Chapter 6:
Monitoring and Assessment

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Introduction

Monitoring and assessment are essential to the success of the Region's water quality control programs and are part of the Regional Water Board's program of implementation for achieving water quality objectives required pursuant to Water Code section 13242. Additionally, Water Code section 13163 directs the State Water Board to coordinate water quality investigations with the Regional Water Boards and among state agencies and evaluate the need for water quality investigations to effectively develop and implement statewide policy for water quality control.

The varied objectives of the State's water quality monitoring programs include:

- Evaluate attainment and maintenance of water quality objectives and beneficial uses consistent with State and federal requirements
- Measure effects of water quality changes on beneficial uses
- Measure background and existing conditions of water quality and determine long-term trends
- Locate and identify sources of pollutants that pose an acute, accumulative, and/or chronic threat to waters
- Provide information needed to relate receiving water quality to mass emissions of pollutants by waste dischargers
- Provide data for determining discharger compliance with the requirements of permits and other orders (e.g., Cleanup and Abatement Orders) and supporting the enforcement of permit and order requirements
- Evaluate effectiveness of treatment and remediation activities
- Provide data needed to implement water quality planning programs
- Measure the effects of water rights decisions on water quality, and to guide the State Water Board in its responsibility to regulate unappropriated water for the control of quality
- Provide a clearinghouse for water quality data gathered by other agencies, regulated parties, and/or citizen monitoring programs
- Report on water quality conditions as required by federal and State regulations or requested by others

To fulfill these objectives, monitoring programs track a wide variety of parameters and metrics to assess the physical, chemical, and biological condition of a waterbody. Physical measurements

may include parameters such as temperature and turbidity, while chemical measurements may include pH, salinity, dissolved oxygen, and the concentrations of various pollutants such as nutrients, metals, salts, pesticides, PCBs, radionuclides, and bacteria. Toxicity testing and tissue sampling may also be used to identify concentrations of pollutants that may be inherently harmful to the biota or may pose risks to human health. In addition, biological assessment (bioassessment) monitoring may be conducted to determine how well a waterbody supports a healthy and diverse aquatic ecosystem. Bioassessments include surveys and other direct measurements of habitat quality and species (benthic macroinvertebrates and algae) diversity and abundance in the waterbody. Because aquatic life is sensitive to the cumulative effects of both chemical (e.g., nutrient concentrations, pH, oxygen levels) and non-chemical (e.g. flow, substrate quality, canopy cover, hydromodification) stressors, bioassessments include measurements that aggregate the impacts of all these stressors.

The Regional Water Board occasionally conducts surveys and monitoring assessments related to specific projects, and also relies on data gathered by existing monitoring or assessment programs. This chapter contains a description of the various State and Regional Water Board monitoring, assessment, and tracking programs, as well as multi-agency programs that contribute to the available pool of data. A large part of these data are available online through a variety of databases that are described below. State programs using this information to assess the quality of regional waters are also described. Additional information about the programs described and web links can be found on the Regional Water Board's website (http://www.waterboards.ca.gov/losangeles/), through the "Our Watersheds" link.

State and Regional Water Board Monitoring, Assessment, and Tracking Programs

Active Programs

Surface Water Ambient Monitoring Program

The Surface Water Ambient Monitoring Program (SWAMP) is a statewide effort designed to monitor and assess the conditions of surface waters throughout the state of California. SWAMP was developed in 2001 as a statewide monitoring effort that provides the scientifically sound data needed to effectively manage California's water resources. SWAMP has four primary responsibilities:

- Monitor, assess, and report on California's water quality;
- Create a common framework that coordinates statewide monitoring efforts by offering a uniform and objective approach to monitoring, sampling, and analytical methods and by maintaining quality control through consistent data quality assurance protocols, data validation, and centralized data management;
- Serve as a technical resource by communicating among project participants and stakeholders and by providing technical expertise; and
- Collaborate with other agencies in the state that monitor water quality so that efforts are comprehensive, integrated, non-duplicative, and appropriately funded.

The SWAMP mission is to provide resource managers, decision makers, and the public with timely, high-quality information to evaluate the condition of all waters throughout California. The program's purpose is to monitor and assess water quality to determine whether waterbodies are attaining and maintaining water quality standards and beneficial uses are protected. SWAMP accomplishes this through carefully designed, externally reviewed monitoring programs, and by assisting other entities state-wide in the generation of comparable data that can be brought together in integrated assessments that provide answers to current regulatory and management questions. Data from SWAMP are used to improve the state's water quality assessment and add or remove water bodies from the impaired water bodies list as required under CWA sections 305(b) and 303(d).

Regardless of scope, all monitoring programs are designed to answer specific assessment questions. SWAMP statewide and regional monitoring programs are each designed to address one or more of the following assessment questions for defined waterbody types and beneficial uses:

- Status: What is the overall quality of California's surface waters?
- Trends: What is the pace and direction of change in surface water quality over time?
- Problem Identification: Which water bodies have water quality problems and which areas are at risk?
- Diagnostic: What are the causes of water quality problems and where are the sources of those stressors?
- Evaluation: How effective are clean water projects and programs?

SWAMP has designed and implemented several regional and statewide assessment programs including: the Perennial Streams Assessment; Bioaccumulation Monitoring Program; and Stream Pollution Trends Monitoring Program. Additionally, SWAMP created a Quality Assurance program; developed a standardized data management, evaluation, and reporting system; and created sampling Standard Operating Procedures (SOPs) for receiving water monitoring. The California Environmental Data Exchange Network (CEDEN) serves as the repository through which SWAMP data are made available to the public.

More information about the Surface Water Ambient Monitoring Program can be found on the State Water Board's website under the following link: http://www.waterboards.ca.gov/water_issues/programs/swamp/.

Groundwater Ambient Monitoring and Assessment Program

The Groundwater Ambient Monitoring and Assessment (GAMA) Program is California's comprehensive groundwater quality monitoring program. The GAMA program was created by the State Water Board in 2000 and was expanded by Assembly Bill 599 -- the Groundwater Quality Monitoring Act of 2001. The goals of GAMA are to improve statewide groundwater monitoring and increase the availability of groundwater quality information to the public. Major groundwater basins are a specific focus of the GAMA program.

GAMA collects data by testing untreated, raw water in different types of wells for naturally occurring and man-made chemicals. These test results are compiled with groundwater quality

data from several other agencies into a publicly accessible internet database, GeoTracker GAMA.

More information about the GAMA Program can be found on the State Water Board's website under the following link: http://www.waterboards.ca.gov/water_issues/programs/gama/.

Clean Water Team and Citizen Monitoring

The Clean Water Team (CWT) works to build watershed stewardship through citizen monitoring programs (citizen science and volunteer water quality monitoring) that collect water quality data to support efforts to reduce and prevent water pollution and restore beneficial uses. Citizen monitoring encompasses any monitoring activity of aquatic resources, aquatic habitat, and/or water quality that relies in whole or in part on participation by volunteers, students, or non-paid staff of monitoring programs. Throughout California, citizen monitoring programs evaluate the condition of streams, rivers, lakes, reservoirs, estuaries, coastal waters, wetlands, and groundwater wells. These efforts are of value both because they provide water quality data and build stewardship of local waterbodies.

The CWT fosters sustainable and robust citizen monitoring programs and directly assists local groups to develop or expand monitoring programs. The CWT typically assists groups through its core functions, which include:

- Technical assistance/quality assurance
- Training
- Loans of equipment
- Information management
- Outreach and communication
- Event support

Additional information on current citizen monitoring programs in the Los Angeles Region or establishing a citizen monitoring program can be obtained by contacting the Regional Water Board.

More information about the Clean Water Team can be found on the State Water Board's website under the following link:
http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_volunteer.shtml.

Total Maximum Daily Load Monitoring

Total Maximum Daily Loads (TMDLs) include implementation plans for achieving water quality standards. Essential to the implementation plan are the methods that will be used to monitor and track progress. Monitoring is needed for the following purposes:

- Track progress toward meeting water quality standards
- Evaluate compliance with interim and final TMDL allocations
- Assess the effectiveness of short- and long-term implementation actions
- Verify or refine assumptions, resolve uncertainties, and improve scientific understanding
- Identify potential needs for revision or update of regulatory actions

To achieve these objectives, most TMDLs include a monitoring program that consists of three components: (1) receiving water monitoring, (2) compliance assessment monitoring, and (3) special studies. The TMDL identifies the type of information necessary for a monitoring program and assigns responsibility for its development. Responsible parties then prepare a monitoring plan for approval by the Regional Water Board Executive Officer. As a result, there are numerous TMDL monitoring programs throughout the region. These programs range from plans developed by a single responsible party to address a single waterbody-pollutant combination, to plans developed by numerous stakeholders that address multiple pollutants on a watershed-wide basis.

More information about the TMDLs adopted in the Region can be found on the Regional Water Board's website under the following link: http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/.

Discharger Monitoring

Section 308(a) of the federal Clean Water Act and sections 122.41(h), (j)-(l), 122.44(i), and 122.48 of Title 40 of the Code of Federal Regulations require that all National Pollutant Discharge Elimination System (NPDES) permits specify monitoring and reporting requirements. California Water Code sections 13267 and 13383 further authorize the State and Regional Water Boards to establish monitoring and reporting requirements in permits and other orders. Dischargers regulated under Waste Discharge Requirements (WDRs) and NPDES permits are required to collect and analyze samples of influent, effluent, and/or receiving waters according

to prescribed schedules to determine discharger facility performance and discharger compliance with permit conditions. Dischargers subject to an enforcement order (e.g., Cleanup and Abatement Order, Cease and Desist Order, or Time Schedule Order) are also required to monitor and report to evaluate the effectiveness of treatment and remediation activities.

The Regional Water Board ensures that discharger monitoring of receiving waters is integrated with other receiving water monitoring programs to the extent possible. The Regional Water Board uses these data to determine compliance with requirements of permits and other orders, support enforcement actions, and perform water quality assessments.

Some monitoring data and discharger reports are available electronically on the State Water Board's website under the following links:
http://www.waterboards.ca.gov/water_issues/programs/ciwqs/
https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp

Municipal Separate Storm Sewer System Monitoring

Federal regulations applicable to municipal separate storm sewer systems (MS4s) also specify additional monitoring and reporting requirements (40 C.F.R. §§ 122.26, subds. (d)(2)(i)(F) & (d)(2)(iii)(D), 122.34(g), 122.42(c)).

All current MS4 permits in the Region require receiving water monitoring to assess trends, ensure the beneficial uses of the receiving waters are protected, and to determine whether a permittee is in compliance with applicable Receiving Water Limitations. Outfall monitoring is also required to measure the quality of MS4 discharges and determine whether a permittee(s) is in compliance with applicable effluent limitations. In addition to monitoring of pollutants, all MS4 permits require toxicity testing to determine if there is an aggregate toxic effect to aquatic organisms from the pollutants discharged from the MS4. MS4 permittees also participate in the Stormwater Monitoring Coalition (SMC) bioassessment program, which examines the organisms present at various sites to determine if the habitat is impaired by pollutants being discharged to the receiving waters.

The two most recently adopted MS4 permits in the Region (2012 Los Angeles County MS4 Permit and 2014 City of Long Beach MS4 Permit) feature an Integrated Monitoring Program (IMP) provision, which allows a permittee to leverage monitoring resources by selecting monitoring locations, parameters, and monitoring techniques that will satisfy multiple monitoring

requirements. In addition to the IMP, the permits feature a Coordinated Integrated Monitoring Program (CIMP) provision, which allows multiple permittees to coordinate their monitoring efforts to address one or more of the required monitoring elements (i.e., receiving water monitoring, outfall based monitoring, regional monitoring, and special studies) on a watershed or subwatershed basis.

Compliance Monitoring

In addition to self-monitoring by dischargers, pursuant to California Water Code sections 13267 and/or 13383, the Regional Water Board may make unannounced inspections and collect samples to determine compliance with the California Water Code, order requirements, and/or receiving water quality objectives, and to provide data for enforcement actions. In the event of violations, the Regional Water Board undertakes appropriate enforcement actions as described in Chapter 4. The scope of the Regional Water Board's compliance monitoring depends on the number and complexity of discharges, the discharger's history of compliance, and the Regional Water Board's resources.

Complaint Investigations

The Regional Water Board responds to a variety of incidents, including accidental and illegal discharges of oil from offshore pipelines, oily waste discharges, problems associated with permitted discharges, sanitary sewer overflows, discharges of sediment to streams, illegal activities in streams, and dumping in storm drains, rivers, and streams. Complaints and reports of such incidents, which are received from citizens as well as other agencies, often require on-site inspections during which the Regional Water Board collects samples and obtains other evidence (e.g., photographs) to investigate and document the extent of the problem. In addition, such documentation provides a basis for enforcement of corrective action and/or penalty assessments that are levied on responsible parties.

Inactive Programs

In the past, the following programs, independent Regional Water Board studies, and other studies were used extensively to evaluate beneficial use impacts in many California enclosed bays and estuaries. While the following programs are inactive, these efforts produced large

amounts of data that were notably used to identify a number of waterbodies as impaired on the CWA section 303(d) list of impaired waters.

Toxic Substances Monitoring and State Mussel Watch Programs

In the 1970s, the State Water Board launched two statewide programs that focused on monitoring bioaccumulation of chemicals in aquatic organisms. The Toxic Substances Monitoring Program (TSMP) was initiated in 1976 and measured chemicals in both fish and clams in lakes, rivers, streams, and estuaries. The State Mussel Watch Program (SMWP), initiated the following year, focused on chemicals in mussels in coastal waters. In 1998, the State Water Board started a third program, the Coastal Fish Contamination Program (CFCP), which assessed health risks to humans from eating sport fish and shellfish from coastal waters. During the course of the programs, the State Water Board accumulated a considerable amount of data that have been useful in assessing regional waters as they provided a direct measure of beneficial use impairment. Sampling under all three programs ended in 2003, as plans for a comprehensive statewide monitoring program took shape in the form of the Surface Water Ambient Monitoring Program (SWAMP). Data and reports from the Mussel Watch/Toxic Substances Monitoring Programs are available through the SWAMP page on the State Water Board's web site (http://www.waterboards.ca.gov/water_issues/programs/swamp/).

Bay Protection and Toxic Cleanup Program

In 1989, state legislation added sections 13390 through 13396 to the California Water Code, which established the Bay Protection and Toxic Cleanup Program (BPTCP). The BPTCP is a comprehensive effort by the State and Regional Water Boards to programmatically link standards development, environmental monitoring, water quality control planning, and site cleanup planning. Specifically, the program has four main goals:

- To provide protection of existing and future beneficial uses of bays and estuarine waters,
- To identify and characterize toxic hot spots,
- To plan for cleanup or other mitigating actions of toxic hot spots, and
- To develop effective strategies to control toxic pollutants, abate existing sources of toxicity, and prevent new sources of toxicity.

Among the Program's primary activities, each Regional Water Board developed a Consolidated Toxic Hot Spots Cleanup Plan. The Consolidated Cleanup Plan is divided into two volumes.

Volume I contains the consolidated list of known toxic hot spots proposed by the seven coastal regional water boards, direction to the Regional Water Boards on implementation of the plan, delisting procedures, waste discharge requirement guidance, strategies to prevent toxic hot spots, and findings on the funding needs. Volume II contains each of the Regional Toxic Hot Spots Cleanup Plans. The State Water Board adopted the Consolidated Cleanup Plan and approved the associated a functional equivalent document in 1999. Those were subsequently revised in 2004. The complete Amended Consolidated Hotspots Cleanup Plan, as well as BPTCP data and reports, are available through the State Water Board's web site (http://www.waterboards.ca.gov/water_issues/programs/bptcp/).

Lake Surveillance

The Lake Surveillance program stemmed from early requirements set forth in CWA section 314, which directed states to identify the trophic condition of all publicly owned freshwater lakes. As part of this program, the State Water Board inventoried about 5,000 freshwater lakes in California and initiated a program to evaluate the lakes' trophic status. For the 1994 Basin Plan update, the Regional Water Board contracted with the University of California at Riverside (Lund, 1993[1]) for a comprehensive water quality assessment of 24 lakes in the Region. Visual observations, aerial photographs, water quality data, and analyses of fish tissue were used in the assessments, and observations from this study were used to update the Basin Plan. While the lake surveillance program is now inactive, lake surveillance and monitoring is still conducted under SWAMP. Most notably, these efforts included a 2007-2008 survey of contaminants in fish conducted in 272 California lakes and reservoirs[2] (http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/lakes_study/lake_survey_yr2_full_rpt.pdf).

[1] Lund, L.J. et al. (1994). Evaluation of Water Quality for Selected Lakes in the Los Angeles Hydrological Basin. Prepared for the Los Angeles Regional Water Quality Control Board by the Department of Soil Science, University of California, Riverside, CA.

[2] Davis J.A. et al., (2010) Contaminants in Fish from California Lakes and Reservoirs, 2007-2008: Summary Report on a Two-Year Screening Survey. A Report of the Surface Water Ambient Monitoring Program (SWAMP). California State Water Resources Control Board, Sacramento, CA.

Multiagency Programs

In addition to the previously described programs that are implemented under the direct supervision of the State and Regional Water Boards, the following multiagency programs also collect water quality data that support the assessment of the health of regional waters.

Southern California Bight Regional Monitoring Program

The Southern California Bight (SCB), an open embayment in the coast between Point Conception (central California) and Cape Colnett (south of Ensenada, Mexico), is an important and unique ecological resource. It is a transitional area that is influenced by currents from cold, temperate ocean waters from the north, and warm, tropical waters from the south. In addition, the bight has a complex topography, with offshore islands, submarine canyons, ridges, and basins, which provide a variety of habitats. The mixing of currents and the diverse habitats in the SCB allow for the coexistence of a broad spectrum of species, including more than 500 species of fish and several thousand species of invertebrates. The SCB also is a major migration route, with marine bird and mammal populations ranking among the most diverse in all northern temperate waters.

Although many organizations conduct environmental monitoring to assess the potential effects of human activities on southern California's coastal ocean, only about 5 percent of the SCB is routinely monitored. The Southern California Bight Regional Monitoring Program is designed to conduct large-scale regional surveys and to provide an integrated assessment of environmental conditions within the SCB.

The Southern California Bight Regional Monitoring Program is a cooperative regional-scale monitoring program that has been conducted approximately every five years since 1994 and represents the joint efforts of more than 90 participating organizations, many of which discharge treated wastewater to the Bight. The Bight Regional Surveys provide regionally based information to assess cumulative impacts of contaminant inputs and to evaluate relative risk among different types of stressors. Prior to each regional survey, the participants develop work plans for each technical element (e.g., Contaminant Impact Assessment, Shoreline Microbiology, Water Quality, Marine Protected Areas, etc.) and determine the assessment questions to be answered and the level of monitoring effort required. Certain core elements

have been part of every bight survey (e.g., benthic infaunal community, sediment chemistry and toxicity, demersal fish and macroinvertebrate communities), while others may change. The Bight Regional Surveys are used to support the development of new technical tools and analysis that are best developed with regional data sets and participation by multiple organizations. The Bight Regional Surveys also have improved comparability of data collected by monitoring organizations in the SCB. Quality assurance and quality control have improved significantly following laboratory intercalibration exercises for chemistry, group training for field crews, and taxonomic resolution for biologists. A series of manuals containing standardized field, laboratory, and data management activities have been produced that increase continuity of data and data reporting among participants even after the regional monitoring surveys are completed.

More information about the Southern California Bight Regional Monitoring can be found at the following website:
http://www.sccwrp.org/researchareas/RegionalMonitoring/BightRegionalMonitoring.aspx.

Southern California Stormwater Monitoring Coalition

The Southern California Stormwater Monitoring Coalition (SMC) was formed in 2001 by cooperative agreement. The SMC member agencies include Phase I MS4 NPDES lead permittees, State and federal NPDES regulatory agencies, the California Department of Transportation, and the Southern California Coastal Water Research Project. The goal of the SMC is to develop the technical information necessary to better understand stormwater mechanisms and impacts, and then develop tools that will effectively and efficiently improve stormwater decision-making. The SMC develops and funds cooperative projects to improve knowledge of stormwater quality management.

The SMC designed a comprehensive monitoring program in 2008 to coordinate and leverage existing monitoring efforts to produce regional estimates of the condition of freshwater perennial streams, improve data comparability and quality assurance, and maximize data availability, while conserving monitoring expenditures. The monitoring program uses several indicators of water quality (benthic macroinvertebrates, benthic algae, riparian wetlands, water chemistry, water toxicity, and physical habitat) to assess the health of 15 coastal southern California watersheds from Ventura to the US-Mexico border. All data collected by the SMC are also used

by the Surface Water Ambient Monitoring Program (SWAMP) for the statewide Perennial Streams Assessment.

The SMC is managed by a Steering Committee of its members that meets quarterly to review new projects and assess progress of ongoing projects.

More information about the SMC can be found under the following link: http://www.socalsmc.org/.

Shoreline Bacteria Monitoring

Shoreline bacteria monitoring in the Los Angeles Region is conducted by various agencies including the County of Los Angeles Department of Public Health, the County of Ventura Environmental Health Agency, the City of Los Angeles Bureau of Sanitation, and the County Sanitation Districts of Los Angeles County. Samples are taken in ankle-to-knee high waters adjacent to public beaches, and then tested for bacterial indicators using USEPA approved methods.

Shoreline bacteria monitoring became more frequent following passage of California Assembly Bill 411 (1999), which amended sections 115880, 115885, and 115915 of the California Health and Safety Code. Implementing regulations mandate a weekly or greater sampling frequency for the summer months in waters adjacent to public beaches visited by more than 50,000 people annually or located adjacent to a storm drain that is flowing in the summer months. Additionally, the regulations require posting of beaches failing to meet standards for bacterial indicators and require closing or restricting usage of beaches affected by the release of untreated sewage (17 Cal. Code Regs. § 7961). Some agencies have also conducted summer sampling on a more frequent basis and during winter months due to TMDL or NPDES monitoring requirements. The environmental group Heal the Bay produces a Beach Report Card, which provides grades of “A” to “F” for over 500 beaches in Southern California.

Southern California Wetlands Recovery Project

The Southern California Wetlands Recovery Project (WRP) is a multi-agency group; one of its tasks is monitoring of the State’s wetlands. More generally, the WRP is a broad-based partnership, chaired by the Natural Resources Agency and supported by the State Coastal Conservancy that has public agencies, non-profits, scientists, and local communities working

cooperatively to acquire and restore rivers, streams, and wetlands in coastal southern California. The WRP's mission is implemented through a working agreement among State and federal resource directors and managers. Using a non-regulatory approach, the WRP partners work together to identify wetland acquisition and restoration priorities, prepare plans for these priority sites, pool funds to undertake these projects, implement priority plans, and oversee post-project maintenance and monitoring.

In 2002, the group began development of a template for a wetlands regional monitoring program for coastal southern California watersheds, some aspects of which have been implemented at a project level so far. This Integrated Wetlands Regional Assessment Program (IWRAP) is based on the USEPA's three-tiered approach to wetland assessment: Level 1 (habitat mapping and landscape assessment), Level 2 (rapid assessment, the origin of the California Rapid Assessment Method (CRAM) used by SWAMP and other monitoring programs), and Level 3 (intensive assessment). The goal of the IWRAP is to provide a cost-effective way to evaluate the status and trends in extent and condition of wetland and riparian areas. It also aids in assessing the WRP's progress toward achieving its regional wetland recovery objectives.

More information about the Wetland Recovery Project can be found under the following link: http://scwrp.org/.

Quality Assurance and Quality Control

Every project that collects monitoring data needs a Quality Assurance Management Program (QAMP) that addresses how quality assurance (QA) and quality control (QC) activities will be performed. The QAMP and QA Project Plans (QAPPs) developed for each monitoring project and/or program must be maintained, and reviewed to ensure the scientific validity of monitoring and laboratory activities. Quality assurance and quality control are distinct but related activities. QA involves the upfront planning and management of monitoring activities conducted prior to sampling and analysis to ensure that the appropriate types and quantities of data are collected. QC activities are implemented to evaluate the effectiveness of QA activities. QA/QC principles

and procedures are applicable to the generation of all monitoring data by all State and Regional Water Board programs and discharger monitoring programs.

In particular, the Surface Water Ambient Monitoring Program developed a Quality Assurance Program Plan (QAPrP) that serves as an umbrella document for use by each of SWAMP's contributing projects. It describes the program's quality system in terms of organizational structure, the functional responsibilities of management and staff, the lines of authority, and the interfaces for those planning, implementing, and assessing all activities conducted. Although developed for SWAMP, this QAPrP is applicable to all programs that collect ambient surface monitoring data and can be used by other programs or modified as necessary. Data collected by many of the State's programs must be submitted in a SWAMP comparable format, which means that the projects meet the requirements specified in the SWAMP QAPrP (specifically laboratory and field quality control, frequency of analysis, measurement quality objectives, and holding times) and related documents (such as standard operating procedures).

More information about quality assurance and quality control can be found under the following link: http://www.waterboards.ca.gov/water_issues/programs/quality_assurance/index.shtml.

Monitoring, Assessment, and Tracking Databases

Several online databases have been created that serve as repositories for a variety of monitoring programs. This section describes the main databases where data related to the programs described above can be found.

California Integrated Water Quality System

The California Integrated Water Quality System (CIWQS) is one of the Water Boards' primary regulatory information tracking systems. It is a web-based relational database for core regulatory data for use by the Water Boards, regulated community, stakeholders, and the general public. It allows the regulated community to submit certain types of information to the

Water Boards in compliance with adopted orders. CIWQS provides one central location for data from a variety of sources, for the purpose of storing, aggregating, analyzing, and disseminating information. A secondary role of CIWQS is to improve the efficiency of the Water Boards through the use of automated tools and automatic processing of voluminous data sets.

CIWQS is used by the State and Regional Water Boards to manage permits and other orders issued by the State and Regional Water Boards, track violations and inspections, and manage enforcement activities. The public interfaces with CIWQS through the public reports web page. This allows the public to see information on regulated facilities, and violation and enforcement data.

The general functions provided by CIWQS are:

- Permit and order tracking
- Violations and inspections tracking
- Complaint investigations relating to a permit
- Self-monitoring reports tracking
- Management of enforcement activities
- Report of regulatory information both internally and externally, including to the public
- Billing information tracking
- Incidents of sanitary sewer overflows tracking

The Water Board programs that utilize CIWQS include:

- NPDES (discharges to surface waters) – excluding general industrial and construction NPDES programs. MS4 NPDES permits are currently hosted by CIWQS, but will be transitioning to SMARTS (see below).
- WDR (discharges to land or non-federal waters), including recycled water
- Landfills
- Water Rights (eWRIMS)
- Irrigated Lands

CIWQS receives, manages, and provides data submitted by regulated entities for the following:

- Online reporting of sanitary sewer overflows (SSO)
- Online submittal of NPDES self-monitoring reports (eSMR)

- Online submittal of Recycled Water for Landscape Irrigation information (RWLI)

CIWQS enables users (Regional Water Board staff, stakeholders, and the public) to access this vast array of information by:

- Storing billing information
- Storing discharger contact information
- Enabling dischargers to submit their self-monitoring reports electronically (eSMR)
- Storing administrative and performance data about regulated facilities
- Providing information to assist the Water Boards monitor and prioritize workload
- Storing information that can be shared with the public and other stakeholders

More information about CIWQS and access to public reports is available on the State Water Board's website under the following link: http://www.waterboards.ca.gov/water_issues/programs/ciwqs/.

Stormwater Multiple Application and Report Tracking System

The Stormwater Multiple Application and Report Tracking System (SMARTS) is an online database currently used for the statewide general industrial and construction stormwater permits and the California Department of Transportation MS4 permit. Other MS4 permits are migrating from CIWQS to SMARTS. The database provides an online tool for dischargers to submit required information including: Notices of Intent, Notices of Termination, annual reports, and view application/renewal fee statements. The database is also used by State and Regional Water Board staff to process and track documents submitted by dischargers to implement the permits. Additionally, the SMARTS database is available to the public and provides general information on permittees and annual water quality data.

Access to the SMARTS database is available under the following link: https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp.

GeoTracker

GeoTracker is the Water Boards' data management system for managing sites that impact groundwater, especially those that require groundwater cleanup (Underground Storage Tanks, Department of Defense, Site Cleanup Program) as well as permitted facilities such as operating

USTs and land disposal sites. GeoTracker enables the State and Regional Water Boards to oversee and track project activities, compliance responses, milestones, land use controls, and risk to water quality. Tools help regulators manage case load, schedule and track when deliverables/reports are due from responsible parties, evaluate sites for risk, and allocate staff resources. GeoTracker provides most of the public record for a site to the public through its Document Manager Module, including regulatory communications with responsible parties, regulatory actions such as records of decision documents, and all data and documents submitted electronically by responsible parties.

Access to the GeoTracker database is available under the following link: http:/geotracker.waterboards.ca.gov/.

California Environmental Data Exchange Network

The California Environmental Data Exchange Network (CEDEN) is a statewide cooperative effort of various groups engaged with the water and environmental resources of the State of California. This network is open to federal, state, county, and private organizations interested in sharing data throughout the state. The purpose of CEDEN is to allow the exchange and integration of water and environmental data between groups and to make it accessible to the public.

Data stored within CEDEN encompass a wide variety of environmental monitoring programs, including SWAMP. These programs have been developed throughout California to answer a number of important questions and aid in developing policy regarding California's vast system of waterbodies. Data in CEDEN include field, sediment, and water column data collected from freshwater, estuarine, and marine environments

CEDEN uses a Regional Data Center concept, which means that a local contact for a designated region of California is available to assist data providers in getting their data into CEDEN. Currently, there are four Regional Data Centers within California: Central Coast Regional Data Center, Central Valley Regional Data Center, San Francisco Regional Data Center, and Southern California Regional Data Center. Each Regional Data Center provides participants with tools and instructions for getting their data into CEDEN.

Access to the CEDEN database is available under the following link: http:/www.ceden.org/.

GeoTracker GAMA

GeoTracker GAMA is the data management system envisioned by the Groundwater Quality Monitoring Act of 2001 (Assembly Bill 599 (2001), Water Code section 10781). The system integrates and geographically displays groundwater quality data from multiple sources through public and secure portals. It has analytical tools and reporting features to assess groundwater quality and identify potential groundwater issues in relationship to roads, satellite imagery, and terrain using Google maps filtered by county, legislative district, groundwater basin, etc. There are a number of reports that allow users to see results above chemical contaminant thresholds and water level data are also displayed. These data can be exported for use in other programs.

Access to the GeoTracker GAMA database is available under the following link: http://geotracker.waterboards.ca.gov/gama/.

Electronic Water Rights Information Management System

The Electronic Water Rights Information Management System (eWRIMS) is a database developed by the State Water Board to track information on water rights in California. eWRIMS contains information on Statements of Water Diversion and Use that have been filed by water diverters, as well as registrations, certificates, and water right permits and licenses that have been issued by the State Water Board and its predecessors.

More information about eWRIMS is available on the State Water Board's website under the following link: http://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/.

EcoAtlas

The California EcoAtlas provides access to information about the quantity and quality of California wetlands. The web based Atlas aggregates data from a variety of data sources to create maps and tools that can be used to create a complete picture of aquatic resources in the landscape by integrating stream and wetland maps, restoration information, and monitoring results with land use, transportation, and other information important to the State's wetlands.

Access to EcoAtlas is available under the following link: http://www.ecoatlas.org/.

Table 6-1: Databases used as repositories for the data collected from various monitoring programs.

Database	Monitoring/Tracking/Reporting Program
CIWQS	Discharger Monitoring
	Compliance Monitoring
	Complaint investigations**
SMARTS	General industrial and construction stormwater permits reporting and tracking
	Caltrans MS4 permit reporting and tracking
	Other MS4 permit reporting and tracking (coming soon)
GeoTracker	Groundwater cleanup activity tracking (USTs, Dept. of Defense, Site Cleanup Program)
	Land disposal permitting tracking
CEDEN	SWAMP
	Southern California Bight Regional Monitoring Project
	SMC
	Clean Water Team and Citizen Monitoring*
GeoTracker GAMA	GAMA
eWRIMS	Water rights tracking
EcoAtlas	Integrated Wetlands monitoring and tracking (IWRAP)
My Water Quality web portal***	Shoreline Bacteria Monitoring

*Only some of the citizen monitoring data are available through CEDEN.
**Complaint investigation data are only put into CIWQS if the complaint relates to a permit.
*** See California Water Quality Monitoring Council section.

Data Use

The data collected through the programs described previously is used by regulatory and non-regulatory entities to assess the quality of the Region's waters, make management decisions, or recommend further monitoring. This section describes specific State programs that use this information.

Biennial Water Quality Assessment Report and Impaired Waters List

Clean Water Act (CWA) section 305(b) requires each state to assess the status of water quality in the state and section 303(d) requires each state to provide a list of impaired water bodies to the USEPA every two years. These required reports are developed and approved together as an Integrated Report. While the State of California reports to USEPA every two years, individual regions may update regional assessments less frequently.

After the Regional Water Board updates water quality assessments and approves an Integrated Report, the report is submitted to the State Water Board for approval. The Los Angeles Region Integrated Report is compiled with other Regional Water Board reports into a statewide integrated report referred to as the "California 303(d)/305(b) Integrated Report." The statewide Integrated Report, including the list of all the water quality limited segments, requires final approval by USEPA. The USEPA then compiles these assessments into a biennial "National Water Quality Inventory Report" to Congress.

Water quality data to be assessed comes from many sources, including: data collected pursuant to NPDES permits (including MS4 permits); data collected through SWAMP; Southern California Bight Regional Monitoring data; and data submitted by stakeholders. Data must be of sufficient data quality. The integrated reports and supporting documentation are available on the State Water Board's website.

The Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Listing Policy) described in Chapter 5 establishes a standardized approach for developing California's CWA section 303(d) list. The Listing Policy also establishes requirements for data quality, data quantity, and administration of the listing process. The Listing Policy specifies the

frequency of exceedance of applicable water quality objectives that is necessary to make a determination that the water is impaired.

For water quality limited segments included on the CWA section 303(d) list, the State is required to develop a Total Maximum Daily Load (TMDL) or take other action to address the impairment.

The Integrated Report and CWA section 303(d) list can be found on the Regional Water Board's website under the following link: http://www.waterboards.ca.gov/losangeles/water_issues/programs/303d_list.shtml.

State of the Watershed Reports

State of the Watershed Reports are periodically prepared by Regional Water Board staff to provide summaries of available data and information for each watershed from multiple Water Board programs as well as data and information from non-Water Board databases and documents. Frequently utilized are data and information about water and sediment quality (from CEDEN), and permitting activities and compliance issues (from CIWQS and SMARTS). Depending on the watershed, groundwater quality may be a major issue and data from GAMA will be utilized. And, in some watersheds, important wetlands occur with many restoration and enhancement activities being undertaken through the Wetlands Recovery Project that are essential to document in a watershed context. Much of this information is available to display visually using mapping tools in order to understand the larger picture of what is going on in a watershed.

State of the Watershed Reports can be found on the Regional Water Board's website under the following link: http://www.waterboards.ca.gov/losangeles/water_issues/programs/regional_program/watershed/index.shtml.

SWAMP Water Quality Assessment Reports

Through its monitoring programs and the many projects it is part of, the Surface Water Ambient Monitoring Program (SWAMP) collects numerous data that are aggregated in a variety of reports and documents. These are grouped below according to (1) regionwide and watershed specific reports, (2) statewide topical reports, and (3) special studies. Some of the key reports and documents available in each category include the following:

- **Regional reports and documents for the Los Angeles area**

    - Yearly Regional Monitoring Plans
    - Toxicity in California Waters - Los Angeles Region (2012)
    - Water Quality in the Dominguez Channel and Los Angeles Long Beach Harbor Watershed Management Area (2007)
    - Toxicity Testing and Toxicity Identification Evaluation Final Report (April 2007)
    - Annual Report on Monitoring Activities for 2005 - San Gabriel River Regional Monitoring Program (2007)
    - Water Quality in the Calleguas Creek and Santa Clara River Watersheds - Under the Surface Water Ambient Monitoring Program, FY 2000-2001 (2005)
    - Water Quality in the Santa Monica Bay Watershed - Under the Surface Water Ambient Monitoring Program, FY 2001-2002 (2005)
    - Assessing the Health of Southern California Streams (fact sheet)

- **Topical Reports**

    - Bioaccumulation Monitoring Program

      The goal of the Bioaccumulation Monitoring Program is to address the "fishable" beneficial use through surveys of contaminant concentrations in fish tissue throughout waters of the State. Sampling for the Bioaccumulation Monitoring Program occurs on a five-year cycle, rotating between lakes and reservoirs, coastal waters, and rivers and streams. Publications include:

        - Lakes Study - Bioaccumulation in Sport Fish reports
        - Coastal Study - Bioaccumulation in Sport Fish reports
        - Rivers & Streams - Bioaccumulation in Sport Fish reports
        - Bioaccumulation of Pollutants in California Waters: A Review of Historic Data and Assessment of Impacts on Fishing and Aquatic Life (2007)

    - Bioassessment Monitoring Program

        - *Perennial Streams Assessment (PSA)*: The PSA is an ongoing, long-term statewide survey of the ecological condition of wadeable perennial streams and rivers. The program collects samples for biological indicators (benthic macroinvertebrates, algae) and chemical constituents (nutrients, major ions, etc.), and conducts habitat assessments (both for in-stream and riparian corridor conditions). The PSA has produced numerous reports, including:

- Ecological Condition Assessments of California's Perennial Wadeable Streams (2000 through 2007) (2011)
- Water Quality Assessment Report of the Condition of California Coastal Waters and Wadeable Streams (Clean Water Act, Section 305(b) Report) (2006)
- Assessing the Health of Southern California Streams (Fact sheet)

- *Freshwater Algae Reports*
  - Condition of California Perennial, Wadeable Streams Based on Algal Indicators (2013)

o Streams Pollution Trends (SPoT) Monitoring Program

The SPoT project, funded primarily by SWAMP, monitors trends in sediment toxicity and sediment contaminant concentrations in selected large rivers throughout California, and relates contaminant concentrations to watershed land uses. Reports include:

- Initial Trends in Chemical Contamination, Toxicity and Land Use in California Watersheds - Field Years 2009-2010 (2013)
- Statewide Perspective on Chemicals of Concern and Connections between Stream Water Quality and Land Use - Field Year 2008 (2012)
- SWAMP Statewide Stream Contaminant Trend Monitoring at Integrator Sites (2008)

▪ **Special Studies**

o Coastal Studies

- Characterization of the rocky intertidal ecological communities associated with southern California Areas of Special Biological Significance (2012)
- Assessing water quality in Marine Protected Areas from Southern California, USA (2011)
- Status of California's Marine Water Quality Protected Areas (2010)
- Watershed-scale Evaluation of Agricultural BMP Effectiveness in Protecting Critical Coastal Habitats (2010)

o Constituents of Emerging Concern

- Monitoring Strategies for Chemicals of Emerging Concern (CECs) in California Ecosystems (2012)

o Healthy Streams Partnership

- California Integrated Assessment of Watershed Health: A Report on the Status and Vulnerability of Watershed Health in California, 2013.

o Specific Stressors

- Co-occurrence of Pesticides and Aquatic Species (2012)
- Bacteria Monitoring Inventory of California's Freshwater Beaches (2008)
- Screening California Surface Waters for Estrogenic Endocrine Disrupting Chemicals (EEDC) with a Juvenile Rainbow Trout Liver Vitellogenin mRNA Procedure (2006)

- Toxicity Studies
  - Toxicity in California Waters (2011)
  - Statewide Investigation of the Role of Pyrethroid Pesticide in Sediment Toxicity in California's Urban Waterways (2008)
  - Toxicity Testing and Toxicity Identification Evaluation Final Report (2007)

- Wetland Studies
  - The Status of Perennial Estuarine Wetlands in the State of California (2008)

The SWAMP Reports are available online on the State Water Board's SWAMP website (http://www.waterboards.ca.gov/water_issues/programs/swamp/).

California Water Quality Monitoring Council

The California Water Quality Monitoring Council was created as a result of California Senate Bill 1070 (Kehoe, 2006), which required the California Environmental Protection Agency (Cal/EPA) and the California Natural Resources Agency to enter into a Memorandum of Understanding (MOU). The legislation and MOU task the Monitoring Council with developing recommendations for a comprehensive monitoring program strategy to improve the efficiency and effectiveness of water quality and ecosystem monitoring and assessment activities in California through coordination among organizations both inside and outside state government. While the Monitoring Council may recommend new monitoring or management initiatives, it builds on existing efforts to the greatest extent possible.

The legislation directed the Monitoring Council to be administered by the State Water Board. Actions of the Monitoring Council are advisory to the Secretaries of Cal/EPA and the Natural Resources Agency, who can implement those recommendations through their departments, boards, commissions, and conservancies. The Monitoring Council's authority consists of its ability to set examples, offer persuasive recommendations, and encourage member agencies and organizations to participate.

Additionally, both the legislation and MOU call for monitoring and assessment information to be made available to decision makers and the public via the internet. This is realized through a web portal (My Water Quality web portal: http://www.mywaterquality.ca.gov/), which is organized around themes framed as easily understood questions that deliver user-oriented access to California's water quality monitoring and assessment information.

Theme-specific workgroups are tasked with developing and enhancing the web portals and their underlying monitoring and assessment programs. Each workgroup is empowered by the Monitoring Council to address a specific theme in water quality or related ecosystem health, approaching problems from the users' perspective to make data comparable and accessible to multiple audiences. A Monitoring Council workgroup is composed of experts representing a variety of agencies and entities, both within and outside state government, who are involved or have expertise in water quality and/or associated ecosystem monitoring and assessment that relates to a specific theme (e.g., the safety of eating fish from our waters). Workgroups to date are listed below.

- Beach Water Quality Workgroups
- Bioaccumulation Oversight Group
- California Estuary Monitoring Workgroup
- California Wetland Monitoring Workgroup
- California Water Quality Monitoring Collaboration Network
- Data Management Workgroup
- Groundwater Ambient Monitoring and Assessment (GAMA) Program
- Healthy Streams Partnership
- Multi-Agency Rocky Intertidal Network (MARINe)
- Safe Drinking Water Workgroup
- Safe-to-Swim Workgroup

The portals include interactive maps and monitoring data that focus on these questions from a variety of perspectives. Data that are displayed or interpreted in the portals originate from a variety of databases led by the California Environmental Data Exchange Network (CEDEN), which itself accepts data from a large number of monitoring programs including the Surface Water Ambient Monitoring Program.

Contaminated Sediments Task Force / Dredge Material Management Team

The Los Angeles Contaminated Sediments Task Force (CSTF) was formed in 1997 to create a long-term strategy for managing contaminated sediments within coastal waters of Los Angeles County, as authorized by California Senate Bill 673 (1997) and Water Code section 13396.9. Since 1997, the CSTF has provided a forum for discussion and a process whereby dredging proponents, State and federal regulators, and representatives of environmental organizations can work together to minimize potential adverse environmental impacts associated with the dredging and disposal of contaminated sediments. The Regional Water Board is an important member of the CSTF due to the Board's regulatory oversight of dredging projects.

The CSTF Long-Term Management Strategy (2005) includes recommendations on regional coordination of sediment management efforts, a process for evaluating contaminated sediment dredging projects, a proposed long-term goal of beneficially reusing all contaminated sediments, and a commitment to continue working on future treatment and reuse issues. The CSTF Strategy seeks to ensure protection of aquatic resources from the discharge of contaminated dredged materials into the water, as well as providing the dredging community with greater certainty and predictability about the results of the regulatory decision-making process. The CSTF has procedures for joint project review by State and federal regulatory agencies, tools for project development and evaluation, and recommended policies for responsible agencies to implement during review of proposed dredging projects.

More information about the CSTF is available on the Regional Water Board's website under the following link:
http://www.waterboards.ca.gov/losangeles/water_issues/programs/contaminated_sediments.shtml.

More recently, in 2010, the United States Army Corps of Engineers established the Dredged Material Management Team (DMMT) for the Southern California area (counties of San Diego, Orange, Los Angeles, Ventura, Santa Barbara, and parts of San Luis Obispo) to facilitate the coordinated review of dredging projects and dredging policy issues. This interagency team meets monthly to discuss technical and policy issues associated with upcoming dredging projects. The core member agencies are the United States Army Corps of Engineers, USEPA, the California Coastal Commission, and the four Regional Water Boards in Southern California

(Central Coast, Los Angeles, Santa Ana, and San Diego). Other regulatory agencies are invited to participate in DMMT meetings (including the California State Lands Commission, California Department of Fish and Wildlife, United States Fish and Wildlife Service, and National Oceanic and Atmospheric Administration (NOAA) Fisheries). For dredging projects in Los Angeles County, DMMT meetings are conducted within the framework of the CSTF guidelines, allowing participation by environmental groups and other interested stakeholders.