Quintozene)
Chlorbenside	Endrin	Perthane
cis-Chlordane	EPN	Phenkapton
trans-Chlordane	Ehtion	Phorate (Thimet)
Chloroneb	Fenitrothion	Ronnel
Chlorpyrifos (Dursban)	Fonofos (Dyfonate)	Strobane
Dacthal	Heptachlor	Tetradifon (Tedion)
DDE op	Heptachlor epoxide	Toxaphene
DDE pp	Hexachlorobenzene (HCB)	2,4-D isopropyl ester
DDD op	Methoxychlor pp '	2,4-D isobutyl ester
DDMS pp	Mirex	2,4-D n-butyl ester

### **III.A.2. STATE MUSSEL WATCH**

The State Mussel Watch (SMW) program has been integrated with the Primary Network Monitoring to provide documentation of the quality of coastal marine and estuarine waters. The SMW program fulfills the goal of providing the State with long-term trends in the quality of these waters.

Mussels were chosen as the indicator organism for trace metals and synthetic organic compounds in the coastal and estuarine waters. Although the mussel populations of bays and estuaries are of a different species than those found in the open coast, their suitability as sentinels for monitoring the presence of toxic pollutants stems from several factors including: (1) their ubiquity along the California coast; (2) their ability to concentrate pollutants above ambient sea water levels and to provide a time-averaged sample; and (3) their non-motile nature which permits a localized measurement of water quality. The trace metals analyzed for in mussel tissues include aluminum, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver and zinc. Synthetic organic compounds analyzed for are summarized in Table VI-1.

When compared with alternative sampling designs, such as seawater and sediment sampling, SMW is a more cost effective program. Reports have been published annually since 1978.

During the 1977 and 1978 sampling periods, the focus of the SMW was, for the most part, on open coast monitoring of sites outside the vicinity of known pollutant point sources. Monitoring water quality in the State Board's designated Areas of Special Biological Significance (ASBS), to establish baseline conditions relating to the range of typical conditions in water, sediment and biota, was given prime importance in the early years of the program.

Based on identification of "hot spot" areas during 1977 and 1978, intensive sampling of these areas was implemented in 1979. Such a sampling strategy was intended to confirm previous findings, establish the magnitude of the potential problem and identify pollutant sources. The program has since evolved to include transplanting *M. californianus* mussels into selected California bays and estuaries at specific sites to confirm potential toxic substance pollution - i.e., in the vicinity of dischargers.

### **III.B. LAKE SURVEILLANCE**

This element is responsive to the requirements set forth in Section 314 of PL 92-500 and applicable federal regulations. The State is required to identify and determine the present trophic condition of all publicly owned fresh water lakes. The lakes inventory is updated on a two year cycle to include additional data as it becomes available and to indicate changes in trophic conditions.

### **III.C. BIENNIAL WATER QUALITY INVENTORY**

Section 305(b) of PL 92-500 requires the State to prepare and submit biennially to EPA the Water Quality Inventory. 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, 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 estimate of the date of such achievement. Recommendations as to the programs which must be taken to control them are provided, along with estimates of the cost.

Data collection and analyses already being carried out by the State in the permits, planning, facilities, monitoring and enforcement programs is utilized in preparing the reports on the quality of the waters of California. The first report was published in 1975 with subsequent reports in 1977 and 1979. The next biennial report is due in 1990.

## IV. WATER QUALITY ASSESSMENT

The State Board has been preparing "Section 305(b) Reports" since the mid-1970's. Most of these reports have been fairly general in nature, highlighting a few significant problem areas and estimating total area or stream mileage of waters statewide which were classified as "good", "medium", or "poor" quality. In 1989, the State Board began a more detailed Water Quality Assessment process to fulfill U.S. EPA reporting requirements and to provide the basis for prioritizing funding under the State's Clean Water Strategy.

The Water Quality Assessment is a computer database. It includes a table which lists water bodies of each region alphabetically by water body type (lakes, streams, ground water, etc). Initially, Regional Boards were directed to include at least all water bodies mentioned by name in their Basin Plans in the Water Quality Assessment table. Additional water bodies are to be added in future updates of the Water Quality Assessment, with the eventual goal of including all waters of the region. The 1992 Water Quality Assessment for the Central Coast Region includes approximately 400 entries.

For each water body, the Water Quality Assessment table identifies the wetland, lake, or ground water basin area or the stream mileage classified as having "good", "intermediate", "impaired", or unknown" water quality. The table includes space for brief narrative problem descriptions. It identifies problem sources as point, nonpoint, or both. It also indicates whether the water body is included on one or more of the following federal "lists" (numbers refer to sections of the Clean Water Act):

- 131.11 Segments which may be affected by toxic pollutants, or segments with concentrations of toxic pollutants that warrant concern.
- 303(d) List of Water Quality Limited Segments where objectives or goals of the Clean Water Act are not attainable with the Best Available Treatment/Best Control Technology.

304(M) A "mini-list" of waters not meeting State adopted numeric water quality objectives due to toxic point sources and/or nonpoint sources after implementation of Best Available Treatment/Best Control Technology.

304(S) A "short-list" of waters not achieving water quality standards due to point source implementation of Best Available Treatment/Best Control Technology.

304(L) A "long-list" of waters not meeting water quality goals of the Clean Water Act after implementation of Best Available Treatment/Best Control Technology due to either point sources or nonpoint source discharges.

314 A list of lake priorities for restoration.

319 A list of impaired surface water bodies from nonpoint source problems due to both toxic and nontoxic pollutants.

The information used by Regional Board staff in compiling and revising the Water Quality Assessment table includes the type of monitoring data discussed in this chapter, records of past Regional Board enforcement actions, professional judgment of Regional Board scientists and engineers, and public comments.

The Water Quality Assessment database also includes the capability to print out a more detailed "Fact Sheet" for each water body in the table. Fact Sheets can include longer problem descriptions, information on threatened or impaired beneficial uses, and summaries of current and projected remedial actions by the State Board and/or the Regional Board. Due to time constraints and, in many cases, lack of information, detailed Fact Sheets have not been prepared for all water bodies in the Central Coast Region's Water Quality Assessment table. Additional Fact Sheets will be added during the ongoing Water Quality Assessment update process.

The Water Quality Assessments adopted by the nine Regional Boards were combined into a statewide Water Quality Assessment which was formally adopted by the State Board. The State Board is using the system to print out statewide "reports", statistical tables graphs, and charts summarizing the total numbers or percentages of water bodies affected by different types of water quality problems. The State Board also uses information in the Water Quality Assessment to prioritize proposals affecting specific water bodies.

## **V. REGIONAL WATER QUALITY CONTROL BOARD PROGRAM TASKS**

### **V.A. COMPLIANCE MONITORING**

This task determines permit compliance, validates self-monitoring reports, checks receiving water standards compliance, and provides data for enforcement actions. Data obtained are added to the water quality supply data for regulation, enforcement, planning, and facilities development activities. Discharger compliance monitoring and enforcement actions are the responsibility of, and will normally be carried out wholly by, the Regional Board staff. Standards Compliance Monitoring will be coordinated by the State Board and use data available from other program tasks.

The scope of the Waste Discharger Compliance Monitoring Program for the basin will be dependent on the number and complexity of Waste Discharger Requirements (NPDES and other Permits) issued by the Regional Board. Waste discharge requirements may or may not include a specific discharger self-monitoring and reporting requirement on the effluent and receiving waters.

This program includes a control procedure whereby each discharger is periodically visited by Regional Board personnel on both an announced and an unannounced "Facility Inspection" basis. The intent of announced visits is to work with the discharger through personal contact and communication to review his procedures in order to assure quality control. The intent of the unannounced inspections is to survey the operation; inspect the discharge area; and collect, check, or reference samples.

### **V.B. SELF-MONITORING REPORT REVIEW**

Discharger self-monitoring reports generated as a result of permits and waste discharge requirements are collected and reviewed by the Regional Board for obvious errors or omissions and entered into the data bank for checking. Significant reports of noncompliance are made immediately upon detection. Other data desired by the Regional or State Board will be rendered on a routine basis. Self-monitoring reports are normally submitted by the discharger on a monthly or quarterly basis as required by the permit conditions.

### **V.C. COMPLAINT INVESTIGATION**

The Complaint Monitoring task involves investigation of complaints of citizens and public or governmental agencies on the discharge of pollutants or creation of nuisance conditions. It is a Regional Board responsibility which includes preparation of reports, letters, or taking other follow-up actions to document observed conditions and to inform the State Board and complainant and discharger of the observed conditions.

### **V.D. AERIAL SURVEILLANCE**

Aerial surveillance is used primarily to gather photographic records of discharges and water quality conditions and to observe conditions at solid waste disposal sites in the Region. Aerial surveillance is particularly effective because of the overall view of a facility that is obtained and because many facilities can be observed in a short period of time.

## **V.E. NONPOINT SOURCE INVESTIGATIONS**

The objective in this task is to (a) identify location of the sources of nonpoint pollutants; (b) develop information on the quantity, strength, character, and variability of nonpoint source pollutants; (c) evaluate impact on receiving water quality and biota; (d) provide information useful in management of nonpoint source pollution; and (e) monitor results of any control plan. Investigations will be undertaken on a statewide priority basis.

## **V.F. INTENSIVE SURVEYS**

Intensive monitoring surveys provide detailed water quality data to locate and evaluate violations of receiving water standards and make waste load allocations. They are usually localized, intermittent sampling at a higher than normal frequency. These surveys are specially designed to evaluate problems in water quality class segments, areas of special biological significance, or hydrologic units requiring sampling in addition to routine monitoring programs. Surveys are repeated at appropriate intervals depending on parameters involved, variability of conditions, and changes in hydrologic or effluent regimes.

Intensive surveys are needed for several water bodies. The data are needed for one or more of the following reasons:

- a. A water quality problem is suspected, however, little data is available to substantiate the existence or degree of a problem,
- b. A water quality screening is needed to verify the Regional Board's judgment of the water quality status, or,
- c. A water body is suspected to be water quality limited.

Table 6-2 lists each water body, the constituent needing sampling, and the reason it should be sampled. The Regional Board urgently requests the State Board to make money available for intensive surveys.

Table 6-2. Water Bodies Needing Intensive Survey

Water Body	Constituent(s)	Water Quality Problem Suspected	Water Quality Screening	Suspected Water Quality Limited
San Lorenzo River*	Bacteria Nutrients	X		
Corcoran Lagoon	Nutrients	X		
Soquel Creek/ Lagoon	Bacteria Nutrients	X		
Aptos Creek			X	
Valencia Creek			X	
Pescadero Creek			X	
Hernandez Lake	Mercury		X	
Monterey Bay	DDT			X
Watsonville Slough	Chromium Copper	X		
Watsonville Slough	Pesticides			X
Elkhorn Slough	Pesticides			X
Elkhorn Slough	Cadmium Chromium Copper Lead Nickel Silver Zinc		X	
Moss Landing Harbor	Pesticides			X
Moro Cojo Slough	Chromium Copper Nickel Zinc		X	
Tembladero Slough	Pesticides			X
Salinas Reclamation Slough	Pesticides			X
Salinas River and Old Salinas River	Pesticides			X
Monterey Harbor	Lead			X
Carmel River/ Lagoon			X	
Garapatta Creek/ Lagoon			X	
Big Sur River			X	
San Antonio River	Cadmium	X		

\*Sampling should be conducted after area sewered.



Table 6-2. Water Bodies Needing Intensive Survey

Water Body	Constituent(s)	Water Quality Problem Suspected	Water Quality Screening	Suspected Water Quality Limited
Nacimiento River	Mercury	X		
Las Tablas Creek	Mercury			X
Atascadero Lake			X	
Morro Creek	Heavy Metals	X		
Morro Bay	Bacteria			X
Chorro Creek	Bacteria Heavy Metals	X		
Los Osos Creek			X	
Sweet Springs	Bacteria	X		
Pismo Creek			X	
Arroyo Grande Creek			X	
Lopez Lake	Nutrients	X		
Oso Flaco Lake			X	
San Antonio Creek*	Bacteria Nutrients	X		
Santa Ynez Lagoon	Copper Lead	X		
Goleta Slough	Bacteria Heavy Metals	X		
Los Palmas Creek			X	
Arroyo Burro Creek			X	
Santa Barbara Channel	Bacteria			X
Mission Creek**	Bacteria Nutrients	X		
Laguna Creek	Bacteria	X		
Franklin Creek			X	
Santa Monica Creek			X	
Carpinteria Marsh	Chromium Copper Lead Silver Zinc  Pesticides			X

\*Downstream of Los Alamos

\*\*Upstream and downstream Mission Creek