CHAPTER 8

Other Monitoring Activities

Sacramento River Watershed Program

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Introduction

The Sacramento River Watershed Program (SRWP) is a stakeholder-driven effort to restore and protect beneficial uses and maintain the economic and social vitality of the Sacramento River Basin. Stakeholders include representatives of local municipalities and districts, local watershed conservancies, state and federal agencies, water districts, agriculture, mining, forest products, environmental organizations, landowners, universities, and technical consultants. The program was initiated in 1996 by the Sacramento Regional County Sanitation District (SRCSD), the Central Valley Regional Water Quality Control Board, and EPA Region IX through federal funding derived from the Sacramento River Toxic Pollutant Control Program (SRTPCP). The SRCSD has been awarded $4.4 million in four separate annual authorizations to perform the tasks included in the SRTPCP workplan. Tasks include supporting the SRWP and implementing a water quality monitoring program in the Sacramento River Basin. Significant public and private support of the SRWP has been provided through in-kind services and participation in subcommittee activities of the program.

Water Quality Monitoring Program

A major emphasis of the SRWP and SRTPCP to date has been on the development and implementation of an integrated water quality monitoring program for the Sacramento River Basin. The program was developed through a subcommittee process which included the following key steps: developing goals and objectives, identifying and understanding ongoing monitoring programs, identifying water quality constituents of concern to various stakeholder groups, developing and evaluating various straw proposals for monitoring, selecting a preferred monitoring plan which capitalized on existing monitoring efforts, selecting parties to perform sampling and analysis tasks, and implementing the monitoring plan. The constituents monitored under the first-year SRWP monitoring program include:

- water column and sediment toxicity
- bioaccumulative substances in fish tissue (mercury, PCBs, organochlorine pesticides)
- pathogens (Cryptosporidium, Giardia, coliform bacteria)
- trace metals (mercury, cadmium, copper, chromium, lead, nickel, zinc, arsenic)
- organic carbon (total and dissolved)
- biological indicators (benthic invertebrates, attached algae, habitat)
- conventional parameters (e.g., pH, temperature, dissolved oxygen, hardness, total suspended solids, electrical conductivity)

The first-year monitoring effort is comprised of regular monitoring events (monthly, semi-annual, and/or annual) at over sixty sites on the Sacramento main stem, major tributaries, and selected smaller tributaries. The long-term goal of the SRWP monitoring program is to develop a coordinated, cost-efficient, long-term program to identify the causes, effects, and extent of water quality constituents that affect beneficial uses, and to develop a baseline for the assessment of the success of control strategies and improvement projects. Information from the monitoring program will be used to improve the understanding of conditions in the watershed. The goal for the first-year monitoring effort is to determine conditions in the main stem of the Sacramento River to assess the degree to which beneficial uses are attained or impaired.

Annual reports will be produced at the end of each year of SRWP monitoring. The first-year monitoring effort will be completed in June 1999. An annual report for the first year will be completed in December 1999. Data from the program

will be placed in a publicly accessible electronic database managed by the Department of Water Resources. Data will be available over the internet through a SRWP homepage with links to the Interagency Ecological Program.

Public Outreach and Education

Another significant component of the ongoing SRWP is outreach and education to build support for watershed management activities, establish links between stakeholders, and promote knowledge and awareness of the watershed. The Public Outreach and Education Subcommittee organizes general stakeholder meetings and educational workshops to achieve these goals. The Subcommittee oversees production of a quarterly newsletter for the SRWP and monthly calendar of events for the SRWP and other watershed activities.

Coordination with other Programs

The Sacramento River Watershed Program has been developed in coordination with a number of ongoing monitoring efforts. These include the Sacramento CMP Ambient Monitoring Program, the U.S. Geological Survey National Water Quality Assessment (USGS NWQA) project for the Sacramento River, Regional Water Quality Control Board toxicity testing in the Sacramento Valley, the Department of Water Resources Northern District tributary monitoring program, and the Department of Pesticide Regulation Dormant Spray Monitoring Program. Coordination has included adopting compatible sampling and analytical methods, coordinating sample collections, sharing sampling duties, restructuring program elements, and agreeing to share data.

Results of SRWP Monitoring

Results to date from SRWP sponsored monitoring is limited to fish tissue and water column toxicity data. Each of these program elements was started as a pilot study ahead of the first-year monitoring effort, which began in June 1998.

Fish tissue results are from a sampling effort performed in September 1997. The work was performed by a team comprised of staff from the San Francisco Estuary Institute, Department of Fish and Game, and Long Marine Laboratory at the University of California, Santa Cruz.

Species tested included white catfish taken from seven sites in the lower watershed and rainbow trout taken from five sites in the upper watershed. Parameters analyzed include mercury, PCBs, and chlorinated pesticides. The purpose of fish tissue monitoring is to determine whether levels of these chemicals are of concern to consumers of fish, including both humans and upper trophic level fish and wildlife. Results of the 1997 fish tissue monitoring effort are summarized in Table 8.1. These results indicate that mercury levels in catfish are of potential concern, while mercury levels in rainbow trout are not of concern. Levels of PCBs are of potential concern at some locations.

Water column toxicity testing for the SRWP started in 1996. The purpose of this testing effort was to further characterize spatial and temporal distribution of ambient toxicity in the main stem and major tributaries of the Sacramento River, and to determine the toxicants responsible for observed toxicity. Three-species freshwater testing protocols from the U.S. EPA were used in the performance of this work. These bioassays measure survival, growth, and/or reproduction of sensitive forms of the following test species: *Ceriodaphnia dubia* (water flea—primary consumer); *Selanastrum capricornutum* (algae—primary producer); and *Pimephales promelas* (fathead minnow—secondary consumer).

Samples were taken from thirteen sites in the Sacramento River basin, ranging from the Sacramento River at Freeport (near Sacramento) to the upper Sacramento River (above Lake Shasta). Samples were collected approximately monthly at most sites. Results of testing for the period August 1996 through July 1997 indicated the following:

- Fathead minnow impairment was observed at most sites, with the exception of the Colusa Basin Drain and Sacramento Slough. Impairment included acute and

Table 8.1. Fish tissue mercury and organochlorine results for the 1997 SRWP. Concentrations are wet weight.

Species/Stations	# Fish in composite	Mean length (mm)	% Lipid	Mercury (ppm)	Sum of PCBs (ppb)	Sum of Aroclors (ppb)	Sum of Chlordanes (ppb)	Sum of DDTs (ppb)	Dieldrin (ppb)
Rainbow Trout									
Pit River above Shasta	1	332		0.047	.	.	.	.	.
McCloud River above Shasta	5	274		0.053	.	.	.	.	.
Sacramento River above Shasta	5	321		0.064	.	.	.	.	.
Sacramento River below Keswick	5	366	3.99	0.032	24	27	3	26	0.6
Sacramento River @ Bend Bridge near Red Bluff	5	313	2.54	0.031	7	ND	2	3	ND
White Catfish									
Sacramento Slough	5	274		0.438	.	.	.	.	.
Colusa Basin Drain	5	288		0.304	.	.	.	.	.
Feather River near Nicolaus	5	264	0.49	0.391	10	ND	4	36	1.0
Sacramento River @ Alamar/Vet. Bridge	5	249	0.84	0.553	11	15	3	43	1.1
American River @ Discovery Park	4	274	0.49	0.470	59	81	8	62	0.7
Sacramento River @ RM 44	5	256	1.55	0.390	33	47	9	68	2.4
Sacramento River @ RM 44 Duplicate	5	258	0.92	0.285	9	13	3	33	1.0
Cache Slough near Ryer Island Ferry	5	271		0.415	.	.	.	.	.
Cache Slough near Ryer Island Ferry Duplicate	5	279		0.552	.	.	.	.	.

chronic mortality. Most frequent mortalities were seen in higher quality, softer waters (McCloud River, Sacramento River at Red Bluff). Toxicity identification evaluation (TIE) work has indicated that a pathogen may be responsible for the observed toxicity.

- Reduced algae growth was observed at only two sites (Pit River and Arcade Creek). TIE work on Arcade Creek samples indicated that the toxicant was a non-polar organic chemical.
- *Ceriodaphnia* mortality was observed at Arcade Creek and at the Upper Sacramento River above Lake Shasta. Impaired *Ceriodaphnia* reproduction was observed at all sites. TIE work indicated that much of the observed *Ceriodaphnia* toxicity was linked to diazinon and/or chlorpyrifos. Toxicity identification evaluation work in the Upper Sacramento River linked observed toxicity to nickel.

Future Direction

The SRWP is continuing to move forward in the areas described above and is also projecting activity in the following areas. These activities are being developed and implemented by the SRWP Subcommittees, with review and approval by the general stakeholder group.

- Monitoring Program: A plan for the second-year monitoring plan is in place. The plan closely resembles the first-year plan, with the following changes: addition of selected sites no longer covered by the USGS NWQA program, expansion of the fish

tissue monitoring effort, expansion of tributary monitoring, and addition of chemical analyses to a subset of the toxicity testing samples. Efforts are underway by the Monitoring Subcommittee to develop a plan for the third-year monitoring effort. The Subcommittee will consider results from first-year monitoring before finalizing the third-year plan.

- Public Outreach and Education: The Public Outreach and Education Subcommittee has formed a communications workgroup comprised of representatives from the following major stakeholder groups: California Cattlemen's Association, Friends of the River, California Rice Industry, Forest Products Association, Western Crop Protection Association, and several others. The workgroup is developing a public information effort to promote stewardship in the watershed, by both industries and private citizens.
- Site-Specific Objectives: Examine possibility of developing site-specific objectives for selected water quality parameters in the Sacramento River Basin. Such enforceable objectives would be tailored to local or regional conditions and would be scientifically defensible. The objectives setting process would comply with federal and state laws and regulations.
- Water Quality Management: The Toxics Subcommittee is considering candidate constituents for selection for pilot efforts in water quality management. The goal is to employ an interest-based, stakeholder-driven approach in the development and implementation of measures to address the selected constituents and to improve environmental conditions and beneficial use attainment in the watershed.
- SRWP Institutional Structure: SRWP stakeholders will be evaluating alternatives for the long-term structure of the program. The goal is to select and implement a long-term structure for management, administration, and funding which meets the interests of stakeholders. Numerous options will be examined, drawing from experiences in other similar groups across the country.

Sacramento Coordinated Water Quality Monitoring Program

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Introduction

The Sacramento Coordinated Water Quality Monitoring Program (CMP) is a cooperative voluntary program initiated and implemented by the Sacramento Regional County Sanitation District (SRCSD), the City of Sacramento (City), and the County of Sacramento Water Resources Division (County). These three public agencies are responsible for the management of all municipal wastewater and most stormwater in the Sacramento urban area within Sacramento County. The CMP was established in July 1991 through a Memorandum of Understanding between these entities.

The fundamental purpose of the CMP is to develop high-quality data to aid in the development and implementation of water quality policy and regulations in the Sacramento area.

The Ambient Monitoring Program (Ambient Program) is the primary water quality monitoring element of the CMP. Sampling under the Ambient Program began in December 1992 and continues at present on a monthly basis. Additionally, episodic storm events are sampled in coordination with the Sacramento Stormwater Program.

Five river sites are now monitored under the Ambient Program, three on the Sacramento River (at Veteran's Bridge near Alamar Marina, at Freeport Bridge, and at River Mile 44 downstream of the Sacramento metropolitan area) and two on the American River (at Nimbus Dam and at Discovery Park near the confluence with the Sacramento River; see Figure 8.1). The monitoring sites have been selected to provide water quality data upstream and downstream of the influence of urban inputs from the Sacramento community.

The historic emphasis of the Ambient Program has been on trace metals monitoring—total recoverable and dissolved metals—using clean techniques and low detection limits. Other parameters monitored under the Ambient Program include organophosphate pesticides (diazinon, chlorpyrifos), total and fecal coliform bacteria, fecal streptococci, total organic carbon, dissolved organic carbon, pH, temperature, dissolved oxygen, hardness, total suspended solids, and electrical conductivity.

Annual reports have been produced each year of the CMP. The latest (1997) Annual Report for the Sacramento CMP presented the results of Ambient Program monitoring completed through December 1997. The next Annual Report will cover data collected through December 1998 and is scheduled for release in spring 1999.

Coordination With Sacramento River Watershed Program

The Sacramento CMP and the Sacramento River Watershed Program (SRWP) are being coordinated at several levels. The SRWP monitoring program (which started as a complete program in June 1998) has been developed in coordination with a number of ongoing monitoring efforts, including the CMP Ambient Monitoring Program. The CMP sampling team will take samples for analysis by the SRWP at four of the five CMP sampling sites. The analytical results produced by the CMP will be combined with other data collected under the SRWP.

The CMP and SRWP have cooperated in the joint sponsorship of the State of the (Sacramento River) Watershed 1997 conference held in October 1997 in Sacramento. This second annual conference was highlighted by awards given to local organizations which distinguished themselves in watershed stewardship. The CMP is a contributor to the November 1998 State of the (Sacramento) River conference which is being sponsored by the Sacramento River Preservation Trust.

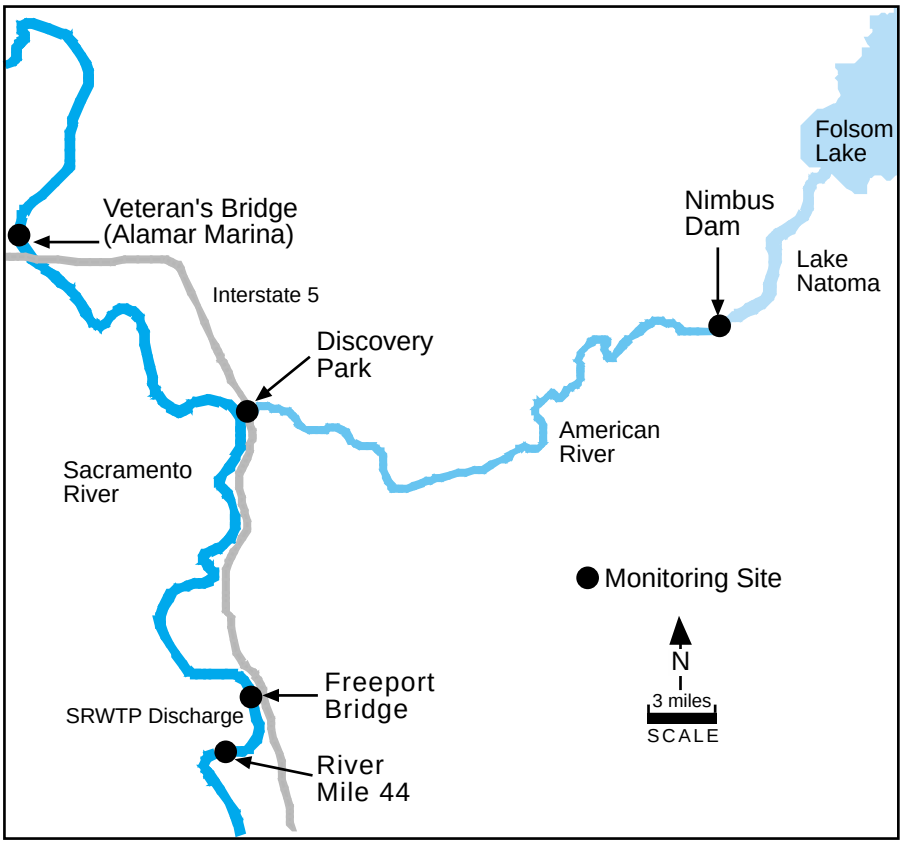

Figure 8.1. Ambient Program monitoring stations.

Results of CMP Monitoring

Based on Ambient Program results for the period December 1992 to December 1997, ambient water quality characteristics of the American and Sacramento rivers is summarized as follows:

- With few exceptions, ambient water quality characteristics monitored by the Ambient Program meet applicable regulatory standards in both rivers.
- Although observed mercury concentrations in each river meet regulatory criteria proposed in the August 1997 California Toxics Rule, mercury has been identified as a pollutant of concern due to levels in some species of fish.
- Sacramento River water quality characteristics are significantly influenced by flow volumes, with pollutant concentrations decreasing with decreasing flow. This influence is complex, because flows are influenced by regulated dam releases and precipitation throughout the watershed. The effect of flows on quality is largely consistent with the resuspension and transport of sediment-associated metals and other constituents.
- Water quality of the American River near Sacramento is not greatly influenced by changes in flow.
- Statistically significant differences between upstream and downstream locations were observed for some measured water quality parameters. In all cases these changes were small as a percentage of observed concentrations. With the exception of coliform bacteria levels, the differences had no significant impact on compliance with regulatory standards.

Future Direction

The CMP Steering Committee annually reviews the Program and considers appropriate adjustments. At its August 1998 meeting, the Steering Committee decided to add several trace organic constituents to the Ambient Program. The trace organics to be monitored include diazinon, chlorpyrifos, carbofuran, malathion, methyl parathion, polynuclear aromatic hydrocarbons (PAHs), pentachlorophenol, and 2,4,6-trichlorophenol. The basis for selection of these constituents is listing of upstream waters on the 1998 303(d) impaired waters list, identification as a constituent of concern by the Sacramento Stormwater Program, or identification as a constituent of potential concern by Sacramento Regional County Sanitation District. Specialized laboratories capable of producing data at pre-established low detection levels will be contracted to perform this monitoring.

Public outreach and education efforts will continue at the local level. The CMP monitoring effort will continue to be coordinated closely with the activities of the Sacramento River Watershed Program.