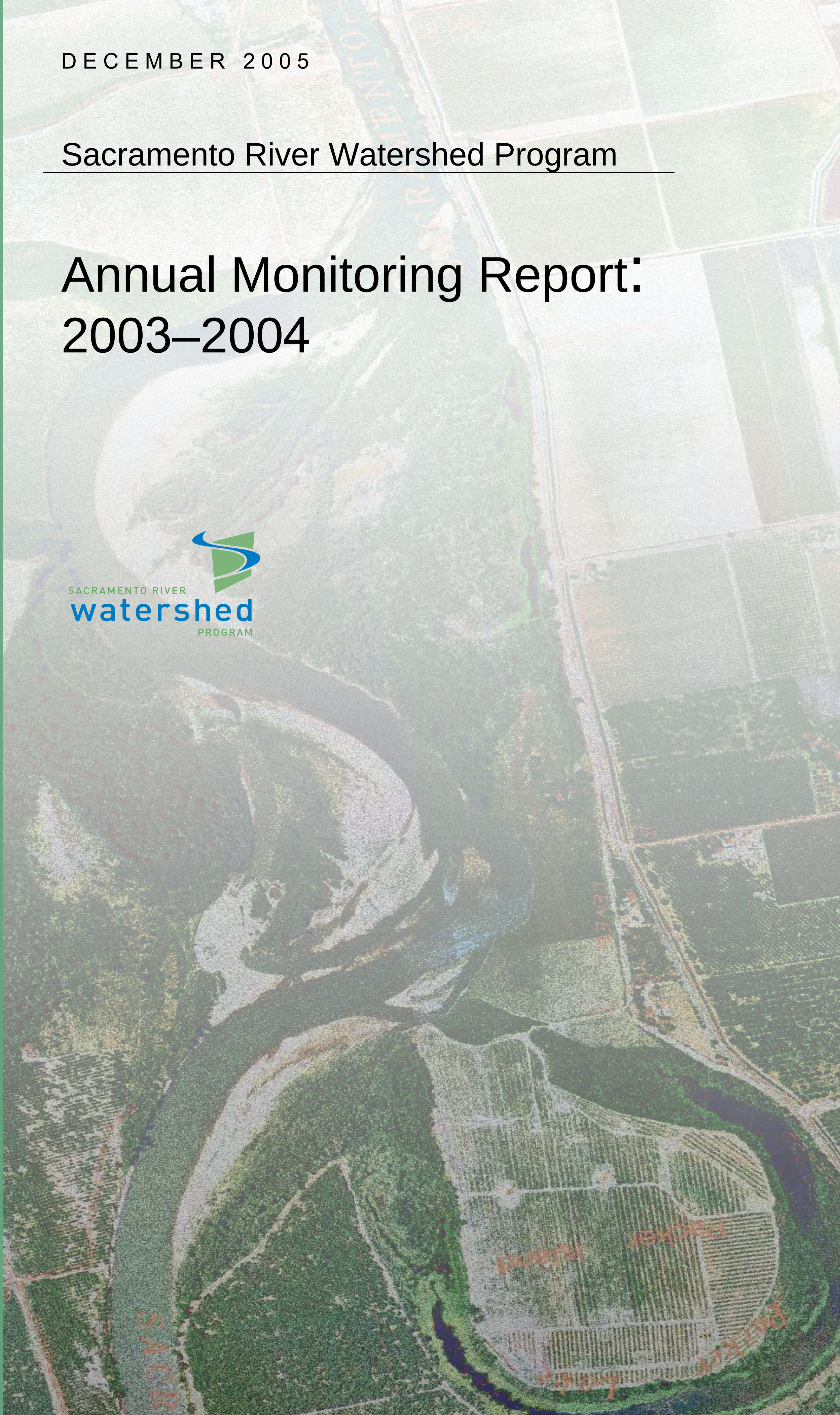
DECEMBER 2005

Sacramento River Watershed Program

Annual Monitoring Report: 2003–2004



Sacramento River Watershed Program

REPORT REVIEW PROCESS

The review process and schedule for the 2003-2004 Annual Monitoring Report of the Sacramento River Watershed Program (SRWP) is outlined in the table below. This process includes internal reviews by the SRWP Monitoring, Toxics, and Public Outreach and Education Subcommittees, peer review by outside experts, and review by all SRWP stakeholders and other interested public. The Final Report is also available from the SRWP website,

http://www.sacriver.org.

Comments received for the Public Draft Annual Monitoring Report are responded to in Appendix E of this document.

SRWP Annual Monitoring Report (AMR) Review and Submittal Schedule

Date	Review Milestones
6-10-2005	AMR Public Draft released for stakeholder and peer review
7-8-2005	Comments on Public Draft due from all reviewers
7-28-2005	Submit Final AMR to SRCSD, Monitoring Subcommittee, and USEPA
after final approval	Post Final AMR to SRWP website

ACKNOWLEDGEMENTS

The Sacramento River Watershed Program Monitoring Program and the Annual Monitoring Report are products of the efforts of many people. A great deal of effort has been expended in field, laboratory, and office work to collect and analyze samples, to manage, summarize data, and to interpret the results of the Sacramento River Watershed Program monitoring effort. While the names of all of the individuals involved in the SRWP monitoring program are too numerous to list here, we would like to gratefully acknowledge the assistance of all of the participating members of the Monitoring Subcommittee, the Toxics Subcommittee, the Biological and Habitat Subcommittee, and the Public Outreach and Education Subcommittee. The members of these committees have provided invaluable assistance and advice in developing the monitoring program and in preparing and reviewing this document. We are also grateful for the efforts of the Peer Reviewers of this report. Their insightful comments and recommendations have resulted in substantial improvements to this document.

In additional to the participating SRWP Subcommittee members, the following agencies and contractors have been instrumental in implementing the SRWP monitoring program:

U. S. Environmental Protection Agency (USEPA)

Sacramento Regional County Sanitation District (SRCSD)

Central Valley Regional Water Quality Control Board (CVRWQCB)

and …

BioVir Laboratories

California Department of Fish and Game (CDFG)

California Department of Water Resources (CDWR)

Larry Walker Associates (LWA)

Moss Landing Marine Lab (MLML)

Office of Environmental Health and Hazard Assessment (OEHHA)

Pacific EcoRisk

San Francisco Estuary Institute (SFEI)

Sierra Foothill Laboratory (SFL)

U. S. Geological Survey (USGS)

ACRONYMS AND ABBREVIATIONS

CCC	Criterion Continuous Concentration
CDFG	California Department of Fish and Game
CDHS	California Department of Health Services
CDWR	California Department of Water Resources
CDPR	California Department of Pesticide Regulation
CSBP	California Stream Bioassessment Procedure
CTR	California Toxics Rule
CVRWQCB	Central Valley Regional Water Quality Control Board
D/DB-P	Disinfection/Disinfection By-Product Rule
DDTs	Dichlorodiphenylethane compounds
DOC	Dissolved Organic Carbon
ICR	Information Collection Rule
MCLs	Maximum Contaminant Levels
µg/L	micrograms per liter
mg/L	milligrams per liter
MPN/100 mL	Most Probable Number of Bacteria per 100 mL
MWQI	California Department of Water Resources Municipal Water Quality Investigations Program
NAWQA	National Water Quality Assessment Program
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
NTR	National Toxics Rule
NTU	Nephelometric Turbidity units
PBO	Piperonyl Butoxide
PCBs	Polychlorinated Biphenyls
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SRCSD	Sacramento Regional County Sanitation District
TIE	Toxicity Identification Evaluation
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total suspended Solids
USEPA	U.S. Environmental Protection Agency

EXECUTIVE SUMMARY

WHAT IS IN THIS REPORT?

This is the sixth Annual Monitoring Report for the Sacramento River Watershed Program (SRWP). This document provides a review of the Sacramento River Watershed Program (SRWP) monitoring effort and data generated by the SRWP and other water quality monitoring programs (USGS NAWQA, Sacramento River Coordinated Monitoring Program, City of Redding NPDES Monitoring, Department of Water Resources Northern District tributary monitoring program). This report describes data collected from 1997–2004 by the SRWP and from varying periods for programs coordinating with the SRWP. These water chemistry, aquatic toxicity, and fish tissue data are used to evaluate the attainment of beneficial uses and potential impairment of surface waters of the Sacramento River watershed; to assess spatial and temporal distributions of a variety of important water quality characteristics; and to compare the relative contributions of selected parameters to the Sacramento-San Joaquin Delta from different sources.

The categories of water quality data considered in this review are mercury (in water and fish tissue), drinking water parameters of concern, organophosphate pesticides in water, and aquatic toxicity. Locations discussed in this executive summary are illustrated in Figure 1 (page 12) and in the individual sections of the Data Review beginning on page 15. The conclusions of this review of SRWP and other monitoring data are summarized below.

Mercury

SRWP Mercury monitoring for 2003-2004 consisted of four total water column sampling events at nine sites, in addition to data provided by coordinating programs. One sample event was conducted in Fall 2003 for mercury in fish tissue at three sites.

Mercury concentrations in fish tissue collected from 1997 to 2003 from the mainstem Sacramento River below Shasta Reservoir and major tributaries to this section of the river were higher than several of the human health-based and wildlife-based advisory and screening values. Frequent exceedances of the tissue-based water quality criterion for mercury recently developed by the USEPA (0.3 mg/kg) and adopted by the California Office of Health Hazard Assessment (OEHHA), and less frequent exceedance of the previous USEPA screening value of 0.6 mg/kg, indicate that there are human health concerns associated with consumption of some fish species from the lower Sacramento River watershed. The current USEPA water quality criterion of 0.3 mg/kg is based on a fish consumption rate of 17.5 g/day (equivalent to 4 quarter-pound servings per month). Although OEHHA has not issued consumption advisories for some of these waters, the Central Valley Regional Water Quality Control Board has added a number of waterbodies to California's 303(d) list based on the same available data. Interim Public Health Notices were issued by Placer, Yuba, and Nevada counties for eight Sierra foothill waterbodies based on the same data used by the Regional Board. These were followed by health advisories and consumptions guidelines issued by OEHHA in December 2003 (OEHHA 2003). Although there is substantial uncertainty regarding the level of risk posed by these concentrations of mercury in fish, there is agreement that the risks are greatest for small children and pregnant women, and that the risks increase with greater consumption of fish. General consumption guidelines are provided by OEHHA on their web page (http://www.oehha.org), in addition to more specific consumption advisories developed for some waterbodies. Concerns over mercury in fish from the lower Sacramento River watershed are being addressed with continuing SRWP monitoring proposed for

2005, and through special studies of fish consumption being conducted by the Delta Tributaries Mercury Council (DTMC). This shift in focus is in large part a result of coordination and consultation with OEHHA, which has been an active participant in the SRWP, and has provided the SRWP with guidance regarding data needs and study design for evaluation of human health risks related to fish consumption. SRWP efforts in 2005 are also coordinating with watershed-wide monitoring efforts supported by CALFED and CVRWQCB.

Consumption-weighted average mercury concentrations in tissues of fish collected from the Sacramento River mainstem from Keswick to the Delta, in smaller tributaries, and in three agricultural drains were equal to or lower than USEPA human health-based criterion of 0.3 mg/kg. However, in almost all trophic level 4 species collected throughout the watershed, average mercury concentrations were higher than the 0.3 mg/kg criterion, and were frequently two to three times higher than this criterion. [Note: “Trophic level” describes the position of a species in the food chain, determined by the number of energy-transfer steps to that level. Trophic level 3 fish consume primarily zooplankton and benthic invertebrates. Trophic level 4 fish preferentially consume trophic level 3 and lower trophic level fish species, as well as benthic invertebrates.]

Consumption-weighted average mercury concentrations in fish tissue collected from the lower American River and Feather River were higher than USEPA human health-based criterion of 0.3 mg/kg. Exceedance of the criterion indicates that there are potential health risks to people that consume fish from these waterbodies at an “average” or higher than average rate.

Total water column mercury concentrations in the Sacramento River from Keswick to River Mile 44 rarely exceeded the CTR mercury criterion of 50 ng/L (USEPA 2000). The Feather and Yuba rivers are significant sources of mercury loads, but water column concentrations of total mercury and methylmercury were not elevated compared to the Sacramento River mainstem in 2000-2004. However, the relatively high concentrations of mercury in fish from the lower Feather River and American River may be due to the similarly high concentrations of methylmercury in particulate matter (suspended solids). Spring Creek in the upper Sacramento River watershed, Battle Creek, Deer Creek, Big Chico Creek (discussed in previous annual reports), and the American River do not appear to be major sources of total mercury: concentrations were low in these tributaries compared to the Sacramento River and have not been observed to exceed the 50 ng/L CTR criterion at these sites. Results from 2001-2003 monitoring indicate that Cottonwood Creek, Battle Creek, and Thomes Creek watersheds may be significant sources of mercury and methylmercury. Mill Creek also appears to be a potentially significant source of bioavailable mercury under episodic high flow conditions. With the exceptions of Mill Creek and Cache Creek, total mercury concentrations rarely exceeded the 50 ng/L CTR criterion at any site.

Methylmercury concentrations in water column samples exceeded the Great Lakes human health-based criterion of 0.24 ng/L most frequently in samples from Arcade Creek (55% of samples) and from two agricultural drain sites (35% and 10% of samples). Methylmercury concentrations exceeded the Great Lakes wildlife-based criterion of 0.05 ng/L in nearly every sample collected from mainstem locations below Hamilton City, and in all other tributaries and agricultural drains sampled.

The Sacramento River watershed is the major source of total mercury to the Delta and contributes approximately 90% of the total mercury loads to the Delta, on average. Within the Sacramento River watershed, the Cache Creek drainage has been identified as the single largest source of total mercury. Major sources of total mercury loads to the Sacramento River watershed include runoff and erosion from historic gold mining sites, erosion of native soils, and natural mineral springs.

Minor mercury sources include treated wastewater, urban runoff, historic mercury mines, and atmospheric mercury deposition from external sources.

Organophosphate Pesticides

Pesticide monitoring for 2003-2004 consisted of four water column sampling events at nine sites, in addition to data provided by coordinating programs.

The results of SRWP and other monitoring programs continue to support the focus of the SRWP and of both state and federal regulatory agencies on the management of organophosphate pesticides in surface waters. Diazinon and chlorpyrifos appear to have the greatest potential for impacts on aquatic life uses, with other monitored pesticides appearing to have relatively low to minimal risk of impacts on aquatic life or human health. The potential impacts on beneficial uses from diazinon and chlorpyrifos in drainages dominated by agricultural runoff are being addressed through the Water Quality Management Strategy developed by the Organophosphate Pesticide Focus Group (SRWP 2001), by the TMDL developed by the Central Valley Regional Water Quality Control Board, and by proposed amendments of the Central Valley Basin Plan to add the CDFG recommended criteria for diazinon (and other provisions related to diazinon). The well-documented problems in urban runoff (exemplified by Arcade Creek) are largely being addressed by regulatory changes banning the use of these products in retail pesticide products.

There are still few data available for the many minor tributaries to the Sacramento River watershed. For smaller tributary watersheds with a substantial proportion of agricultural land use (e.g. Big Chico Creek), there may be a significant potential for pesticides to occasionally reach concentrations of concern in surface waters. Although few pesticides were detected in the limited SRWP monitoring of several smaller tributary watersheds in 2000-2003, the available monitoring data are far too limited to make any reliable assessments regarding the potential impacts of pesticides for these and other tributaries. However, small tributaries with only a small proportion of their total drainage in agricultural land uses (e.g. Deer Creek and Mill Creek) are probably at relatively low risk of pesticide impacts on beneficial uses. Additional pesticide monitoring data (e.g., from CDWR) should be evaluated for these watersheds if they become available, to better characterize the potential risks from pesticides in these watersheds, and additional monitoring should also be considered.

An important source of new information on pesticide use and potential impacts will be the data resulting from the extensive monitoring being conducted for the Conditional Waiver of Waste Disharge Requirements for Irrigated Lands (SWRCB 2003). Monitoring by agricultural coalition groups throughout the Central Valley includes tracking of pesticide use patterns, toxicity testing, and analyses for pesticides (and other potential causes of toxicity) in water and sediment. Additionally, the Watershed Evaluation Reports submitted by each coalition in April 2004 provide valuable information on existing pesticide use patterns, management practices, and potential risks from pesticide use in specific drainages in the Central Valley. Monitoring for this program began in July 2004.

The shift from use of organophosphate and carbamate pesticides for agricultural and other uses to other pesticides (including but not limited to pyrethroids and pyrethrins) indicates the need for increased monitoring for these pesticides. Both private contract laboratories and public agencies (University of California at Davis, USGS) have developed new sampling and analytical techniques to adequately identify and measure toxic concentrations of pyrethroid pesticides in water, sediment, and tissue. The SRWP has collaborated with Dr. Donald Weston (University of California Berkeley) in a study of the distribution and toxicity of sediment-associated pesticides in the Sacramento River watershed. The study is focused on pyrethroid pesticides, and Dr. Weston has demonstrated the ability to analyze pyrethroids (and other sediment-associated pesticides) at concentrations that cause toxicity in laboratory tests of sediment toxicity. Preliminary results of this study indicated that approximately half of the sites sampled exhibit significant sediment toxicity. Funding for this project is provided by the Pesticide Research and Identification of Source, and Mitigation (PRISM) Grant program administered by the State Water Resources Control Board.

Aquatic Toxicity

Aquatic toxicity monitoring for 2003-2004 consisted of four sampling events, with additional samples collected for two sites for follow-up investigations. During this monitoring period, testing was conducted using *Ceriodaphnia dubia* (water flea), *Pimephales promelas* (fathead minnow), and *Selenstrum capricornutum* (single-celled algae), using U.S EPA short-term chronic test procedures.

The results of the 2003-2004 monitoring and previous SRWP aquatic toxicity monitoring efforts have confirmed that significant toxicity to test organisms continues to occur in surface waters throughout the watershed. *Ceriodaphnia dubia* toxicity attributable to organophosphate pesticides in agricultural runoff and urban runoff has previously been definitively shown by SRWP monitoring and other studies. In 2003-2004 monitoring, toxicity to both *Ceriodaphnia* and *Pimephales* was more frequently observed during the two dry season events than during wet season events, with no clear indication of a specific source of toxicity.Widespread toxicity to *Ceriodaphnia* and *Pimephales* was observed in the July 2004 event, with the more severe effects observed in *Pimephales*. Effects on *Ceriodaphnia* during this event were limited to reductions in reproduction that were similar for all sites exhibiting toxicity. Sacramento River at Freeport and Arcade Creek were the only sites that did not exhibit some level of mortality during this event. A similar case of widespread mortality was also observed in a previous dry season event (September 2001) and not associated with any known causes of toxicity, and indicates a need to continue to monitor for toxicity during a wide range of hydrologic and weather conditions.

Regularly scheduled monitoring conducted from 1998–2000 was valuable in beginning to evaluate the overall frequency and distribution of observed water column toxicity, and for identifying or confirming the causes of some of the observed toxicity. However, spatial and temporal coverage of the watershed by SRWP and other programs is far from comprehensive, and significant questions remain regarding the sources, severity, persistence, and ecological significance of periodic toxicity in surface waters of the Sacramento River watershed. It is clear that definitively addressing all of these questions will require monitoring and studies of much greater scope (and cost) than the current efforts by SRWP and other programs. To address some of these questions, the SRWP aquatic toxicity monitoring effort for 2000-2004 has focused primarily on monitoring specific episodic events (e.g. agricultural dormant spray season, runoff events, high flow events). This strategy resulted in observation of more frequent and severe toxicity in the Arcade Creek urban watershed, but did not result in a notably greater frequency of observed toxicity for other locations. Although the 2000-2001, 2001-2002, and 2003-2004 wet seasons all had below-average rainfall, the 2002-2003 wet season had above average precipitation with no apparent increase in frequency (or magnitude) of episodic aquatic toxicity throughout the watershed. Interpretation of the results of a handful of episodic events for these few seasons of monitoring must be cautious because the causes and timing of significant episodic toxicity events may differ greatly in different waterbodies, and the likelihood of missing a particular toxic event is high. Although even a single toxic event of sufficient severity has the potential to have significant adverse ecosystem impacts, there is currently insufficient evidence to either support or rule out such a hypothetical event for most sites monitored.

In contrast to previous years, samples collected from Arcade Creek at Norwood Avenue did not exhibit a higher frequency or severity of toxicity than other tributaries and mainstem Sacramento River sites.

Other issues that require additional investigation are the causes and ecological significance of the adverse reproductive effects to *Ceriodaphnia* observed to occur sporadically at different sites throughout the watershed. Because these effects manifest at sub-lethal levels and the toxicity is often not persistent in the original samples, determining the causes of these effects has proven difficult with the available TIE and follow-up testing procedures. This is complicated by the unpredictable nature of these sub-lethal toxic “events”. These sub-lethal toxic effects need to be further evaluated through additional testing to quantify potential frequency and magnitude of toxicity at these sites. Selected elements of the Strategy to Address Toxicity of Unknown Cause are being implemented in 2005, and it is hoped that these efforts will provide additional tools to address these questions.

This three-species approach for monitoring episodic aquatic toxicity by SRWP will be continued and expanded for the 2005-2006 monitoring effort. Ongoing monitoring conducted by agricultural coalitions in the Central Valley (beginning in 2004) is also using a similar event-based monitoring approach with toxicity testing and TIEs using *Ceriodaphnia*, *Pimephales*, and *Selenastrum* for water samples, and *Hyalella* for sediment samples. It is expected that this expanded focus on toxicity will provide more insight into the causes and significance of toxicity in the Sacramento River watershed.

Drinking Water Parameters of Concern

Monitoring of drinking water parameters for 2003-2004 consisted of four water column sampling events at nine sites, in addition to data provided by coordinating programs.

The Sacramento River and major tributaries provide water supplies for municipal, industrial and agricultural use in the Sacramento River Basin and downstream in the Sacramento-San Joaquin Delta. In addition, the Sacramento River is the primary source of flow to the Sacramento-San Joaquin Delta and the source of drinking water for an additional 20 million people in the Bay Area, Central Coast, and Southern California. The Sacramento River and its major tributaries are generally considered high quality drinking water sources. Although the quality of the Sacramento River is changed as it moves downstream and into the Delta, data collected to date for the best available indicators demonstrate that drinking water beneficial uses are substantially realized in the Sacramento River watershed. Water supply agencies treating Sacramento River and Delta water are currently able to meet drinking water standards and provide safe drinking water to millions of consumers throughout California. However, anticipated future drinking water regulations *may* require agencies treating Delta water to implement additional treatment (at increased costs). Drinking water parameters of potential concern included in the SRWP monitoring program include organic carbon, total dissolved solids, pathogens, turbidity, and nutrients. Organic carbon is of concern primarily due to its role in the creation of carcinogenic trihalomethanes (THMs) and other disinfection by-products during disinfection of source water. Total dissolved solids (TDS) can have an important effect on the taste and palatability of drinking water, and at very high levels, may cause health problems in sensitive individuals. The presence of high levels of TDS may also be objectionable to consumers owing to excessive scaling in water pipes and fixtures, heaters, boilers, and household appliances. TDS concentrations are also a factor limiting use of Delta waters for groundwater recharge, particularly in the Southern San Joaquin Valley. Pathogens such as *Cryptosporidium* and *Giardia* are of concern due to their potential to cause adverse human health effects. The primary concern associated with turbidity is its effect on disinfection processes, because high levels have been shown to protect microorganisms from the action of disinfectants and to increase the levels of chlorine and oxygen needed during treatment. Elevated nutrient concentrations may promote excessive algal growth and consequently contribute to taste and odor problems associated with some species of algae.

The mainstem Sacramento River, and major tributaries (the Yuba, Feather, and American rivers) consistently meet water quality goals and objectives for drinking water-related parameters. Based on the best available indicators, these results suggest that designated beneficial uses of the Sacramento River and tributaries as sources of municipal and agricultural supply water and recreational uses are generally being achieved.

There is a general trend for concentrations TDS, organic carbon, and nutrients (evaluated in previous SRWP annual reports) to increase in the mainstem Sacramento River from the upper watershed to the lower watershed. This trend can generally be attributed to a combination of natural and anthropogenic sources, and is moderated by high quality Sierra tributary inflows.

The highest concentrations of most drinking water parameters of concern were generally observed in agricultural drains (Sacramento Slough and Colusa Basin Drain) and in urban drainages and creeks (Natomas East Main Drain, Arcade Creek). Natomas East Main Drain was also identified as a “site of concern” in the CALFED Drinking Water Quality Program Plan (CALFED 2000).

The Basin Plan limit for median fecal coliform numbers (200 MPN/100mL) was exceeded at only one site (Natomas East Main Drain), and the maximum limit for single samples (400 MPN/100 mL) was exceeded infrequently in the Sacramento River and the American River. Recommended USEPA and CDHS single sample and geometric mean limits for total coliform are also infrequently exceeded at monitored locations. Recommended single sample Basin Plan limits for *E. coli* were exceeded at most locations monitored, but *E. coli* numbers exceeded the geometric mean limit only at Natomas East Main Drain. Note that comparisons for E. coli are based on data biased towards episodic events expected to result in elevated bacteria counts.

TOC concentrations measured in the Sacramento River at Colusa, Verona, and Freeport often exceed the Stage 1 Disinfectant/Disinfection By-Product (D/DBP) Rule treatment threshold of 2 mg/l. The 2 mg/L threshold is significant because exceedance of this threshold may require utilities to remove up to 35% percent of TOC in their source water. However, it is not necessarily the case that the observed concentrations of organic carbon will result in a requirement for municipal drinking water suppliers to remove additional TOC in source water. The Stage 1 D/DBP Rule does not require such treatment if certain treatment technology requirements used, or if other water quality requirements are met in influent or treated water. Additionally, treatment technologies currently in use by many utilities are already able to remove ≥35% of source water TOC from Sacramento River water. Even if additional TOC removal is necessary, the fact that TOC often exceeds the 2 mg/L threshold would not limit the water supply use. Available Specific UV Absorbance (SUVA) data suggest that average SUVA in surface waters of the Sacramento River watershed is generally greater than D/DBP alternative criterion (2.0 L/mg-m) and would not provide relief from additional treatment requirements.

Analyses presented in previous SRWP annual reports indicate that nitrate and nitrite meet USEPA and CDHS MCLs at all locations monitored in the Sacramento River watershed. Other nitrogen and phosphorus compounds that have been monitored by SRWP in previous years (ammonia, total nitrogen, dissolved orthophosphate) currently have no relevant regulatory thresholds for comparison. Although total nitrogen and total phosphorus concentrations in many Sacramento River watershed surface waters may exceed expected ecoregional nutrient criteria under development by USEPA, these criteria are not currently based on thresholds for protection of beneficial uses.

Water from the Sacramento River from Hood and upstream is considered to be of high quality for drinking water supply. However, the quality of water in the Central and Southern Sacramento-San Joaquin Delta is often marginal for drinking water supply, and compliance with increasingly stringent drinking water objectives is becoming more difficult. The Sacramento River alone provides up to 75% of the water entering the Delta, including a large portion of seasonal organic carbon and TDS mass loads. Although the Sacramento River clearly has a substantial effect on the quality of Delta drinking water supply source water, there are also significant additional internal sources of TOC and TDS within the Delta and from the San Joaquin River. Assessing the variety of sources and loads of Delta TOC is in fact one of the primary goals of the CALFED water quality program. The parameters of primary concern for drinking water quality—TOC, TDS, nutrients, and pathogens—are currently largely unregulated by the CVRWQCB and the Water Quality Control Plan (Basin Plan). Expected changes in Sacramento River watershed land uses (e.g. increased urbanization and development) have the potential to increase regulated point source discharges and (relatively) unregulated non-point source discharges, and therefore may increase loads of TOC, TDS, and pathogens to the Delta. In order to address these and other drinking water concerns, the CVRWQCB is implementing a work plan for the development of an effective drinking water policy. This effort is currently focusing on evaluating loads and sources of these parameters and is expected to establish water quality objectives for eventual inclusion in the revised Basin Plan.

PCBs and Organochlorine Pesticides in Fish Tissue

No SRWP monitoring of PCBs and organochlorine pesticides in fish tissue was conducted in 2003-2004. Conclusions and recommendations from past Annual Reports are as follows:

- Based on comparisons to screening values for organochlorine pesticides and PCBs in fish tissue, consumers who eat a variety of fish from different locations appear to be at relatively low risk from these compounds in fish tissue. However, potential risks increase for people selectively consuming a limited number of higher trophic level species (e.g. white catfish, largemouth bass, striped bass), and for individuals consuming more fish than the 21 g/day (about six quarter-pound servings per month) on which the screening values were based.
- Consumption-weighted average concentrations of DDTs and dieldrin in fish from agricultural drains, and of PCBs in fish from major tributaries (American River and Feather River) and Delta locations exceeded screening values, but these results were dependent on very limited data for trophic level 3 species. Additional data are needed to adequately assess the potential risks for these waterbodies.
- Evaluation of consumption-weighted average and species average concentrations suggests the need to re-evaluate at least one of the waterbodies cited on the 2002 303(d) for impairment due to organochlorine pesticides and PCBs. The results indicate that the Regional Board's listing of the Feather River for "Group A" pesticides (aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexanes including lindane, endosulfan, and toxaphene) may not be necessary.
- Fish from smaller tributaries throughout the watershed tended to have lower concentrations of most organochlorines than other waterbodies. There was little evidence of other distinct spatial trends in organochlorine concentrations in fish tissue.

Monitoring of organochlorine pesticides and PCBs in fish tissue was suspended for 2003-2004 due to budgetary constraints. However, samples collected for mercury analyses were retained for analysis of organochlorine pesticides and PCBs if and when funding becomes available for that purpose. More extensive monitoring of organochlorine pesticides, PCBs, and PBDEs in fish will be conducted in 2005-2006 through coordination with CALFED and Regional Board projects..

Bioassessment

The focus of the SRWP 2001-2004 bioassessment effort was shifted to developing a process for identifying reference conditions in the Sierra Nevada foothill and the Central Valley regions, in cooperation with the California State Water Resources Control Board and Department of Fish and Game. The Sierra foothill region was selected for the initial focus of this effort because this region is undergoing rapid development and urbanization. Identification of reference sites and conditions are critical for interpreting bioassessment monitoring results and for developing biocriteria. The process developed for identifying and selecting reference sites is expected to have application throughout the watershed and the state. This effort continued through 2004. The SRWP has committed to continue supporting bioassessment efforts in the watershed through direct funding of specific relevant projects in the watershed.

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PROGRAM OVERVIEW

ORGANIZATION AND FUNDING

The Sacramento River Watershed Program (SRWP) is an association of stakeholders in the Sacramento River watershed. These stakeholders include representatives of local municipalities and districts, state and federal agencies, agriculture, industry, landowners, environmental organizations, universities, technical consultants, and watershed conservancies. The SRWP was formed in 1996 and functions through a series of stakeholder meetings. In 2002, the SRWP elected a Board of Trustees and was incorporated as a not-for-profit California public benefit corporation.

Formation of the SRWP was facilitated by the Sacramento River Toxic Pollutant Control Program (SRTPCP), a locally initiated effort led by Sacramento County and the Sacramento Regional County Sanitation District (SRCSD). The SRTPCP is a watershed-based approach to the management of potentially toxic pollutants in surface waters of the Sacramento River watershed.

Funding for the SRTPCP has been provided primarily by the federal government (over $10 million since 1996) and is administered by USEPA Region IX. Local matching funds have been provided by the Sacramento Regional County Sanitation District, and in-kind services have been provided by several participating stakeholders. Additionally, significant public and private support of the program has been provided through the active participation of numerous representatives on the SRWP subcommittees. A portion of the SRTPCP funding was specifically designated to assist in the formation of the broader watershed program.

PROGRAM GOALS AND OBJECTIVES

The goal statement developed by the participating stakeholders for the SRWP in 1996 is:

> *"To ensure that current and potential uses of the watershed's resources are sustained, restored and, where possible, enhanced while promoting the long-term social and economic vitality of the region."*

One of the ongoing primary tasks of the SRTPCP and the SRWP is the design and implementation of a water quality monitoring program for the watershed. In early stakeholder meetings, a Monitoring Subcommittee was formed to lead the development of the water quality monitoring program.

Monitoring Program Goals

The Monitoring Subcommittee established the following long-term goal for the SRWP water quality monitoring program:

> **"***In coordination with other subcommittees and the larger stakeholder group, develop a cost-efficient and well-coordinated long term monitoring program within the watershed to identify the causes, effects and extent of constituents of concern that affect the beneficial uses of water and to measure progress as control strategies are implemented."*

The SRWP water quality monitoring program was envisioned by the Subcommittee to be a long-term (e.g., 20 year) effort that provides information to promote the understanding of conditions in surface waters of the watershed and to assess the health of these waters. The monitoring program changes annually as information is accumulated and new information needs are identified. It is projected that the water quality program will be integrated with other resource monitoring activities, including biological communities, habitat, and land use. More in-depth descriptions of the monitoring program are provided in the Phase 1 Monitoring Plan (SRWP 1998a), and the Quality Assurance Project Plans for monitoring conducted from 1998 through 2003 (SRWP 1998b, 1999, 2000, 2001, 2002, 2003).

The Monitoring Subcommittee established the following goal for the first year of the monitoring program, and retained this goal for subsequent years of monitoring:

> *"To assess conditions in the mainstem of the Sacramento River through the collection of baseline information, with an emphasis on examining the degree to which beneficial uses are attained or potentially impaired."*

The SRWP has made substantial progress towards meeting both the long-term and short-term goals for the monitoring program. The monitoring program developed by the SRWP through the stakeholder process is currently coordinating with a number of ongoing monitoring programs managed by federal, state, and regional public agencies. The collection and evaluation of baseline information for water quality parameters of interest to SRWP stakeholders is being accomplished directly through SRWP monitoring, as well as through cooperative data sharing with other monitoring programs conducted by the Department of Water Resources, the Central Valley Regional Water Quality Control Board, the U.S Geological Survey, the Sacramento River Coordinated Monitoring Program, and the City of Redding. Additionally, the program also compiles and reports water quality data generated prior to the initiation of SRWP monitoring in 1998. Evaluating the available information and identifying gaps in the data needed to assess the degree to which beneficial uses are achieved or potentially impaired in the watershed was (and continues to be) an integral part of the development of the monitoring program. The evaluation of water quality monitoring information documented herein is an extension of this ongoing process.

Objectives

The Monitoring Subcommittee also adopted long-term and short-term objectives. The long-term objectives include:

- Identification of available monitoring program elements that will provide information needed to understand the condition of surface waters of the watershed (i.e., to inventory the characteristics of the watershed).
- Identification of an approach for determining the relative health of the watershed (i.e. a means to assess and evaluate the meaning of the above information).

The short-term objectives developed by the Subcommittee include:

- Identification of the monitoring goals and future uses for the data being collected, including: water quality characterization, biological assessment, long-term trend analysis, and compliance with applicable water quality regulations
- Identification of data needs and data quality objectives (i.e. to ensure that data collected will be useful, understandable, accessible, manageable, and scientifically valid).
- Coordination with other Subcommittees of the SRWP (e.g. Toxics, Biological and Habitat, Education and Outreach).

ASSESSMENT OF BENEFICIAL USES AND COMPLIANCE WITH WATER QUALITY OBJECTIVES

As stated above, the initial goal for the SWRP monitoring effort includes examining the degree to which beneficial uses are attained or potentially impaired. The existing and potential beneficial uses for the Sacramento River watershed are outlined in the water quality control plan (Basin Plan) for the Central Valley Region. The following are existing beneficial uses in the Sacramento River watershed, as defined in the Central Valley Region Basin Plan (CVRWQCB 1995):

municipal and domestic water supply	agriculture (irrigation, stock watering)
industry (process, service supply, power)	contact recreation
non-contact recreation	freshwater habitat
migration	spawning
wildlife habitat	navigation

Another purpose of the SRWP monitoring program is the comparison of observed ambient concentrations with adopted water quality objectives and criteria[1]. Numeric and narrative objectives have also been adopted in the Basin Plan (CVRWQCB 1995) for surface waters of the Sacramento River watershed for selected toxic pollutants in California. (Basin Plan objectives are analogous to National water quality criteria.) Water quality criteria for toxic pollutants are also included in the California Toxics Rule (CTR) (USEPA 2000). The CTR criteria are largely the same as the current USEPA recommended national ambient water quality criteria (USEPA 1999).

The Regional Water Quality Control Boards for the Central Valley and San Francisco Bay have developed lists of impaired waters which will not meet water quality objectives after implementation of water quality- and technology-based controls for point sources and best management practices for non-point sources. These lists are required under Section 303(d) of the Clean Water Act. The portions of the lists that address the Sacramento River and its tributaries and the Sacramento-San Joaquin Delta are provided in individual data review sections. Management plans that establish Total Maximum Daily Loads (TMDLs) for listed pollutants must be prepared for all waters contained on the 303(d) lists, and the regulations state that TMDLs must lead to compliance with adopted water quality objectives.

MONITORING PROGRAM DESCRIPTION

The 2003-2004 SRWP monitoring program included chemical, physical, biological and toxicological monitoring elements. The program augmented and coordinated with a number of other monitoring efforts that were ongoing in the watershed, including the USGS National Water Quality Assessment Program (NAWQA), the Sacramento Coordinated Water Quality Monitoring Program (CMP), and monitoring efforts by the Department of Water Resources (CDWR), Department of Pesticide Regulation (CDPR), City of Sacramento, and City of Redding.

The SRWP Monitoring Program was developed through an interest-based, coordinated approach. Managers of major water quality monitoring activities in the watershed were identified and

[1] The SRWP's review and evaluation of designated uses and the criteria developed to protect these uses is consistent with the Water Quality Standards program mandated by the Clean Water Act (33 U.S.C. §§ 1251 *et seq*.), wherein a Standard for a water body is defined by four elements: designated uses of the water body, water quality criteria to protect the designated uses, an antidegradation policy, and general policies addressing implementation issues.

invited to participate on the Monitoring Subcommittee. Numerous Subcommittee meetings were held to discuss and evaluate considerations in the development of the first year SRWP monitoring program. Existing monitoring programs were described and opportunities for coordination and integration were identified. Parameters of interest, candidate monitoring locations, monitoring frequency, sample collection methods, appropriate analytical methods, quality assurance/quality control, and program costs were evaluated by the Subcommittee.

Several possible monitoring approaches were discussed and evaluated during development of the proposed program design. The approach selected by the Monitoring Subcommittee as the starting point for the SWRP monitoring program was to monitor selected locations and parameters to facilitate an initial evaluation of beneficial use attainment in the watershed, with an emphasis on the mainstem and major tributaries of the Sacramento River. The emphasis on the mainstem Sacramento River was favored to provide a foundation to which other programs and future additions to the SRWP Monitoring Program could be connected. This approach was considered the best available means to achieving SRWP monitoring goals and was chosen to provide the best achievable information using conventional monitoring tools. Monitoring parameters and methods were selected to provide data immediately useful for evaluating beneficial use attainment and potential impairment, and for identification of management issues. Sites were chosen to complement and augment ongoing monitoring, to provide information at the mouths of major tributaries, and to coincide with flow monitoring stations where possible.

Each year, the SRWP monitoring program is evaluated and modified by the Monitoring Subcommittee based on the guidance and recommendations from other SRWP subcommittees and focus groups (Toxics Subcommittee, Delta Tributaries Mercury Council, Biological and Habitat Subcommittee, Fish Tissue Focus Group, Drinking Water Focus Group, Organophosphate Pesticides Focus Group [now inactive], and agricultural issues workgroup). The SRWP monitoring program for 2001-2002 implemented several significant changes to the monitoring program (changes retained for 2002-2003), including modification of sampling locations, parameters, and sampling and analytical contractors. Note that changes made in the monitoring program have always been prioritized by considering the goals of the program and the overall approach, even as changes were required by decreases in the monitoring budget. The specific changes to the monitoring program are documented in the Quality Assurance Project Plans (QAPP) (SRWP 2003). A brief historical overview, and a summary of the sites monitored, parameters measured, and sampling schedule for the SRWP 2003-2004 monitoring program are discussed in the following sections.

Monitoring Sites

Early in the development of the SRWP monitoring program, the Monitoring Subcommittee established a set of criteria to evaluate and select the monitoring locations for the SWRP monitoring program. Criteria used for the selection of sites included the following:

existing sampling station	site access constraints
flow gauging station	sampling access constraints
magnitude of streamflow	available water quality data
critical habitat area	in existing watershed program
predominant land use (e.g., agriculture, municipal, industrial, mining, etc.)	potential water quality impairment, including 303(d) listed waterbodies

After an initial screening using the criteria listed above, the selection was narrowed to include sites along the mainstem of the Sacramento River and at the mouths of major tributaries. Major tributaries were identified based on existing streamflow data. Mainstem sites were selected to facilitate coordination with existing programs and to provide information below major reservoirs. Major tributaries were selected based on the magnitude of flow into the mainstem. Early in the monitoring effort, the three major tributaries to Lake Shasta were also included to capture these inputs and large tributary areas.

In addition to the mainstem monitoring, three smaller Sierra Nevada tributaries (Mill Creek, Big Chico Creek, and Deer Creek) were monitored for special studies in 1998-2000. The Subcommittee included these tributaries on a demonstration basis to encourage monitoring in these areas and to coordinate with the monitoring activities of the Department of Water Resources, Northern District.

For the 2001-2002 and 2002-2003 monitoring years, locations were added for mercury monitoring in Cottonwood Creek watershed (three locations), Battle Creek watershed (three locations), Thomes Creek (three locations), Dry Creek (one site), and Little Chico Creek (one site). All of these locations were added to provide a better understanding of the mercury sources in the Sacramento River Watershed. Cottonwood Creek, Battle Creek, and Thomes Creek are relatively large tributary watersheds for which there were little or no mercury data, and Dry Creek and Little Chico Creek may be affected by significant historical mining operations in those watersheds.

For 2003-2004, monitoring was reduced to 14 sites (from 31 in the previous year) considered to be the “backbone” of the monitoring program. The reduction in monitoring locations was made in response to budget reductions and to allow a consistent suite of parameters to continue to be monitored at these sites. Seven of the sites are located on the mainstem of the Sacramento River, from the Sacramento River below Keswick Reservoir to the Sacramento River at River Mile 44. Three sites are located on major tributaries to the Sacramento River, two sites are located on major agricultural drains, and two sites are located in highly urbanized drainages. All of these locations were continued from previous years of monitoring.

Of the 14 sites monitored in 2003-2004, aquatic toxicity testing with *Ceriodaphnia, Pimephales*, and *Selenastrum* was conducted at 11 locations. Fish tissue monitoring for mercury was continued at three locations selected by the SRWP Fish Tissue Focus Group as the highest priority for continued monitoring for tracking of long-term trends in mercury concentrations. Chemical characteristics and pathogen indicators in water were monitored at 12 locations. Overall, the monitored sites cover over 300 miles of the Sacramento River system and represent a drainage area of over 23,000 square miles. Table 1 lists the sampling sites for the SWRP 2003-2004 monitoring program with a description of the location, type of site, and contributing land use percentages. The site locations are also illustrated in Figure 1.

Monitoring Parameters

Specific individual parameters measured by the SRWP 2003-2004 monitoring effort are listed in Table 2. Monitoring parameters were generally selected as the best (i.e., most sensitive) available indicators for specific beneficial uses. Monitoring performed in 2003-2004 was largely a continuation of 2001-2003 monitoring program at the core SRWP location, and most of the same parameters were monitored. Changes to parameters for 2003-2004 consisted of a suspension of analysis for nutrient parameters, suspension of chlorinated pesticides and PCBs in fish tissue, and reinstatement of toxicity testing with *Pimephales* and *Selenastrum*. The rationales for monitoring the specific environmental parameters in the SRWP 2003-2004 program are discussed below.

Mercury in Fish Tissue

Mercury and certain organic contaminants (including DDT and PCBs) are readily accumulated directly from water or through the food web from very low concentrations in water, resulting in concentrations in fish tissue which may be of concern to humans and wildlife. Monitoring levels of these pollutants in fish provides an effective way to assess potential human health hazards due to contamination of the Sacramento River system. Because fish accumulate contaminants throughout their life span and their habitat, measurements of contaminant concentrations in fish tissue provide an indication of average conditions over space and time. Fish tissue data can be useful in the determination of long term levels and trends of bioaccumulative contaminants (such as mercury, DDT and PCBs) in the watershed. This long-term data set can be used to measure the effectiveness of activities to control these pollutants. Only mercury was monitored in fish tissue in 2003-2004.

Mercury in Water

As stated above, concentrations of mercury and methylmercury in water are of potential concern to human health. Several programs are currently planned or under way in the Sacramento River watershed to monitor mercury concentrations at various locations, including the Sacramento Coordinated Water Quality Program, the USGS National Water Quality Assessment for the Sacramento River, and CALFED. SRWP mercury monitoring supplemented existing data, and planned and ongoing monitoring efforts, with information for eight locations. Data obtained were used to quantify ambient concentrations of mercury and methylmercury in surface waters of the Sacramento River watershed and to study whether these concentrations are causing or contributing to potential human health risks or otherwise adversely affecting beneficial uses.

Pesticides in Water

Low concentrations of pesticides in water can affect the growth, reproduction and/or survival of sensitive aquatic species. In 2003-2004, SRWP monitored only organophosphate (OP) pesticides, although carbamate and triazine pesticides have been monitored in previous years. These classes of pesticides have been identified as being of potential concern to aquatic life in the Sacramento River system and are responsible for the presence of several Sacramento River watershed waterbodies on the 303(d) list of impaired waterbodies. Several programs are currently under way in the Sacramento River watershed to monitor pesticides at various locations in the Sacramento River watershed, including programs administered by the California Department of Pesticide Regulation (CDPR), the Central Valley Regional Water Quality Control Board (CVRWQCB), and the USGS National Water Quality Assessment for the Sacramento River. SRWP pesticide monitoring supplemented the existing data with information for 9 additional locations. Specific pesticide analyses and locations for monitoring were selected on the basis of documented use of these pesticides upstream from the locations monitored, on pesticide-caused toxicity detected in these waters, and on inclusion for pesticides on the 303(d) list of impaired water bodies. Data obtained were used to quantify ambient concentrations of pesticides in surface waters of the Sacramento River watershed and to assess whether these concentrations are potentially affecting uses adversely. It should be noted that numerous other pesticides of potential concern to aquatic life and human health (including pyrethroids and legacy organochlorine pesticides) have not been monitored in water by the SRWP to date.

Toxicity in Water

Ambient samples of water and sediment can be tested in the laboratory for toxicity to provide an indication of the conditions that exist in the natural environment. Standard test species and test procedures are used to provide reliable and comparable results. Toxicity is deemed to occur when test species are significantly adversely affected by exposure to toxicants in ambient water or sediment as compared to laboratory controls. (*Note*: No sediment toxicity tests were conducted during this monitoring preriod.) Toxic effects measured for the SRWP in 2003-2004 include reduced reproduction and increased mortality of *Ceriodaphnia dubia*, reduced growth and increased mortality of *Pimephales promelas* (fathead minnow), and decreased cell growth of *Selenastrum capricornutum* (a single cell green alga). Effects may occur rapidly over a period of hours to four days (acute toxicity) or may occur over a longer period (chronic toxicity). The results of SRWP toxicity testing were also used to trigger further investigations to determine the cause(s) of observed toxicity. These toxicity identification evaluations (TIEs) included the consideration of a number of factors: contributing watershed characteristics; chemical characteristics of the water; biology; differential species responses; and additional toxicity testing wherein classes of toxicants are selectively removed or rendered non-toxic. Results from these weight-of-evidence investigations are useful in identifying potential water quality problems in the watershed. Sites for aquatic toxicity monitoring were selected to provide an overall survey of the distribution of toxicity in the watershed, and to coordinate with existing monitoring programs as described previously.

Pathogens and Pathogen Indicators

Pathogens are disease-producing organisms (protozoa, bacteria, and viruses) that adversely affect the quality of drinking water and/or may pose human health risks for water contact recreation. Two pathogens of particular concern are *Giardia lamblia* and *Cryptosporidium parvum.* Water treatment agencies are currently required to remove or inactivate at least 99.9% of *Giardia* and effective December 2001, are required to remove 99% of *Cryptosporidium* (Interim Enhanced Surface Water Treatment Rule, USEPA 1998a). Although most facilities utilizing conventional or direct filtration remove at least 99% of *Cryptosporidium* (*ibid.)*, this organism is resistant to disinfection with chlorine, and high numbers of *Cryptosporidium* in source waters may require water supply agencies to switch to ozone or other disinfectants. Although some data exist for the Sacramento River near Redding and in the Sacramento River below Sacramento, data on the numbers of these pathogens are generally lacking for most of the Sacramento River system. Monitoring efforts by the Department of Water Resources, and the Metropolitan Water District of Southern California in the lower end of the watershed near Sacramento to assess numbers of *Cryptosporidium*, *Giardia*, and coliform organisms (indicators of fecal contamination) were completed in April, 1998, but no final report has been released. Past SRWP pathogen monitoring effort extended monitoring for these specific parameters to several additional upstream locations in the Sacramento River watershed. Coliform bacteria are monitored primarily as indicators of fecal contamination and the possible presence of enteric pathogens such as *Cryptosporidium* and *Giardia*. The USEPA recommends monitoring *Escherischia coli* and *Enterococci* as the preferred indicators of pathogen organisms. SRWP data was intended to be used primarily to determine the magnitude and extent of numbers of these pathogens in the mainstem of the river and large tributaries below major reservoirs.

While monitoring of coliform indicator bacteria was continued in 2003-2004, monitoring by SRWP for *Cryptosporidium* and *Giardia* was suspended after the 2000-2001 monitoring effort. Although the analytical method used to monitor *Giardia* and *Cryptosporidium* in 1999-2001 was much improved (compared to the ICR method used previously), there remains a high degree of uncertainty associated with data for these pathogens. The results of a recent CDWR study (DiGiorgio *et al.* 2002) found that while analytical recoveries (the percent of organisms recovered from samples) of both organisms are acceptable under low turbidity conditions, recoveries of *Giardia* decrease unacceptably in higher turbidity waters. In addition, there are currently no regulatory guidelines or meaningful environmental benchmarks for these pathogens in surface waters.

Organic Carbon in Water

The organic content of water (measured as total and dissolved organic carbon) is a parameter important to drinking water suppliers. High concentrations of organic compounds in source waters contributes to the production of disinfection by-products (trihalomethanes and halo-acetic acids) as a result of conventional water treatment. Some of these by-products are carcinogenic and pose human health problems at relatively low concentrations. Additionally, the Stage 1 Disinfectants and Disinfection By-Product Rule (effective January 2002) requires drinking water systems serving at least 10,000 people to meet specified total organic carbon (TOC) removals dependant on source water TOC concentrations. For these reasons, baseline data on typical organic carbon concentrations and seasonal variability of those concentrations in the Sacramento River system are important to the assessment of drinking water uses. SRWP monitoring for organic carbon augments fairly extensive monitoring already performed by the USGS NAWQA program, the City of Sacramento and the California Department of Water Resources (CDWR).

Some organic compounds commonly found in wastewaters and natural surface waters (lignin, humic and fulvic acids, and some aromatic compounds) strongly absorb ultraviolet radiation. Strong correlations have been demonstrated with organic carbon and precursors of trihalomethanes and other disinfection by-products (APHA *et al.* 1998). Ultraviolet absorbance at 254 nm (UVA_{254}) is considered to be a useful surrogate measure for the ability of organic compounds to form these disinfection by-products.

General Constituents (Suspended and Dissolved Solids, Turbidity, Alkalinity, and Hardness) in Water

These "conventional" water quality characteristics are important to the evaluation of the attainment of a variety of uses, including drinking water supply, recreation, aesthetics, aquatic habitat, and agricultural supply. Data for these parameters are available from a number of programs, including USGS NAWQA, the Sacramento Coordinating Monitoring Program and the Department of Water Resources. SRWP monitoring augments the ongoing data collection efforts for some of these constituents.

Benthic Invertebrates and Habitat Characterization

Benthic invertebrates are the aquatic insects and other organisms that live along the bottom of streams, lakes, and other waterbodies. Procedures have been developed to standardize the assessment of biological habitat and benthic communities for use as a monitoring tool (Plafkin et al. 1989, CDFG 1996, CDWR 1997). Ideally, information on invertebrate diversity, abundance, species richness, and other community metrics collected at specific sites is compared against expected conditions (or reference stream conditions) to evaluate the relative health of the biological community at that location. This information is used in combination with chemical concentration and toxicity data to assess ecosystem conditions at various locations. Different procedures are used depending on the characteristics of the stream (i.e. wadable versus nonwadable). This monitoring tool has been effectively used by citizen monitoring groups in smaller tributary watersheds. The Department of Water Resources, Department of Fish and Game, and the Central Valley Regional Board continue to work actively with a number of tributary watershed groups to provide education and training regarding the assessment methods. Data from the SRWP monitoring program is intended to supplement and integrate results from projected tributary efforts.

In 2001 the focus of SRWP bioassessment monitoring was shifted to developing a process for identifying reference conditions in the Sierra Nevada foothill region and the valley floor, in cooperation with the California State Water Resources Control Board and Department of Fish and Game. The Sierra foothill region was selected for the initial focus of this effort because this region is undergoing rapid development and urbanization. Identification of reference sites and conditions are critical for interpreting bioassessment monitoring results and for developing biocriteria. The process developed for identifying and selecting reference sites is expected to have application throughout the watershed and the state. No other SRWP monitoring of benthic macroinvertebrates was performed in 2003-2004.

Sampling Frequency and Schedule

The monitoring frequency for 2003-2004 was reduced to only 4 events (down from six events in the previous two years, nine events per year for 2000-2001, and 12 events in previous years). These changes in frequency were made to accommodate significant decreases in the SRWP monitoring budget. In order to best satisfy the monitoring goals and priorities of the SRWP and to maintain monitoring at existing station, reductions in monitoring frequency were considered preferable to discontinuing monitoring for additional parameters or discontinuing existing long-term monitoring locations. The basis for planning sample events was also changed to “episodic” (event-based) for all parameters in 2001-2002. This change was made to allow the program to focus on specific hydrological conditions and other events relevant to water quality (low and high flows, storm events, pesticide application seasons and events, spills, etc.).

Monitoring frequency varied by location and the parameter to be tested. Water quality monitoring for mercury, pesticides, pathogen indicators, organic carbon, general constituents in water, and for aquatic toxicity sampling was “event-based”, for a total of four sample events. These sample events were planned to coincide with a range of hydrological conditions and other events expected to significantly affect water quality (e.g. during seasonal pesticide applications, expected periods of agricultural or urban runoff, high and low flows), or conditions that match a previously observed pattern of toxicity or changes in concentrations of parameters. All data represent the results of a single grab sample per event per site (*i.e.*, no composite samples were collected), and analytical results for different parameters are essentially for the same sample (within the limitations of parameter-specific sampling requirements). Fish tissue sampling was conducted once annually (in the fall) for the three sites monitored.

The sample events were typically conducted over a period of two to three days. In 2003-2004, a total of four events, (two wet season events and two dry weather events) were monitored. Wet season events were conducted in January 2004 following an extended period of watershed-wide wet weather and significant rainfall, and in early February 2004 following the organophosphate pesticide dormant spray application period. One dry weather event was scheduled to during the rice herbicide application and discharge period (early June, 2004), and one was schedule to coincide with late dry season low flows. (Descriptions and dates for specific events are also described later in the Data Review sections of this report.) A breakdown of sampling sites, sampling frequency, and parameters to be analyzed are provided in Table 3.

Table 1. SRWP 2003-2004 Monitoring Sites

Site description	Site ID[(1)]	Site Type	Percent Contributing Land Use: Rangeland	Forest	Agriculture	Urban, Residential	Other[(2)]
Sacramento River below Keswick	SRBKR	Mainstem	20	70	4.5	0.3	4.9
Sacramento River above Bend Bridge	SRABB	Mainstem	20	71	4.5	0.7	3.9
Sacramento River near Hamilton City	SRHAM	Mainstem	21	69	6.6	0.7	3.4
Sacramento River at Colusa	SRCOL	Mainstem	22	67	7.5	0.8	3.2
Sacramento River at Veterans Bridge	SRVET	Mainstem	18	62	16	1.1	3.0
Sacramento River at Freeport	SRFPT	Mainstem	18	62	15	1.8	3.4
Sacramento River at River Mile 44	SRRMF	Mainstem	18	62	15	1.9	3.4
Yuba River at Marysville	YRMRY	Major Trib	9.9	85	1.0	0.8	3.5
Feather River near Nicolaus	FRNIC	Major Trib	11	77	7.0	1.3	3.4
American River at Discovery Park	ARDPK	Major Trib	12	76	3.1	3.8	5.6
Colusa Basin Drain above KL	COLDR	Ag Drain	18	17	64	1.4	0.2
Sacramento Slough	SACSL	Ag Drain	12	18	63	2.8	3.3
Natomas East Main Drain[(3)]	NEMDR	Urban	—[(4)]	—	—	—	—
Arcade Creek at Norwood Ave.	ARCNW	Urban	0.06	.003	14	84	2.1

(1) SRWP Site identification Code.
(2) Includes water, wetlands, snowfields, shrub and brush tundra, and transitional areas.
(3) Characteristics of the Natomas East Main Drain drainage are nearly identical to that of Arcade Creek.
(4) "—" indicates land use percentage not calculated.

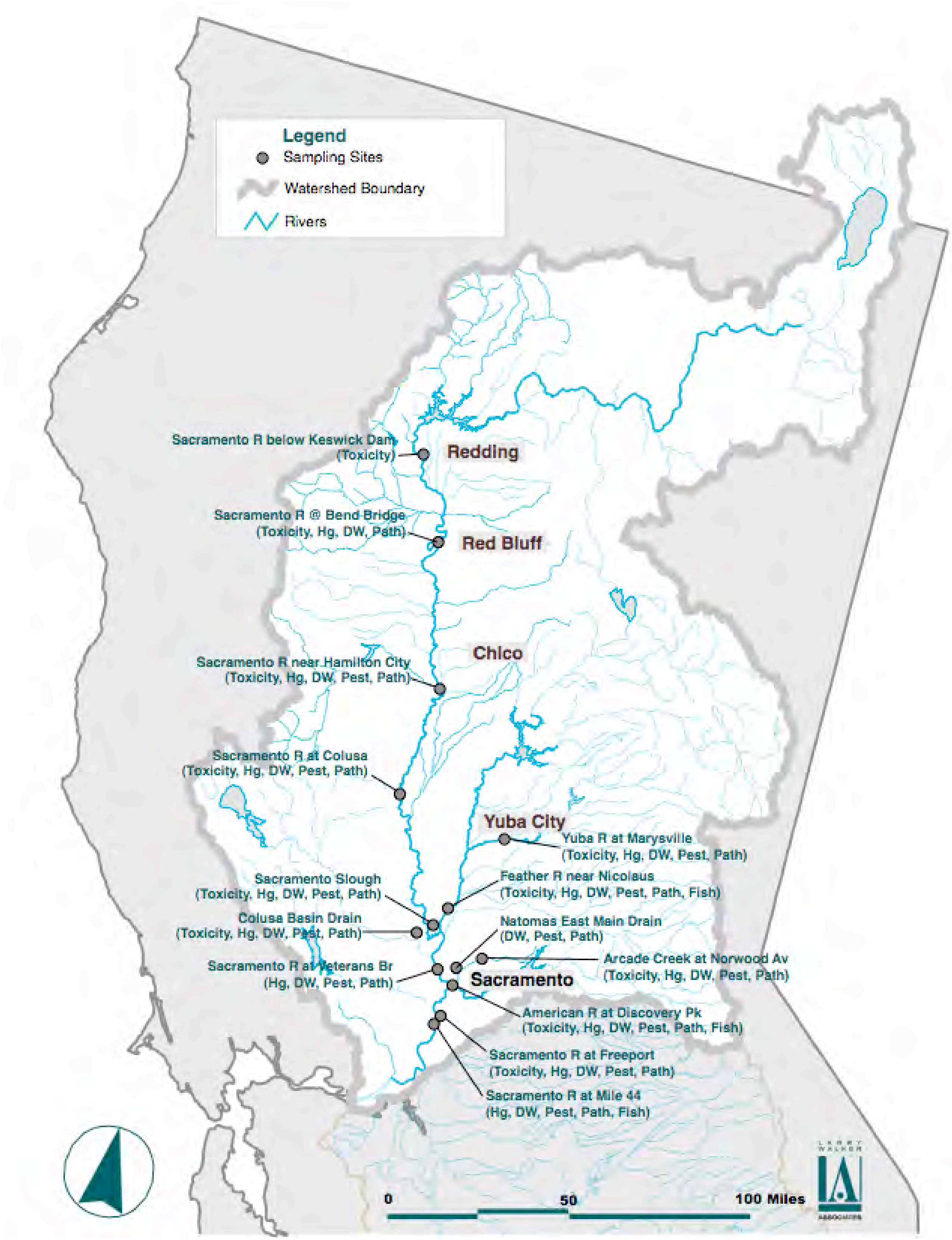


Figure 1. SRWP Monitoring Program Sampling Sites, 2003-2004

Table 2. Parameters Measured for the SRWP 2003-2004 Monitoring Program and Relevant Beneficial Uses.

Parameters Monitored	Beneficial Uses									
	Municipal and Domestic Water Supply	Industrial Water Supply	Agricultural Water Supply	Non-Contact Recreation (Aesthetic Value)	Contact Recreation	Sport and Subsistence Fishing	Freshwater Habitat and Aquatic Life	Spawning	Fish Migration	wildlife Habitat and Uses
Physical and Chemical Parameters in Water										
Alkalinity	X	X	X							
Conductivity	X	X	X							
Dissolved Oxygen							X	X	X	
Hardness	X	X	X							
Mercury, Filtered and Unfiltered						X				X
Methylmercury, Filtered and Unfiltered						X				X
Organic Carbon, Total and Dissolved	X									
pH							X			
Temperature							X	X	X	
Total Dissolved Solids (TDS)	X	X	X							
Total Suspended Solids (TSS)							X	X		
Turbidity	X			X			X	X		
Ultraviolet Absorbance at 254 nm	X									
Pesticides in Water										
OP Pesticides							X			
Molinate and Thiobencarb	X						X			
Microbiological Characteristics in Water										
Escherischia coli Bacteria	X				X					
Total and Fecal Coliform Bacteria	X				X					
Aquatic Toxicity										
Ceriodaphnia dubia (Mortality and Reproduction)							X			
Pimephales promelas (Mortality and Growth)							X			
Selenastrum capricornutum (Cell Density)							X			
Fish Tissue										
Mercury						X				X

Table 3. Summary of SRWP Monitoring for 2003-2004.

	Chemical Characteristics					Pathogen Indicators	Aquatic Toxicity			Fish Tissue
Monitoring Locations	total Hg and MeHg (filtered and unfiltered)	TSS	% sand [(a)]	TOC, DOC, UVA_{254}, TDS	OP Pesticides	E. coli, Total & Fecal Coliforms	Ceriodaphnia, Pimephales, Selenastrum	Hardness, Alkalinity	WC Tox Followup (b)	Mercury in fish
Sac. R. below Keswick							4	4	E	(c)
Sac. R. at Bend Br	4	4	4	4		4	4	4	E	
Sac. R. near Hamilton City	4	4	4	4	4	4	4	4	E	
Sac. R. @ Colusa	4	4	4	4	4	4	4	4	E	
Sac. Slough	4	4	4	4	4	4	4	4	E	
Colusa Basin Dr	4	4	4	4	4	4	4	4	E	
Yuba R. at Marysville	4	4	4	4	4	4	4	4	E	
Feather R. near Nicolaus	4	4	4	4	4	4	4	4	E	2
Sac. R. at Veterans Br.	CMP	CMP	4	CMP	4	CMP				
Arcade Creek	4	4	4	4	4	4	4	4	E	
Natomas East Main Drain				4	4	4				
American R. at Discovery Pk	CMP	CMP	4	CMP	CMP	CMP	4	4	E	2
Sac. R. at Freeport	CMP	CMP	4	CMP	CMP	CMP	4	4	E	
Sac. R. at RM44	CMP	CMP	4	CMP	CMP	CMP				4
Number of Sites	8	8	12	9	9	9	11	11	(a)	3
Number of Regular Analyses	32	32	48	36	36	36	44	44	(a)	8
Additional QC Analyses	8	4	4	4	8	4	4	4	(a)	0

Note: Tabled values indicate number of environmental samples collected annually. All 2003-2004 water quality monitoring was scheduled to coincide with hydrological conditions of interest. “CMP” indicates data or samples collected by the Sacramento River Coordinated Monitoring Program.

(a) Samples for analysis of percent sand in suspended solids were not collected because an appropriate method and laboratory was not found.

(b) There are no fixed frequencies or locations for aquatic toxicity follow-up.

(c) Two additional rainbow trout samples were collected by CDFG at this location.

DATA REVIEW PROCESS

The purpose of this data review is to present the results of monitoring performed by the SRWP and coordinating programs, and to present the conclusions of evaluation of these data. This review utilizes data compiled for the period 1994 through 2003, but focuses on SRWP monitoring conducted in 2003-2004. The primary data considered and presented for this review were generated by the following programs:

- The Sacramento River Watershed Program (SRWP) (http://www.sacriver.org)
- The Sacramento River Coordinated Monitoring Program (CMP) (LWA 2003),
- The City of Redding NPDES monitoring program,
- USGS National Assessment of Water Quality (NAWQA) for the Sacramento River (http://water.wr.usgs.gov/sac_nawqa/index.html),
- California Department of Water Resources (Northern District) Intensive Tributary Monitoring Program (http://wwwdpla.water.ca.gov/nd/index.html),
- California Department of Water Resources Municipal Water Quality Investigations (MWQI) Program

The data from the coordinating programs are collected using similar sampling and analytical methods, and were therefore considered compatible with SRWP data. Data from these programs were pooled for subsequent evaluations, presentation of summary data (e.g. summary statistics), and plots of data, unless stated otherwise. For parameters with concentrations reported below analytical detection limits, summary statistics presented in this report were estimated using the robust method of Helsel and Cohn (1988), which uses probabilities adjusted for the proportion of data below detection to calculate unbiased estimates of the typical parametric statistics (mean, standard deviation, etc.). Additionally, selected results were also considered and evaluated from a number of other monitoring studies referenced in following data review sections.

The review of data for parameters measured for the 2003-2004 SRWP monitoring effort is organized into the following general categories:

- Mercury in water and fish tissue
- Pesticides in water
- Aquatic toxicity
- Drinking water parameters of concern (organic carbon, dissolved and suspended solids, pathogen indicators)

PROCESS FOR DATA EVALUATION

Each evaluation is preceded by an overview of relevant monitoring information. The evaluations presented within each data review category were designed to address specific goals of the SRWP monitoring program. Monitoring data were evaluated for evidence that beneficial uses are attained or impaired, and if these evaluations indicated potential impairment due to a specific monitoring parameter, temporal and spatial trends in water quality were also evaluated and discussed. These evaluations are conducted using the most sensitive indicators available. If the evaluations indicated that a particular parameter is probably not causing impairment, spatial and temporal trends were not evaluated for that parameter. Descriptions of the specific methods used to evaluate attainment of beneficial uses and spatial and temporal trends follow.

Evaluation of Attainment and Potential Impairment of Beneficial Uses

Comparisons with applicable water quality criteria, objectives, and other advisory criteria were performed as a preliminary evaluation of the degree to which beneficial uses of the Sacramento River watershed are attained or potentially impaired. Concentrations in water are compared to California Toxics Rule (CTR) criteria, USEPA Maximum Contaminant Levels (MCLs) for drinking water, and Central Valley Basin Plan objectives (which incorporate California Department of Health Services (CDHS) Maximum Contaminant Levels (MCLs) for drinking water by reference). Concentrations of mercury and organic compounds in fish tissue were compared to various screening values developed by several different state and federal regulatory agencies. As a rule, these regulatory criteria and other limits define what are believed to be “safe levels”, rather than thresholds of adverse effects. Because these limits are conservative by design, individual exceedances are not necessarily predictive of actual impairments of beneficial uses. For the purpose of these evaluations, concentrations that exceed these regulatory limits in water or tissue are considered indicators of potential impairment of beneficial uses. Cases where concentrations clearly do not exceed regulatory limits indicate that beneficial uses are not being impaired by a specific constituent, but do not provide unequivocal evidence that a specific beneficial use is being fully attained. The results of these comparisons to regulatory criteria and other limits were also evaluated for consistency with the State Water Resources Control Board’s 303(d) list of waterbodies which the State considers to be impaired and not attaining beneficial uses. Note that the State Water Resources Control Board is currently developing a “listing policy” that will define how to determine impairment of beneficial uses, including data requirements, numbers of exceedances, and other information needed to qualify a waterbody for inclusion on the 303(d) list.

As discussed previously, water column monitoring frequency was reduced to six events per year in 2001 (from nine events per year for 2000-2001, and 12 events in previous years). Additionally, the monitoring strategy was changed to “event-based” for all water column parameters in 2001-2002. Because the majority of monitoring events are selected to characterize hydrological events expected to result in higher than typical concentrations and loads of pollutants, over time this change in strategy will tend to bias the dataset towards “worst case” water quality conditions. For most monitoring locations with several years of monitoring data, this effect is offset (for a while) by the large majority of unbiased data in the data set. However, for locations monitored for the first time or with relatively short monitoring histories (e.g. many of the smaller tributaries monitored from 2001-2003), this bias can be substantial and immediate. There is no simple cure for this introduced bias. Statistical corrections may be possible in some cases, but they typically rely on complex modeling or data-weighting methods. For the purpose of these assessments, no attempt is made to correct for the bias, other than to make the reader aware and to warn of its potential impact on the evaluations. Assessments based on fish tissue or bioassessment monitoring remain unbiased because they are not affected by these changes in water column monitoring strategy.

Spatial and Temporal Trends

For parameters determined to have the potential to impair beneficial uses, evaluations of spatial and temporal trends were also performed. Evaluation of these trends support the SRWP goal of collecting and evaluating water quality data for the purpose of characterizing baseline conditions in the watershed, and also provide information relevant to identifying sources of pollutants or causes of potential impairment. Due to the limitations of the data (e.g. only a few years of data for most parameters, varying monitoring periods for different programs, high percentages of data below detection for some parameters and programs, and very few data for some sites and parameters), formal statistical analysis of the spatial and temporal trends would be resource-intensive and would provide little additional useful information for the SRWP. The discussions of general trends are qualitative and descriptive and are generally not characterized as statistically significant. Summary statistics and time series plots of chemical, physical, and microbiological water quality characteristics were also prepared and are provided in Appendix A and Appendix B, respectively. Fish tissue data are presented in Appendix C. If appropriate for the specific data category, a semi-quantitative assessment was performed of the relative importance of the loads of selected pollutants to the Delta.

Statement of Data Quality

Data presented in this report have been reviewed and validated as required by the Quality Assurance Project Plan (SRWP 2003). In general, data collected by the SRWP and cooperating programs are adequate for the purposes intended and the evaluations presented in this review. A detailed review of data quality is presented in Appendix D of this report.

MERCURY

Monitoring results for the Sacramento River Watershed Program (SRWP) for the period June 1998 through July 2004 and for primary coordinating programs during the 2003-2004 period (Sacramento River Coordinated Monitoring Program) are presented and summarized in this section. Data are compared to adopted water quality objectives and advisory criteria to evaluate attainment and potential impairment of beneficial uses in the watershed. Data are evaluated for spatial and temporal trends. SRWP 2003-2004 water column monitoring data are provided in Appendix A, and fish tissue data are provided in Appendix C.

BACKGROUND AND AVAILABLE DATA OVERVIEW

The sources of data utilized for this report are summarized in Table 4. The monitoring locations for the primary data considered for this report (USGS NAWQA, Sacramento River Coordinated Monitoring Program, City of Redding NPDES monitoring, the California Department of Water Resources, and the Sacramento River Watershed Program) are illustrated in Figure 1.

Table 4. Mercury Monitoring Programs (Water Column and Fish Tissue), Sacramento River Watershed

Program	Monitoring Period(s)	Parameters	# of Locations & Geographic Reference
SRWP	6/98–7/04 6/00–6/03	▪ Total Hg in water, ▪ Total Hg in fish tissue ▪ Methylmercury in water	3 water column sites: 2 upper watershed, and 1 in lower watershed; 13 fish tissue sites on Sacramento River and major tributaries
SRWP Special Study (USGS)	1/19/00, 2/20/00	▪ TSS, total Hg, and methylmercury in water	Sac. R. at bend Bridge and Woodson Bridge, Antelope Creek, Elder Creek, and Mill Creek
SRWP Special Study (CDFG)	3/01–6/01	▪ TSS, total Hg, and methylmercury in water	11 Sacramento River sites from Hamilton City to Colusa
SRWP Special Study (PER)	4/01	▪ TSS, total Hg, and methylmercury in water	3 sites in Mill Creek drainage
Sacramento River Mercury Control Planning Project (LWA 1997)	3/95–2/96	▪ Total and filtered Hg and MeHg, and TSS in water ▪ Hg and MeHg in benthic invertebrates and fish	7 water column sites on Sacramento River, Feather River, and Yuba River. MeHg at selected sites. 55 benthic invertebrate and 25 fish sites on Sierra tributaries to the Sacramento River.
Sacramento River CMP (SRCSD)	12/92–6/04	▪ Total and dissolved Hg in water	5 sites on Sacramento and American rivers in Sacramento metropolitan area
USGS Mercury Transport Study (Roth et al. 1998)	6/96–5/97	▪ Total, dissolved, and colloidal Hg in water	6 sites on Sacramento River and 7 sites on selected tributaries.
Sacramento River Basin NAWQA (USGS)	1996—2003	▪ Total Hg and MeHg in water ▪ Total Hg in sediments	12 Hg sites (5 MeHg sites), distributed throughout watershed 1996-98. 5 sites 1998-2002.
USGS (Domagalski 2001)	2/96–2/97	▪ Total Hg and MeHg in water ▪ Total Hg in sediments	11 water column and 17 sediment sites on the Sacramento River and major tributaries.
CVRWQCB (Slotton et al. 1997)	Spring, 1996	▪ Hg in benthic invertebrates.	38 sites in the Cache Creek watershed
CVRWQCB (Foe and Croyle 1998)	10/93–4/95, 1996-1998	▪ Total and dissolved Hg, and TSS in water	22 sites in major Delta tributaries, and 10 additional sites in Cache Ck watershed
City of Redding	1/98–5/01	▪ Total Hg in water	1 site at Sacramento River below Keswick Dam
SF Estuary Regional Monitoring Program	1989–1997	▪ Total and dissolved Hg in water ▪ Total Hg in fish tissue	18 Bay-Delta sites, including Sacramento River and San Joaquin River at the Delta terminus
Special Tributary Program (CDWR)	6/98–5/00	▪ Total Hg in water ▪ Total Hg in fish tissue	13 water column sites and 8 fish tissue sites on Mill Creek, Big Chico Creek, and Deer Creek
CALFED Bay-Delta Hg Program	1999—2003	▪ Total Hg and MeHg in water, sediments, fish, clams, bird eggs, benthic invertebrates,	Locations throughout the Bay-Delta Estuary, and Cache Creek watershed. *Data final but not yet available for most projects.*
USGS Hg Bioaccumultion Study (May *et al.* 2000)	1999	▪ Total mercury in fish	22 sites in the South Yuba River, Deer Creek, and Bear River

ATTAINMENT OF BENEFICIAL USES AND POTENTIAL IMPAIRMENT

One of the SRWP monitoring program's primary goals is to assess the degree to which beneficial uses are attained or potentially impaired in surface waters of the watershed. For the purpose of these evaluations, mercury concentrations in water and fish tissue were compared to various regulatory criteria and screening or advisory thresholds. Concentrations that exceed these regulatory limits in water or tissue are considered indicators of potential impairment of beneficial uses, as described previously. Cases where concentrations clearly do not exceed regulatory limits indicate that beneficial uses are not being impaired by a specific constituent, but do not provide unequivocal evidence that a specific beneficial use is being fully attained. The results of these comparisons to regulatory criteria and other limits were also evaluated for consistency with the State Water Resources Control Board's 303(d) list of waterbodies which the State considers to be impaired and not attaining beneficial uses.

Water Column

Human Health Thresholds

Total mercury concentrations in water were compared with a variety of regulatory, screening, and advisory thresholds (Table 5). Adopted total mercury water quality objectives for the Sacramento River watershed include a human health-based water quality objective for drinking water of 2000 ng/L (the drinking water Maximum Contaminant Level or MCL) adopted in the Central Valley Basin Plan, and a human-health-based federal water quality criterion of 50 ng/L (30-day average) adopted in the May 2000 California Toxics Rule (CTR). The CTR criterion reflects the latest USEPA national water quality criterion for total mercury for protection of human health, which superceded the 1985 USEPA national criterion value of 12 ng/L. The CTR criterion does not reflect the approach used in the Great Lakes Initiative, where an objective of 3.1 ng/L was adopted based on use of field-derived bioaccumulation factors (BAFs). The fish consumption-based human health criteria for mercury are intended to protect sensitive individuals (pregnant women, unborn children, infants) and are based on different assumptions of fish consumption rates and bioaccumulation rates.

USEPA re-evaluated and revised its 304(a) national criterion for mercury in 2001 (USEPA 2001a) and has promulgated the human health-based water quality criterion as a fish tissue-based criterion for methylmercury. New human health criteria based on USEPA's 304(a) revisions have not yet been proposed for California.

Wildlife Thresholds

No wildlife-based water quality objectives have been adopted for mercury in California and USEPA has not issued national wildlife-based advisory criteria for mercury in water. A wildlife-protective standard of 1.3 ng/L total mercury has been adopted for the Great Lakes area, based on criteria developed by USEPA. USEPA revised these Great Lakes values for protection of wildlife species in its Mercury Report to Congress (USEPA 1997), an advisory document. Total mercury criterion values presented in the Mercury Report to Congress ranged from 0.6 ng/L to 1.8 ng/L, with an average of 0.9 ng/L for the species considered. The Mercury Report to Congress also identified a methylmercury criterion of 0.05 ng/L in water for protection of wildlife.

Table 5. Regulatory Standards and Other Threshold Values for Mercury in Water

Basis for Limit	Concentration in Water, ng/L	Form of Mercury	Reference
Human Health	2000	Total	Maximum Contaminant Level (MCL) in drinking water (USEPA 1996)
Human Health	50[2]	Total	Federal water quality criterion per California Toxics Rule (May 2000), Recommended National Water Quality Criteria (USEPA 1999)
Human Health	0.24 3.1	Methyl Total	Specific to Great Lakes, federal water quality criterion for Great Lakes (USEPA 1995a)
Wildlife[1]	0.05 0.641 0.91	Methyl Dissolved Total	Mercury Report to Congress, Vol. VI (USEPA 1997)
Wildlife	1.3	Total	Specific to Great Lakes, federal water quality criterion for Great Lakes (USEPA 1995a)

(1) Lowest average criterion, based on the average for all mammalian wildlife species studied in Mercury Report to Congress.

(2) This value represents a 30-day average not to be exceeded more than once in three years.

Comparison with Water Column Threshold Values

Because the mercury objective for protection of human health for drinking water exposure is orders of magnitude higher than fish consumption-based limits, the remaining discussion will focus only on the fish consumption-based values. The percentage of data meeting specific regulatory or advisory thresholds are presented in Table 6.

Total mercury concentrations in the Sacramento River (from Keswick to Greene's Landing) and in the major tributaries were rarely observed to exceed the CTR criterion for mercury. Mercury concentrations exceeded the CTR criterion in only one sample collected from the two agricultural drains monitored by SRWP (Sacramento Slough and Colusa Basin Drain), but exceeded the criterion in 30% of samples collected in the Yolo Bypass.

In comparison with total mercury advisory criteria in the range from 2–5 ng/L (as indicated by USEPA Region IX staff) for human health protection, or at 1.3 ng/L concentrations (as has been adopted in the Great Lakes for wildlife protection), ambient water column concentrations of total mercury frequently exceed these values at all sites tested throughout the Sacramento River watershed. In comparison with the 3.1 ng/L Great Lakes criterion for the protection of human health, the Sacramento River exceeded this criterion in approximately 20% of samples collected from Hamilton City and upstream, while the 3.1 ng/L limit was exceeded in 85% of samples collected from the Sacramento River from Colusa to Greene's Landing.

The Great Lakes Initiative also adopted a human health-based methylmercury criterion of 0.24 ng/L. Methylmercury concentrations measured by SRWP and the Sacramento coordinated Monitoring Program at eight mainstem Sacramento River sites exceeded 0.24 ng/L in 2% of samples (2000-2004), and methylmercury concentrations in the two agricultural drain sites (Colusa Drain and Sacramento Slough, 2001-2004) exceeded 0.24 ng/L in 35% and 10% of samples, respectively. Arcade Creek (an urban creek) exhibited the highest percentage of exceedances of the 0.24 ng/L limit (55%, 2000-2004 data). In comparisons with the 0.05 ng/l wildlife-based methylmercury advisory criterion identified in the *Mercury Report to Congress* by USEPA, methylmercury concentrations exceeded the limit in approximately 75% of the total samples collected at all sites.

Table 6. Comparison with Water Quality Criteria for Human Health: Percent of Data Meeting Criterion

	Site	Years Monitored	n	Max Value	2000 CTR Criterion, 50 ng/L	1985 USEPA, 12 ng/L	1997 USEPA Great Lakes Criterion, 3.1 ng/L
Mainstem	Sacramento River below Keswick	1998–2003	53	10.4	100%	100%	93%
	Sacramento River above Bend Bridge	1999–2004	32	14.4	100%	97%	78%
	Sacramento River near Hamilton City	1999–2004	32	54.1	97%	88%	59%
	Sacramento River at Colusa	2000–2004	21	68.2	95%	81%	46%
	Sacramento River at Veterans Bridge	1994–2004	140	34.9	100%	81%	7.3%
	Sacramento River at Freeport	1994–2004	140	96.0	99%	79%	17%
	Sacramento River at River Mile 44	1994–2004	132	73.4	99%	78%	14%
	Sacramento River at Greene's Landing	2000–2001	8	4.0	100%	100%	65.3%
Major Trib	Yuba River at Marysville	1999–2004	32	40.2	100.0%	91%	49%
	Feather River near Nicolaus	1999–2004	33	21.4	100.0%	90%	38%
	American River below Nimbus Dam	1994–2004	138	15.4	100.0%	99%	78%
	American River at Discovery Park	1994–2004	139	13.3	100.0%	99%	66%
Urban	Arcade Creek at Norwood Ave.	1999–2004	31	54.3	96%	65%	19%
Ag Drains	Colusa Basin Drain above KL	1999–2004	31	75.1	97%	75%	23%
	Sacramento Slough	1999–2004	29	19.1	100 %	86%	12%
	Yolo Bypass near Woodland	1997-1998	10	223.7	70%	8.8%	0.1%

Fish Tissue

Threshold Values

Mercury concentrations in composite and individual fish tissue samples were compared with several different advisory thresholds and criteria for mercury in fish tissue (all expressed as wet weight) (Table 7). Human health-based limits range from 1.0 mg/kg (the Food and Drug Administration (FDA) Action Level applicable to commercially-caught fish), to 0.30 mg/kg (national ambient water quality criterion for protection of human health; USEPA 2001a), to 0.14 mg/kg (SFBRWQCB 1995). USEPA fish tissue advisory criteria for protection of wildlife in the Great Lakes, as revised in the 1997 Mercury Report to Congress, range from 0.68 mg/kg to 0.028 mg/kg. These criteria and screening values are risk-based advisory values against which tissue concentrations can be compared to determine whether more intensive monitoring, evaluation, or risk management (e.g. consumption advisories) are warranted. Note that these risk-based values are based on assumed fish consumption rates for humans (6.5 g/day to 30 g/day) or for wildlife species. For individuals or populations consuming more or less fish than assumed for a specific limit or screening value, the risk of adverse health effects is correspondingly increased or decreased. Additionally, each criterion or screening value is calculated from a reference dose (RfD) based on a daily intake level estimated not to cause adverse effects, and a safety factor to account for uncertainties in the reference dose. The current USEPA human health-based reference dose incorporates a safety factor of 10, and reference doses for birds and mammalian wildlife range from 2 to 10. The consumption rate and reference dose associated with each limit are also specified in Table 7.

Comparison with Fish Tissue Threshold Values

Fish tissue data from the 2003-2004 monitoring effort were compared with fish tissue advisory values[2]. The concentrations of mercury accumulated in fish are known to be species specific, with predatory upper trophic level fish (e.g. Trophic Levels 3 and 4) having higher mercury concentrations. Additionally, concentrations of mercury are size- and age-dependent within a given species, with older, larger fish typically having higher mercury concentrations. (The process which produces these conditions is termed "biomagnification".) To control for these species-, age-, and size-dependent effects, SRWP fish tissue monitoring focused on mercury concentrations in individual fish and composite samples comprised of fish of similar legal catchable size. Where there were sufficient numbers of a particular species, tissue concentrations were plotted against length to illustrate this relationship (Figure 2, for largemouth bass, and Figure 3 for Sacramento sucker and pikeminnow).

During the reduced 2003-2004 monitoring effort, three sites were sampled for fish: Sacramento River at Mile 44, Feather River at Nicolaus, and American River at Discovery Park. A total of 14 samples were analyzed, comprised of composites of largemouth bass, Sacramento pikeminnow, and Sacramento sucker. Average mercury concentrations are presented for each species and location in Table 8. Average mercury concentrations are also summarized by waterbody type, species, and trophic level[3] in Table 9, and the consumption-weighted average is provided for each waterbody type. The consumption-weighted average is an estimate of the average concentration of mercury for the total freshwater and estuarine fish consumed, and assumes that a combination of trophic level 3 and trophic level 4 fish are consumed. While the approach has not been adopted as official policy, USEPA Region 4 used this method for a TMDL developed for the Savannah River in Georgia, in which the consumption-weighted average was compared directly to the fish tissue-based water quality criterion for methylmercury (0.3 mg/kg) to evaluate whether a waterbody should be considered impaired (USEPA 2001b). The approach is also consistent with the development of the methylmercury criterion (USEPA 2001a), which also assumes that fish consumed consist of a mix of different trophic level species. The consumption-weighted average mercury concentration is calculated as follows:

Consumption-Weighted Average = (57% x *Trophic Level 3 avg.*) + (43% x *Trophic Level 4 avg.*).

The percentages used for trophic levels 3 and 4 (TL3 and TL4) in this equation are based on assumptions used by USEPA in development of the methylmercury criterion, which assumed consumption of TL2, TL3, and TL4 species in proportions of 21.7%, 45.7%, and 32.6%, respectively (USEPA 2001a). For the purpose of this analysis for the SRWP, it was assumed that no TL2 species were consumed and the TL2 percentage was apportioned equally between TL3 and TL4 species. It should be noted that the USEPA default consumption rates and TL3 and TL4 percentages may not be appropriate for consumers in the Sacramento River watershed, and should ideally be adjusted based on site-specific consumption information. Fish consumption patterns for the Sacramento River watershed are being investigated by the Delta Tributaries Mercury Council

[2] All SRWP fish tissue data presented are for edible fillets with skin off.

[3] "Trophic level" describes the position of a species in the food chain, determined by the number of energy-transfer steps to that level. Trophic level 3 fish consume primarily zooplankton and benthic invertebrates. Trophic level 4 fish preferentially consume trophic level 3 and lower trophic level fish species, as well as benthic invertebrates. Larger individuals of some primarily trophic level 3 species (e.g. trout) may be piscivorous and function at trophic level 4.

of the SRWP. Additionally, although a consumption-weighted average should ideally be calculated separately for each waterbody, there were insufficient data to perform these calculations for each location and waterbody. However, species average concentrations were similar within each defined waterbody category, so grouping the locations within these broad waterbody categories appeared to provide characterizations that were also reasonable for the individual waterbodies.

Comparisons of tissue mercury concentrations to fish tissue advisory values for 1997-2004 data are summarized below.

- A total of 15 fish species are represented in the data set, including seven trophic level 3 species and eight trophic level 4 species (Table 8 and Table 9). The average mercury concentrations for combined trophic level 3 species (0.9–0.27 mg/kg) were lower than the 0.3 mg/kg criterion for all waterbody categories sampled (Ag drains, tributaries, major tributaries, the Sacramento River from Keswick to the I Street Bridge, and Delta sites including Cache Slough and the Sacramento River at Mile 44 below I Street Bridge). Average mercury concentrations calculated individually for each of the seven trophic level 3 species (84 total samples) were also below 0.3 mg/kg for all locations and waterbody categories, with the exception of splittail and smallmouth bass samples (0.37 and 0.57 mg/kg, respectively) collected from Sacramento River at Mile 44.
- The average mercury concentrations for combined trophic level 4 species (0.32–0.82 mg/kg) were greater than the 0.3 mg/kg criterion for every waterbody category sampled. Average mercury concentrations calculated individually for each of the eight trophic level 4 species (229 total samples) were greater than 0.3 mg/kg for most locations and waterbody categories, with the following exceptions: Sacramento pikeminnow in the Sacramento River mainstem from Bend Bridge to River Mile 44, white catfish and crappie in Colusa Basin Drain, white catfish in Natomas East Main Drain and Putah Creek, and smallmouth bass in Chico Creek and Deer Creek all had average mercury concentrations lower than 0.3 mg/kg.
- Average mercury concentrations in fish tissue exceeded the USEPA criterion (0.3 mg/kg) in largemouth bass from all waterbody types and locations sampled, and average concentrations in white catfish exceeded the USEPA criterion in six of nine sites sampled (Table 8). These two species were collected from lower Sacramento River and Delta sites, agricultural drains, and major and lesser tributaries from Keswick to Cache Slough. (Note: no white catfish were sampled in 2003-2004)
- Most largemouth bass collected also exceeded the USEPA 1996 Screening Value (0.6 mg/kg), and a number of individual largemouth bass collected from the American River, Feather River, and Sacramento River at River Mile 44 (Figure 2), and from Cache Slough exceeded the FDA Action Level of 1.0 mg/kg.
- All striped bass sampled (n = 8) exceeded the 0.3 mg/kg criterion (Figure 3). Striped bass exhibited the highest average mercury concentration (1.2 mg/kg) for any species sampled, and included the highest mercury concentration of any sample (3.5 mg/kg) for a single large individual fish (~33 inches long) collected from the Feather River at Nicolaus.
- Consumption-weighted average mercury concentrations were highest (0.45 mg/kg) for the two major tributaries sampled (American River and Feather River), and also exceeded the 0.3 mg/kg criterion for the two Delta locations sampled (0.33 mg/kg, Sacramento River at Mile 44 and Cache Slough). Consumption-weighted averages were lower than the 0.3 mg/kg criterion for smaller tributaries (0.23 mg/kg), the Sacramento River from Keswick to the “I” Street Bridge (0.27 mg/kg), and the two agricultural drains (0.27 mg/kg, Colusa Basin Drain and Sacramento Slough). The single urban drainage (Natomas East Main Drain) was represented by only trophic level four species with an average of 0.57 mg/kg.

Table 7. Criteria and Screening Values for Mercury in Fish Tissue

Basis for Limit	Criterion or Screening Value[1], mg/kg	RfD, µg/kg/day	Body Weight, kg	Consump-tion Rate, kg/day	Reference
Human Health	1.0	0.47	60	0.0284	FDA Action Level[2] (vm.cfsan.fda.gov/~dms/)
	1.0	0.3	60	0.018	ATSDR 1999 (www.atsdr.cdc/gov/press/ma990419.html)
	0.6	0.06	60	0.065	USEPA Screening Value (USEPA 1993)
	0.33	0.1	60	0.018	Mercury Report to Congress, Vol. VI (USEPA 1997)
	0.14	0.06	70	0.030	SFBRWQCB Screening Value (SFBRWQCB 1995)
	0.23	0.1	70	0.030	OEHHA and SFEI Screening Value (OEHHA 1999, SFEI 1999a)
	0.3	0.1	70	0.0175	Ambient Water Quality Criterion for Human Health (USEPA 2001)
Wildlife[4]	0.08 0.34	Hg criterion in trophic level 3 fish Hg criterion in trophic level 4 fish (See USEPA 1997 for calculations)			Mercury Report to Congress, Vol. VI (USEPA 1997)

(1) Expressed as mg/kg wet weight. Values are calculated as (RfD x Body Weight) ÷ Consumption Rate.

(2) The FDA Action Level is intended to apply only to commercially caught fish, and not to locally-caught or sport fish.

(3) The USEPA 2001 criterion also assumes that a specific proportion of 3 trophic levels of fish are consumed—.0038 kg/day Trophic Level 2 (21.7%), .0080 mg/day Trophic Level 3 (45.7%), and .0057 kg/day Trophic Level 4 fish (32.6%).

(4) Lowest average criterion, based on the average for all mammalian wildlife species studied in Mercury Report to Congress.

Table 8. Mercury in Fish Tissue, Concentrations by Species and Location

		Hg in Fish Tissue, mg/kg, Wet Weight					
Type	**Location**	**Species (size range, mm)**	**n**	**Mean**	**Std Dev**	**Min**	**Max**
Delta	Cache Slough	Carp (352)	1	0.11	–		
		Crappie (231)	1	0.32	–		
		Largemouth Bass (270-560)	18	0.71	0.290	0.31	1.27
		Sacramento Sucker (394)	1	0.11	–		
		White Catfish (228-385)	21	0.50	0.193	0.14	1.00
	Sacramento R. at Mile 44	Bluegill (185)	1	0.10	–		
		Largemouth Bass (227-392)	31	0.88	0.30	0.18	1.37
		Pike Minnow (252-271)	2	0.15	0.046	0.11	0.18
		Sacramento Sucker (452)	4	0.20	0.05	0.12	0.23
		Smallmouth Bass (338)	1	0.57	–		
		Splittail (388)	1	0.37	–		
		Striped Bass (450)	1	0.34	–		
		White Catfish (207-345)	30	0.40	0.240	0.16	1.14
Mainstem	Sacramento R. below Keswick	Rainbow Trout (321-422)	4	0.03	0.016	.003	0.04
	Sacramento R. above Bend Bridge	Pike Minnow (254)	1	0.12	–		
		Rainbow Trout (313-350)	2	0.04	0.008	0.03	0.04
		Sacramento Sucker (457)	1	0.10	–		
	Sacramento R. near Hamilton City	Pike Minnow (286-298)	2	0.25	0.052	.22	0.29
		Sacramento Sucker (316-322)	2	0.03	0.001	.03	0.03
	Sacramento R. at Colusa	Carp (398)	1	0.19	–		
		Pike Minnow (275-278)	2	0.22	0.108	0.15	0.30
		Sacramento Sucker (290)	1	0.06	–		
		Striped Bass (451)	1	0.30	–		
	Sacramento R. at Veterans Bridge	Largemouth Bass (335-371)	2	0.89	0.099	0.82	0.96
		Pike Minnow (266)	1	0.25	–		
		Sacramento Sucker (318)	1	0.10	–		
		White Catfish (249-264)	2	0.38	0.239	0.21	0.55
Major Tributary	American River at Sunrise	Sacramento Sucker (462)	1	0.20	–		
	American R. at J Street	Largemouth Bass (375)	1	0.66	–		
		Pike Minnow (248-265)	2	0.49	0.084	0.43	0.54
		Sacramento Sucker (249-266)	2	0.09	0.010	0.08	0.10
	American R. at Discovery Park	Largemouth Bass (324-471)	8	0.93	0.42	0.43	1.43
		Pike Minnow (278-339)	6	0.35	0.12	0.17	0.45
		Redear Sunfish (169-193)	2	0.19	0.159	0.08	0.30
		Sacramento Sucker (314-489)	6	0.23	0.10	0.09	0.35
		Striped Bass (559)	1	0.28	–		
		White Catfish (262-274)	2	0.39	0.185	0.26	0.52
	Feather River above Bear River	Redear Sunfish (159)	1	0.10	–		
		Sacramento Sucker (497)	1	0.27	–		
	Feather R. near Nicolaus	Bluegill (184)	1	0.12	–		
		Channel Catfish (479)	1	0.73	–		
		Largemouth Bass (233-495)	34	0.76	0.48	0.21	2.35
		Pike Minnow (255-500)	7	0.77	0.41	0.19	1.38
		Redear Sunfish (154)	1	0.22	–		
		Sacramento Sucker (469)	1	0.28	–		
		Striped Bass (441-817)	5	1.59	1.172	0.32	3.5
		White Catfish (205-670)	10	0.70	0.315	0.39	1.25

Table 8. Mercury in Fish Tissue, Concentrations by Species and Location
(Continued from previous page)

		Hg in Fish Tissue, mg/kg, Wet Weight					
Type	**Location**	**Species (size range, mm)**	**n**	**Mean**	**Std Dev**	**Min**	**Max**
Tributary	Clear Creek at Mouth	Largemouth Bass (376)	1	0.45	–		
		Rainbow Trout (359)	1	0.05	–		
	McCloud R. above Shasta	Rainbow Trout (274)	1	0.05	–		
	Pit R. above Shasta	Rainbow Trout (332)	1	0.05	–		
	Sacramento R. above Shasta	Rainbow Trout (318-321)	2	0.06	0.004	0.057	0.063
	Clear Cr. at Reading Bar	Rainbow Trout (NA)	2	0.03	0.018	0.02	0.05
		Riffle Sculpin (NA)	2	0.12	0.051	0.09	0.16
	Clear Cr. above Whiskeytown	Rainbow Trout (NA)	2	0.05	0.000	0.05	0.05
		Riffle Sculpin (NA)	3	0.14	0.065	0.10	0.21
	Clear Cr. at Hwy 273	Riffle Sculpin (NA)	1	0.24	–		
	Mill Cr. at Black Rock	Riffle Sculpin (NA)	2	0.34	0.018	0.33	0.35
	Mill Cr. at Hwy 99	Riffle Sculpin (NA)	2	0.28	0.006	0.28	0.29
	Deer Cr. below Childs Meadow	Rainbow Trout (NA)	2	0.02	0.000	0.02	0.02
		Riffle Sculpin (NA)	2	0.03	0.010	0.02	0.03
	Deer Cr. at Hwy 99	Riffle Sculpin (NA)	2	0.06	0.028	0.04	0.08
		Smallmouth Bass (NA)	2	0.06	0.022	0.04	0.08
	Big Chico Cr. at Hwy 32	Rainbow Trout (NA)	3	0.04	0.004	0.037	0.044
	Big Chico Cr. near mouth	Largemouth Bass (359)	1	0.33	–		
		Pike Minnow (288)	1	0.48	–		
	Big Chico Cr. at Hwy 99	Riffle Sculpin (NA)	2	0.16	0.025	0.15	0.18
		Smallmouth Bass (NA)	2	0.18	0.076	0.12	0.23
	Putah Creek	Bluegill (112-135)	6	0.12	0.037	0.07	0.16
		Largemouth Bass (210-425)	17	0.43	0.187	0.10	0.82
		Sacramento Sucker (383)	1	0.19	–		
		White Catfish (470)	1	0.15	–		
	Upper Putah Creek	Brown Trout (301)	1	0.06	–		
Ag Drain	Sacramento Slough	Largemouth Bass (355-381)	3	0.48	0.034	0.44	0.51
		White Catfish (262-274)	3	0.51	0.115	0.44	0.64
	Colusa Basin Drain near KL	Carp (372-504)	4	0.21	0.133	0.11	0.41
		Crappie (241)	1	0.08	–		
		White Catfish (259-288)	2	0.26	0.066	0.21	0.30
Urban	Natomas East Main Drain	Largemouth Bass (332-367)	3	0.64	0.041	0.60	0.68
		Striped Bass (494)	1	0.81	–		
		White Catfish (258-276)	2	0.25	0.053	0.21	0.29

Table 9. Mercury in Fish Tissue, Summarized by Waterbody Type and Trophic Level

	Species	Trophic Level(1)	N	Mean	Std. Dev.	Species-Weighted Trophic Level Average(2)	Consumption-Weighted Average(3)
				Hg concentrations in fish tissue, mg/kg, wet weight			
Ag Drains (Sac. Slough, Colusa Drain)	Carp	3	4	0.215	0.133	0.215	0.268
	Crappie	4	1	0.078	–	0.322	
	Largemouth Bass	4	3	0.480	0.034		
	White Catfish	4	5	0.407	0.162		
Urban (Natomas E. Main Drain)	Largemouth Bass	4	3	0.645	0.041	0.567	0.567
	Striped Bass	4	1	0.808	–		
	White Catfish	4	2	0.248	0.053		
Tributaries (above Shasta, Clear Cr, Mill Cr, Deer Cr, Big Chico Cr, Putah Cr)	Bluegill	3	6	0.118	0.037	0.114	0.234
	Brown Trout	3	1	0.056	–		
	Rainbow Trout	3	14	0.042	0.014		
	Riffle Sculpin	3	16	0.166	0.107		
	Sacramento Sucker	3	1	0.185	–		
	Smallmouth Bass	3	4	0.119	0.082		
	Largemouth Bass	4	19	0.428	0.178	0.353	
	Pike Minnow	4	1	0.484	–		
	White Catfish	4	1	0.146	–		
Major Tributaries (Yuba R, Feather R, American R)	Bluegill	3	1	0.121	–	0.168	0.449
	Redear Sunfish	3	4	0.174	0.106		
	Sacramento Sucker	3	11	0.210	0.095		
	Channel Catfish	4	1	0.729	–	0.821	
	Largemouth Bass	4	43	0.787	0.461		
	Pike Minnow	4	15	0.563	0.348		
	Striped Bass	4	6	1.376	1.177		
	White Catfish	4	12	0.650	0.314		
Lower Mainstem (Keswick to "I" Street Bridge)	Carp	3	1	0.186	–	0.093	0.271
	Rainbow Trout	3	6	0.030	0.014		
	Sacramento Sucker	3	5	0.064	0.035		
	Largemouth Bass	4	2	0.888	0.099	0.449	
	Pike Minnow	4	6	0.221	0.074		
	Striped Bass	4	1	0.303	–		
	White Catfish	4	2	0.384	0.239		
Delta (Sacramento River below "I" Street, Cache Sl.)	Bluegill	3	1	0.103	–	0.265	0.329
	Carp	3	1	0.107	–		
	Sacramento Sucker	3	5	0.179	0.059		
	Smallmouth Bass	3	1	0.568	–		
	Splittail	3	1	0.369	–		
	Crappie	4	1	0.315	–	0.413	
	Largemouth Bass	4	49	0.817	0.304		
	Pike Minnow	4	2	0.147	0.046		
	Striped Bass	4	1	0.343	–		
	White Catfish	4	51	0.442	0.224		

What Do The Results Tell Us About Attainment Of Beneficial Uses And Potential Impairment, And How Does This Compare With Any Relevant 303(d) Listings?

The beneficial uses at greatest potential risk from elevated mercury concentrations are wildlife protection and human health protection related to the consumption of fish, and therefore fish tissue concentrations are considered the best available indicator of potential impairment. An interim sport fish consumption advisory is currently in effect for the San Francisco Bay and Delta Region for elevated concentrations of mercury and other chemicals. Sport fish consumption advisories are also in effect for elevated mercury concentrations in fish in Clear Lake and Lake Berryessa.

The California Office of Environmental Health and Hazard Assessment (OEHHA) has also issued an interim advisory and consumption guidance for Black Butte Reservoir in the Stony Creek Watershed, and fish consumption advisories for a number of Sierra foothill reservoirs and streams (Lake Natoma and the lower American River, Camp Far West Reservoir, Lake Combie, Lake Englebright, Rollins Reservoir, Scotts Flat Reservoir, Deer Creek, Bear and South Yuba Rivers). Based on these advisories (which recommend limiting consumption of specific sizes and species of fish), the local sportfishing beneficial use has been described by the Regional Board and SWRCB as impaired in the Bay, in the Delta, and in a number of Sacramento River watershed waterbodies.

A number of both mainstem and tributary reaches in the Sacramento River watershed are included for mercury on the California 2002 303(d) list (Table 10). The CVRWQCB used a more conservative approach to determine impairment than used by USEPA to develop the methylmercury criterion or the Savannah River TMDL (USEPA 2001a, 2001b). The CVRWQCB compared average concentrations only in trophic level 4 species with the 0.3 mg/kg USEPA criterion, and considered trophic level 3 species only when there were “limited” data for trophic level 4 fish. With only one exception, all of the current and recommended 303(d) listings for mercury are based on elevated concentrations of mercury in fish tissue, and abandoned mines are cited as the major or only source of mercury.

With the exception of Cache Creek, the waterbodies included on the 303(d) list had a fairly high frequency of compliance with the CTR criterion of 50 ng/L (97-100%) and the USEPA 1985 criterion of 12 ng/L (>70%) for total mercury concentrations in water. Conversely, with the exceptions of the Sacramento River at Hamilton City and the American River at Discovery Park, 303(d)-listed waterbodies had relatively low rates of compliance (less than 40%) with the Great Lakes 3.1 ng/L human health objective for total mercury in water (Table 6). Fish tissue data indicated that concentrations of mercury in trophic level 4 species (particularly largemouth bass, white catfish, and striped bass) frequently exceed screening values at a number of locations in the lower watershed. Based on comparisons of consumption-weighted average tissue mercury concentrations to the recently-adopted 0.3 mg/kg USEPA criterion, SRWP fish tissue data generally support the need for fish consumption advisories already in effect for the lower American River, the lower Feather River, and Sacramento Slough, and indicate that advisories should be evaluated for one additional agricultural drain (Colusa Basin Drain) and an urban drainage (Natomas East Main Drain) which also includes the Arcade Creek drainage. These same data also indicate that potential health risks are lower for the Sacramento River mainstem from Keswick to River Mile 44 (which is technically in the Delta) and for most smaller tributaries throughout the watershed, for consumers of a mix of trophic level 3 and 4 fish. Potential health risks are of course higher for individuals that are smaller than 70 kg or that consume higher than average amounts of fish, or for those consuming primarily trophic level 4 species (especially largemouth bass, white catfish, or striped bass). However, because the USEPA criterion for methylmercury includes substantial margins of safety, moderate differences in the rates of consumption and percentages of TL3 and TL4 species would not result in greatly increased risks. Potential risks may also vary significantly for specific waterbodies within each waterbody category, but these differences appear to be relatively small since mercury concentrations were generally similar in fish from the different locations monitored within each category.

Based in part on SRWP fish tissue data, the CVRWQCB's update to the 2002 303(d) list changed the upstream limit of the mercury-impaired reach of the mainstem Sacramento River from Red Bluff to Knight's Landing and reduced the total mercury-impaired length from 30 to 16 miles of river. Based on guidance from OEHHA, the available fish tissue data from the SRWP are not yet sufficient to support additional consumption advice from OEHHA in the Sacramento River watershed. However, SRWP fish tissue data for the lower Sacramento River watershed and the addition of ten waterbodies to the 2002 303(d) list for mercury in fish tissue, as well as the additional advisories issued by OEHHA in 2003, clearly indicate a need for continued evaluation of potential human health and wildlife concerns in these waterbodies. The SRWP is continuing to investigate these concerns with fish tissue monitoring performed in the fall of 2005. The SRWP effort is coordinating with extensive fish tissue monitoring efforts conducted by SFEI and the CVRWQCB in the Sacramento River watershed for this purpose.

Table 10. Waterbodies Listed For Mercury On the California 2002 303(d) List

Waterbody	Listed Source of Mercury	Area Affected		Fish Advisory
Delta Waterways	Resource Extraction	43,991	Acres	Yes
Clear Lake	Resource Extraction	40,070	Acres	Yes
Berryessa Lake	Resource Extraction	19,083	Acres	Yes
Black Butte Reservoir	Resource Extraction	4,507	Acres	Yes(2)
Camp Far West Reservoir	Resource Extraction	1,945	Acres	IPHN(1)
Rollins Reservoir	Resource Extraction	774	Acres	IPHN(1)
Lake Englebright	Resource Extraction	754	Acres	IPHN(1)
Scotts Flat Reservoir	Resource Extraction	660	Acres	IPHN(1)
Lake Combie	Resource Extraction	362	Acres	IPHN(1)
Davis Creek Reservoir	Resource Extraction	163	Acres	No
Cache Creek	Resource Extraction	96	Miles	No
Feather River, Lower	Resource Extraction	42	Miles	No
Putah Creek, Lower	Resource Extraction	28	Miles	No
American River, Lower	Resource Extraction	27	Miles	No
Sacramento River (Knight's Landing To Delta)	Resource Extraction	16	Miles	No
Bear Creek	Resource Extraction	15	Miles	No
Sulfur Creek	Resource Extraction	14	Miles	No
Bear River, Upper	Resource Extraction	10	Miles	IPHN(1)
James Creek	Resource Extraction	6.3	Miles	No
Harley Gulch	Resource Extraction	6	Miles	No
Little Deer Creek	Resource Extraction	4.1	Miles	IPHN(1)
Humbug Creek	Resource Extraction	2.2	Miles	No
Sacramento Slough	Source Unknown	1.7	Miles	No

(1) Interim Public Health Notification issued by Placer, Nevada, and Yuba counties.

(2) Draft Advisory issued by OEHHA, 2000.

SPATIAL DISTRIBUTIONS AND PATTERNS

Evaluations of spatial distribution based primarily on water quality data collected between 1994 and 2003 by the SRWP and other monitoring programs have been presented in detail in previous SRWP Annual Monitoring Reports. Because monitoring performed by SRWP in 2003-2004 represents only a small incremental addition to these data, the analyses were not updated. A summary of significant findings from those evaluations follows. The complete 2003-2004 SRWP water column data set is provided in Appendix A. Fish tissue data reviewed in this section are also presented in Appendix C.

Water Column

Water column total mercury concentrations in the mainstem Sacramento River generally increased with distance downstream from the Keswick Reservoir discharge (Figure 4). A significant proportion of the increase occurs between Keswick and Colusa, with more than a four-fold increase in median concentrations (from 1.1 ng/L to 5.1 ng/L). Median total mercury concentrations in the mainstem increased more moderately below Colusa to the Sacramento below the confluence with the Feather River (by about 40%). Concentrations in the mainstem decreased slightly below the American River confluence (by about 10%). In the Sacramento River below the American River confluence, there was no apparent trend in total mercury concentrations (Sacramento River at Freeport, River Mile 44, and Greene’s Landing).

Total mercury concentrations at the mouth of the Feather River system were midway between those in the Sacramento River at Colusa and Veterans Bridge. Concentrations in the Yuba and American rivers were much lower than either the lower Sacramento or Feather rivers. Total mercury concentrations in Arcade Creek, and the two agricultural drains monitored are substantially higher than concentrations anywhere in the mainstem Sacramento River.

Concentrations of total mercury in particulate matter (expressed as ng of particulate total mercury per gram of suspended solids) were also evaluated using data collected between 2000-2003 (Figure 5). The distribution of mercury concentrations in suspended solids in the mainstem exhibits a similar pattern of increase to that of total mercury. Although concentrations of mercury in particulates are substantially higher in the major tributaries and some lesser tributaries than in the mainstem, the effect of this difference on loads is offset by much lower concentrations of suspended solids. The exceptions to this pattern are Colusa Basin Drain and Sacramento Slough, which had relatively low mercury concentrations in particulates and high concentrations of suspended solids compared to the mainstem.

SRWP special studies conducted in 2000 by USGS (Domagalski 2000) and in 2001 by Pacific Ecorisk to identify potential sources of the observed increase in mercury between Red Bluff and Colusa confirmed that Mill Creek was a significant source of mercury during some storm events. Although Mill Creek discharges at the time of this USGS study were relatively low, discharges as high as 14,000 cfs have been recorded on Mill Creek (January 1997) and could be responsible for much greater loads than demonstrated by earlier monitoring. The USGS study also concluded that there were also other significant sources of mercury in this stretch of the river. It was determined that Elder Creek (on the West side of the valley) and Antelope Creek (on the East side of the valley) were probably not significant sources, but Thomes Creek was identified as a potentially significant source of mercury. Previous monitoring in Thomes Creek and Cottonwood Creek for the USGS NAWQA program indicated that mercury concentrations in bed sediments from these drainages were similar to those in sediments collected in the Sacramento River mainstem above the Feather River confluence (Domagalski *et al.* 2000). The same USGS study concluded that there was no evidence of elevated natural or anthropogenic sources of mercury in the Thomes Creek or Cottonwood Creek watershed. Limited data also suggest that Cottonwood Creek and Battle Creek may be responsible for a substantial proportion of the increase in mercury concentrations observed in the Sacramento River between Keswick and Bend Bridge. For the events monitored by the SRWP, mercury loads from these two drainages accounted for 10% to 70% of the increase in daily loads observed between Keswick and Bend Bridge, with larger percentages estimated for higher flow events.

Total methylmercury concentrations measured in the mainstem Sacramento River by SRWP in 2000-2002 exhibit a similar spatial distribution pattern to that for total mercury (compare Figure 4 and Figure 6). Median unfiltered methylmercury concentrations in the mainstem Sacramento River also exhibited a dramatic (more than six-fold) increase from less than 0.02 ng/L below Keswick to 0.12 ng/L at Veterans Bridge. An interesting deviation from the pattern observed for total mercury was observed in the Sacramento River below the American River confluence. A similar decrease was observed below the American River confluence for the Sacramento River at Freeport, but methylmercury concentrations appeared to increase substantially between Freeport and River Mile 44, and then decrease again at Greene's Landing to concentrations below those at Freeport. Although the influence of the Sacramento Regional Wastewater Treatment Plant below Freeport may explain some of the increase in methylmercury at River Mile 44, there is no obvious explanation for the observed decrease at Greene's Landing in 2000-2001 (Greene's Landing was not monitored by SRWP after 2001). Greene's Landing data exhibit a lower range of TSS and methylmercury concentrations than the larger data sets for Freeport and River Mile 44. However, methylmercury concentrations were also consistently lower at Greene's Landing while TSS concentrations were similar at all three sites during the period when all three lower Sacramento River sites were monitored (June 2000 to June 2001).

Methylmercury data for the tributaries to the Sacramento River exhibit patterns that differ somewhat from total mercury concentrations (Figure 4 and Figure 6). Because methylmercury is a non-conservative pollutant (i.e., mass is not necessarily conserved in the form of methylmercury due to methylation and demethylation processes), source assessments based on apparent differences in concentration must be made with caution. However, it is interesting to note that nearly all of the increase observed in Sacramento River mainstem methylmercury concentrations occurs before confluences with the major tributaries. Additionally, methylmercury concentrations observed in the Feather and Yuba Rivers were not high enough to account for increases below the confluence with the Feather River. Methylmercury concentrations in the Yuba and Feather River were similar to those in the Sacramento River above the confluence with the Feather River, while concentrations in the lower American River were still well below concentrations above its confluence with the Sacramento River. In Cottonwood Creek, Battle Creek, Mill Creek and Thomes Creek watersheds, methylmercury concentrations were observed to increase substantially toward the lower reaches of each watershed, and concentrations were higher in the mouths of these tributaries than in the Sacramento River at each confluence. Concentrations in these tributary drainages also tended to be much more variable than observed in the Sacramento River mainstem or major tributaries. Methylmercury concentrations were also higher in Sacramento Slough, Colusa Basin Drain, and Arcade Creek (with concentrations approximately 50% to more than 100% higher than those measured in the mainstem). Although the flows from these sources are relatively small compared to the mainstem, these sources may cumulatively account for a substantial proportion of the increase in mainstem methylmercury concentrations and loads. However, the patterns observed in mainstream methylmercury concentrations suggests that increases are due in large part to methylation of instream mercury sources in the Sacramento River.

Concentrations of methylmercury in particulate matter (expressed as ng of particulate methylmercury per gram of suspended solids) in the mainstem exhibit no apparent spatial trend between Hamilton City and Greene's Landing (2000-2003 data, Figure 7). Colusa Basin Drain and Sacramento Slough exhibited methylmercury concentrations in particulates that were similar to the lower mainstem Sacramento River, but with much higher concentrations of suspended solids. Concentrations of methylmercury in particulates were dramatically higher in the major tributaries than in the mainstem. As noted for total mercury, the effect of this difference on loads is offset by much lower concentrations of suspended solids from these drainages. However, this pattern does suggest a mechanism for the high concentrations of mercury observed in fish tissue in the lower American River and Feather River. Assuming that rates of consumption of particulate matter by lower trophic level organisms are similar from drainage to drainage, higher concentrations of methyl mercury in particulate matter would account for the relatively higher rates of bioaccumulation through the food chain at these locations.

Fish Tissue

Fish tissue samples (typically consisting of composites of five fish each) have been collected from 30 locations ranging from the Sacramento River above Lake Shasta to Cache Slough (near Rio Vista) in the Delta. Fish were collected during the months of September and October from 1997 to 2003. A total of 15 fish species have been sampled, including seven trophic level 3 species and eight trophic level 4 species. Mercury concentrations in fish tissue are dependent not only on water column concentrations of bioavailable mercury, but also on the productivity of the waterbody (e.g. oligotrophic vs. eutrophic) and the trophic level, feeding patterns, and age of the fish. For these reasons, mercury concentrations in trophic level 3 species (e.g. rainbow trout), should not be directly compared with concentrations in trophic level 4 species (e.g. largemouth bass) as a means of inferring spatial differences in levels of bioavailable mercury. Examination of the average tissue mercury concentrations for each trophic level (Table 9) provides a less biased view of regional patterns in fish tissue concentrations, but comparisons should ideally be based on a similar size for each species. For this reason, most species were collected within a narrow size range and results are reasonably comparable from site to site. However, white catfish and largemouth bass were collected over a somewhat larger size range than other species, and where possible, potential biases due to the different sizes collected at a site were considered by normalizing to a standard size for each species.

Spatial patterns in average mercury concentrations for each trophic level are generally similar to the patterns discussed previously for consumption-weighted averages. The average tissue mercury concentrations for trophic level 4 species were highest for the two major tributaries (Feather River and American River), and concentrations were lowest in trophic level 4 species from agricultural drains and smaller tributaries. Average tissue mercury concentrations in trophic level 3 species were generally similar in agricultural drains, major tributaries, and the two Delta locations, and were lowest in fish from the lower mainstem and lesser tributaries. Average tissue mercury concentrations in trophic level 4 species were highest in the major tributaries and were lower by about a factor of two in the lower Sacramento River mainstem (from Keswick to the "I" Street Bridge), the two Delta sites (Sacramento River at Mile 44 and Cache Slough), and in the two agricultural drains (Colusa Basin Drain and Sacramento Slough). The one location in an urban drainage (Natomas East Main Drain) was represented only by trophic level 4 species, with an average concentration that was about 30% higher than fish from lower mainstem and Delta locations, and about 66% higher than fish from ag drains and lesser tributaries.

This pattern in fish tissue concentrations exhibits at least one interesting contrast with the spatial pattern observed for the water column mercury and methylmercury concentrations—in 2000-2003 mercury and methylmercury concentrations in the Feather and American rivers were generally lower than or similar to concentrations observed in the mainstem, while average fish tissue mercury concentrations were approximately twice as high in the two tributary locations as in the mainstem Sacramento River. Because the mercury concentrations in fish tissue integrate bioavailable mercury concentrations in water over a period of several years, these results suggest several possibilities: (1) that the pattern observed in water column concentrations of total mercury and methylmercury in 2000-2003 may not be representative of typical conditions over a longer period; (2) that average water column concentrations of total mercury and methylmercury are not the single most important factor controlling fish tissue mercury concentrations. The results of comparisons between concentrations of the particulate fraction of methylmercury and suspended solids suggests a possible cause for this pattern. The relatively high concentrations of particulate methylmercury per unit of suspended solids at the major tributary locations would result in the lower trophic level species (benthic invertebrates and zooplankton) consuming and accumulating greater amounts of methylmercury than at locations with relatively low particulate methylmercury concentrations. These organisms are part of the base of the food web and consequently pass on the accumulated methylmercury to higher trophic level fish.

An ongoing study conducted by CVRWQCB is also investigating relationships between water column methylmercury and fish tissue mercury concentrations in the Sacramento River watershed. Results from this study are expected to become available in 2006 and should provide additional insight into causes of spatial variation in fish tissue mercury.

TEMPORAL DISTRIBUTION AND PATTERNS

Unfiltered total mercury concentrations in the water column exhibit strong seasonal patterns in the mainstem Sacramento River and major tributaries. Concentrations of total mercury typically peak following early wet season precipitation and with increased river flows of the early wet season (typically in November-December), and then decrease steadily through the remainder of the year. In general, this pattern is consistent with the seasonal mobilization of fine-grained particulates in river sediments and runoff deposited during the dry season and during lower stream flows. Mercury tends to adsorb to fine grained sediments, leading to the close correlation between sediment transport and mercury transport phenomena. This pattern appears to be consistent at all the mainstem Sacramento River sites monitored between Redding and River Mile 44, and in the major tributaries in the lower watershed (the Feather River, Yuba River, and American River). This pattern is less distinct for total mercury concentrations in the agricultural drainage-dominated Colusa Basin Drain and Sacramento Slough.

Longer term trends in water column and particulate total mercury concentrations were also examined as simple regressions of concentrations over time (1994 – 2003) for the lower Sacramento River and American River (illustrated for the Sacramento River at Freeport in Figure 8; not illustrated for other locations). Regressions for all five locations examined exhibited significant decreasing trends ($p < 0.05$) in filtered and unfiltered total mercury. The rates of decrease in filtered and unfiltered total mercury were similar at all five locations (between 10% to 15% per year). There were also significant decreases in concentrations of particulate total mercury normalized to suspended solids concentrations. These decreases were again similar at the three lower Sacramento River locations (9% - 11% decreases per year), but were steeper at the two American River locations (24% - 26% decreases per year). Although these decreases were significant and dramatic over the period of available data, it can not necessarily be expected that this trend will continue, and there is some evidence that the high concentrations at the beginning of the 1994 – 2003 period may have been anomalous. Four of the five years preceeding this period were very low water years (1990, 1991, 1992, and 1994 were designated as *Critical* in CDWR's water supply index). This may have resulted in a buildup of mercury in soils (e.g., from dry atmospheric deposition) and a simultaneous buildup of finer sediments, especially in stream channel margins due to a lack of precipitation and flows capable of transporting soils and sediments into watershed streams and through the mainstem. This dry period was followed by a series of six *Wet* or *Above Normal* water years with a generally decreasing trend in average and peak flows (1995 – 2000, Figure 9). These conditions may have contributed to higher than normal concentrations of mercury during the higher rainfall amounts and stream flows that occurred from 1995 – 2000. If this were the case, the mercury concentrations observed during the last three or four years may better represent average long term conditions than the longer data set. Unfortunately, the period of record for methylmercury data does not extend back to 1994, so it can not be determined whether there was a similar trend for that parameter. Such a trend may become evident in fish tissue after several more years of monitoring, however.

Methylmercury concentrations exhibited less distinct and more variable seasonal patterns throughout the watershed from 2000 to 2004 (Figure 10). Water column concentrations of unfiltered methylmercury exhibited similar patterns of increases in the major tributaries during this period, but the pattern is not obviously consistent from year to year. The most apparent temporal trend in the 2000-2004 data was a two- to five-fold increase in methylmercury that was observed for spring of 2001 for all three major tributary locations. This did not coincide with a comparable increase in methylmercury concentrations in the lower Sacramento River mainstem, which exhibited an early wet season peak in the fall of 2002, but no notable increase during the spring of 2001. Longer-term patterns in methylmercury concentrations in the lower Sacramento River (at Veterans Bridge, Freeport, and Mile 44) exhibit a somewhat more consistent pattern of increased concentrations in the early wet season with peaks often occurring from January through March, followed by another peak in late spring or early summer. Probable causes of temporal variations in Sacramento River methylmercury include seasonal mobilization of total mercury, increased methylation due to seasonal water temperature changes, or increased inflows of methylmercury from tributaries. Continuing methylmercury monitoring by the SRWP monitoring program and several CALFED-funded projects are expected to provide additional information to address this question.

Longer-term patterns in seasonal variation in unfiltered total mercury and methylmercury concentrations are also illustrated for the Sacramento River at Freeport in Figure 11 for 1996 through 2004. Time series plots of water column mercury and methylmercury concentrations are also presented in Appendix B of this report.

MASS LOAD COMPARISONS

Evaluations of mass load sources within the Sacramento River watershed and from other major Delta tributaries are currently being performed as part of the Strategic Plan being developed by the Delta Tributaries Mercury Council (DTMC) for management of mercury in the Delta and Sacramento River. This information is vital to development of pollutant management strategies and Total Maximum Daily Loads (TMDLs). It should be noted that mass loads are not direct indicators of water quality or predictors of instantaneous concentrations of mercury in water or in fish tissue.

The results of previous assessments of mass load contributions to the Delta (SRWP 2000, 2001) highlighted the dominance of the Sacramento River watershed with respect to total riverine flows and mercury inputs to the Delta—approximately 90% of estimated total average total mercury loads are from the Sacramento River and Yolo Bypass. In years with relatively high annual flows, such as 1998, loads from the Yolo Bypass and the Cache Creek watershed are estimated to exceed the loads from the rest of the Sacramento River watershed. Within the Cache Creek watershed, mercury loads from the Superfund mine site at Clear Lake do not appear to contribute a significant proportion of the total mercury loads from the Cache Creek watershed. Evidence compiled by the Delta Tributaries Mercury Council from their Strategic Plan for Mercury in the Sacramento River Watershed (http://www.sacriver.org/subcommittees/dtmc/documents.html) indicate that erosion of native soils with naturally-elevated mercury concentrations is the predominant source of mercury loads from the highly erosive Cache Creek drainage, which have been estimated to be greater than 200 kg in wet years. On average, only about 5 kg of mercury is estimated to be discharged from Clear Lake annually (CVRWQCB 2001). (See also Domagalski *et al*. 2004 for a synthesis of CALFED studies in the Cache Creek watershed, and Bloom 2003 for methods used to evaluate methylation potentials of Cache Creek sediment). Available data for the San Joaquin River and the Mokelumne River are still very limited, but the low annual flows (in comparison to the Sacramento River flows) and moderate mercury concentrations in these rivers suggest that these inputs are responsible for a relatively low percentage of total mercury inputs to the Delta (less than 10% for the San Joaquin River and Mokelumne River, combined). These estimates are intended only to provide a semi-quantitative comparison of the relative magnitude of the major Delta inputs, and are not intended to be definitive estimates of actual loads. Because these estimates are based on limited data and long-term average flows, they do not fully account for the seasonal spikes in mass loads that typically occur during peak streamflow events, and may therefore underestimate total mercury loads to the Delta. It should also be noted that estimates of mass loads of total mercury provide little direct information regarding causes of excessive mercury bioaccumulation in the Delta, primarily because total mercury concentrations are not closely related to concentrations of bioavailable mercury. For this reason, more recent efforts of SRWP, the CVRWQCB and others to characterize sources of excess mercury bioaccumulation risk have focused on methylmercury.

As part of the Strategic Plan for mercury controls (DTMC and SRWP 2002), the DTMC has analyzed a variety of data sources in addition to mercury concentration and flow data to develop load models for the Sacramento River watershed. In the Strategic Plan, the DTMC evaluated land use characteristics, density of mercury and gold mines, and several other measures of factors useful in relating load estimates for specific sources and tributary watersheds to loads in the Sacramento River mainstem. The goal of this process was to estimate known background loads and source loads, and to compute discrete contributions from controllable sources. Results of these evaluations indicate that total mercury loads double (approximately) in the mainstem between Hamilton City and Colusa, and double again between Colusa and the Sacramento River below the confluence with the Feather River. The largest increase in methylmercury load in the mainstem Sacramento River is estimated to occur between Hamilton City and Veterans Bridge, increasing the load approximately six-fold in this reach. The Feather River is estimated to represent approximately one-fifth of the methylmercury load at Veterans Bridge. The results of the DTMC evaluations don't indicate any single outstanding source of mercury or methylmercury loads to the Sacramento River, but instead suggest that loads in mainstem increase throughout the river's length. This assessment is consistent with the patterns described for spatial variability of total mercury and methylmercury water column concentrations. Major sources of total mercury loads include erosion of native soils, and geothermal springs, which appear to represent significant proportions of the total loads, in addition to the major anthropogenic source (runoff and erosion from historic gold mine sites). Other minor sources of mercury mass loads include treated municipal and industrial wastewater, atmospheric deposition, historic mercury mines, and urban runoff. The Strategic Plan estimates that a substantial proportion (up to 39%) may be from sources as yet unknown.

CONCLUSIONS AND RECOMMENDATIONS

Mercury concentrations in fish tissue collected from 1997 to 2003 from the mainstem Sacramento River below Shasta Reservoir and major tributaries to this section of the river were higher than several of the human health-based and wildlife-based advisory and screening values. Frequent exceedances of the tissue-based water quality criterion for mercury recently developed by the USEPA (0.3 mg/kg) and adopted by the California Office of Health Hazard Assessment (OEHHA), and less frequent exceedance of the previous USEPA screening value of 0.6 mg/kg, indicate that there are human health concerns associated with consumption of some fish species from the lower Sacramento River watershed. The current USEPA water quality criterion of 0.3 mg/kg is based on a fish consumption rate of 17.5 g/day (equivalent to 4 quarter-pound servings per month). Although OEHHA has not issued consumption advisories for some of these waters, the Central Valley Regional Water Quality Control Board has added a number of waterbodies to California's 303(d) list based on the same available data. Interim Public Health Notices were issued by Placer, Yuba, and Nevada counties for eight Sierra foothill waterbodies based on the same data used by the Regional Board. These were followed by health advisories and consumptions guidelines issued by OEHHA in December 2003 (OEHHA 2003). Although there is substantial uncertainty regarding the level of risk posed by these concentrations of mercury in fish, there is agreement that the risks are greatest for small children and pregnant women, and that the risks increase with greater consumption of fish. General consumption guidelines are provided by OEHHA on their web page (http://www.oehha.org), in addition to more specific consumption advisories developed for some waterbodies. Concerns over mercury in fish from the lower Sacramento River watershed are being addressed with continuing SRWP monitoring proposed for 2005, and through special studies of fish consumption being conducted by the Delta Tributaries Mercury Council (DTMC). This shift in focus is in large part a result of coordination and consultation with OEHHA, which has been an active participant in the SRWP, and has provided the SRWP with guidance regarding data needs and study design for evaluation of human health risks related to fish consumption. SRWP efforts in 2005 are also coordinating with watershed-wide monitoring efforts supported by CALFED and CVRWQCB.

Other conclusions of this review of mercury monitoring data can be summarized as follows:

Consumption-weighted average mercury concentrations in tissues of fish collected from the Sacramento River mainstem from Keswick to the Delta, in smaller tributaries, and in three agricultural drains were equal to or lower than USEPA human health-based criterion of 0.3 mg/kg. However, in almost all trophic level 4 species collected throughout the watershed, average mercury concentrations were higher than the 0.3 mg/kg criterion, and were frequently two to three times higher than this criterion.

Consumption-weighted average mercury concentrations in fish tissue collected from the lower American River and Feather River were higher than USEPA human health-based criterion of 0.3

mg/kg. Exceedance of the criterion indicates that there are potential health risks to people that consume fish from these waterbodies at an “average” or higher than average rate.

Total water column mercury concentrations in the Sacramento River from Keswick to River Mile 44 rarely exceeded the CTR mercury criterion of 50 ng/L (USEPA 2000). The Feather and Yuba rivers are significant sources of mercury loads, but water column concentrations of total mercury and methylmercury were not elevated compared to the Sacramento River mainstem in 2000-2004. However, the relatively high concentrations of mercury in fish from the lower Feather River and American River may be due to the similarly high concentrations of methylmercury in particulate matter (suspended solids). Spring Creek in the upper Sacramento River watershed, Battle Creek, Deer Creek, Big Chico Creek (discussed in previous annual reports), and the American River do not appear to be major sources of total mercury: concentrations were low in these tributaries compared to the Sacramento River and have not been observed to exceed the 50 ng/L CTR criterion at these sites. Results from 2001-2003 monitoring indicate that Cottonwood Creek, Battle Creek, and Thomes Creek watersheds may be significant sources of mercury and methylmercury. Mill Creek also appears to be a potentially significant source of bioavailable mercury under episodic high flow conditions. With the exceptions of Mill Creek and Cache Creek, total mercury concentrations rarely exceeded the 50 ng/L CTR criterion at any site.

Methylmercury concentrations in water column samples exceeded the Great Lakes human health-based criterion of 0.24 ng/L most frequently in samples from Arcade Creek (55% of samples) and from two agricultural drain sites (35% and 10% of samples). Methylmercury concentrations exceeded the Great Lakes wildlife-based criterion of 0.05 ng/L in nearly every sample collected from mainstem locations below Hamilton City, and in all other tributaries and agricultural drains sampled.

The Sacramento River watershed is the major source of total mercury to the Delta and contributes approximately 90% of the total mercury loads to the Delta, on average. Within the Sacramento River watershed, the Cache Creek drainage has been identified as the single largest source of total mercury. Major sources of total mercury loads to the Sacramento River watershed include runoff and erosion from historic gold mining sites, erosion of native soils, and natural mineral springs. Minor mercury sources include treated wastewater, urban runoff, historic mercury mines, and atmospheric mercury deposition from external sources.

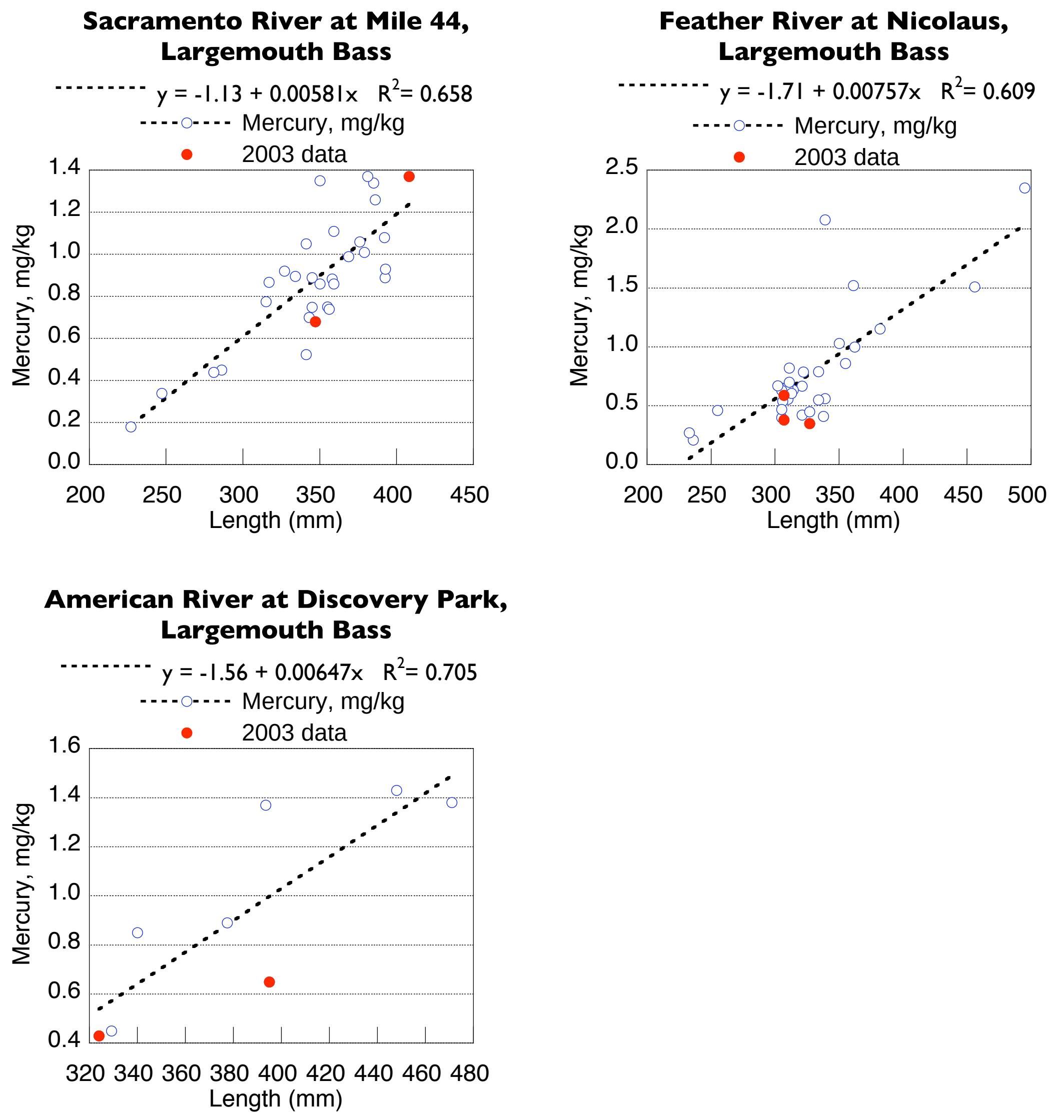


Figure 2. Mercury in Largemouth Bass, 1997–2003 SRWP Data for Sites Sampled in 2003

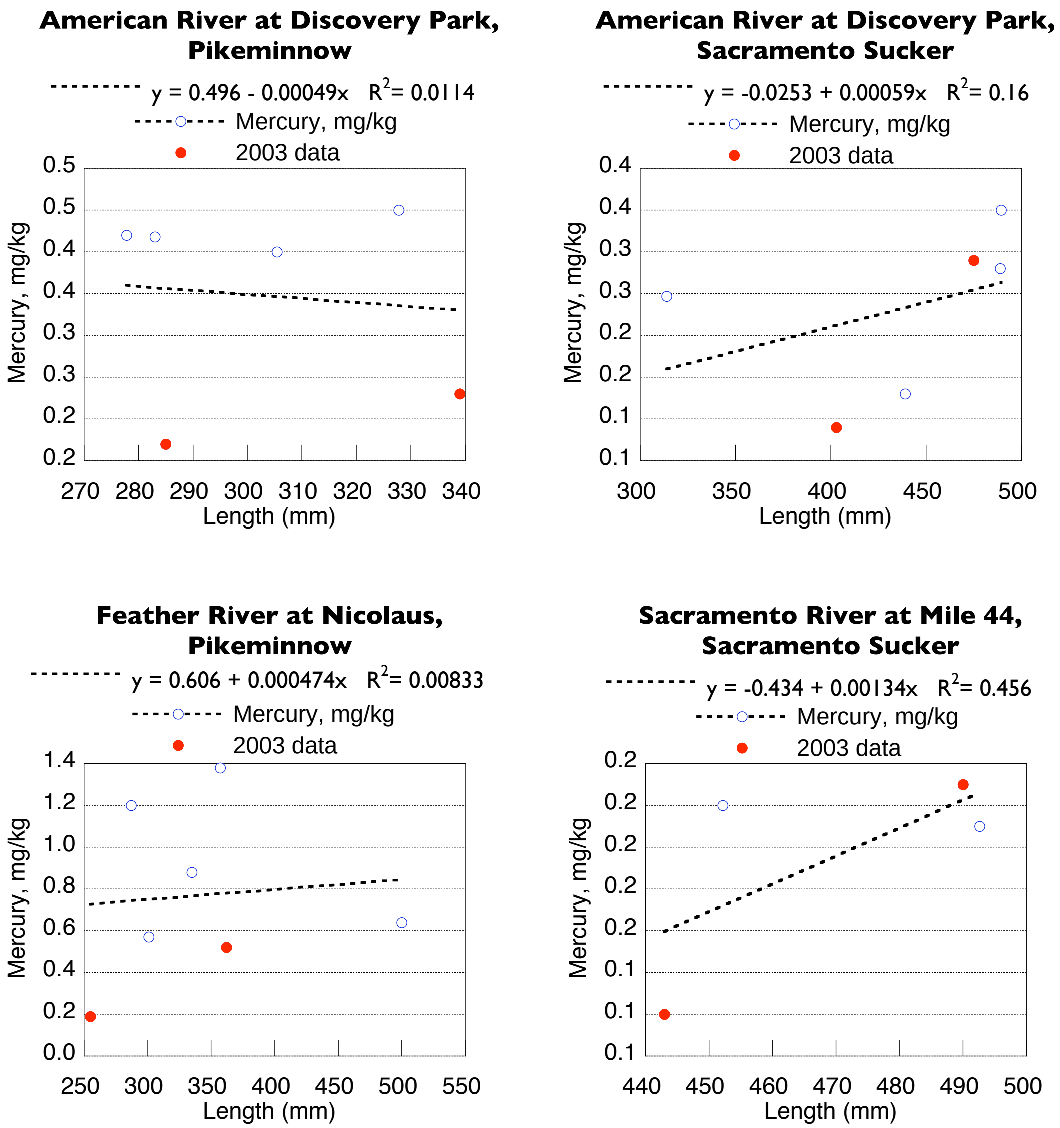


Figure 3. Mercury in Pikeminnow and Sacramento Sucker, 1997–2003 SRWP Data for Sites Sampled in 2003

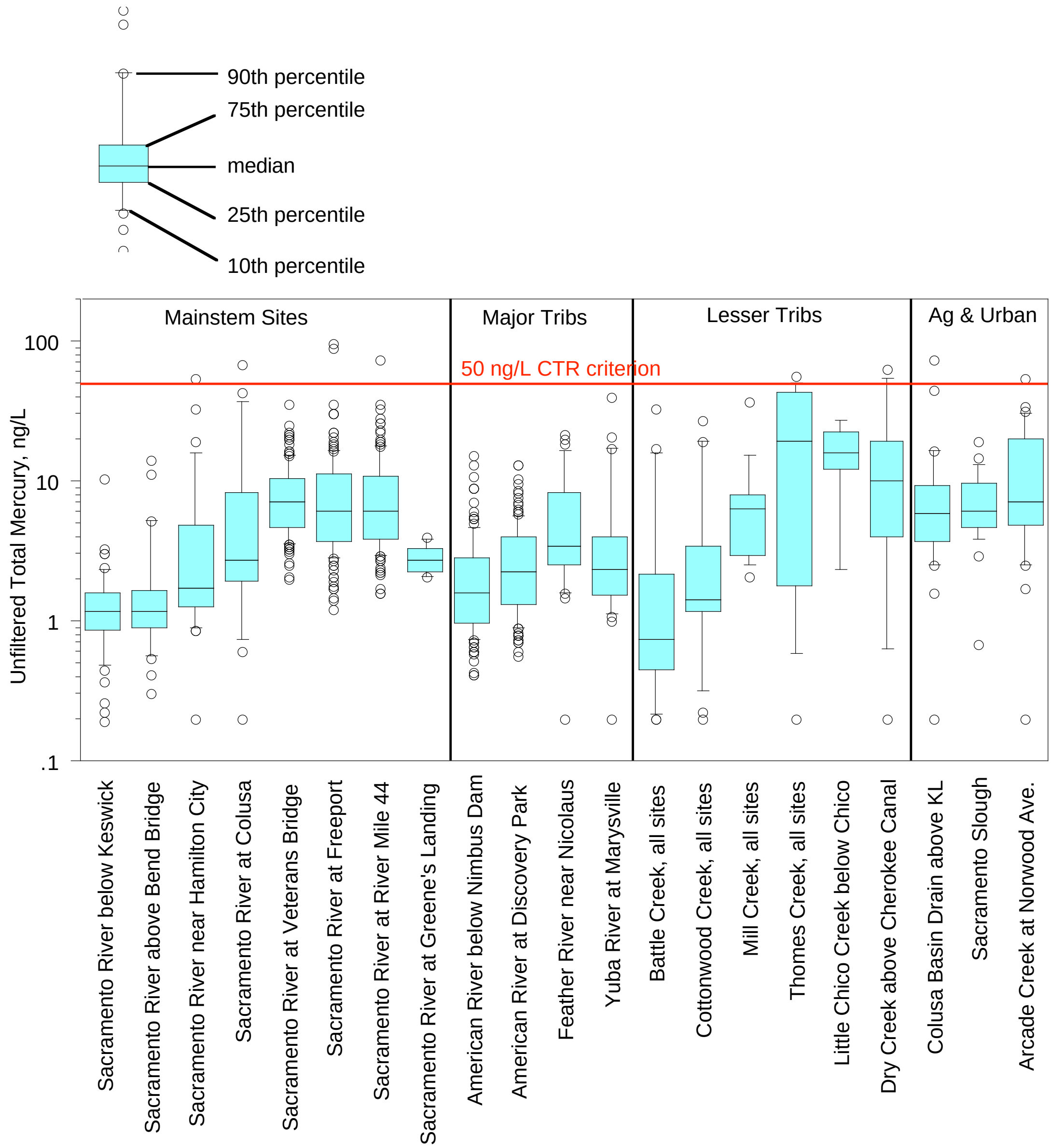


Figure 4. Unfiltered Total Mercury Concentrations, Sacramento River Watershed, 1994-2003

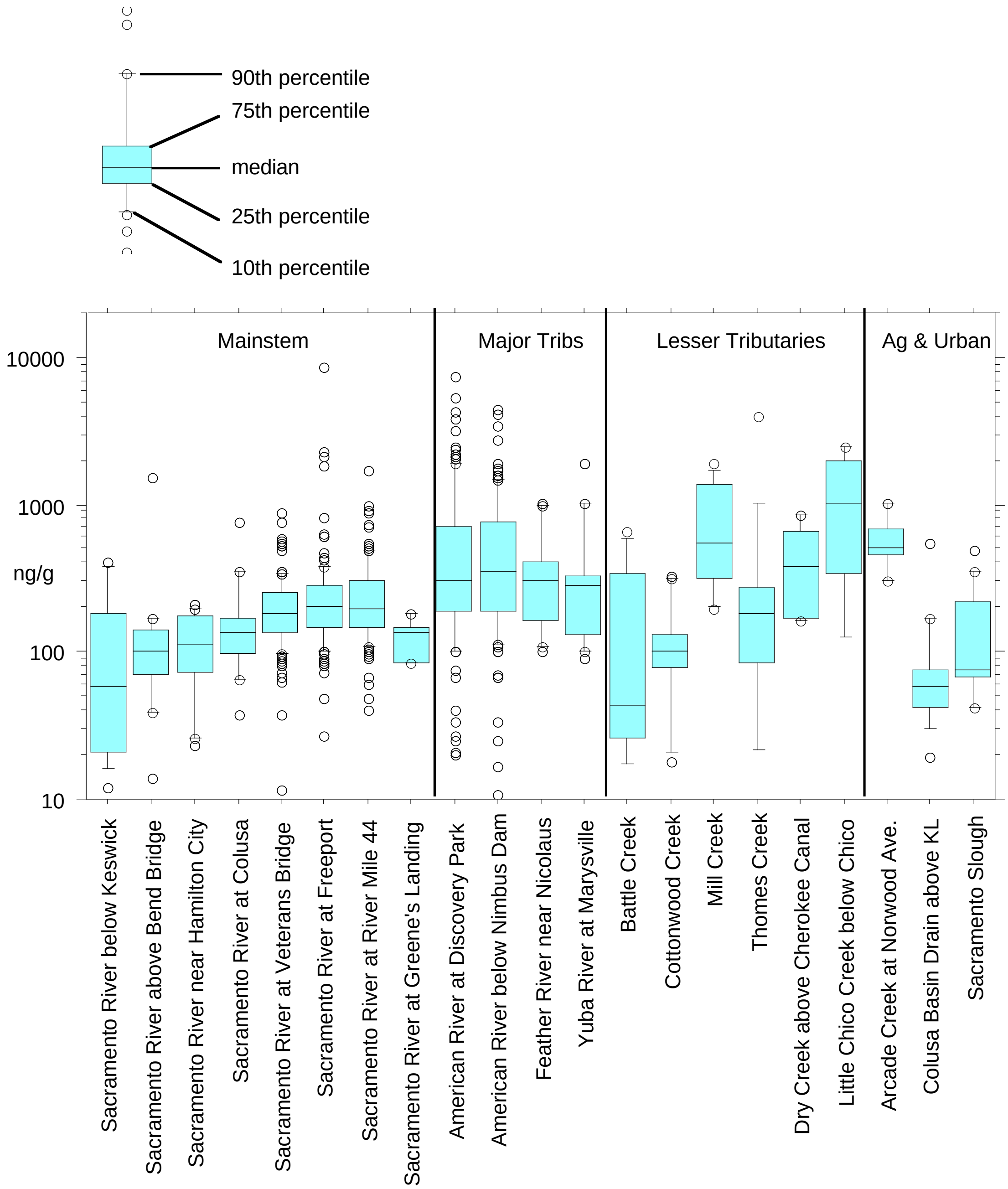


Figure 5. Total Mercury Concentrations in Total Suspended Solids: Particulate Total Mercury in the Sacramento River Watershed, 2000-2003

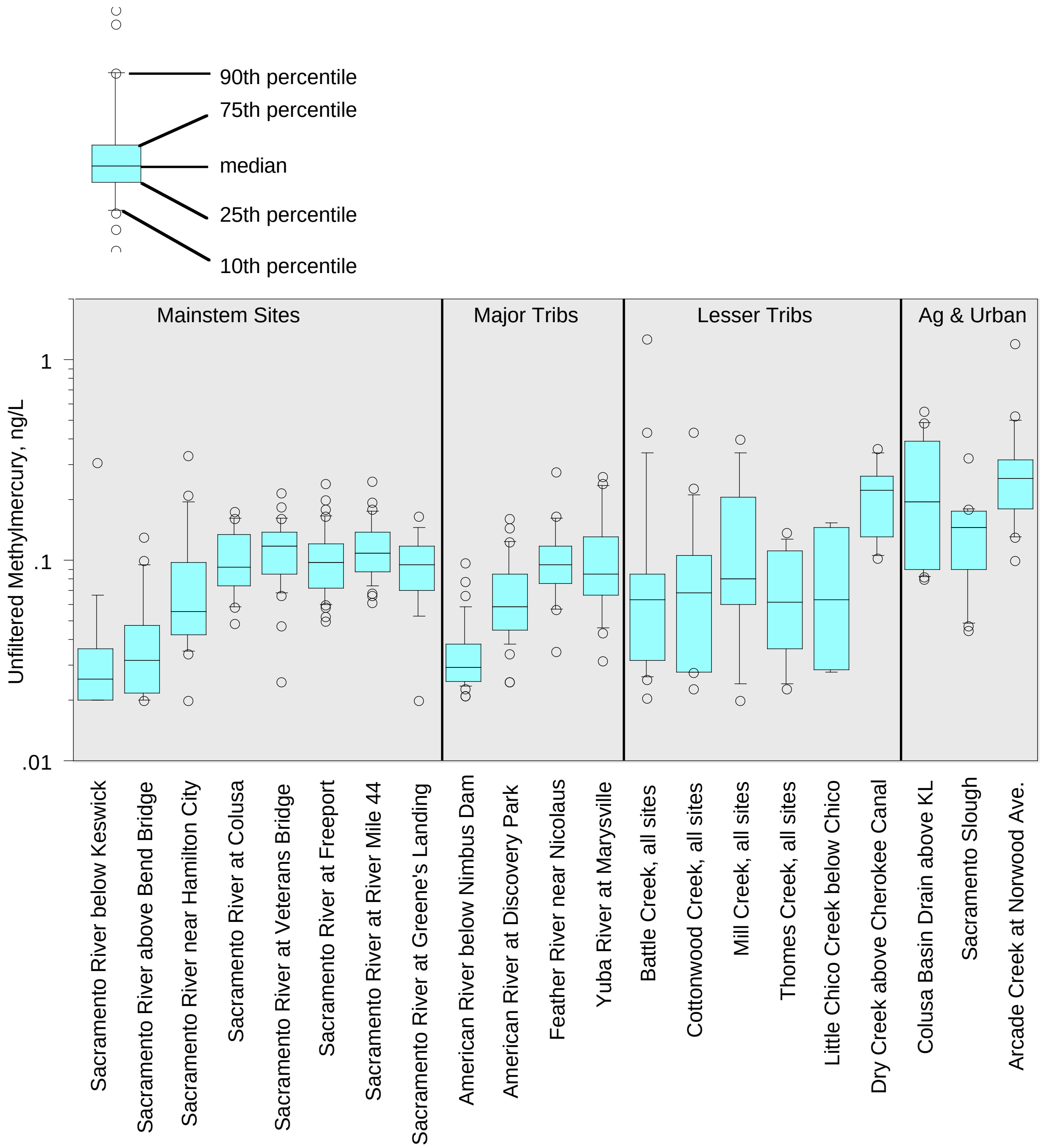


Figure 6. Unfiltered Methylmercury Concentrations, Sacramento River Watershed, 2000-2003

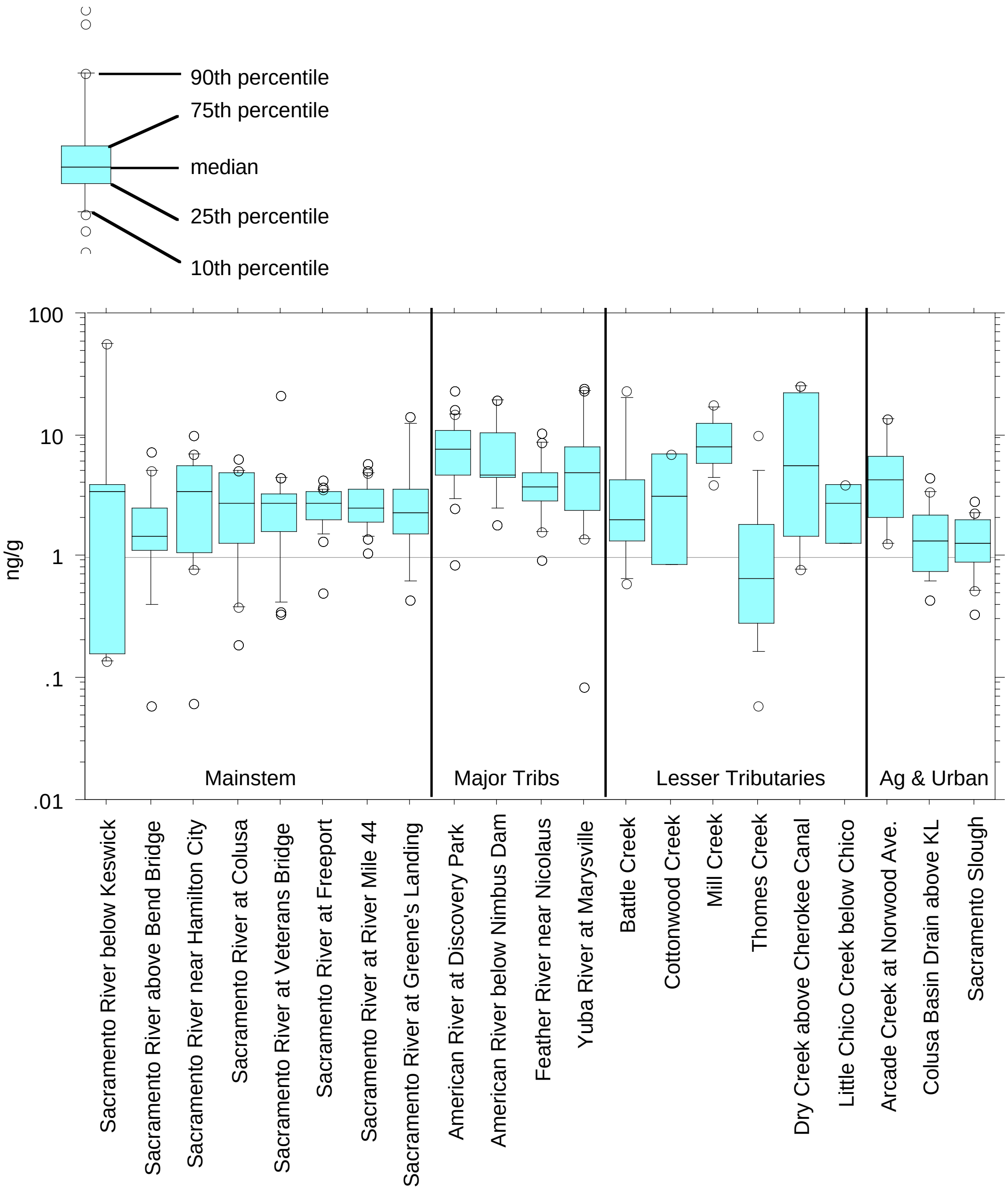


Figure 7. Methylmercury Concentrations in Total Suspended Solids: Particulate Methylmercury in the Sacramento River Watershed, 2000-2003

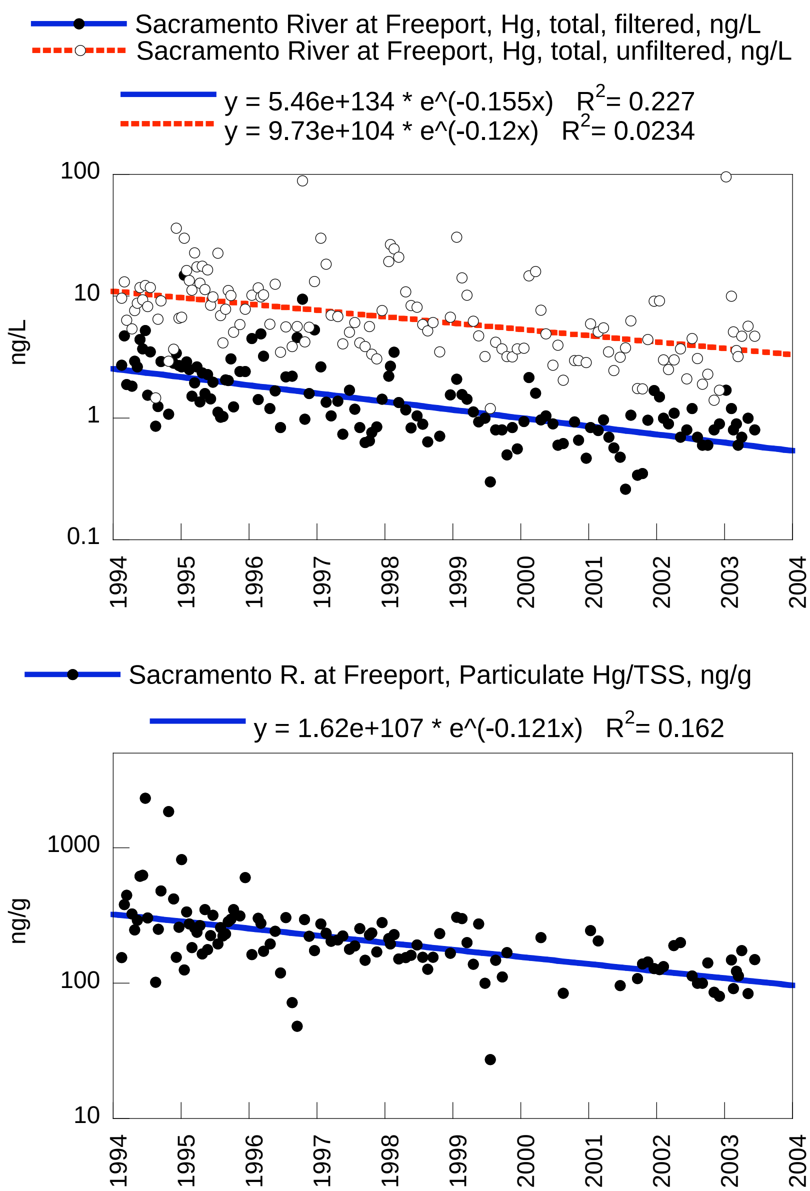
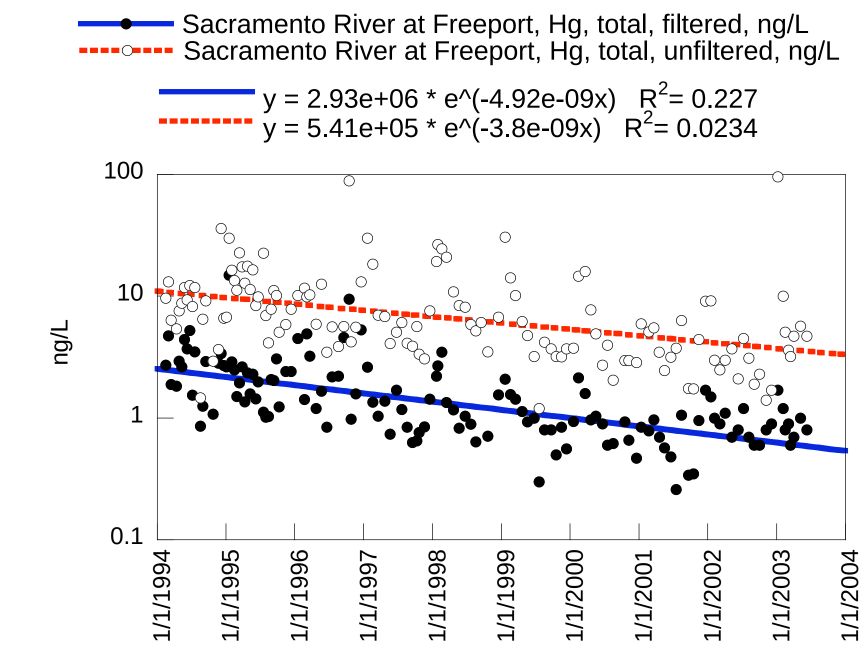


Figure 8. Trends in Water Column and Particulate Total Mercury, Sacramento River at Freeport, 1994 – 2003

(Illustrated trends are statistically significant at $p<0.05$)



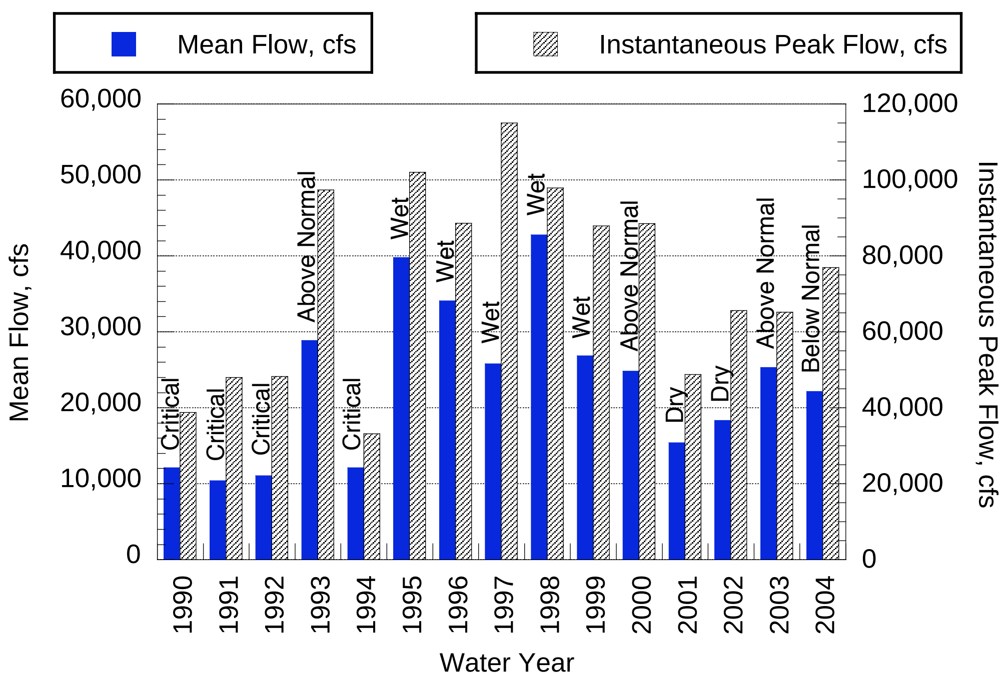


Figure 9. Trends in Total Mercury and Sacramento River Flows, 1994 – 2003

(All illustrated trends are statistically significant at p<0.05)

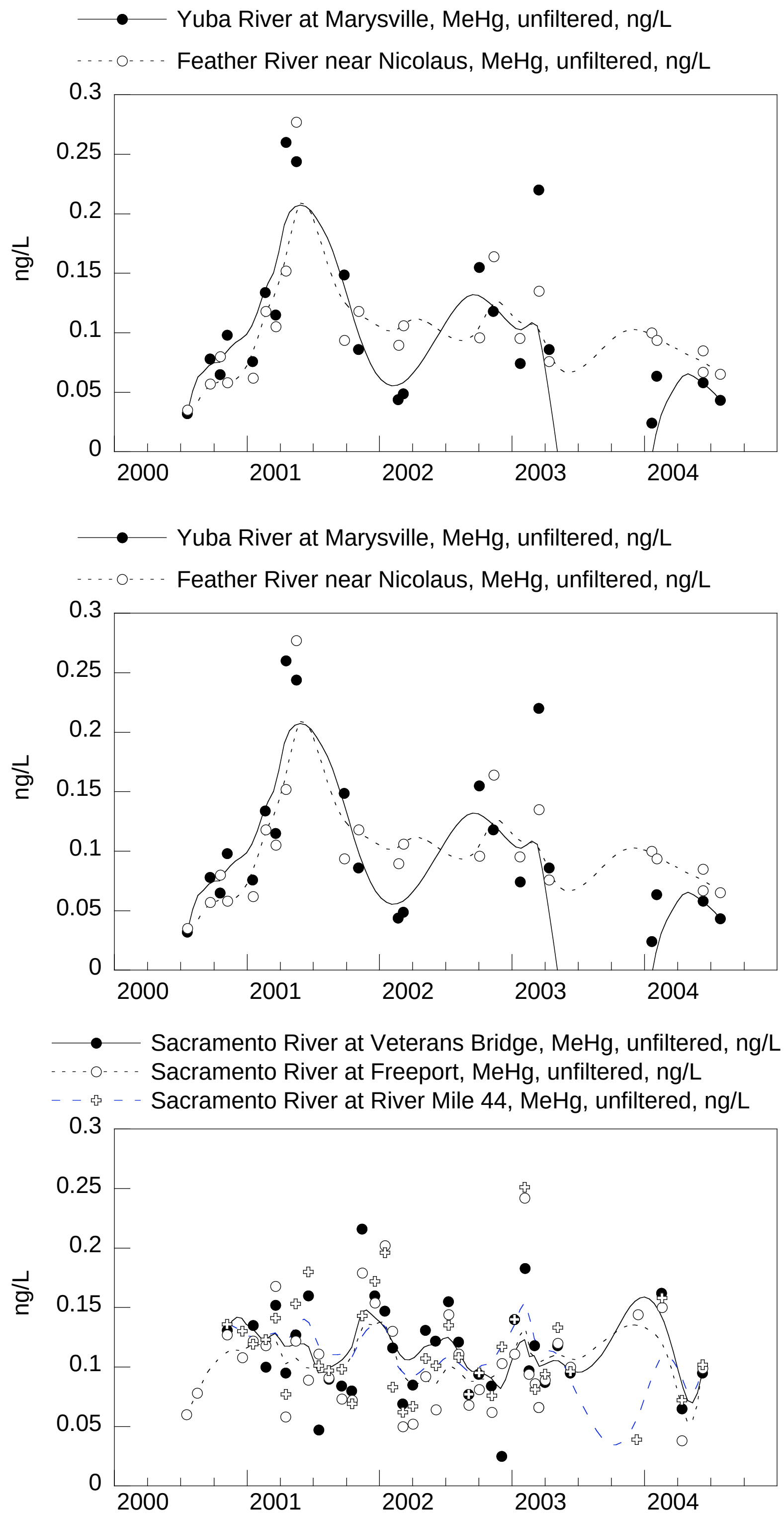


Figure 10. Temporal Patterns in Unfiltered Methylmercury, Lower Sacramento River Watershed, 2000 – 2004

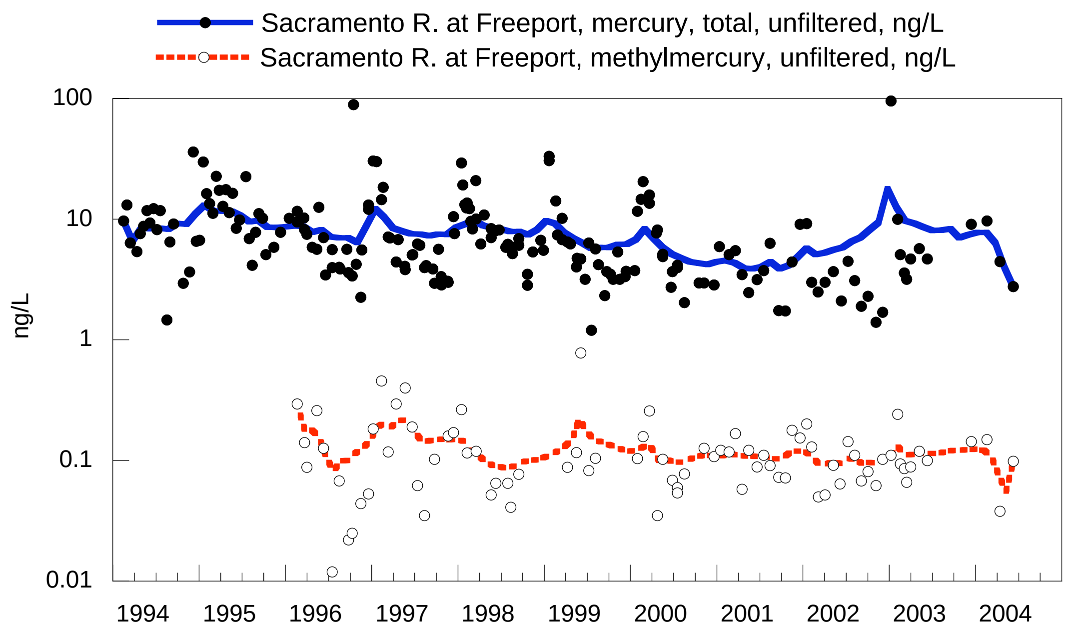


Figure 11. Seasonal Patterns in Mercury and Methylmercury, Sacramento River at Freeport, 1994 – 2004

PESTICIDES

Monitoring results for the Sacramento River Watershed Program (SRWP) for primary coordinating programs (USGS NAWQA, Sacramento River Coordinated Monitoring Program, and California Department of Water Resources), and from the California Department of Pesticide Regulation (CDPR) Surface Water Database are presented and summarized in this section. Data were compared to relevant water quality objectives and toxicity thresholds to evaluate attainment of beneficial uses and potential impairment of these uses in surface waters of the watershed. It should be noted that these evaluations are limited to the pesticides monitored by SRWP, and do not include other pesticides that have potential to affect beneficial uses. Data were evaluated for spatial and temporal trends if evidence of potential impairment was found. SRWP 2003-2004 pesticide data are provided in Appendix A.

BACKGROUND AND AVAILABLE DATA OVERVIEW

The sources of data utilized for this report are summarized in Table 11. The majority of non-SRWP data discussed in this report were obtained from CDPR's Surface Water Database (January 2004). The pesticide monitoring locations for Sacramento River Watershed Program 2003-2004 monitoring are illustrated in Figure 1.

The majority of the pesticide monitoring performed in surface waters of the Sacramento River watershed has been focused on pesticides used in rice cultivation and orchard dormant spray applications, and on pesticides commonly found in urban runoff. Of these, the SRWP monitoring program has focused primarily on organophosphate and carbamate pesticides, with triazine pesticides also monitored at selected locations. "Legacy" organochlorine pesticides (including DDT, aldrin, dieldrin, endrin, heptachlors, chlordanes, endosulfans, toxaphene, and hexachlorocyclohexanes) have not been monitored by SRWP in water. Only organophosphate pesticides were monitored for all four events in 2003-2004. Molinate and thiobencarb were also analyzed for one event. All samples were collected as instantaneous grab samples.

As discussed previously in this document, SRWP monitoring for pesticides was performed on an scheduled event basis in 2003-2004. A total of 4 events, including two wet weather events and two dry weather events, were monitored at 9 locations. Wet season events were conducted in January 2004 following an extended period of watershed-wide wet weather and significant rainfall, and in early February 2004 following the organophosphate pesticide dormant spray application period. One dry weather event was scheduled to occur during the rice herbicide application and discharge period (early June, 2004), and one was scheduled to coincide with late dry season low flows. These events are summarized in Table 12. The number of detections and total number of samples analyzed at each site are summarized in Table 13 for pesticides detected in SRWP 2003-2004 monitoring.

Table 11. Pesticide Monitoring in the Sacramento River Watershed

Program	Monitoring Period(s)	Parameters	# of Locations & Geographic Reference
SRWP	6/99–5/01	▪ Organophosphate, carbamate, and triazine pesticides in water	6 sites: 3 Sac. River sites (OPs), 2 Ag. Drain sites (OPs, carbamates), and 1 urban runoff-dominated site (all parameters)
Sacramento River CMP (SRCSD)	12/92–12/01	▪ Diazinon and chlorpyrifos in water	5 sites on Sacramento and American rivers in Sacramento metropolitan area
Sacramento River Basin NAWQA (USGS)	2/96–4/98	▪ Wide range of pesticides, including OPs, carbamates,	5 sites: 1 Sac. River site, 2 Ag. Drainage dominated sites, 1 urban runoff-dominated site, and Yolo Bypass
USGS (Domagalski 1998)	5/98–9/00	▪ Wide range of pesticides, including OPs, carbamates,	Continuation of NAQWA monitoring at Sac. River at Freeport, Arcade Creek, and Sacramento Slough (through 9/04)
Department of Pesticide Regulation (DPR)	1996–2001 (wet season episodic sampling)	▪ Organophosphate, carbamate, and triazine pesticides in water	3 sites: Sacramento River at Veterans Bridge (Alamar) and Sutter Bypass near Karnak, and Wadsworth Canal
DPR	1995–2001	▪ Rice Pesticides	3 sites: Sacramento River at Village Marina, Butte Slough, and Colusa Basin Drain
DPR (Spurlock 2002)	1991-2001	▪ Chlorpyrifos, diazinon ▪ Acute Toxicity	Meta-analysis of 32 surface water and dormant spray studies
CVRWQCB	1/94–3/94	▪ Organophosphate, carbamate, and triazine pesticides in water	21 sites: Sacramento River, Feather River, Yuba River, and multiple ag. drainage-affected sites
Sacramento NPDES Stormwater Monitoring Program (LWA 2003)	1990–2002	▪ Organophosphate and carbamate pesticides in water	13 Sacramento area urban runoff and river sites
SF Estuary Regional Monitoring Program	1989–1998	▪ Pesticides in water	18 Bay-Delta sites, including Sacramento River and San Joaquin River at the Delta terminus
Special Tributary Program (CDWR)	6/98–5/00	▪ Pesticides in water	13 water column sites on Mill Creek, Big Chico Creek, and Deer Creek
Offstream Storage Study (CDWR)	1999 to 2001	▪ Pesticides in water	42 sites: 7 Sac. River sites and 32 tributary sites between Keswick and Colusa, and 3 reservoir sites. *Data not available*
DPR (Gill 2004)	2003	▪ Esfenvalerate	1 BMP study site in Glenn County
CVRWQCB, CALFED	9/00–8/01	▪ 4-day *Selenastrum* toxicity tests ▪ Pesticides in water	7 sites in the Sacramento River watershed
DPR (Bacey, Starner, and Spurlock 2003)	2002–2003 (wet season episodic)	▪ Pyrethroid, organophosphate, and triazine pesticides	2 ag drain sites near Marysville
USGS (Dileanis *et al. 2002)*	2000 wet season	▪ Wide range of pesticides, including OPs, carbamates,	6 ag drain sites in Butte Co.;
USGS (Dileanis *et al. 2003)*	2001 wet season	▪ Wide range of pesticides, including OPs, carbamates,	21 ag and urban sites
USGS (NWIS DB)	1/02–2/02	▪ Wide range of pesticides, including OPs, carbamates,	11 sites (ag drains, urban, mainstem, and tributaries)

Table 12. SRWP Pesticide Monitoring, 2003-2004: Events and Locations

		Mainstem Sacramento River			Major Tributaries		Ag Drains		Urban	
Sample Dates	**Event Description**	**S.R. near Hamilton City**	**S.R. at Veterans Bridge**	**S.R. at Colusa**	**Feather River near Nicolaus**	**Yuba River at Marysville**	**Colusa Basin Drain**	**Sacramento Slough**	**Arcade Creek**	**Natomas East Main Drain**
Jan 20 – 22, 2004	After significant watershed-wide wet season storm event	O	O	O	O	O	O	O	O	O
Feb 03 – 04, 2004	Rain event following OP pesticide dormant spray application	O	O	O	O	O	O	O	O	O
Jun 09 – 11, 2004	Rice pesticide application and discharge season (dry weather event)	O	R/O	R/O	R/O	O	R/O	R/O	O	O
Jul 27 – 29, 2004	Dry season low flows	O	O	O	O	O	O	O	O	O

Notes: "O" – Organophosphate Pesticides by EPA 8141A;
"R" – Rice Pesticides (molinate and thiobencarb) by EPA 507;

Table 13. Numbers of Detections and Total Numbers of Samples for Pesticides Detected in SRWP Monitoring, SRWP Data 2003-2004

		Locations and Numbers of Detections/Total Analyses [1]									
		Mainstem Sacramento River			Major Tributaries		Ag Drains		Urban		
Method	**Pesticide**	**S.R. near Hamilton City**	**S.R. at Colusa**	**S.R. at Veterans Bridge**	**Feather River near Nicolaus**	**Yuba River at Marysville**	**Colusa Basin Drain**	**Sacramento Slough**	**Arcade Creek**	**Natomas East Main Drain**	**Total Detections For Pesticide**
EPA 8141A	Chlorpyrifos	1/4	0/4	0/4	1/4	0/4	0/4	0/4	1/4	0/4	3 of 36 (8.3%)
	Diazinon	1/4	1/4	1/4	0/4	0/4	1/4	0/4	1/4	0/4	5 of 36 (14%)
	Malathion	0/4	0/4	0/4	0/4	0/4	0/4	0/4	1/4	0/4	1 of 36 (2.8%)
	Prometon	0/3	0/3	0/3	0/3	0/3	0/3	0/3	1/3	0/3	1 of 27 (3.7%)
	Simazine	0/3	0/3	0/3	0/3	0/3	0/3	0/3	1/3	1/3	1 of 27 (3.7%)
EPA 507	Molinate	—	0/1	1/1	0/1	—	1/1	1/1	—	—	3 of 5 (60%)
	Thiobencarb	—	0/1	0/1	0/1	—	1/1	1/1	—	—	2 of 5 (40%)

(1) Number of samples in which pesticide was detected over total number of samples analyzed.

ATTAINMENT OF BENEFICIAL USES AND POTENTIAL IMPAIRMENT

Pesticides monitored by SRWP in 2003-2004 include organophosphate and phenoxyurea pesticides (analyzed by USEPA method 8141). In addition, the rice herbicides molinate and thiobencarb were monitored at five locations for a single event using EPA method 507 (in coordination with the City of Sacramento). Individual pesticides and their respective reporting limits are presented in Table 14. Seven of these pesticides were detected in SRWP monitoring in 2003-2004. A number of additional pesticides have been detected in 1999-2003 monitoring have been discussed in previous Annual Monitoring Reports and are not evaluated again in this document. The concentrations of pesticide detected in 2003-2004 were compared with a variety of regulatory and toxicity thresholds (Table 15) to evaluate potential risks to human health and aquatic life. The frequency that these same pesticides were detected in different waterbody types is summarized for SRWP and coordinating data sources in Table 16. The frequency that concentrations of these pesticides were observed to exceed regulatory and toxicity thresholds in different waterbody types is summarized in Table 17 and Table 18. The regulatory thresholds considered include USEPA aquatic life criteria, USEPA's Maximum Contaminant Levels (MCL) for drinking water, reference doses for drinking water from USEPA's IRIS database, and minimum toxic thresholds from USEPA's Office of Pesticide Programs (OPP) Ecotoxicity database. Also considered were recommended aquatic life criteria developed by the California Department of Fish and Game for diazinon, chlorpyrifos (CDFG 2000), and carbaryl (CDFG 1998). There are no criteria in the adopted California Toxics Rule for any of the pesticides detected in SRWP monitoring. Of the pesticides detected in SRWP monitoring, only chlorpyrifos, diazinon, and malathion have aquatic life criteria developed using USEPA methodology. Of the pesticides detected in 2001-2002, only molinate and thiobencarb have Drinking Water MCLs. No relevant regulatory limits are available for other detected pesticides (carbaryl, diuron, prometon, and prowl). The results of these comparisons provide some perspective regarding potential impacts on beneficial uses. However, these results do not provide definitive or conclusive information regarding such impacts.

Comparisons with Water Quality Criteria and Toxicity Thresholds

Chlorpyrifos (an organophosphate insecticide) was detected at greater than DFG's recommended Criterion Continuous Concentration (CCC) of 0.014 μg/L in four samples in 2003-2004 monitoring (Table 17). Two of these were field replicates collected from the Arcade Creek that were qualified as *estimated* based on high variability between the replicates. The concentrations reported in both of these samples (0.65 μg/L and 0.041 μg/L) also exceeded the lowest toxic threshold reported in USEPA's OPP Ecotoxicity Database (.028 μg/L, LC_{50} for crustacean species) and the recommended Criterion Maximum Concentration (CMC) of 0.02 μg/L. Chlorpyrifos detected in one sample from Feather River (0.051 μg/L) and one sample from Sacramento River at Hamilton City (0.029 μg/L) also exceeded these thresholds. Chlorpyrifos was not detected in any other samples in SRWP 2002-2003 monitoring, and data in the CDPR Surface Water database indicate that chlorpyrifos is infrequently detected the Sacramento River mainstem, major and minor tributaries, and agricultural drains (Table 16). However, many of these results are from analyses with detection limits that are higher than relevant toxicity thresholds and water quality objectives. Given this limitation of the data, it appears that the greatest magnitude and most frequent exceedances of DFG's recommended CCC and CMC occur in urban runoff and creeks.

Diazinon (an organophosphate insecticide) was detected at greater than DFG's recommended Continuous Concentration Criterion (CCC) of 0.050 μg/L in four samples collected in

2003–2004. The highest diazinon concentration observed in 2003-2004 (0.64 µg/L) was reported for Arcade Creek (2/4/2004), and also exceeded the lowest LC_{50} (0.2 µg/L, for crustacea) reported in the USEPA's OPP Ecotoxicity database in four these samples. Aquatic toxicity testing has previously indicated that metabolically activated toxicants are often the cause of significant mortality and/or reproductive toxicity frequently observed at this site—a pattern that is consistent with diazinon toxicity. Two samples collected from Sacramento River mainstem sites also exceeded DFG's recommended criterion. However, there was no toxicity to *Ceriodaphnia* in any of these samples. One additional sample exceeded the DFG criterion in Colusa Drain (0.07 µg/L, 2/4/04)—this sample did exhibit reproductive toxicity to Ceriodaphnia, although the concentrations of diazinon in this sample was lower than detected concentrations in samples that werenot toxic. Data in the CDPR Surface Water database indicate that diazinon concentrations have commonly exceeded this value at nearly every location monitored, including the Sacramento River mainstem, and major and minor tributaries. The greatest magnitude and most frequent exceedances of the recommended CCC have been observed in the numerous waterways most directly affected by agricultural drainage or urban runoff. Based on the data in the CDPR Surface Water database, diazinon concentrations in agricultural drainage-dominated waterways commonly exceed 0.2 µg/L, the lowest LC_{50} (for crustacea) reported in the USEPA's OPP Ecotoxicity database. Although it appears that this concentration is not frequently exceeded in the Sacramento River or major tributaries, other studies have documented cases of significant reproductive effects and mortality to *Ceriodaphnia dubia* due to diazinon, or have observed diazinon concentrations high enough to cause toxicity (Foe and Sheipline 1993, Larsen *et al*. 1998a and b, Holmes *et al*. 1998). Concentrations many times higher than DFG's recommended CCC and other toxicity thresholds have been documented in urban creeks and agricultural drains by numerous researchers and monitoring programs (Ogle and Cooke 2000, Denton 2001, LWA 2001)

Malathion (an organophosphate insecticide) was not detected at concentrations exceeding or approaching the lowest toxic threshold reported in USEPA's OPP Ecotoxicity Database (1.5 µg/L, crustacean species LC_{50}) or USEPA's 1976 criterion for the protection of aquatic life (0.1 µg/L) ().

Simazine (a selective triazine herbicide) was not detected at concentrations exceeding or approaching the lowest toxicity threshold reported in USEPA's OPP Ecotoxicity Database (36 µg/L, aquatic plant species EC_{50}) or the California MCL (4 µg/L), either in SRWP monitoring or data reported in CDPR's Surface Water Database.

Prometon (a non-selective triazine herbicide) was not detected at concentrations exceeding or approaching the lowest toxicity threshold reported in USEPA's OPP Ecotoxicity Database (98 µg/L, aquatic plant species EC_{50}), either in SRWP monitoring or data reported in CDPR's Surface Water Database. There are no aquatic life criteria or human health-based MCLs for prometon.

Molinate (a selective thiocarbamate herbicide) was not detected at concentrations exceeding or approaching the lowest toxic threshold reported in USEPA's OPP Ecotoxicity Database (220 µg/L, aquatic plant species EC_{50}), either in SRWP monitoring or data reported in CDPR's Surface Water Database. Concentrations detected in Colusa Basin Drain (0.52 µg/L), Sacramento Slough (2.3 µg/L), and Sacramento river at Veterans bridge (0.21 µg/L) were well below the USEPA MCL (20 µg/L) and the IRIS RfD (14 µg/L) for molinate. Concentrations exceeding the MCL and the RfD have often been reported in USEPA's OPP Ecotoxicity Database for two agricultural drains (Colusa Basin Drain and Butte Slough), but not for Sacramento River mainstem or the Feather River sites.

Thiobencarb (a thiocarbamate herbicide) was not detected at concentrations exceeding or approaching the lowest toxic threshold reported in USEPA's OPP Ecotoxicity Database (2 µg/L, crustacean species LOEC for *Daphnia magna*; no NOEC was reported). Concentrations detected in one sample from Sacramento Slough (0.5 µg/L) approached but did not exceed or approach the secondary taste and odor-based MCL of 1 µg/L. In CDPR's Surface Water Database, thiobencarb has been reported to exceed the toxicity threshold frequently in two agricultural drains (Colusa Basin Drain and Butte Slough), but never in the Sacramento River mainstem or the Feather River sites.

No pesticides were detected at concentrations exceeding drinking water reference doses (RfD) reported in USEPA's IRIS database.

Table 14. Pesticides Monitored by the Sacramento River Watershed Program

Analyte	RL, µg/L[1]	Analyte	RL, µg/L[1]
Organophosphate pesticides by EPA Method 8141a			
Azinphosmethyl	1.0	Fenthion	0.10
Bolstar	0.10	Malathion	0.10
Chlorpyrifos	0.05	Merphos	0.10
Coumaphos	0.20	Mevinphos	0.70
Def	0.10	Naled	0.50
Demeton-S	0.20	Parathion, ethyl	0.10
Diazinon	0.05	Parathion, methyl	0.10
Dichlorovos	0.20	Phorate	0.10
Dimethoate	0.10	Prowl	0.10
Disulfoton	0.10	Ronnel	0.10
EPN	0.10	Stirophos	0.10
EPTC	0.10	Tokuthion	0.10
Ethion	0.10	Trichloronate	0.10
Ethoprop	0.10	Trifluralin	0.10
Fensulfotion	0.50		
EPA Method 507			
Molinate	0.5	Thiobencarb	0.5

(1) Reporting Limit

Table 15. Advisory Criteria and Other Threshold Values for Pesticides Detected in SRWP 2003-2004 Monitoring

Pesticide	Chronic Aquatic Life Criterion (CCC)	MCL	IRIS RFd	Minimum Toxicity Thresholds (1) (threshold type, taxonomic class)
	Units = µg/L			
Chlorpyrifos	0.014 (3)	—	21	0.028 (minimum LC_{50}, crustacea) 0.01 (LOEC, crustacea)
Diazinon	0.05 (3)	—	—	0.2 (minimum LC_{50}, crustacea)
Malathion	0.1 (5)	—	140	1.5 (minimum LC_{50}, crustacea)
Molinate	13	20	14	220 (minimum EC_{50}, aquatic plants)
Prometon	—	—	100	98 (minimum EC_{50}, aquatic plants)
Simazine	10.0(4)	4	3.5	36 (minimum EC_{50}, aquatic plants)
Thiobencarb	3.1	70 (1° MCL) 1 (2° MCL)	70	17 (minimum EC_{50}, aquatic plants) 2 (LOEC, crustacea)

(1) From U.S. EPA's Environmental Fate and Effects Division of the Office of Pesticide Programs Pesticide Ecotoxicity Database, (USEPA 2003).
(2) CDFG 1998
(3) CDFG 2000
(4) U.S. Environmental Protection Agency, *Water Quality Criteria, 1972* (1973) [*The Blue Book*]
(5) Applied as instantaneous maximum. U.S. Environmental Protection Agency, *Water Quality Criteria for Water, 1976* (1976) [*The Red Book*]

Table 16. Percent Detections in the Sacramento River Watershed and Total Number (n) of Analyses 1991-2004, for Pesticides Detected in SRWP Monitoring in 2003-2004

Pesticide	Mainstem		Major Tributaries (American, Feather, Yuba)		Tributaries		Ag Drains		Urban Creek		Urban Runoff	
Chlorpyrifos	2.2%	(543)	0.6%	(162)	0.0%	(36)	3.4%	(328)	33.4%	(71)	55.6%	(27)
Diazinon	18.8%	(707)	17.2%	(343)	31.6%	(57)	65.4%	(584)	83.1%	(71)	27.8%	(79)
Malathion	0.0%	(626)	0.0%	(202)	0.0%	(36)	7.1%	(638)	23.9%	(71)	2.1%	(96)
Molinate	30.8%	(156)	26.3%	(38)	66.7%	(3)	85.2%	(500)	3.3%	(30)	—	—
Prometon	0.0%	(289)	3.4%	(59)	0.0%	(37)	3.4%	(293)	38.6%	(101)	8.3%	(24)
Simazine	12.9%	(311)	18.4%	(103)	12.2%	(41)	39.9%	(401)	22.8%	(101)	45.8%	(24)
Thiobencarb	10.5%	(162)	3.3%	(30)	—	—	60.7%	(450)	0.0%	(30)	—	—

Notes: Data are from SRWP monitoring, Sacramento River Coordinated Monitoring Program, USGS NAWQA, and Other Studies contained in CDPR's Surface Water Database, 1991-2003.
"—" indicates category not monitored for parameter.

Table 17. Maximum Concentrations of Detected Pesticides, SRWP 2003–2004 Data

Location	Organophosphate Pesticides					Rice Herbicides	
	Chlorpyrifos	Diazinon	Malathion	Prometon	Simazine	Molinate	Thio-bencarb
Mainstem							
Sacramento River at Hamilton City	0.029	0.04	ND	ND	ND	— (2)	—
Sacramento River at Colusa	ND(1)	0.16	ND	ND	ND	ND	ND
Sacramento River at Veterans Br.	ND	0.13	ND	ND	ND	0.21	ND
Sacramento River at Freeport	ND	ND	ND	—	—	—	—
Sacramento River at Mile 44	ND	ND	ND	—	—	—	—
Main Tributaries							
Feather River at Nicolaus	0.051	ND	ND	ND	ND	ND	ND
Yuba River at Marysville	ND	ND	ND	ND	ND	—	—
American River below Nimbus	ND	ND	ND	—	—	—	—
American River at Discovery	ND	ND	ND	—	—	—	—
Ag Drains							
Colusa Basin Drain	ND	0.06, 0.07(3)	ND	ND	ND	0.52	0.15
Sacramento Slough	ND	ND	ND	ND	ND	2.3	0.5
Urban							
Arcade Creek	0.65, 0.041(3)	0.64	0.05	0.09	2.1	—	—
Natomas East Main Drain	ND	ND	ND	ND	0.4	—	—
Minimum Aquatic Life Criteria:	*0.014*	*0.05*	*0.1*	*none*	*10*	*13*	*3.1*
Minimum Toxicity Thresholds:	*0.028*	*0.2*	*1.5*	*98*	*36*	*220*	*2*
Drinking Water MCLs	*none*	*none*	*none*	*none*	*40*	*20*	*70 (1° MCL)* *1 (2° MCL)*

Note: Data are from SRWP monitoring and Sacramento River Coordinated Monitoring Program. All units are µg/L.

(1) ND = Not Detected

(2) "—" = not analyzed

(3) Data from 2 field replicates collected 7/28/2004

Table 18. Detected Exceedances of Minimum Toxicity Thresholds, Percent and Number (n) of Total Analyses, 1991-2003

Analyte	Minimum Toxicity Threshold, ug/L (EC_{50} or LC_{50})	Sacramento River Mainstem Sites	Major Tributaries	Tributaries	Ag Drains	Urban Creek	Urban Runoff
Chlorpyrifos	0.028	1.7% (519)	0.0% (146)	0.0% (36)	0.3% (320)	6.3% (63)	55.6% (27)
Diazinon	0.2	2.5% (683)	2.8% (327)	1.8% (57)	24.0% (576)	65.1% (63)	22.8% (79)
Malathion	0.5	0.0% (602)	0.0% (186)	0.0% (36)	2.1% (630)	1.6% (63)	1.0% (96)
Prometon	98	0.0% (280)	0.0% (53)	0.0% (37)	0.0% (287)	0.0% (95)	0.0% (24)
Simazine	36	0.0% (302)	0.0% (97)	0.0% (41)	0.0% (395)	0.0% (95)	0.0% (24)
Molinate	220	0.0% (154)	0.0% (37)	0.0% (3)	0.0% (498)	0.0% (30)	—
Thiobencarb	17	0.0% (160)	0.0% (29)	—	0.0% (448)	0.0% (30)	—

Notes: Data are from SRWP monitoring, Sacramento River Coordinated Monitoring Program, USGS NAWQA, and Other Studies contained in CDPR's Surface Water Database, 1991-2003.
"—" indicates category not monitored for parameter.

What Do These Results Say About Attainment of Beneficial Uses and Potential Impairment, and How Does This Compare with Relevant 303(D) Listings for Parameter and Sites?

Waterbodies in the Sacramento River watershed that are included on California's 2002 303(d) list due to elevated pesticide concentrations are presented in Table 19.

As stated previously, it should be noted that comparisons with advisory criteria and toxicity thresholds do not provide conclusive evidence of attainment or impairment of beneficial uses. However, for the purpose of these evaluations, repeated significant exceedances of these values are considered as an indication of potential impairment of beneficial uses. In general, regulatory agency advisory criteria (*e.g.*, USEPA aquatic life criteria or drinking water MCLs) are given the most weight in these evaluations. However, because most of the pesticides detected do not have adopted regulatory limits, detected concentrations were compared to available toxicity threshold data as an initial screen for potential impairment of beneficial uses. These were considered the best available indicators of potential impairment. As previously noted, these evaluations are limited to the pesticides monitored by SRWP, and do not include many other pesticides that have the potential to affect beneficial uses.

The beneficial uses at greatest potential risk from elevated pesticide concentrations in surface water are "Cold Freshwater and Estuarine Habitat", "Commercial and Sport Fishing", and "Municipal and Domestic Water Supply" (as defined in the Central Valley Region Basin Plan, CVRWQCB 1995). The most direct effects are likely to be on aquatic plants and crustacea, taxonomic groups which include the species most sensitive to the most widely used insecticides and herbicides. Based on data from the SRWP and other monitoring efforts, there may be significant potential for localized impacts on these beneficial uses due to elevated concentrations of some pesticides in some surface waters of the Sacramento River watershed. Based on findings of elevated concentrations and documented toxicity in surface waters ranging from small urban creeks and agricultural drains to the Sacramento River mainstem and Delta waterways, diazinon appears to pose the greatest and most extensive risks. The Central Valley Regional Board has concluded that beneficial uses are impaired by diazinon, and has cited diazinon as the primary reason for including numerous waterbodies on the 2002 303(d) list of impaired waterbodies (Table 19). Direct effects of elevated diazinon concentrations are likely to be limited to sensitive zooplankton species. These invertebrate species are also important food sources for higher trophic level organisms in the ecosystem, and reduction of zooplankton populations during critical periods could also impact populations of higher trophic level organisms (*e.g.*, fish) (Ogle and Cooke 2000).

Although less frequently detected at toxic concentrations in the mainstem Sacramento River, elevated chlorpyrifos concentrations appear to pose similar risks. Because its toxic mode of action is the same as diazinon, chlorpyrifos will also contribute to organophosphate toxicity even at concentrations below its single-chemical toxicity threshold (Bailey *et al.* 1996). The available pesticide concentration data agree well with the California 303(d) list of impaired waterbodies. Chlorpyrifos and diazinon are responsible for the greatest number of the individual listings on the California 303(d) list of impaired waterbodies, with diazinon alone responsible for the listing of 16 Sacramento River miles and 42 Feather River miles, 24,917 acres of Delta waterways, and hundreds of thousands of acres in the Sacramento-San Joaquin Delta and San Francisco Bay Estuary. Diazinon is also responsible for numerous listings in urban creeks in the Sacramento metropolitan area, as well as in other urban areas in California (*e.g.*, the San Francisco Bay area). Based on a weight of evidence approach, it has been determined that these two organophosphate pesticides have a high potential for impairment of aquatic life and related beneficial uses in surface waters of the Sacramento River watershed. It should be noted that a Department of Pesticide Regulation meta-analysis of data from 32 surface water and dormant spray application studies (Spurlock 2002) found that the use and frequency of detections and the maximum concentrations of both of these pesticides has decreased substantially over the period studied (1991-2001), suggesting that risks to beneficial uses may be decreasing as well.

The previous SRWP Annual Monitoring Report (SRWP 2004) documented some potential for localized impacts on aquatic life in specific waters in the watershed due to occasionally elevated concentrations of malathion and carbofuran, primarily in waterways dominated by agricultural drainage. As with diazinon and chlorpyrifos, direct toxic effects of these insecticides are likely to be limited to sensitive aquatic invertebrate species. There appears to be little risk of beneficial use impairment from these pesticides in the Sacramento River and larger tributaries, however. The available data appear to support the single 303(d) listing for malathion in the Sacramento River watershed (Colusa Basin Drain), although the number of detections and potential impacts of both carbofuran and malathion have been substantially reduced in recent years by changes in rice farming practices. There are no 303(d) listings in the Sacramento River watershed specifically for carbofuran. The same SRWP Annual Report (2004) also documented some potential for localized impacts on aquatic life due to occasionally elevated concentrations of diuron, primarily in urban creeks and other waterways affected by urban runoff. There appears to be little risk of beneficial use impairment in the Sacramento River and larger tributaries from this herbicide. Direct toxic effects of diuron are probably limited to sensitive aquatic plant species. There are no 303(d) listings specifically for diuron.

For the locations monitored, there appears to be little to no significant potential for impairment of aquatic life uses due to elevated concentrations of other pesticides monitored by the SRWP. Although the potential certainly exists for impairment due to synergistic effects from exposure to multiple pesticides, based on the available data there is yet little evidence of this phenomenon at the locations monitored, with the specific exception of organophosphate pesticides (discussed previously). Beneficial uses related to human health concerns (drinking water supply, and contact and non-contact recreational use) do not appear to be at risk from any of the pesticides monitored by the SRWP.

Table 19. Waterbodies in the Sacramento River Watershed Listed for Pesticides on the California 2002 303(d) List

Pesticide	Waterbody	Area Affected		Cited Sources
Azinphos-methyl, diazinon, malathion, methyl parathion, molinate	Colusa Drain	49	Miles	Agriculture
Chlordane, DDT, diazinon, dieldrin,	Sacramento-San Joaquin Delta	41,736	Acres	Nonpoint Source
Chlorpyrifos	Delta Waterways(2)	24,917	Acres	Agriculture; Urban Runoff
	Elder Creek	11	Miles	Urban Runoff
	Arcade Creek	9.9	Miles	Urban Runoff
	Chicken Ranch Slough(3)	8	Miles	Urban Runoff
	Strong Ranch Slough(3)	6.4	Miles	Urban Runoff
DDT	Delta Waterways(2)	24,917	Acres	Agriculture
Diazinon	Delta Waterways(2)	24,917	Acres	Agriculture; Urban Runoff
	Feather River, Lower	42	Miles	Agriculture; Urban Runoff
	Sac. R. (Red Bluff To Delta)	16	Miles	Agriculture
	Lower Bear River	21	Miles	Agriculture
	Morrison Creek	21	Miles	Agriculture; Urban Runoff
	Sutter Bypass	19	Miles	Agriculture
	Jack Slough	14	Miles	Agriculture
	Elder Creek(3)	11	Miles	Agriculture; Urban Runoff
	Arcade Creek	9.9	Miles	Agriculture; Urban Runoff
	Chicken Ranch Slough(3)	8	Miles	Agriculture; Urban Runoff
	Elk Grove Creek	6.9	Miles	Agriculture
	Strong Ranch Slough(3)	6.4	Miles	Agriculture; Urban Runoff
	Natomas E. Main Drain	3.5	Miles	Agriculture; Urban Runoff
	Sacramento Slough(3)	1.7	Miles	Agriculture; Urban Runoff
Diazinon, molinate	Butte Slough	8.9	Miles	Agriculture
Dieldrin, chlordane	SF Bay/Delta Estuary	292,520	Acres	Nonpoint Source
Group A pesticides(4)	Delta Waterways	24,917	Acres	Agriculture
	Colusa Drain	49	Miles	Agriculture
	Feather River, Lower	42	Miles	Agriculture

(1) Recommended for removal from 303(d) list in 2002 (CVRWQCB 2003)

(2) Sum of acreage for Western and Eastern Delta waterways

(3) Area Affected was increased in 2002 update (CVRWQCB 2003)

(4) "Group A" pesticides are aldrin, dieldrin, endrin, heptachlor, heptachlor epoxide, chlordanes, endosulfans, toxaphene, and hexachlorocyclohexanes)

SPATIAL DISTRIBUTIONS AND PATTERNS

Spatial distributions and patterns of detection were evaluated for pesticides determined to have a reasonable potential to cause impairment of beneficial uses (chlorpyrifos, diazinon, malathion, and diuron). As with other pollutants, the ability to evaluate spatial distribution patterns is highly dependent on the sites selected for monitoring. SRWP monitoring was performed at sites selected to complement monitoring performed by USGS NAWQA and the Department of Pesticide Regulation. Most of the data available are from monitoring performed in water bodies dominated by agricultural drainage or urban runoff, and for the mainstem Sacramento River. There are relatively few data available for the major tributaries to the Sacramento River (Feather River, Yuba River, and American River), and even fewer data currently available for the greater number of minor tributaries to the Sacramento River. Within these limitations, there are still a number of general patterns discernible in the available data.

General Patterns

As expected, the frequency of detection and maximum concentrations detected are generally highest in waterbodies dominated by agricultural drainage or urban runoff, and lowest in the mainstem Sacramento River and tributaries.

In the Sacramento River, the frequency of detection and maximum values are generally lower upstream of the major agricultural production areas in the watershed. As an example, in SRWP monitoring, organophosphate pesticides have rarely been detected in any samples collected from the Sacramento River near Hamilton City and Colusa sites, or from several smaller tributaries (Mill Creek, Deer Creek, and Big Chico Creek), which are above the region of the most intensive agricultural use of organophosphate pesticides for dormant spray applications. Pesticides were detected in in none of the 15 samples from the Yuba River collected in 2000-2004, only one of 25 samples from the Feather River, and, rarely in the lower American River. When the larger combined dataset was evaluated previously (data through 2003), the Feather River had the highest percentage of detected pesticides (15%, n = 570 analyses from two locations). The percentage of detected pesticides was much lower in the Yuba River (2.4%, n = 170 analyses from one location near Marysville) and American River (2.2%, n = 767 analyses from three locations from Nimbus Dam to Discovery Park).

In SRWP monitoring, the greatest number of different pesticides (13 of the 18 different pesticides detected, 1999-2003) was observed at Colusa Basin Drain. The most frequent detections were observed at Arcade Creek (13%, n = 555 total analyses for 33 samples) This pattern is consistent with results of USGS NAWQA monitoring performed 1996-1998.

Organophosphate Pesticides

Organophosphate pesticides have been monitored at 14 locations by the SRWP. Of the 29 pesticides analyzed in the organophosphate pesticide scan (EPA Method 8141), seven were detected in SRWP monitoring conducted 1999-2004. These were chlorpyrifos, diazinon, EPTC, malathion, pendimethalin, prometon, and simazine.

Diazinon has been a widely used organophosphate insecticide. Its pattern of detection reflects its use in a variety of agricultural and urban/residential settings. In SRWP monitoring, it was the most frequently detected organophosphate pesticide, detected at nine of 14 sites monitored (Colusa Basin Drain; Sacramento Slough; Sacramento River at Hamilton City, Veterans Bridge and Freeport; Arcade Creek; Feather River at Nicolaus; American River at Discovery Park; and Cache Slough). Of these SRWP sites, diazinon was detected most frequently in Arcade Creek, an urban creek affected by both urban runoff and aerial deposition from nearby agricultural areas. In studies contained in the CDPR Surface Water database, diazinon was frequently detected (and concentrations were highest) in both urban runoff and waterways dominated by agricultural runoff. Diazinon was less frequently detected in the Sacramento River mainstem and tributaries monitored. Reporting limits for most of the data ranged from 0.002 µg/L for the USGS NAWQA program, to 0.01-0.05 µg/L for most of the other studies in the CDPR Surface Water database.

Chlorpyrifos was most frequently detected in urban runoff, never detected in the Sacramento River mainstem, and was rarely detected in other water bodies in the studies contained in the CDPR Surface Water database. Chlorpyrifos was detected in three SRWP samples (on each from Arcade Creek, Colusa Basin Drain, and Sacramento River at Veterans Bridge). Reporting limits for most of the data ranged from 0.004 µg/L for the USGS NAWQA program, to 0.03-0.05 µg/L for most of the other studies in the CDPR Surface Water database.

Malathion was detected in only two SRWP samples, from Sacramento Slough and Colusa Basin Drain. In studies contained in the CDPR Surface Water database, malathion was most frequently detected in waterways dominated by agricultural drainage, and it has been less frequently detected in urban runoff and urban creeks. Malathion was not reported at detectable concentrations for any of the hundreds of results reported for the Sacramento River in the CDPR Surface Water database. Reporting limits for most of the data ranged from 0.005 µg/L for the USGS NAWQA program, to 0.03-0.1 µg/L for most of the other studies in the CDPR Surface Water database.

TEMPORAL DISTRIBUTION AND PATTERNS

Most of the available monitoring data are focused on the periods of greatest use of particular pesticides or categories of pesticides (e.g. rice pesticide monitoring in late spring and organophosphate pesticide monitoring during the dormant spray application season). Although the episodic monitoring conducted by the SRWP from 2000-2004 is intended to monitor conditions most likely to result in pesticide detections, pesticides were infrequently detected at any location other than Arcade Creek. It should be noted that these four years of monitoring represent only a few samples for each specific type of episodic “event”, and therefore no definitive conclusions regarding temporal patterns can be reached based solely on SRWP monitoring. Additionally, this focused approach to monitoring provides relatively little information about other periods or seasons. However, in combination with the available data from other programs, these results generally confirm that the pattern of detections and greatest concentrations reflects patterns of pesticide use. Specific examples include:

- The highest concentrations and highest frequency of diazinon detections occurred in the months of January (55%) and February (54%) throughout the watershed (Figure 12). This period coincides with the dormant spray application season.
- The highest concentrations of carbofuran, malathion, and molinate have been observed in May and June, coincident with the release of water from rice fields.
- The percentage of carbofuran detections reported for the Sacramento River watershed in CDPR’s Surface Water Database decreased from approximately 66% in 1994, to 2.5% in 2000, and no detected carbofuran was reported in 2001-2003 monitoring. A similar pattern was observed for malathion. These decreases correspond to changes made by the rice farming industry to pesticide application practices and in holding times for irrigation water after pesticide application. Granular formulations of carbofuran were also banned in 1994 to protect wildlife.

Overall use of cholinesterase-inhibiting organophosphate and carbamate insecticides has declined over the last several years (DPR 2000a, Spurlock 2002). In contrast, over the same period, the total number of acres planted in fruit and vegetable crops and the total pounds of all varieties of pesticides applied has increased in California (DPR 2000a). This suggests that there may be a general shift from organophosphate and carbamate insecticides to other categories of pesticides, possibly in response to economic pressures, patterns of pest pressures, and pesticide resistance. It has been suggested that pyrethroid pesticides are increasingly being used in place of organophosphate and carbamate pesticides for many crops, and the Department of Pesticide Regulation documented an increase in the number of pyrethroid applications from 1991 to 1996 and a corresponding decrease in the number of organophosphate pesticide applications during this period (DPR 1999). On the basis of total pounds applied, applications of the five pyrethroids accounting for 93% of the total pyrethroid use in California in 1999 (bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, and permethrin) appeared to have stabilized in counties in the Sacramento River watershed (based on published pesticide use reports from DPR). However, there has also been a shift in the use patterns to more effective pesticides (*i.e.*, more toxic per pound of chemical) within the pyrethroid class. Use of bifenthrin, cyfluthrin, cypermethrin, deltamethrin, and other other pyrethroids increased in 2001 and 2002, while applications of esfenvalerate, permethrin, and cyhalothrin decreased. To better evaluate the trend in pyrethroid use, the total pounds of each pyrethroid applied were “normalized” to permethrin-equivalent pounds by multiplying by the ratio of each pesticide’s 10^{th} percentile LC_{50} to the permethrin 10^{th} percentile LC_{50} values (Solomon *et al*. 2001, Weston *et al.* 2004). Although actual total pounds of pyrethroids applied in the Sacramento River watershed have only increased by about 20% from 1999 to 2002, applications increased by 71% when evaluated based on toxicity-normalized values (Figure 13). Pyrethroids use in 2003 was similare to 2002 and showed a slight decrease.

Pyrethroids are also replacing organophosphate pesticides (diazinon and chlorpyrifos) in popular retail pesticide products since their ban for these uses. Other means of pest control, including biopesticides (*e.g.*, bacteria, naturally-occurring compounds, and pheromones), reduced-risk pesticides, and non-chemical pest management practices have also increased dramatically since 1995 (*ibid*.). Given the extremely low toxicity thresholds of some of these pesticides (e.g. pyrethrins and pyrethroids, Table 20), the lack of monitoring data has been recognized as significant information gap. In response to this need, the University of California Davis, Department of Entomology has developed new analytical and monitoring methods for monitoring pyrethroid pesticides, and USGS has been funded by CALFED to develop analytical methods. Commercial laboratories have also responded to the new market demand and have developed or modified existing methods for analysis of these pesticides. The SRWP is collaborating with Dr. Donald Weston (University of California Berkeley) in a study of the distribution and toxicity of sediment-associated pesticides in the Sacramento River watershed. The study is focused on pyrethroids and other sediment-associated pesticides. Preliminary results of this study indicate that approximately half of the sites sampled exhibit significant sediment toxicity.

The California Department of Pesticide Regulation has also documented an increase in the number of detections of thiobencarb in Colusa Basin Drain (1994-2000) and the number of exceedances of the performance goal of 1.5 µg/L and the USEPA criterion of 6.2 µg/L (Newhart 2000). The increasing number and magnitude of detected concentrations are due in part to the increased use of thiobencarb. Increased use of this rice pesticide is attributed to an increase in acreage planted in rice in Glenn and Colusa counties, the geographical spread of rice weeds, and the development of herbicide resistance in rice weeds.

SRWP pesticide monitoring data for 2003-2004 are presented in Appendix A. However, there were generally insufficient detected SRWP pesticide data to generate meaningful time series plots.

Table 20. Toxicity Threshold Values for the Pyrethroid Pesticides

Pyrethroid	Minimum LC_{50} Values Reported in OPP Database, µg/L (threshold type, taxonomic class) [1]	10th centile LC_{50} [2]	Permethrin equivalent factor [3]
Bifenthrin	0.004 (LC_{50}, crustacea) 0.15 (LC_{50}, fish)	0.015	12
Cyfluthrin	0.0024 (LC_{50}, crustacea) 0.3 (LC_{50}, fish)	0.012	15
Cypermethrin	0.0047 (LC_{50}, crustacea) 0.73 (LC_{50}, fish)	0.01	18
Deltamethrin	0.0017 (LC_{50}, crustacea) 0.25 (LC_{50}, fish)	0.009	20
Esfenvalerate and Fenvalerate	0.15 (LC_{50}, crustacea) 0.07 (LC_{50}, fishes)	0.037	4.9
Fenpropathrin	0.021 (LC_{50}, crustacea) 2.2 (LC_{50}, fishes)	0.24	0.75
Lambda-Cyhalothrin	0.0041 (LC_{50}, crustacea) 0.21 (LC_{50}, fishes)	0.01	18
Permethrin	0.019 (LC_{50}, crustacea) 0.79 (LC_{50}, fishes)	0.18	1
Tralomethrin	0.039 (LC_{50}, crustacea) 1.6 (LC_{50}, fishes)	<0.31	0.6

(1) From U.S. EPA's Office of Pesticide Programs Pesticide Ecotoxicity Database, (USEPA 2003).
(2) The average LC_{50} for the lower 10^{th} centile species tested. As reported in Solomon *et al.* 2001.
(3) Calculated as permethrin 10^{th} centile LC_{50} ÷ 10^{th} centile LC_{50} for pesticide.

MASS LOAD COMPARISONS

Average mass loads of pesticides to the Delta can not be reliably estimated from the available data, due primarily to relatively infrequent monitoring and even less frequent detection of pesticides in most waterbodies monitored. Also needed for reliable load estimates for agricultural drains are accurate flow data and characterizations of the relationship between pesticide concentrations in water and event hydrographs. Some of this information is expected to be developed as part of the conditional agricultural waiver monitoring programs implemented in the Central Valley in 2004.

CONCLUSIONS AND RECOMMENDATIONS

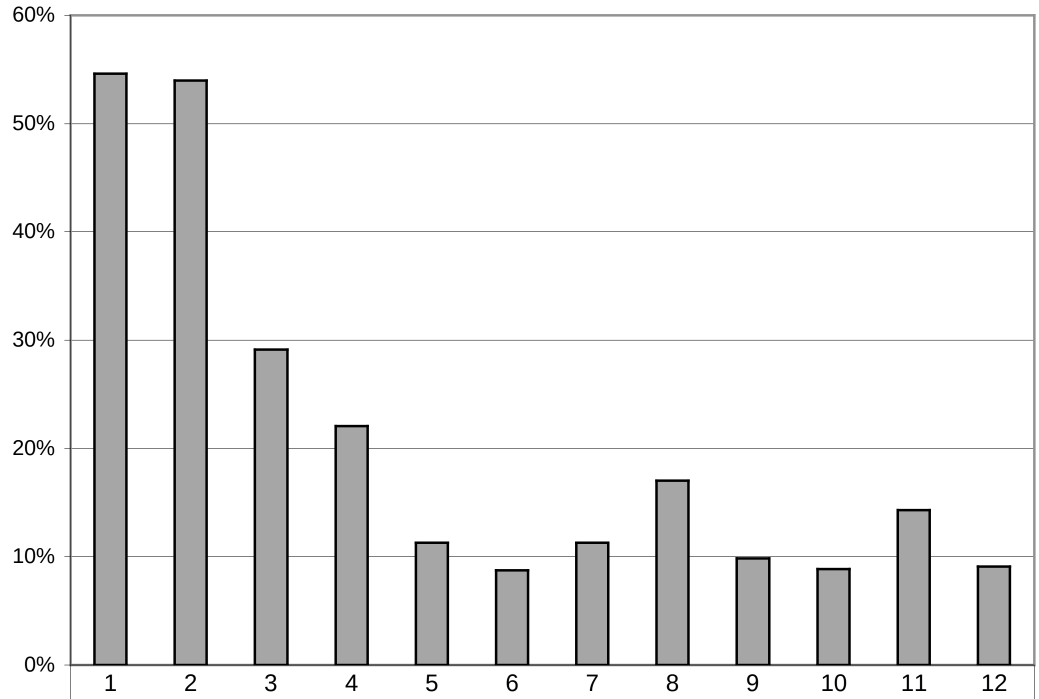
The results of SRWP and other monitoring programs continue to support the focus of the SRWP and of both state and federal regulatory agencies on the management of organophosphate pesticides in surface waters. Diazinon and chlorpyrifos appear to have the greatest potential for impacts on aquatic life uses, with other monitored pesticides appearing to have relatively low to minimal risk of impacts on aquatic life or human health. The potential impacts on beneficial uses from diazinon and chlorpyrifos in drainages dominated by agricultural runoff are being addressed through the Water Quality Management Strategy developed by the Organophosphate Pesticide Focus Group (SRWP 2001), by the TMDL developed by the Central Valley Regional Water

Quality Control Board, and by proposed amendments of the Central Valley Basin Plan to add the CDFG recommended criteria for diazinon (and other provisions related to diazinon). The well-documented problems in urban runoff (exemplified by Arcade Creek) are largely being addressed by regulatory changes banning the use of these products in retail pesticide products.

There are still few data available for the many minor tributaries to the Sacramento River watershed. For smaller tributary watersheds with a substantial proportion of agricultural land use (e.g. Big Chico Creek), there may be a significant potential for pesticides to occasionally reach concentrations of concern in surface waters. Although few pesticides were detected in the limited SRWP monitoring of several smaller tributary watersheds in 2000-2003, the available monitoring data are far too limited to make any reliable assessments regarding the potential impacts of pesticides for these and other tributaries. However, small tributaries with only a small proportion of their total drainage in agricultural land uses (e.g. Deer Creek and Mill Creek) are probably at relatively low risk of pesticide impacts on beneficial uses. Additional pesticide monitoring data (e.g., from CDWR) should be evaluated for these watersheds if they become available, to better characterize the potential risks from pesticides in these watersheds, and additional monitoring should also be considered.

A important source of new information on pesticide use and potential impacts will be the data resulting from the extensive monitoring being conducted for the Conditional Waiver of Waste Disharge Requirements for Irrigated Lands (SWRCB 2003). Monitoring by agricultural coalition groups throughout the Central Valley includes tracking of pesticide use patterns, toxicity testing, and analyses for pesticides (and other potential causes of toxicity) in water and sediment. Additionally, the Watershed Evaluation Reports submitted by each coalition in April 2004 provide valuable information on existing pesticide use patterns, management practices, and potential risks from pesticide use in specific drainages in the Central Valley. Monitoring for this program began in July 2004.

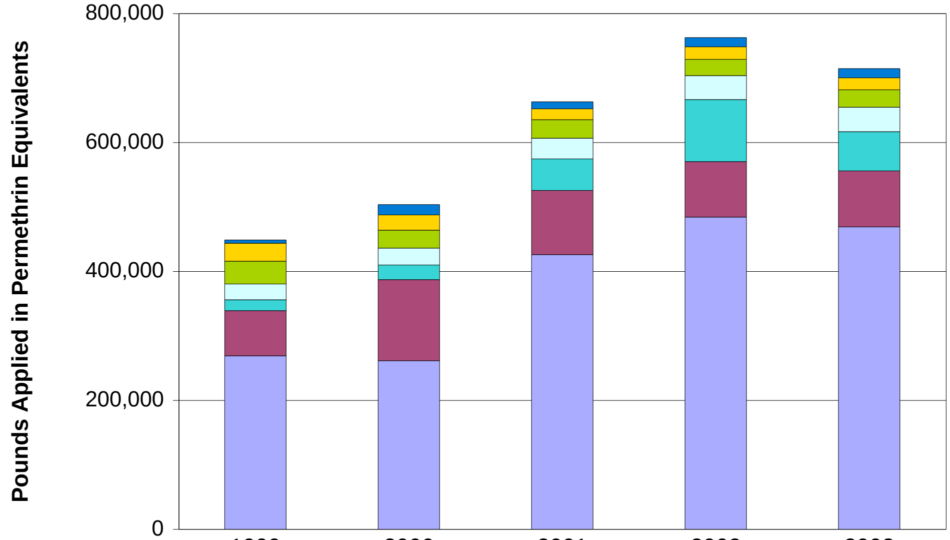
The shift from use of organophosphate and carbamate pesticides for agricultural and other uses to other pesticides (including but not limited to pyrethroids and pyrethrins) indicates the need for increased monitoring for these pesticides. Both private contract laboratories and public agencies (University of California at Davis, USGS) have developed new sampling and analytical techniques to adequately identify and measure toxic concentrations of pyrethroid pesticides in water, sediment, and tissue. The SRWP has collaborated with Dr. Donald Weston (University of California Berkeley) in a study of the distribution and toxicity of sediment-associated pesticides in the Sacramento River watershed. The study is focused on pyrethroid pesticides, and Dr. Weston has demonstrated the ability to analyze pyrethroids (and other sediment-associated pesticides) at concentrations that cause toxicity in laboratory tests of sediment toxicity. Preliminary results of this study indicated that approximately half of the sites sampled exhibit significant sediment toxicity. Funding for this project is provided by the Pesticide Research and Identification of Source, and Mitigation (PRISM) Grant program administered by the State Water Resources Control Board.



	1	2	3	4	5	6	7	8	9	10	11	12
Detections	54.6%	54.0%	29.1%	22.1%	11.3%	8.8%	11.3%	17.0%	9.8%	8.9%	14.3%	9.1%

Percent Detections by Month

Figure 12. Diazinon Detection Frequency, Percentage of Total Analyses per Month, SRWP and CDPR Surface Water Database Data, 1991 - 2003



	1999	2000	2001	2002	2003
DELTAMETHRIN	5,276	16,404	11,471	14,432	14,230
PERMETHRIN	27,620	23,432	17,030	19,309	18,259
ESFENVALERATE + FENVALERATE	34,948	27,981	28,288	25,594	27,416
BIFENTHRIN	24,902	25,800	32,240	36,944	37,550
CYFLUTHRIN	17,112	23,001	48,645	95,917	61,458
LAMBDA-CYHALOTHRIN	70,038	125,388	99,900	86,116	86,189
CYPERMETHRIN	268,902	261,951	426,087	484,661	469,516

Figure 13. Trends in Pyrethroid Pesticide Use in the Sacramento River Watershed

(Total Pounds Applied, as Permethrin Toxicity Equivalents, DPR Pesticide Use Reporting Data, 1999 – 2002

AQUATIC TOXICITY

BACKGROUND AND OVERVIEW OF AVAILABLE DATA

Aquatic toxicity monitoring in the mainstem Sacramento River and its tributaries was undertaken by the SRWP to characterize the spatial and temporal distribution of toxicity in surface waters of the watershed, and to identify potential sources and causes of toxicity. Laboratory toxicity tests were performed using standard USEPA procedures with the following freshwater test species to assess water quality:

- *Ceriodaphnia dubia* (water flea), seven-day reproduction and survival test
- *Pimephales promelas* (fathead minnow) seven-day growth and survival test
- *Selenastrum capricornutum* (single-cell green algae) short-term chronic (4-day) growth test

Toxicity tests using the fathead minnow (*Pimephales promelas*) and the algae *Selenastrum capricornutum* were also performed in previous SRWP monitoring years, but have not been conducted in recent years. Determination of significant toxicity for each test endpoint was accomplished using hypothesis testing statistical procedures described in the method documents for the specific tests[4] (USEPA 1994). Toxicity Identification Evaluations (TIEs) (USEPA 1991, 1992, 1993) were performed on selected samples to attempt to identify the toxicants responsible for repeated adverse effects in toxicity tests. The toxicity monitoring program (implemented in 1996 and continuing to the present) was designed to assess the success of implemented pollution control programs (e.g. for rice pesticides), as well as to identify toxicity concerns in the study area.

Aquatic toxicity monitoring conducted in 2003-2004 was performed at 11 locations throughout the watershed. Sites monitored for aquatic toxicity monitoring were selected to provide an overall survey of the distribution of toxicity in the watershed and to coordinate with existing monitoring programs, and were located on the Sacramento mainstem, three major tributaries, two agricultural drainage-dominated sites, and one urban runoff-dominated site. In previous years, monitoring has also been performed on ten additional tributaries (Pit River, Sacramento River above Shasta, McCloud River, Mill Creek, Deer Creek, Big Chico Creek, Clear Creek, Butte Creek, and Cache Creek). The locations of the SRWP 2003-2004 monitoring sites are illustrated in Figure 1.

A total of 4 events, including two wet weather events and two dry weather events, were monitored at 11 locations. Wet season events were conducted in January 2004 following an extended period of watershed-wide wet weather and significant rainfall, and in early February 2004 following the organophosphate pesticide dormant spray application period. One dry weather event was scheduled to during the rice herbicide application and discharge period (early June,

[4] Although the hypothesis testing procedures described in the USEPA 1994 document refer specifically to testing for differences between several treatments and a control, the methods are equally applicable to testing for differences between ambient water samples and a control. The specific statistical methods used for a particular sample depend on the results of each test and include both parametric t-tests and non-parametric tests.

2004), and one was schedule to coincide with late dry season low flows. (Note: These events are also summarized in Table 12 in the previous section.)

A summary of a number of other relevant studies of aquatic toxicity in the Sacramento River watershed is provided in Table 21 (and are also summarized in more detail in de Vlaming *et al.* 2000). The critical results of these studies may be briefly summarized as follows:

Foe 1998—This study identified diazinon as the responsible toxicant in each of ten samples (out of 33) exhibiting toxicity from Orestimba Creek, San Joaquin River at Vernalis, and Sacramento Slough. Samples from the Sacramento River at Greene's Landing were not toxic to *Ceriodaphnia* (three samples, January 1997). Samples were collected following precipitation events of 0.5 inches or more.

DPR (Nordmark et al. 1998-2000, Gill 2002)—This five-year study by the Department of Pesticide Regulation is focused on the occurrence of toxicity attributable to detections of dormant-spray pesticides in a small agricultural drainage (Wadsworth Canal), the Sutter Bypass, and in the Sacramento River. Preliminary results reported from this ongoing study indicate that significant chronic toxicity was rarely observed in samples from the Sacramento River (one sample in 1998-99 monitoring, and one sample in 1999-00 monitoring). At the Sutter Bypass location, only acute toxicity to *Ceriodaphnia* was monitored, and no significant toxicity was observed (1996-1998). Acute toxicity monitoring was changed to the Wadsworth Canal location for 1998-99 monitoring, and multiple occurrences of acute toxicity to *Ceriodaphnia* were observed in 1998-99 and 1999-00 monitoring. The authors stated that occurrences of acute toxicity generally corresponded with diazinon concentrations of approximately 0.2 μg/L. Diazinon and methidathion were the most commonly detected pesticides, with occasional detections of carbaryl, diuron, simazine, bromacil, and hexazinone also reported. The highest concentrations and most frequent detections were reported for Wadsworth Canal. Results from monitoring in winter 2000-2001 were not available in time for inclusion in this report.

SFEI 1999b—The Regional Monitoring Program for Trace Substances aquatic toxicity results for the Sacramento River: one of two samples caused significant toxicity to *Mysidopsis bahia* (shrimp), zero of two samples caused significant toxicity to *Mytilus edulis* (mussel) larvae.

DPR 1998—Studies performed by the Department of Pesticide Regulation have concluded that aquatic toxicity attributed to pesticides in rice field drainage has been greatly reduced, due to changes in farming practices and extended holding times for applied pesticides.

CVRWQCB 2000—Sacramento River Watershed Program aquatic toxicity data for 1998-1999 have also been compiled and reported in a separate report prepared by the Central Valley Regional Water Quality Control Board.

CVRWQCB 2002—This one-year study used modified USEPA testing protocols and TIE procedures to investigate potential causes of toxicity to the single-cell green algae, *Selenastrum capricornutum*, at seven sites in the Sacramento River watershed and 6 sites in the San Joaquin River watershed. Toxicity (inhibition of algal cell growth) was observed for several ag drains, an urban creek site, and the mainstem Sacramento River. Nineteen of the 95 samples collected (20%) in the Sacramento River watershed exhibited significant toxicity to *Selenastrum*. In 16 of the 19 toxic samples (84%), the toxicity was removed by a C8 solid phase extraction column, indicating that toxicity was due to non-polar organic compounds (such as herbicides and other pesticides). The study concluded that diuron the primary toxicant in approximately 13 of the 54 (24%) samples with observed toxicity. Specific causes of toxicity were not determined for the majority of samples.

Table 21. Selected Aquatic Toxicity Monitoring Programs in the Sacramento River Watershed

Program	Monitoring Period and (Frequency)	Parameters	Number of Sampling Locations & Geographic Reference
SRWP	8/96–5/00 (monthly); 7/00–5/02 (episodic)	▪ 7-day *Ceriodaphnia* toxicity tests ▪ 4-day *Selenastrum* toxicity tests ▪ 7-day *Pimephales* toxicity tests ▪ Toxicity Identification Evaluations	21 sampling sites throughout the Sacramento River watershed (*Selenastrum* testing limited to 3 sites after 5/98; *Pimephales* testing discontinued after 5/99)
Regional Board/CalFed	6/99–5/00 (monthly)	▪ 7-day *Pimephales* toxicity tests	24 sampling sites throughout the Sacramento River watershed
CUWA	2/98–3/99 (monthly)	▪ *Pimephales* toxicity tests with SRWP samples split with UCD Aquatic Toxicology Lab	6 SRWP sites: 5 mainstem Sacramento River sites and one Feather River site
CDWR Special Tributary Monitoring	6/98–5/00 (monthly)	▪ 7-day *Ceriodaphnia* and 10-day*Pimephales* toxicity tests ▪ Toxicity Identification Evaluations	27 (*Cerio.*) sampling sites in Sac River tributaries (Clear Ck, Mill Ck, Deer Ck, Big Chico Ck)
SF Bay Regional Monitoring Program (SFEI 1999b)	1994–1997 (episodic storm events)	▪ 48-hour *Mytilus* and *Crassostrea* toxicity tests, and 7-day *Mysidopsis* bahia toxicity tests ▪ Dissolved and particulate diazinon and chlorpyrifos in water	10-13 Bay-Delta sampling sites, including the Sacramento River and San Joaquin River at the Delta terminus
CVRWQCB (Foe *et al*. 1998)	1996 and 1997 wet seasons	▪ 7-day *Ceriodaphnia* toxicity tests ▪ Toxicity Identification Evaluations ▪ Dormant-spray pesticides in water	4 sampling sites: Sac Slough and Sac River at Greene's Landing; Orestimba Ck, and San Joaquin River at Vernalis
DPR (Nordmark *et al*. 1998-00)	1996–00, weekly during dormant spray season	▪ 96-hour and 7-day *Ceriodaphnia* toxicity tests ▪ Dormant-spray pesticides, herbicides in water	2 Sutter Bypass sampling sites, Wadsworth Canal, 1 sampling site at Sacramento River at Bryte *or* Alamar
DPR (Spurlock 2002)	1991-2001	▪ Chlorpyrifos, diazinon ▪ Acute Toxicity	Meta-analysis of 32 surface water and dormant spray studies
Rice Pesticide Monitoring (DPR 1995-98)	1995-1999 (episodic discharge events)	▪ 96-hour *Ceriodaphnia* toxicity tests ▪ Rice pesticides in water	4 sampling sites: Colusa Basin Drain, Butte Slough, and Sacramento River at Village Marina and near Bryte
CVRWQCB, CALFED	9/00–8/01 (monthly)	▪ 4-day *Selenastrum* toxicity tests, TIEs ▪ Pesticides in water	7 sites in the Sacramento River watershed
DPR (Bacey, Starner, and Spurlock 2003)	2002–2003 (wet season episodic)	▪ 96-hour *Ceriodaphnia* toxicity tests ▪ Pyrethroid, organophosphate, and triazine pesticides	2 ag drain sites near Marysville (Jack Slough and Wadsworth Canal)

ATTAINMENT OF BENEFICIAL USES AND POTENTIAL IMPAIRMENT

Comparisons with water quality criteria and 303(d) listings: What do the data say about attainment of beneficial uses and potential impairment? Toxicity to aquatic organisms in surface waters outside designated mixing zones[5] is prohibited by the Basin Plan's enforceable narrative water quality objective:

> *"All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the Regional Water Board."*

The results of SRWP monitoring and other studies have documented that water collected from streams and rivers throughout the watershed have episodically caused toxicity to zooplankton, fish larvae, and algal test organisms (*Ceriodaphnia, Pimephales*, and *Selenastrum*, respectively). The magnitude of statistically significant effects observed on test organisms has ranged from small decreases in growth or reproduction to 100% mortality of the test organisms. This observed toxicity to test organisms may be of ecological significance, *e.g.*, if it translates to significant decreases in instream populations of resident species. Studies have established that there is a statistically significant relationship between ecosystem effects and mortality in laboratory tests, most clearly for highly toxic point source discharges (de Vlaming *et al.* 2000, de Vlaming and Norberg-King 1999). Probabilistic risk assessments have been proposed as an alternative method for evaluating the likelihood and ecological significance of the potential toxic effects (*e.g.*, that conducted by Giddings *et al*. (2000) for diazinon in the Sacramento-San Joaquin system). The relationship between ecosystem impairment and statistically significant sublethal chronic effects (such as inhibition of reproduction) in laboratory toxicity tests has not been well established by either of these methods. However, for the purpose of the evaluations performed herein, it was assumed that significant toxicity to test organisms are an indication of potential impairment to aquatic species and ecosystems.

As stated previously, toxicity in surface waters is prohibited by the Basin Plan, and violations of this prohibition have resulted in waterbodies being included on the 303(d) list of impaired waterbodies. A number of sites have been included on California's 2002 303(d) list of impaired waterbodies for toxicity of unknown cause (Table 22) and for organophosphate pesticides, which have been identified as causes of observed toxicity in the watershed. The observed toxicity attributed to diazinon and chlorpyrifos in Arcade Creek samples is consistent with the 303(d) listings of this and several other waterbodies for toxicity due to these pesticides. The Sacramento River mainstem from Shasta to the Delta, the lower Feather River, and the American River are all listed for toxicity of unknown causes(s), and some samples from each of these reaches have caused toxicity to test organisms in previous monitoring years. The specific causes of observed toxicity at these locations has not yet been determined. Members of the Toxicity Focus Group of

[5] The Central Valley Basin Plan states that mixing zones *may* be allowed and that objectives *may* not apply within designated mixing zones, but will apply at the edge of designated mixing zones (CVRWQCB 1995). If granted, mixing zones are generally designated in NPDES permits for specific point source discharges. None of the locations monitored by the SRWP are within designated mixing zones.

the SRWP have developed a strategy to address toxicity of unknown causes in 2001 and are currently revising the strategy (Larsen *et al*. 2001).

Table 22. Waterbodies Cited for Toxicity of Unknown Cause and Organophosphate Pesticides on California's 2002 303(d) List

Waterbody	Cause for Listing	Source	Area Affected	Units
Delta Waterways (Western and Eastern Portions)	Unknown Toxicity[1]	Source Unknown	43,039	Acres
Sacramento River (Keswick to Delta)	Unknown Toxicity	Source Unknown	129	Miles
Cache Creek	Unknown Toxicity	Source Unknown	96	Miles
Colusa Basin Drain	Unknown Toxicity	Agriculture	49	Miles
Feather River, Lower	Unknown Toxicity	Source Unknown	42	Miles
American River, Lower	Unknown Toxicity	Source Unknown	27	Miles
Delta Waterways	Chlorpyrifos, Diazinon	Agriculture, Urban Runoff	43,039	Acres
Elder Creek	Chlorpyrifos	Urban Runoff	11	Miles
Arcade Creek	Chlorpyrifos, Diazinon	Agriculture, Urban Runoff	9.9	Miles
Chicken Ranch Slough	Chlorpyrifos, Diazinon	Agriculture, Urban Runoff	8	Miles
Feather River, Lower	Diazinon	Agriculture, Urban Runoff	42	Miles
Morrison Creek	Diazinon	Agriculture, Urban Runoff	21	Miles
Lower Bear River	Diazinon	Agriculture	21	Miles
Sutter Bypass	Diazinon	Agriculture	19	Miles
Sacramento River, Knight's Landing - Delta	Diazinon	Agriculture	16	Miles
Jack Slough	Diazinon	Agriculture	14	Miles
Elder Creek	Diazinon	Agriculture, Urban Runoff	11	Miles
Butte Slough	Diazinon, Molinate	Agriculture	8.9	Miles
Elk Grove Creek	Diazinon	Agriculture, Urban Runoff	6.9	Miles
Strong Ranch Slough	Diazinon	Agriculture, Urban Runoff	6.4	Miles
Natomas East Main Drain	Diazinon	Agriculture, Urban Runoff	3.5	Miles
Sacramento Slough	Diazinon	Agriculture, Urban Runoff	1.7	Miles

SPATIAL AND TEMPORAL PATTERNS

Ceriodaphnia toxicity testing results from 2003-2004 monitoring are summarized in Table 23 and Table 24. Fathead minnow toxicity testing results from 2003-2004 monitoring are summarized in Table 25 and Table 26. No Selenastrum toxicity was observed in 2003-2004 monitoring, It should be noted that the spatial and temporal coverage of the watershed by SRWP and other monitoring efforts are not adequate to completely characterize the incidence and significance of aquatic toxicity throughout the watershed. However, the results available so far have demonstrated some consistent temporal and spatial patterns discussed below.

The significant results of 2003-2004 aquatic toxicity monitoring are summarized in the following sections.

Ceriodaphnia Mortality and Reproductive Toxicity

Six of 46 samples collected (13%) caused significant mortality to *Ceriodaphnia*. All six samples were collected during or immediately following the June 2004 dry weather event intended to coincide with the rice field drainage season. It should be noted that three of these sites exhibiting toxicity were outside of the areas expected to be affected by these rice field drainage. All 11 sites exhibited significant mortality or reproductive toxicity during this event, and 9 of 11 sites exhibited significant reproductive toxicity during the July 2004 dry season event. Taken together, 91% of the dry season samples caused significant *Ceriodaphnia* mortality or reproductive toxicity. In the previous monitoring year (2002-2003) monitoring year, no samples collected during the late dry season or during rice pesticide application and discharge period caused significant mortality to *Ceriodaphnia*. No significant mortality to *Ceriodaphnia* was observed in samples collected during the two wet season events or the July 2004 dry season event, but 9 of the 22 samples collected during these two events exhibited reproductive toxicity, with 7 of these occurring in the lower watershed (below Colusa).

Significant mortality was observed in only one sample from the two agricultural drainage-dominated sites (Colusa Basin Drain and Sacramento Slough) in monitoring conducted 2003-2004. However, an additional 7 of the 9 total samples at these sites exhibited significant reproductive toxicity. Only one case of significant mortality has been observed in the previous monitoring periods (1999-2003). Monitoring performed prior to 1996 reported 100% *Ceriodaphnia* mortality in samples collected from these sites during the spring, when rice field runoff was present in surface waters (Connor et al. 1993). The long-term decline in mortality at these locations has been attributed largely to the effectiveness of changes in pesticide application practices and longer holding times implemented by the rice farming industry for rice flood water to allow for degradation of pesticides.

One of the four samples collected in 2003-2004 from Arcade Creek at Norwood Avenue caused significant mortality to *Ceriodaphnia*, with one additional sample causing reproductive toxicity. Twelve of 17 samples (70%) collected from the major tributaury sites (Feather, Yuba, and American Rivers) also exhibited some level of significant toxicity.

Samples collected from the Sacramento River exhibited moderate but statistically significant reproductive toxicity (and no mortality) in 20% of dry season samples. For the two dry season events, 90% percent of Sacramento River samples caused mortality or reproductive toxicity to *Ceriodaphnia*.

The watershed-wide pattern of reproductive toxicity to *Ceriodaphnia* observed in the months of January and February of 1997-2000 and February 2002, was not evident in 2003, but re-surfaced in 2004. This period typically coincides with seasonal high flows and application of dormant-spray pesticide applications. The 2003-2004 water year was a below average rainfall year in the watershed with normal precipitation patterns in January and February, and typical seasonal high flows in the Sacramento River mainstem and the major tributaries. Although no consistent seasonal patterns have been observed in the incidence of significant toxicity to *Ceriodaphnia* in 1998-2003 monitoring, the results of the SRWP and other monitoring programs support the conclusion that significant adverse effects on test organisms (at most locations) tend to be associated with specific episodic events. The episodic events most commonly associated with observed toxicity are the application and subsequent runoff of dormant-spray pesticides from agricultural areas, and seasonal hydrologic events such as first-flush storms in areas affected by urban runoff. However, in 2003-2004 monitoring, the most severe toxicity observed in the mainstem Sacramento River occurred during June 2004, and no significant mortality was observed during the two wet season events.

Pimephales Mortality and Growth Toxicity

Ten of 44 samples collected (23%) caused significant mortality to *Pimephales*. Half of these were observed during the July 2004 dry season sampling. An additional four samples exhibited significant growth reduction, with three of these observed during the July sample event. Overall, 32% of the samples collected exhibited some toxicity to *Pimephales*, with more than half of these occurring during the July 2004 dry season event.

The only apparent spatial pattern was that samples collected from mainstem Sacramento River sites exhibited a higher frequency of mortality or growth reduction toxicity: eight of 20 (40%) were observed to be toxic to *Pimephales*. Toxicity to *Pimephales* was less frequently observed in samples collected from the major tributaries (25%), agricultural drains (25%), or Arcade Creek (25%). Within the group of Sacramento River sites, toxicity to Pimephales was more severe in the upper river from Keswick to Hamilton City (5 of 12 samples or 42% caused mortality to more than 65% of test organisms), than from Colusa to Freeport, where only one of 8 samples or 13% exhibited significant mortality.

Another significant result of the the Pimephales monitoring was that 40% (19 of 48) of the environmental samples required retesting with a modified procedure to control for pathogen related mortality. Pathogen-related mortality was observed in most of the environmental samples collected in the January and February events. The high frequency of this problem in samples collected when water temperatures are low is consistent with the pattern reported in the past. The problem was successfully controlled by using a modified U.S. EPA toxicity testing procedure (Geis et al., 2003). These modifications consist of using smaller test containers (30 mL), including only two fish per container, and increasing the number of replicates to ten.

Selenastrum Mortality and Reproductive Toxicity

No toxicicity to *Selenastrum* was observed in the 44 environmental samples collected for this monitoring effort.

TOXICITY FOLLOW-UP RESULTS

A number of cases of observed toxicity to *Ceriodaphnia* were investigated using Toxicity Identification Evaluation (TIE) procedures. The results of these investigations are described below.

One case of significant *Ceriodaphnia* mortality was observed at Arcade Creek in June 2004, and was retested with 100 ppb piperonyl butoxide (PBO). In this case toxicity was not persistent in the original sample and there was no difference between the lab control, the retested sample, and the PBO-treated sample. No organophosphate pesticides were detected in the Arcade Creek sample, indicating that this class of pesticides was not likely the cause of the observed toxicity.

Significant *Ceriodaphnia* mortality was also observed in Sacramento Slough and in the Feather River near Nicolaus samples for the June 2004 dry season event. The original samples were retested and treated by centrifugation, C-8 Solid Phase Extraction (SPE), and PBO. Both untreated samples were still toxic at the initiation of the targeted TIE procedures. Centrifugation removed the toxicity of the Feather River sample. The combination of the SPE treatment and centrifugation reduced but did not completely remove toxicity, and the PBO treatment also reduced and delayed the onset of mortality in the Feather River sample. PBO and the SPE treatment both improved survival in the Sacramento Slough sample, while centrifugation did not. These results suggest that metabolically activated organic compound(s) (e.g., organophosphate pesticides) may have contributed to the observed toxicity. There were no organophosphate pesticides detected in either the Feather River or the Sacramento Slough sample, but molinate (2.3 ug/L) and thiobencarb (0.5 ug/L) were detected in the Sacramento Slough sample. These concentrations are not high enough to explain all of the toxicity, but indicate that these pesticides may have contributed to the toxicity (at least in the Sacramento Slough sample). This indicates that another non-organophosphate metabolically activated pesticide (e.g., some thiourea insecticides) may be responsible for at least some of the toxicity in these samples. To determine whether toxicity could be recovered, acute *Ceriodaphnia* toxicity tests were conducted with concentrated elutions of the SPE columns. Toxicity was recovered from the Feather River and Sacramento Slough samples from the SPE extractions. These results generally support the hypothesis that non-polar organic compounds (e.g., pesticides) were contributing to observed toxicity, although it is not conclusive proof. No further evaluations were performed with these samples.

Targeted TIEs were also initiated using *Ceriodaphnia* with toxic samples from the Sacramento River at Bend, Sacramento River at Freeport, and Arcade Creek, but toxicity was not persistent in the original samples at the time of re-testing. No further evaluations were conducted with these samples.

No TIEs were conducted with *Pimephales* (fathead minnows) or *Selenastrum* in 2003-2004.

CONCLUSIONS AND RECOMMENDATIONS

The results of the 2003-2004 monitoring and previous SRWP aquatic toxicity monitoring efforts have confirmed that significant toxicity to test organisms continues to occur in surface waters throughout the watershed. *Ceriodaphnia dubia* toxicity attributable to organophosphate pesticides in agricultural runoff and urban runoff has previously been definitively shown by SRWP monitoring and other studies. In 2003-2004 monitoring, toxicity to both *Ceriodaphnia* and *Pimephales* was more frequently observed during the two dry season events than during wet season events, with no clear indication of a specific source of toxicity.Widespread toxicity to *Ceriodaphnia* and *Pimephales* was observed in the July 2004 event, with the more severe effects observed in *Pimephales*. Effects on *Ceriodaphnia* during this event were limited to reductions in reproduction that were similar for all sites exhibiting toxicity. Sacramento River at Freeport and Arcade Creek were the only sites that did not exhibit some level of mortality during this event. A similar case of widespread mortality was also observed in a previous dry season event (September 2001) and not associated with any known causes of toxicity, and indicates a need to continue to monitor for toxicity during a wide range of hydrologic and weather conditions.

In contrast to previous years, samples collected from Arcade Creek at Norwood Avenue did not exhibit a higher frequency or severity of toxicity than other tributaries and mainstem Sacramento River sites.

Regularly scheduled monitoring conducted from 1998–2000 was valuable in beginning to evaluate the overall frequency and distribution of observed water column toxicity, and for identifying or confirming the causes of some of the observed toxicity. However, spatial and temporal coverage of the watershed by SRWP and other programs is far from comprehensive, and significant questions remain regarding the sources, severity, persistence, and ecological significance of periodic toxicity in surface waters of the Sacramento River watershed. It is clear that definitively addressing all of these questions will require monitoring and studies of much greater scope (and cost) than the current efforts by SRWP and other programs. To address some of these questions, the SRWP aquatic toxicity monitoring effort for 2000-2004 has focused primarily on monitoring specific episodic events (e.g. agricultural dormant spray season, runoff events, high flow events). This strategy resulted in observation of more frequent and severe toxicity in the Arcade Creek urban watershed, but did not result in a notably greater frequency of observed toxicity for other locations. Although the 2000-2001, 2001-2002, and 2003-2004 wet seasons all had below-average rainfall, the 2002-2003 wet season had above average precipitation with no apparent increase in frequency (or magnitude) of episodic aquatic toxicity throughout the watershed. Interpretation of the results of a handful of episodic events for these few seasons of monitoring must be cautious because the causes and timing of significant episodic toxicity events may differ greatly in different waterbodies, and the likelihood of missing a particular toxic event is high. Although even a single toxic event of sufficient severity has the potential to have significant adverse ecosystem impacts, there is currently insufficient evidence to either support or rule out such a hypothetical event for most sites monitored.

Other issues that require additional investigation are the causes and ecological significance of the adverse reproductive effects to *Ceriodaphnia* observed to occur sporadically at different sites throughout the watershed. Because these effects manifest at sub-lethal levels and the toxicity is often not persistent in the original samples, determining the causes of these effects has proven difficult with the available TIE and follow-up testing procedures. This is complicated by the unpredictable nature of these sub-lethal toxic "events". These sub-lethal toxic effects need to be further evaluated through additional testing to quantify potential frequency and magnitude of toxicity at these sites. Selected elements of the Strategy to Address Toxicity of Unknown Cause (available from the SRWP website at http://www.sacriver.org/subcommittees/toxics/documents/) are being implemented in 2005 and 2006, and it is hoped that these efforts will provide additional tools to address these questions. Specific elements of the Strategy to be implemented will include TIEs, development of targeted TIEs for specific pesticides, and forensic investigations of observed toxicity.

This three-species approach for monitoring episodic aquatic toxicity by SRWP will be continued and expanded for the 2005-2006 monitoring effort. Ongoing monitoring conducted by agricultural coalitions in the Central Valley (beginning in 2004) is also using a similar event-based monitoring approach with toxicity testing and TIEs using *Ceriodaphnia*, *Pimephales*, *Selenastrum* in water, and *Hyalella* in sediment. It is expected that this expanded focus on toxicity will provide moreinsight into the causes and significance of toxicity in the Sacramento River watershed.

Table 23. Summary of 2003-2004 Toxicity Monitoring Results: Samples Exhibiting Significant Toxicity to *Ceriodaphnia dubia*

	Total Samples Collected	Significant Mortality[(1)]		Significant Reduction in Reproduction[(1)]		Significant Mortality *or* Reproductive Toxicity[(1)]	
Site	**n**	**n**	**%**	**n**	**%**	**n**	**%**
Sacramento River below Keswick	4	0	0%	3	75%	3	75%
Sacramento River above Bend Bridge	4	1	25%	1	25%	2	50%
Sacramento River near Hamilton City	4	0	0%	3	75%	3	75%
Sacramento River at Colusa	4	0	0%	2	50%	2	50%
Sacramento River at Freeport	4	1	25%	0	0%	1	25%
Feather River at Nicolaus	5	2	40%	2	40%	4	80%
Yuba River at Marysville	4	0	0%	2	50%	2	50%
American River at Discovery	4	0	0%	4	100%	4	100%
Arcade Creek at Norwood Ave.	4	1	25%	1	25%	2	50%
Colusa Basin Drain	4	0	0%	4	100%	4	100%
Sacramento Slough	5	1	20%	3	60%	4	80%
Total	46	6	13%	25	54%	31	67%

(1) Significant toxicity is defined as mortality or decreased reproduction (≥20%) that is significantly different from controls at the 95% confidence level.

Table 24. SRWP 2003-2004 Toxicity Monitoring Results:
Mortality and Reproduction Endpoints for *Ceriodaphnia dubia*

Event Types and Dates:	Mid Wet Season 01/20/04 – 01/22/04 Event 46	Post-OP Pesticide Dormant Spray Application 02/04/04 – 02/06/04 Event 47	Rice Field Discharge Season (Dry Weather Event) 06/09/04 – 06/11/04 Event 48	Follow-up Sampling 6/16/04 Event 48-FU	Dry Season, Low Flows 07/27/04 – 07/29/04 Event 49
Toxicity Testing Endpoints[1]:	Mean Percent Mortality (Days to 100% Mortality)				
	Reproduction, Mean Neonates/Adult				
Sacramento River below Keswick	0	22	30		20
	28.6	12.4*	7.2*		10.2*
Sacramento River above Bend Bridge	0	0	100* (day 6)		0
	29.8	15.7	0.0		12.7*
Sacramento River near Hamilton City	10	0	22		20
	19.7*	19.8	10.0*		11.9*
Sacramento River at Colusa	0	10	10		10
	31.5	21.5	14.0*		11.1*
Sacramento River at Freeport	0	0	60*		0
	21.8	16.3	5.6		13.9
Yuba River at Marysville	0	0	30		0
	23.4	19.4	4.9*		8.9*
Feather River at Nicolaus	10	10	90*	70*	0
	21.4*	18.6	1.6	1.9	11.1*
American River at Discovery	0	10	40		20
	11.8*	12.9*	3.2*		8.3*
Arcade Creek at Norwood Ave.	10	0	67*		0
	12.4*	21.7	13.1		21.8
Colusa Basin Drain	0	0	30		20
	21*	12.9*	1.7*		15.1*
Sacramento Slough	0	0	70*	0	30
	23.7	15.3*	0.3	6.1*	9.0*
Lab Control Results	0	0	0	0	0
	31.3	20.2	26.8	17.1	17.9
	0	0	0		11
	26.8	22.9	26.1		24.6
	0	0	0		0
	23.6	18.3	26.1		16.2
	Sac R. at Hamilton	Colusa Basin Drain	Feather R. at Nicolaus		
Field Duplicates	0	10	50*		
	28.6	12.3*	3.9		

(1) Unshaded rows are mortality results. Shaded rows are reproduction results. "*" indicate a statistically significant (p<0.05) increase in mortality (≥20%) or reduction in reproduction compared to the laboratory control.

(2) Laboratory controls meeting EPA criteria for test acceptability

(3) Reduction of reproduction compared to control was statistically significant but less than 20%.

(4) Results of retest due to control failure

Table 25. Summary of 2003-2004 Toxicity Monitoring Results: Samples Exhibiting Significant Toxicity to *Pimephales promelas*

	Total Samples Collected	Significant Mortality(1)		Significant Reduction in Growth(1)		Significant Mortality *or* Reduction in Growth (1)	
Site	**n**	**n**	**%**	**n**	**%**	**n**	**%**
Sacramento River below Keswick	4	1	25%	0	0%	1	25%
Sacramento River above Bend Bridge	4	2	50%	0	0%	2	50%
Sacramento River near Hamilton City	4	2	50%	0	0%	2	50%
Sacramento River at Colusa	4	0	0%	2	50%	2	50%
Sacramento River at Freeport	4	1	25%	0	0%	1	25%
Feather River at Nicolaus	4	1	25%	1	25%	2	50%
Yuba River at Marysville	4	1	25%	0	0%	1	25%
American River at Discovery	4	0	0%	0	0%	0	0%
Arcade Creek at Norwood Ave.	4	1	25%	0	0%	1	25%
Colusa Basin Drain	4	1	25%	0	0%	1	25%
Sacramento Slough	4	1	25%	0	0%	1	25%
Total	46	12	27%	4	9%	16	36%

(1) Significant toxicity is defined as mortality or decreased growth (≥20%) that is significantly different from controls at the 95% confidence level.

Table 26. SRWP 2003-2004 Toxicity Monitoring Results:
Mortality and Reproduction Endpoints for Fathead Minnow (*Pimephales promelas*)

Event Types and Dates:	Mid Wet Season 01/20/04 – 01/22/04 Event 46	Post-OP Pesticide Dormant Spray 02/04/04 – 02/06/04 Event 47	Rice Field Discharge Season 06/09/04 – 06/11/04 Event 48	Dry Season, Low Flows 07/27/04 – 07/29/04 Event 49
Toxicity Testing Endpoints[1]:	Growth, Mean Biomass/Fish, mg			
	Mean Percent Mortality (Days to 100% Mortality)			
Sacramento River below Keswick	0.54	0.32	0.40	0.16
	0	12.5	15	**75***
Sacramento River above Bend Bridge	0.69(2)	0.52(2)	0.20	0.17
	10	20	**65***	**75***
Sacramento River near Hamilton City	0.58(2)	0.70(2)	0.07	0.02
	10	5	**85***	**95***
Sacramento River at Colusa	0.68(2)	0.58(2)	**0.35***	**0.38***
	0	20	30	35
Sacramento River at Freeport	0.52(2)	0.74(2)	0.72(3)	0.49
	30*	0	10	5
Yuba River at Marysville	0.66(2)	0.75(2)	0.62(3)	0.19
	5	5	15	**35***
Feather River at Nicolaus	0.64(2)	0.47(2)	0.67(3)	**0.35***
	10	**30***	10	15
American River at Discovery	0.69(2)	0.67(2)	0.52(3)	0.35
	0	0	10	20
Arcade Creek at Norwood Ave.	0.39	0.36	0.76(3)	0.45
	2.5	**20***	10	0
Colusa Basin Drain	0.67(2)	0.35	0.78(3)	**0.39***
	0	10	5	10
Sacramento Slough	0.67(2)	0.70(2)	0.67(3)	0.33
	7	0	5	**30***
Lab Controls	0.56	0.27	0.45	0.60
	0	0	10	15
	0.51	0.45	0.35	0.48
	0	0	40(4)	0
	0.44	0.38	0.43	0.49
	0	0	35(4)	15
	0.64	0.61	0.44	0.39
	0	5	15	5
	0.60			
	5			
Field Duplicates	Sac R. at Hamilton	Colusa Basin Drain	Feather R. at Nicolaus	Arcade Creek at Norwood
	0.58(2)	0.60 (2)	0.66(3)	0.40
	15	20	5	0

(1) Shaded rows are growth results. Unshaded rows are mortality results. "*" indicate a statistically significant ($p<0.05$) increase in mortality (≥20%) or reduction in reproduction compared to the laboratory control.

(2) Results are from test modified to control pathogen-related mortality.

(3) Sample was not toxic in initial test, but controls did not meet test acceptability requirements. Results are shown for initital test of sample.

(4) Controls did not meet test acceptability requirements and tests were re-initiated.

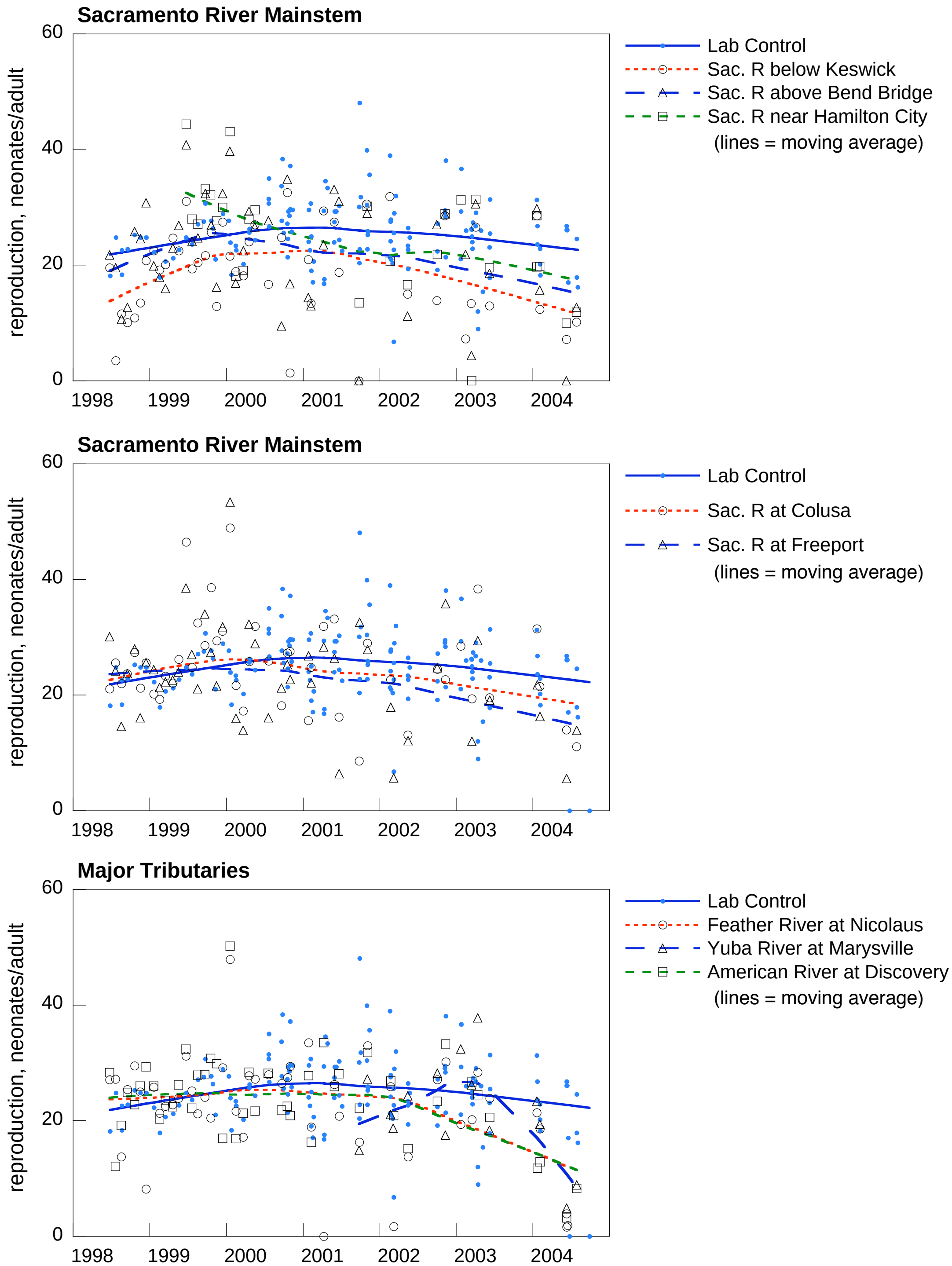


Figure 14. *Ceriodaphnia* Reproduction: Mainstem Sacramento River and Major Tributaries, 1998-2004

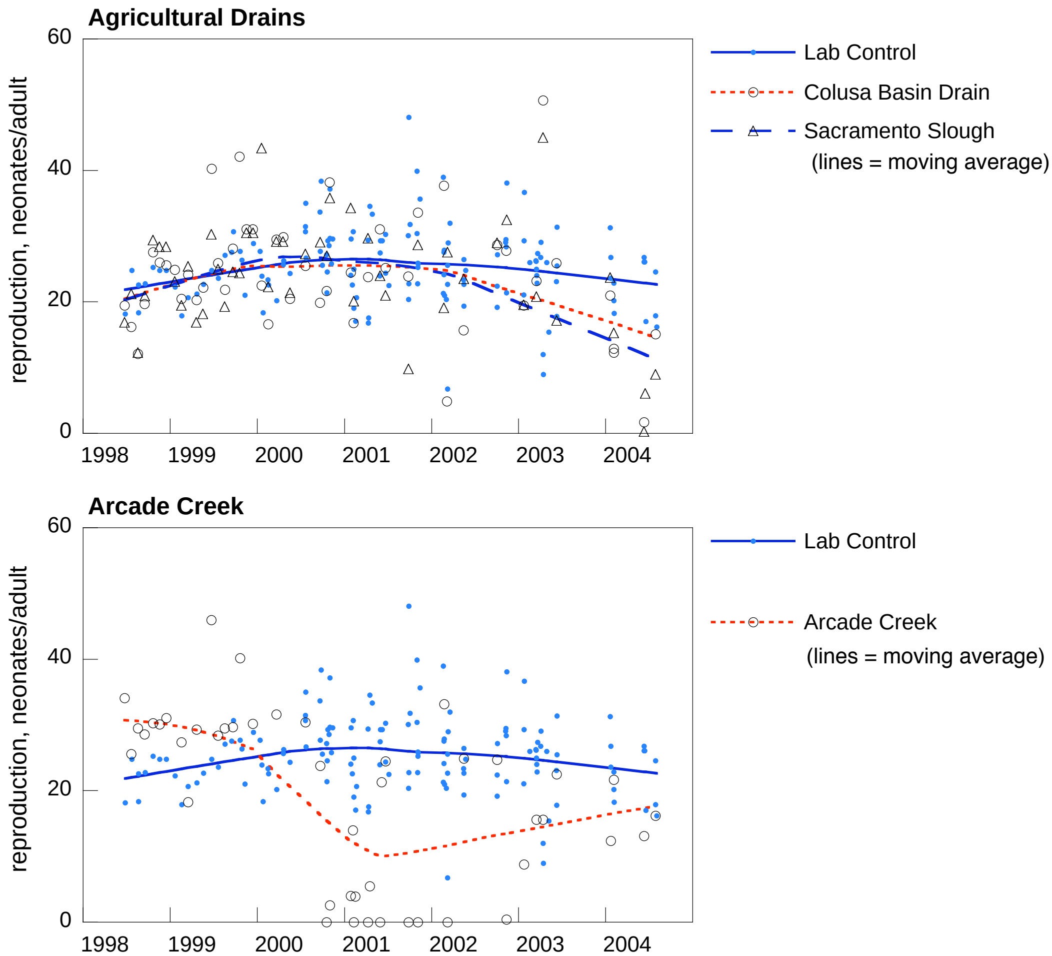


Figure 15. *Ceriodaphnia* Reproduction: Ag Drains, and Arcade Creek, 1998-2004

DRINKING WATER PARAMETERS

BACKGROUND AND AVAILABLE DATA OVERVIEW

For the purposes of this analysis, drinking water parameters are grouped into three categories: total dissolved solids, organic carbon and ultraviolet absorbance, and bacterial pathogen indicators. Specific minerals, pathogenic organisms (*Cryptosporidium* and *Giardia*), and nitrogen and phosphorus compounds are also considered parameters relevant to drinking water beneficial uses, but were not monitored in 2003-2004. The parameters included within each category are discussed below in terms of their attainment of beneficial uses, and spatial and temporal distributions, if additional evaluation was warranted. For selected parameters, relative contribution to mass loads within the Sacramento-San Joaquin Delta are also discussed. General spatial distribution patterns, when considered, are described in terms of mean or median concentrations, as appropriate. SRWP 2003-2004 monitoring data for all parameters discussed are provided in Appendix A.

The sources of data utilized for this report are summarized in Table 27. The monitoring locations for the primary data considered for this report (USGS NAWQA, Sacramento River Coordinated Monitoring Program, City of Redding NPDES monitoring, the California Department of Water Resources, and the Sacramento River Watershed Program) are illustrated in Figure 1.

Table 27. Selected Programs Monitoring Drinking Water Constituents in the Sacramento River Watershed

Program	Monitoring Period(s)	Parameters	# of Sampling Locations & Geographic Reference
NAWQA (USGS)	2/96–4/98 (through 2003 for Sacramento River at Freeport)	▪ Total Dissolved Solids in water ▪ Total and Dissolved Organic Carbon in water ▪ Nutrients in water: nitrite as N; nitrate as N; ammonia as N organic nitrogen as N; dissolved orthophosphate as P; total phosphorus as P ▪ General Minerals in water: total alkalinity; sodium; chloride; sulfate; calcium; dissolved magnesium, manganese, potassium, iron, silica as SiO_2	12 sampling sites distributed throughout the Sacramento River watershed
SRWP	6/98–6/04	▪ Total Dissolved Solids in water ▪ Organic carbon and UVA_{254} in water ▪ Nutrients in water: nitrite as N nitrate as N; ammonia as N dissolved orthophosphate as P total phosphorus as P ▪ General Minerals in water: Total Alkalinity; Sodium; Chloride; Sulfate; Calcium; Total Magnesium, Manganese, Potassium, Iron ▪ Total and Fecal Coliform and E. coli in water ▪ *Giardia* and *Cryptosporidium* in water	12 sampling sites on Sacramento River and major tributaries
MWQIP (CDWR)	3/86–3/98 (1/96–3/98 considered for present analysis)	▪ Total Dissolved Solids in water ▪ Dissolved Organic Carbon in water ▪ Nutrients in water: Nitrate as N; Ammonia as N ▪ General Minerals in water: Total Alkalinity; Sodium; Chloride; Sulfate; Calcium; Dissolved Magnesium, Potassium ▪ Fecal Coliform in water	19 sampling sites distributed throughout the Sacramento-San Joaquin Delta (5 sites considered for present analysis)
CMP (SRCSD)	12/92–6/04 (10/96–6/04 considered for present analysis)	▪ Total Dissolved Solids in water ▪ Organic carbon and UVA_{254} in water ▪ Nutrients in water: nitrite as N nitrate as N; ammonia as N dissolved orthophosphate as P total phosphorus as P ▪ Total and Fecal Coliform and E. coli in water ▪ *Giardia* and *Cryptosporidium* in water	5 sites on Sacramento and American rivers in Sacramento metropolitan area
City of Redding	1/98–5/01	▪ Total Dissolved Solids in water	1 site at Sacramento River below Keswick Dam

ATTAINMENT OF BENEFICIAL USES AND POTENTIAL IMPAIRMENT

Comparisons with Relevant Water Quality Objectives

The Central Valley Basin Plan has adopted by reference California Title 22 of the California Code of Regulations Maximum Contaminant Levels (MCLs) for drinking water, as Basin Plan objectives. Specifically, the Basin Plan states:

> *"At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) and 64431-B. "*

Note that these drinking water MCLs are originally intended to apply to finished tap water, rather than to untreated sources of drinking water. Comparisons of surface water characteristics with MCLs clearly indicate that there is no impairment due to a specific parameter when the MCL for that parameter is not exceeded. Exceedances of MCLs in untreated source water indicate that there is some potential for increased treatment costs or for exceedances of the MCL in the treated drinking water, but are not definitive evidence that the use is impaired. For the purpose of these evaluations, it is assumed that waters that comply with MCLs are achieving the designated use as sources of drinking water, and that exceedance of MCLs indicate potential impairment of this use.

Existing applicable water quality objectives and goals for the parameters included within three drinking water categories (TDS and conductivity, TOC and DOC, nutrients, and pathogens) are listed in Table 28. The results of comparisons with these numeric thresholds are presented in Table 29 and are summarized below.

Total dissolved solids (TDS) concentrations in surface waters monitored in the Sacramento River watershed have been observed to exceed CDHS and USEPA's Secondary Drinking Water Standard Maximum Contaminant Level (MCL) of 500 mg/L once in Sacramento Slough and twice in Colusa Basin Drain. Long-term median concentrations were well below the 500 mg/L MCL at both sites, and compliance with the TDS limit is estimated to be greater than 96% for Colusa Basin Drain and 97% for Sacramento Slough. TDS concentrations were not observed to exceed the 500 mg/L MCL at any other sites. Concentrations were not observed to exceed 500 mg/L at any site in SRWP 2003-2004 monitoring. The Central Valley Basin Plan also includes a site-specific objective for TDS in the American River (125 mg/L as a 90^{th} percentile) from Folsom Dam to the Sacramento River. This objective was exceeded in only 1 of more than 100 samples collected from the American River. TDS concentrations in the Sacramento River watershed are also illustrated in Figure 16 using data through 2003.

There are site-specific and seasonal objectives for *specific conductivity (at 25˚C)* in the Central Valley Basin Plan. Relevant site-specific objectives are expressed as conductivities not to be exceeded by the 50^{th} and 90^{th} percentile of data in the Sacramento River at Knight's Landing (230 μmhos/cm and 235 μmhos/cm, respectively) and at the I Street Bridge (240 μmhos/cm and 340 μmhos/cm, respectively), and in the Feather River (150 μmhos/cm as a 90^{th} percentile). There are also seasonal- and water year-specific objectives for the Sacramento River at Emmaton, which range from 450 μmhos/cm in wet years to 2,780 in critical dry years. None of these site-specific objectives were exceeded at any sites where they might reasonably apply.

Total organic carbon (TOC) concentrations were compared to the 2 mg/L and 4 mg/L TOC treatment threshold included in the Stage 1 Disinfectants/Disinfection By-products (D/DBP) Rule. This regulation is designed to limit precursors to disinfection byproducts such as trihalomethanes, which are human carcinogens. In cases where the running annual average TOC in source water (measured at water treatment plant intakes) is 2.0–4.0 mg/L, water utilities may be required to remove up to 35% of the TOC (depending on source water alkalinity) unless they meet other specific quality or treatment technology requirements[6]. If the running average source water TOC is greater than 4 mg/L, water utilities may be required to remove up to 45% of the TOC in their influent. Total organic carbon concentrations occasionally exceeded the D/DBP 2 mg/L goal at all sites evaluated (Table 29). TOC concentrations measured in Sacramento Slough and the Colusa Basin Drain exceeded the 2 mg/L D/DBP treatment threshold in almost every sample analyzed, and exceeded the 4 mg/L threshold in more than 70% of samples collected. TOC in the Natomas East Main Drain (a primarily urban drainage) also exceeded the 2 mg/L threshold in virtually every sample, and exceeded the 4 mg/L threshold in approximately 85% of samples. The percentage of TOC concentrations in the mainstem Sacramento River exceeding the 2 mg/L D/DBP threshold value increased from Keswick to River Mile 44. The Yuba, Feather, and American rivers all exhibit TOC concentrations above the 2 mg/L treatment threshold, with percent exceedances ranging from 17% (in the Yuba River at Marysville) to 45% (in the Feather River near Nicolaus). Concentrations of TOC in all of these major tributaries were below the 4 mg/L threshold more than 95% of the time. Long-term average TOC concentrations were greater than 2.0 mg/L at most locations monitored, with the exception of the Yuba River, the American River, and the Sacramento River above Bend Bridge. The distribution of TOC concentrations in the Sacramento River watershed is illustrated in Figure 17 using data collected through 2003.

Included in the D/DBP Rule is a provision that utilities would not have to meet these removal requirements if the average *Specific UV Absorbance (SUVA)* is less than 2.0 L/mg-m in source water *or* treated water. SUVA is defined as the ratio of ultraviolet absorbance at 254 nm to the dissolved organic carbon concentration (UVA_{254}/DOC), and is used as a measure of the ability of organic carbon to react with disinfectants and form trihalomethanes and other disinfection by-products. UVA_{254} has been measured in a total of 11 events 2001-2003 by the SRWP, and in several more events by the Sacramento Coordinated Monitoring Program, and by CDWR for the Natomas East Main Drain. These preliminary results indicate that average SUVA is greater than the 2.0 L/mg-m D/DBP threshold in Sacramento River watershed surface waters monitored for this parameter (the Sacramento River mainstem and three major tributaries, two agricultural drains, and one urban drainage). SUVA data are also illustrated in Figure 18 for data compiled through 2003.

Fecal coliform bacteria numbers were evaluated in comparison to the Basin Plan water quality objective of 200 Most Probable Number (MPN) per 100 milliliters (ml) as a geometric mean value and a maximum value of 400 MPN/100 ml. Long-term geometric mean fecal coliform numbers exceeded the 200 MPN/100 ml objective only at Natomas East Main Drain, which also exceeded the 400 MPN/100 ml objective in 50% of samples collected in 2001-2004. Fecal coliform numbers were observed to exceed the 400 MPN/100 ml objective in 7% to 25% of

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[6] Utilities would not have to meet these removal requirements if they meet one of several possible conditions, including: (1) average TOC in their treated water less than 2.0 mg/L; (2) average levels of haloacetic acids and trihalomethanes below 30 µg/L and 40 µg/L, respectively, or a clear commitment to implement treatment to meet these levels by June 2005; or (3) average Specific UV Absorbance (SUVA) less than 2.0 L/mg-m in source water or treated water.

samples in the Sacramento River from Bend Bridge to Freeport, with no clear spatial trend. In the major tributaries, exceedances frequencies ranged from 7% in the Feather River to 23% of samples in Yuba River.

Total and fecal coliform data are also relevant to another important beneficial use, contact recreation. Although USEPA has identified as a priority the transition to using *E. coli* and *Enterococcus* bacteria (instead of total and fecal coliform bacteria) as indicators of microbial contamination (Action Plan for Beaches and Recreational Waters; EPA/600/R-98/079, March 1999), in this same document, USEPA reaffirmed commitment to the limits established in the 1986 criteria document (*Ambient Water Criteria for Bacteria—1986*), which include specific limits for total and fecal coliform bacteria. The 1986 criteria document is also referenced in USEPA's *National Recommended Water Quality Criteria* (USEPA 1999). The California Department of Health Services (CDHS) *Guidance for Freshwater Beaches* (Draft, February 11, 2000) recommends limits and testing for total and fecal coliform bacteria, as well as *E. coli* or *Enterococcus*. The non-regulatory CDHS *Guidance* also cites the numbers of bacteria at which closing and posting beaches is recommended. These recommended limits are identical to the limits cited by USEPA in the 1986 criteria document (*Ambient Water Criteria for Bacteria—1986*). In 2002, CVRWQCB Staff recommended adopting the recommended limits for *E. coli* in the Basin Plan for the Central Valley (CVRWQCB 2002). This amendment to the Basin Plan is still awaiting final approval from the Office of Administrative Law and the U.S. Environmental Protection Agency.

For the purpose of evaluating achievement and potential impairment of contact recreational uses, total and fecal coliform and *E. coli* data were compared to the limits recommended by CVRWQCB staff, USEPA, and CDHS. The recommended limits for total coliform are 1,000 MPN/100 mL as a 5-sample 30-day geometric mean and 10,000 MPN/100 mL as a single sample maximum. The single sample limit for total coliform bacteria was exceeded in 7% of samples collected from the American River at Discovery Park, in 3% of samples from the Sacramento River at Veterans Bridge, and in approximately 1% of samples collected from the Sacramento River at Freeport. The 10,000 MPN/100 mL limit was not exceeded at any other sites sampled. The long-term geometric mean was below the 1,000 MPN/100 mL limit at all locations monitored. The limits for fecal coliform bacteria are essentially the same values adopted in the Central Valley Basin Plan (200 MPN/100 mL as a geometric mean and 400 MPN/100 mL as a single sample maximum). Comparisons to fecal coliform limits are provided in previous paragraphs.

The recommended limits for *E. coli* are 126 MPN/100 mL as a 5-sample 30-day geometric mean and 235 MPN/100 mL as a single sample maximum. The single sample limit for *E. coli* was exceeded at nearly every site, but long-term geometric means exceeded the 126 MPN/100 mL recommended objective only in Natomas East Main Drain. The high concentrations reported by DWR for Natomas East Main Drain are similar to those observed in urban runoff monitoring conducted by the Sacramento Stormwater Monitoring Program (LWA 2003). It should be noted that SRWP began monitoring *E. coli* in 2001-2002 and that these data are biased by the focus on episodic rainfall events, which are expected to result in elevated bacteria counts in surface waters. This also applies to other total and fecal coliform data, but to a lesser degree, because these data sets have longer and less biased monitoring histories.

Table 28. Water Quality Objectives Relevant to Drinking Water Parameters

Parameter	Units	Threshold Values	Basis
TDS	mg/L	500 125	CDHS and USEPA Secondary Drinking Water Standard MCL [1] Basin Plan Site-specific Objective
Specific Conductivity	μmhos/cm at 25°C	150 – 2,780	CVRWQCB Basin Plan Site-specific objectives
TOC	mg/L	2 4	D/DBP Rule Treatment Thresholds
Fecal coliforms	MPN/100 mL	200, geo.mean[2] 400, maximum[3]	CVRWQCB Basin Plan, CDHS Recommended Limits (CDHS 2000), and USEPA Recommended Criteria (USEPA 1999)
Total coliforms	MPN/100 mL	1,000, geo.mean[2] 10,000, maximum[3]	CDHS Recommended Limits (CDHS 2000), USEPA Recommended Criteria (USEPA 1999),
E. coli	MPN/100 mL	126, geo.mean[2] 235, maximum[3]	CVRWQCB Basin Plan Amendment (CVRWQCB 2002)

(1) Primary and Secondary Drinking Water Standard MCLs have been adopted by reference in the Central Valley Basin Plan.

(2) This limit is intended to be applied to a 30-day geometric mean consisting of 5 samples.

(3) This limit is applied as a one-sample maximum.

Table 29. Comparisons with Drinking Water and Recreational Water Quality Goals: Percent of Data Meeting Limits

	Site	Fecal Coliform, 400 MPN/100 mL	Total Coliform, 10,000 MPN/100 mL	E. coli, 235 MPN/100 mL	TOC, 2 mg/L	TDS, 500 mg/L
Main-stem	Sacramento River below Keswick	100%	100%	—	—	100%
	Sacramento River above Bend Bridge	93%	100%	82%	78%	100%
	Sacramento River near Hamilton City	75%	100%	62%	75%	100%
	Sacramento River at Colusa	87%	100%	72%	65%	100%
	Sacramento River at Veterans Bridge	95%	97%	96%	49%	100%
	Sacramento River at Freeport	93%	99%	92%	47%	100%
	Sacramento River at River Mile 44	100%	100%	—	35%	100%
Major Trib-utaries	Yuba River at Marysville	77%	100%	72%	83%	100%
	Feather River near Nicolaus	93%	100%	91%	58%	100%
	American River at Discovery Park	89%	93%	86%	64%	98%(1)
Ag Drains	Colusa Basin Drain above KL	84%	100%	82%	0.0%	96%
	Sacramento Slough	100%	100%	96%	5%	97%
	Yolo Bypass near Woodland	—	—	—	—	100%
Urban	Natomas East Main Drain	50%	100%	33%	0.1%	94.5%
	Arcade Creek at Norwood Ave.	—	—	—	—	100%

(1) Compared to Basin Plan Site-specific objective of 125 mg/L.

What Do These Results Say About Attainment of Beneficial Uses and Potential Impairment, and How Does This Compare with Relevant 303(D) Listings for Parameter and Sites?

The California 2002 303(d) list does not consider all of the contaminants of concern to drinking water supply, and few waterbodies in the Sacramento River watershed are cited on the 303(d) list for pollutants relevant to drinking water and recreational use concerns (Table 30). The Pit River and Clear Lake are the only waterbodies in the Sacramento River watershed listed for impairment due to nutrients. Four waterbodies in the Sacramento River watershed are included in the 2002 303(d) list for impairments due to fecal coliform (South Cow Creek, Clover Creek, Clover Creek, and Whiskeytown Reservoir. The Western portion of the Delta is on the 2002 303(d) list for impairment due to specific conductance. It is clear however that the Sacramento River and major tributaries generally provide water that is of very high quality for municipal and agricultural supply. Comparisons of drinking water parameters with relevant water quality goals and objectives for the Sacramento River watershed show that the mainstem Sacramento River, and major tributaries (the Yuba, Feather, and American rivers) consistently meet water quality goals and objectives, suggesting that these waterbodies achieve their beneficial uses as sources of municipal and agricultural supply water and contact recreation, as designated by the Central Valley Region Basin Plan (CVRWQCB 1995). Analyses by USGS (Saleh *et al*. 2003) concluded that DOC concentrations even decreased significantly from 1990 to 2000 in the Sacramento River at Freeport and the lower American River. Although the TOC concentrations measured in the Sacramento River from Bend Bridge to the Delta often exceeded the 2 mg/l goal, it is not clear that these concentrations of organic carbon will result in a requirement for additional treatment for municipal drinking water suppliers to remove additional TOC in source water. The Stage 1 D/DBP Rule does not require such treatment if certain treatment technologies are used, or if other water quality requirements are met (e.g. for specific ultraviolet absorbance in source or treated water, TOC <2.0 mg/L in treated water, or trihalomethanes and haloacetic acids less than specified concentrations in treated water). Additionally, treatment technologies currently in use by many utilities are already able to remove ≥35% of TOC from Sacramento River water. If additional TOC removal is necessary, this requirement would increase treatment costs, but would not otherwise limit the water supply use. Additionally, comparisons of coliform bacteria data to limits recommended by USEPA, California Department of Health Services, and the CVRWQCB indicate that these limits are infrequently exceeded and suggest that recreational uses protected by these limits are generally well-supported in the mainstem Sacramento River and its major tributaries.

Table 30. Waterbodies Cited for Drinking Water-Related Parameters on California's 2002 303(d) List.

Waterbody	Cause for Listing	Source	Area	Units
Clear Lake	Nutrients	Unknown	40,070	Acres
Delta Waterways (Western portion)	Electrical Conductivity	Agriculture	22,904	Acres
Delta Waterways (Stockton Ship Channel)	Organic Enrichment, Low DO	Municipal point sources, urban runoff, storm drains	952	Acres
Pit River	Nutrients, Organic Enrichment, Low DO	Agriculture, Grazing	123	Miles
Whiskeytown Reservoir	Coliform bacteria	Septage disposal	98	Acres
Wolf Creek	Fecal coliform bacteria	Urban runoff, recreation, agriculture	23	Miles
Clover Creek	Fecal coliform bacteria	Human and livestock sources	11	Miles
South Cow Creek	Fecal coliform bacteria	Human and livestock sources	7.9	Miles

SPATIAL AND TEMPORAL DISTRIBUTION PATTERNS AND MASS LOADS

Because drinking water and recreational beneficial uses generally appear to be adequately supported for the Sacramento River watershed locations monitored by the SRWP, and the parameters monitored were not considered likely to impair these uses, spatial and temporal distributions were not evaluated for any of the drinking water-related parameters monitored in 2003-2004. Based on the same criterion, mass loads were also not evaluated for these parameters in this report. Spatial and temporal trends and mass loading have been considered in previous Annual Monitoring Reports (SRWP 2000, 2001) for results of SRWP monitoring conducted 1998-2000 and from other major monitoring efforts.

CONCLUSIONS AND RECOMMENDATIONS

The mainstem Sacramento River, and major tributaries (the Yuba, Feather, and American rivers) consistently meet water quality goals and objectives for drinking water-related parameters. Based on the best available indicators, these results suggest that designated beneficial uses of the Sacramento River and tributaries as sources of municipal and agricultural supply water and recreational uses are generally being achieved.

There was a general trend for concentrations TDS, organic carbon, and nutrients (evaluated in previous SRWP annual reports) to increase in the mainstem Sacramento River from the upper watershed to the lower watershed. This trend can generally be attributed to a combination of natural and anthropogenic sources, and is moderated by high quality Sierra tributary inflows.

The highest concentrations of most drinking water parameters of concern were generally observed in agricultural drains (Sacramento Slough and Colusa Basin Drain) and in urban drainages and creeks (Natomas East Main Drain, Arcade Creek). Natomas East Main Drain was also identified as a “site of concern” in the CALFED Drinking Water Quality Program Plan (CALFED 2000).

The Basin Plan limit for median fecal coliform numbers (200 MPN/100mL) was exceeded at only one site (Natomas East Main Drain), and the maximum limit for single samples (400 MPN/100 mL) was exceeded infrequently in the Sacramento River and the American River. Recommended USEPA and CDHS single sample and geometric mean limits for total coliform are also infrequently exceeded at monitored locations. Recommended single sample Basin Plan limits for *E. coli* were exceeded at most locations monitored, but *E. coli* numbers exceeded the geometric mean limit only at Natomas East Main Drain. Note that comparisons for E. coli are based on data biased towards episodic events expected to result in elevated bacteria counts.

TOC concentrations measured in the Sacramento River at Colusa, Verona, and Freeport often exceed the Stage 1 Disinfectant/Disinfection By-Product (D/DBP) Rule treatment threshold of 2 mg/l. The 2 mg/L threshold is significant because exceedance of this threshold may require utilities to remove up to 35% percent of TOC in their source water. It is not necessarily the case that the observed concentrations of organic carbon will result in a requirement for municipal drinking water suppliers to remove additional TOC in source water. The Stage 1 D/DBP Rule does not require such treatment if certain treatment technology requirements used, or if other water quality requirements are met in influent or treated water. Additionally, treatment technologies currently in use by many utilities are already able to remove ≥35% of source water TOC from Sacramento River water. Even if additional TOC removal is necessary, this requirement would not limit the water supply use. Available Specific UV Absorbance (SUVA) data suggest that average SUVA in surface waters of the Sacramento River watershed is generally greater than D/DBP alternative criterion (2.0 L/mg-m) and would not provide relief from additional treatment requirements.

Analyses presented in previous SRWP annual reports indicate that nitrate and nitrite meet USEPA and CDHS MCLs at all locations monitored in the Sacramento River watershed. Other nitrogen and phosphorus compounds that have been monitored by SRWP in previous years (ammonia, total nitrogen, dissolved orthophosphate) currently have no relevant regulatory thresholds for comparison. Although total nitrogen and total phosphorus concentrations in many Sacramento River watershed surface waters may exceed expected ecoregional nutrient criteria under development by USEPA, these criteria are not currently based on thresholds for protection of beneficial uses.

Water from the Sacramento River from Hood and upstream is considered to be of high quality for drinking water supply. However, the quality of water in the Central and Southern Sacramento-San Joaquin Delta is often marginal for drinking water supply, and compliance with increasingly stringent drinking water objectives is becoming more difficult. The Sacramento River alone provides up to 75% of the water entering the Delta, including a large portion of seasonal organic carbon and TDS mass loads. Although the Sacramento River therefore has a substantial effect on the quality of Delta drinking water supply source water, there are also significant internal sources of TOC and TDS within the Delta and from the San Joaquin River. Assessing the variety of sources and loads of Delta TOC is in fact one of the primary goals of the CALFED water quality program. As stated previously, the parameters of primary concern for drinking water quality—TOC, TDS, nutrients, and pathogens—are currently largely unregulated by the CVRWQCB and the Water Quality Control Plan (Basin Plan). Expected changes in Sacramento River watershed land uses (e.g. increased urbanization and development) have the potential to increase regulated point source discharges and (relatively) unregulated non-point source discharges, and therefore to increase loads of TOC, TDS, and pathogens to the Delta. In order to address these and other drinking water concerns, the CVRWQCB is implementing a work plan for the development of an effective drinking water policy. This effort is currently focusing on evaluating loads and sources of these parameters and is expected to establish water quality objectives for eventual inclusion in the revised Basin Plan.

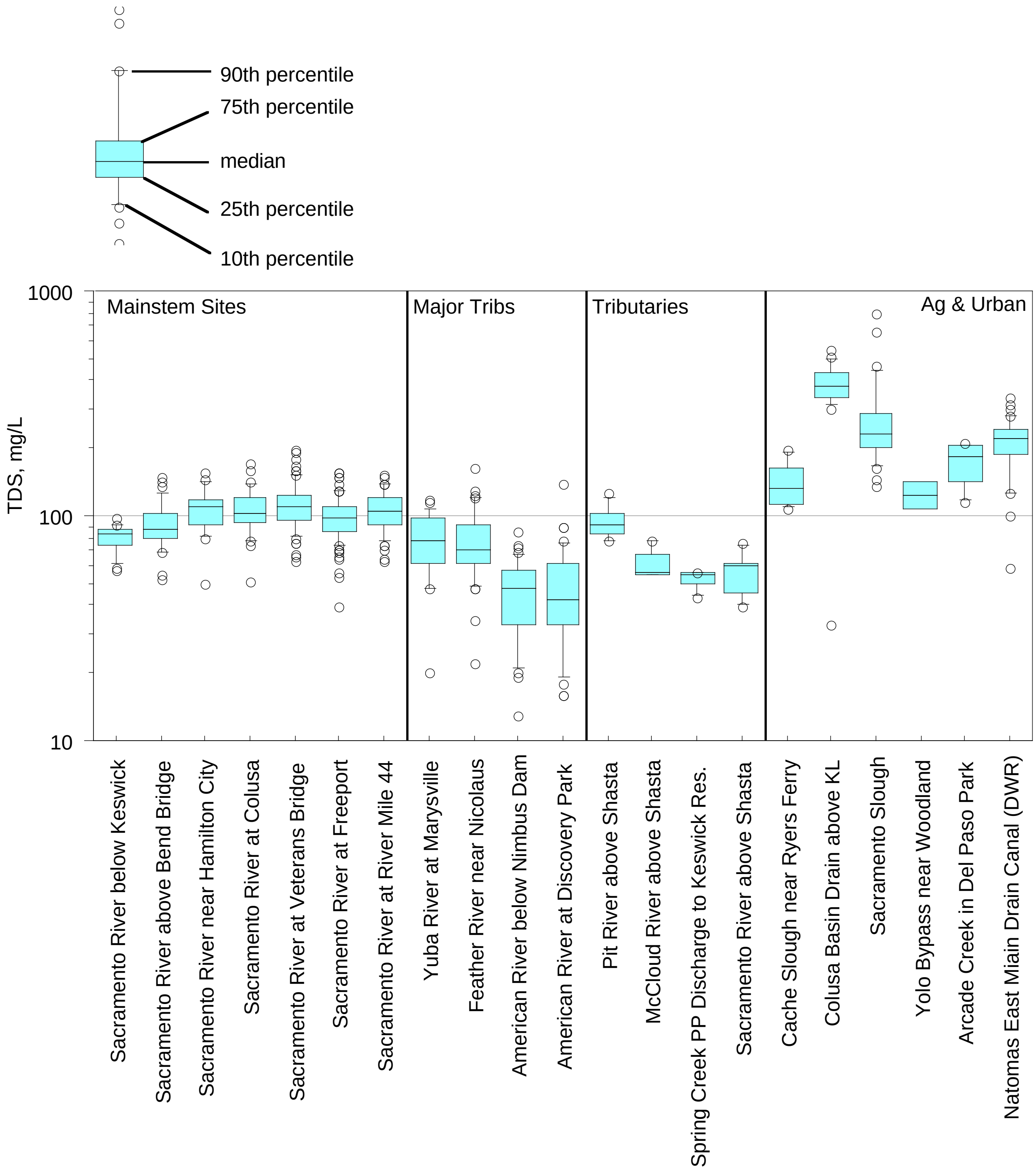

Figure 16. Total Dissolved Solids (TDS) Distribution, Sacramento River Watershed, 1998-2003 Data

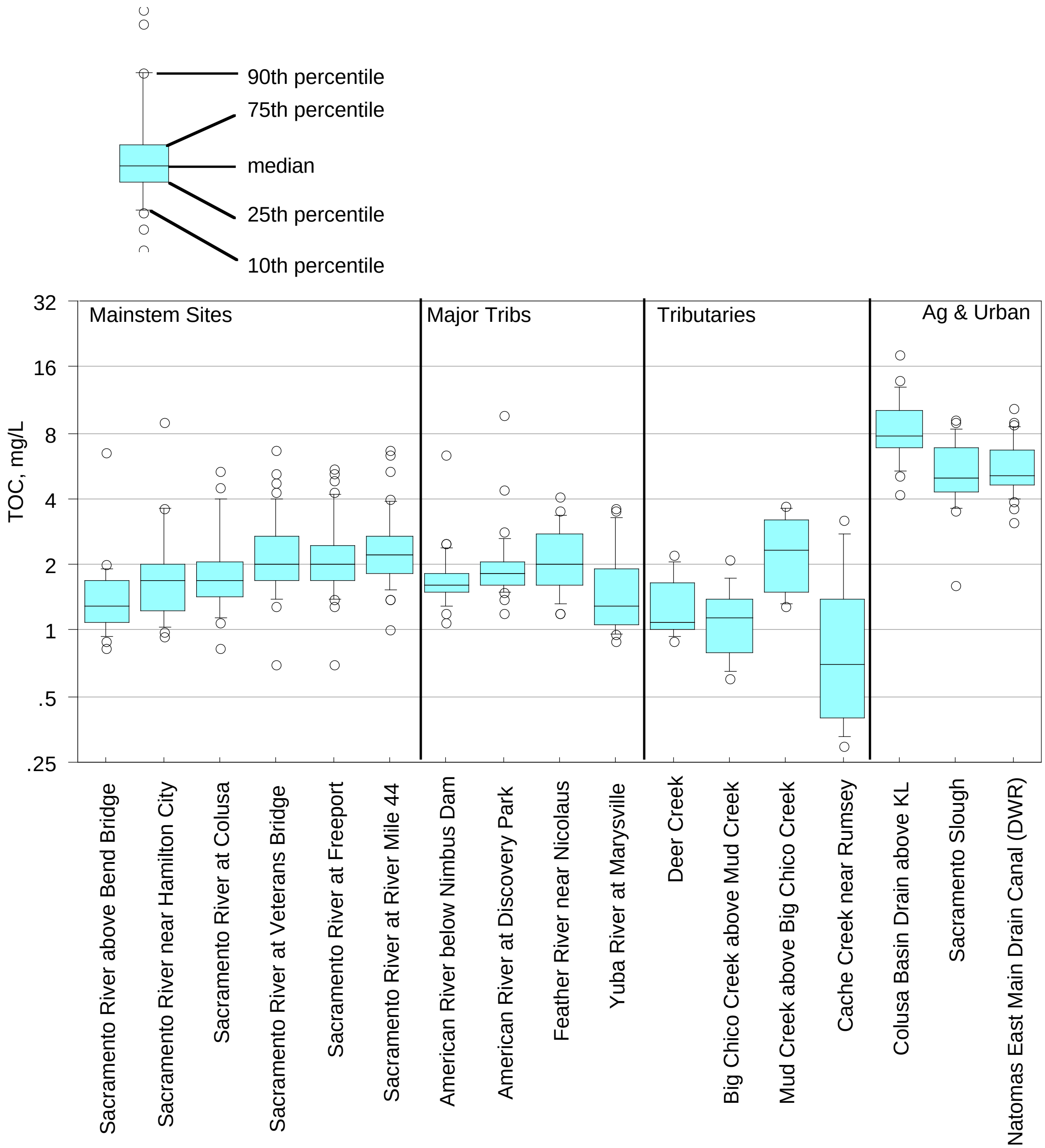

Figure 17. Total Organic Carbon (TOC) Distribution, Sacramento River Watershed, 1998-2003 Data

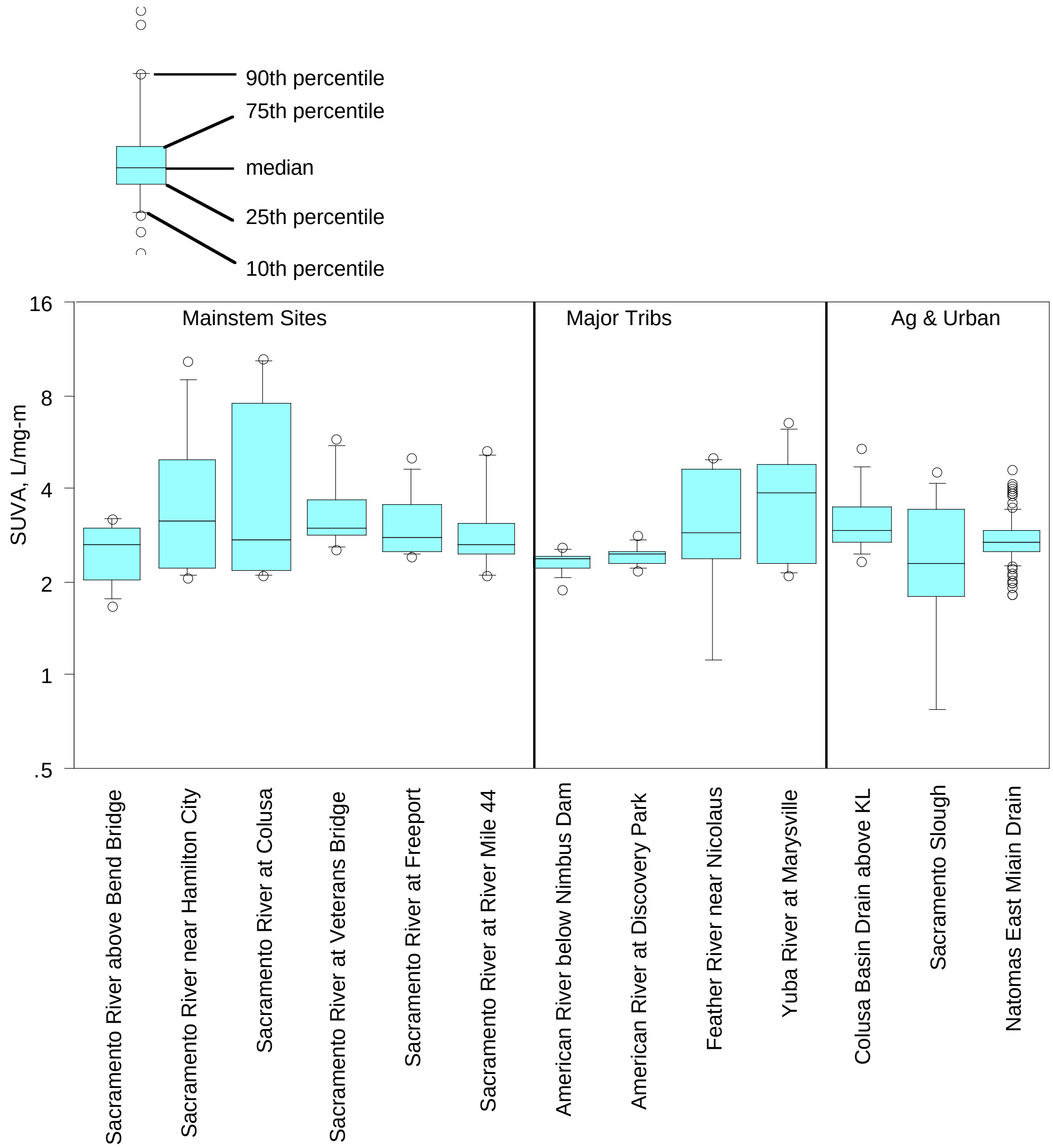

Figure 18. Specific Ultraviolet Absorbance (SUVA) at 254 nm Distribution, Sacramento River Watershed

(1988-2000 data for Natomas East Main Drain;
2002-2003 Data for All Other Locations)

ONGOING AND PLANNED MONITORING

No monitoring was planned or conducted for the SRWP in 2004-2005. This hiatus in monitoring was undertaken to allow the SRWP to re-evaluate its monitoring program objectives and focus. This evaluation was conducted primarily through the Monitroing and Toxics Subcommittee and through stakeholder workshops held in 2004 and 2005. As a result of these evaluations, the SRWP's core monitoring program focus on the Sacramento River mainstem and major tributaries has been reaffirmed by stakeholders and the SRWP Board of Directors. Monitoring outside of the core program will be conducted on a "special study" basis. SRWP stakeholders also expressed a strong consensus for more comprehensive "watershed health" monitoring, and the SRWP is currently developing a strategy to pursue this expansion of its monitoring scope beyond surface water quality monitoring.

In 2004, the SRWP submitted a grant proposal for funding for program development and an expanded monitoring effort through the State Water Resources Control Board's Consolidated Grants program. The SRWP proposal was funded and will support the next two years of water quality monitoring. Monitoring under the grant program is projected to begin in July 2005. The draft monitoring plan for 2005-2007 has been approved by the SRWP Monitoring and Toxics Subcommittee and is being submitted for review by the State Water Resources Control Board.

Monitoring planned for 2005-2007 will be conducted on an "episodic" basis, with events defined to coincide with specific hydrological or other conditions considered to potentially impact water quality. Monitoring will coordinate with extensive fish tissue monitoring efforts being implemented through the CALFED Bay-Delta Authority (CBDA) and Central Valley Regional Water Quality Control Board beginning in the summer of 2005. Monitoring at several locations will be coordinated with the Sacramento Valley Water Quality Coalition Monitoring and Reporting Program being conducted under the Agricultural Conditional Waiver program. The SRWP will also continue to coordinate with the Sacramento River Coordinated Monitoring Program. The parameters being monitored by the SRWP will include the following:

- Total Hg and MeHg (filtered and unfiltered)
- Hg and MeHg in suspended sediments, photodegradation rates, and sulfates
- TSS, TOC, DOC, UVA254, TDS, and N and P compounds
- DO, Temp, pH, EC, Turbidity
- organophosphate, carbamate, triazine, and pyrethroid pesticides
- E. coli bacteria
- Aquatic toxicity testing with *Ceriodaphnia*, *Pimephales*, and *Selenastrum*, with Toxicity Identification Evaluations (TIEs) and other follow-up investigations
- Mercury in fish tissue, phytoplankton, benthic invertebrates, and lower trophic level fish
- PCBs, organochlorine pesticides, and PBDEs in fish tissue
- Continued support for bioassessment monitoring by other programs (exact scope still to be determined)

The 2005-2007 monitoring plan approved by the SRWP Monitoring and Toxics Subcommittee is summarized in Table 31.

Table 31. SRWP Monitoring for 2005-2007:
Locations, Analytes, and Number of Annual Sample Events

		Chemical Characteristics					Pathogen Indicators	Aquatic Toxicity[1]	Biota and Tissue [2]			
Monitoring Locations		Total Hg and MeHg (filtered and unfiltered)	Hg and MeHg in suspended sediments, photodegradation rates, sulfates	TSS, TOC, DOC, UVA254, TDS, N and P compounds	DO, Temp, pH, EC, Turbidity	Pesticides (OP, carbamates, triazines, pyrethroids)	E. coli	Ceriodaphnia, Fatheads, Selenastrum	Mercury in fish tissue	Mercury in algae, benthic invertebrates, and lower trophic level fish	PCBs & OC pest.	PBDEs in fish
Mainstem Sacramento River	Sac. R. below Keswick	RED		RED	RED		9	9				
	Sac. R. at Bend Br	9	9	9	9	6	9	9				
	Sac. R. near Hamilton City	9	9	9	9	6	9	9	CF, RB			
	Sac. R. @ Colusa	9	9	9	9	6	9	9	CF, RB			
	Sac. R. at Veterans Br.	6	9	CMP	CMP	6	CMP	9	CF, RB	14		2
	Sac. R. at Freeport	6	9	CMP	CMP		CMP	9				
	Sac. R. at RM44	6	9	CMP	CMP		CMP	SRCSD	CF, RB	14	10	2
Major Tributaries	Yuba R. at Marysville	9		9	9	6	9	9	CF, RB	14		
	Feather R. near Nicolaus	9		9	9	6	9	9	CF, RB	14		2
	American R. at Discovery	6		CMP	CMP		CMP	9	CF, RB	14	10	2
Ag Drains	Sacramento Slough	9		9	9	6	9	9	CF, RB		2	
	Colusa Basin Drain	9		9	9	6	9	9	CF, RB		2	
Urban Creek	Churn Creek	9		TBD	TBD	6	TBD	9				

Note: Tabled values indicate number of environmental samples collected annually. Additional samples are collected for Quality Assurance. Text entries indicate data or samples collected by primary coordinating programs: CMP = Sacramento River Coordinated Monitoring Program, RED = City of Redding NPDES monitoring; CF = CALFED; RB = Regional Board

(1) A fixed budget is allocated for Toxicity follow-up consisting of chemistry, TIE testing, and additional sampling. The exact scope of toxicity follow-up is sample-specific and is determined on an *ad hoc* basis by the SRWP Toxicity Focus Group

(2) Fish tissue monitoring wiil be adjusted to take advantage of the coordination with the CBDA and Regional Board fish tissue monitoring efforts.

DATABASE AND DATA ACCESS

Larry Walker Associates (LWA) is responsible for both data management and database development for the Sacramento River Watershed Program. All data collected by the SRWP is currently stored in a normalized, relational database (Microsoft Access™) designed by LWA and the Department of Water Resources (Interagency Ecological Program) to house water chemistry and toxicity test data. The sampling crews and laboratories contracted to collect and analyze the Program's monitoring data provide the data manager (LWA) with electronic and hard copy data that are then imported into the SRWP Database. These data are then validated and qualified according to the protocols described in the SRWP Quality Assurance Project Plan (QAPP).

In addition to the results reported in SRWP Annual Monitoring Reports, final qualified data are also being made available through the Department of Water Resources Bay Delta and Tributaries (BDAT) database, which is part of the larger California Environmental Data Exchange Network (CEDEN). This database also contains results from many monitoring programs and is accessible to the public through the BDAT website: http://baydelta.ca.gov/

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APPENDIX A:

SRWP 2003-2004 WATER QUALITY DATA, CHEMICAL AND TOXICITY RESULTS

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Azinphosmethyl	ng/L	ND		1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	01/22/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	30	2		0
Arcade Creek at Norwood Av	01/22/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	70	2		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	8	2		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	EPN	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	3.48	0.16		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	4.60	0.16		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.142	0.0234		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.221	0.0234		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	01/22/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	6.6	0.2		0
Arcade Creek at Norwood Av	01/22/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	7.4	0.2		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 160.1	TDS	mg/L	DETECTED	182	5		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1	EST	0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	01/22/04	environ	EPA 160.2	TSS	mg/L	DETECTED	11.1	5		0
Arcade Creek at Norwood Av	01/22/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.308	0.0001	HT	0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	02/04/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	1600	2		0
Arcade Creek at Norwood Av	02/04/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2	GTE	0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Diazinon	µg/L	DETECTED	0.64	0.018	HB, EST	0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	1600	2		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	4.08	0.16		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	12.35	0.16		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Malathion	µg/L	DETECTED	0.05	0.1	HB, DNQ	0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.047	0.0234		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.105	0.0234		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	02/04/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	6.2	0.049		0
Arcade Creek at Norwood Av	02/04/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	8.4	0.049		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Prometon	µg/L	DETECTED	0.09	0.1	HB, DNQ	0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Simazine	µg/L	DETECTED	2.1	0.5	HB	0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Arcade Creek at Norwood Av	02/04/04	environ	EPA 160.1	TDS	mg/L	DETECTED	120	5		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	02/04/04	environ	EPA 160.2	TSS	mg/L	DETECTED	27.6	5		0
Arcade Creek at Norwood Av	02/04/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.415	n/a		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	06/11/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	90	2		0
Arcade Creek at Norwood Av	06/11/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2	GTE	0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	60	2		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	1.33	0.16		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	3.96	0.16		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.172	0.0234		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.29	0.0234		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.257	0.0234		1
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	06/11/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	10	0.049		0
Arcade Creek at Norwood Av	06/11/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	11	0.049		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Arcade Creek at Norwood Av	06/11/04	environ	EPA 160.1	TDS	mg/L	DETECTED	253	5		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	06/11/04	environ	EPA 160.2	TSS	mg/L	DETECTED	12	5		0
Arcade Creek at Norwood Av	06/11/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.393	na		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Chlorpyrifos	µg/L	DETECTED	0.65	0.018	EST	0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Chlorpyrifos	µg/L	DETECTED	0.041	0.018	DNQ, EST	0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	07/28/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	110	2		0
Arcade Creek at Norwood Av	07/28/04	field blank	SM 9221E	Coliform, fecal	MPN/100 mL	ND		2		0
Arcade Creek at Norwood Av	07/28/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	500	2		0
Arcade Creek at Norwood Av	07/28/04	field blank	SM 9221B	Coliform, total	MPN/100 mL	ND		2		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Def	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Def	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Disulfoton	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Arcade Creek at Norwood Av	07/28/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	70	2		0
Arcade Creek at Norwood Av	07/28/04	field blank	SM 9221B/E	*E. coli*	MPN/100 mL	ND		2		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	EPN	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	EPN	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	EPTC	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	EPTC	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Ethion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Ethion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.85	0.16		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	1.68	0.16	EST	0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	2.28	0.16	EST	0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Malathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Malathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.328	0.0234		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 1630	MeHg, filtered	ng/L	ND		0.0234		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.419	0.0234		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.399	0.0234		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Merphos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Merphos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0

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Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Naled	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Naled	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	07/28/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	6.7	0.049		0
Arcade Creek at Norwood Av	07/28/04	field blank	SM 5310C	Organic carbon, dissolved	mg/L	ND		0.049		0
Arcade Creek at Norwood Av	07/28/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	8	0.049		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	SM 5310C	Organic carbon, total	mg/L	DETECTED	7.2	0.049		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Phorate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Phorate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Phosmet	µg/L	ND		1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Phosmet	µg/L	ND		1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Prometon	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Prometon	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Simazine	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Simazine	µg/L	ND		0.5		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1	LB	0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 160.1	TDS	mg/L	DETECTED	276	5		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 160.1	TDS	mg/L	DETECTED	260	5		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Tokuthion	µg/L	ND		0.1		0

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Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	field blank	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Arcade Creek at Norwood Av	07/28/04	environ	EPA 160.2	TSS	mg/L	DETECTED	8.4	5		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	EPA 160.2	TSS	mg/L	DETECTED	9	5		0
Arcade Creek at Norwood Av	07/28/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.246	na		0
Arcade Creek at Norwood Av	07/28/04	field duplicate	SM 5910B	UVA254	1/cm	DETECTED	0.245	na		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Colusa Basin Drain	01/21/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	30	2		0
Colusa Basin Drain	01/21/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	50	2		0
Colusa Basin Drain	01/21/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	500	2		0
Colusa Basin Drain	01/21/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	400	2		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	30	2		0
Colusa Basin Drain	01/21/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	50	2		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	1.46	0.16		0
Colusa Basin Drain	01/21/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	6.77	0.16		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.235	0.0234		0
Colusa Basin Drain	01/21/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.41	0.0234		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0

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Colusa Basin Drain	01/21/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Colusa Basin Drain	01/21/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	6.3	0.2		0
Colusa Basin Drain	01/21/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	6.8	0.2		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 160.1	TDS	mg/L	DETECTED	405	5		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Colusa Basin Drain	01/21/04	environ	EPA 160.2	TSS	mg/L	DETECTED	77.3	5		0
Colusa Basin Drain	01/21/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.266	0.0001		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Colusa Basin Drain	02/04/04	field blank	SM 9221E	Coliform, fecal	MPN/100 mL	ND		2		0
Colusa Basin Drain	02/04/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	1600	2	HT, GTE	0
Colusa Basin Drain	02/04/04	field blank	SM 9221B	Coliform, total	MPN/100 mL	ND		2		0
Colusa Basin Drain	02/04/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2	HT, GTE	0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Def	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Def	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Diazinon	µg/L	ND		0.018		0

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Colusa Basin Drain	02/04/04	environ	EPA 8141A	Diazinon	µg/L	DETECTED	0.06	0.018		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Diazinon	µg/L	DETECTED	0.07	0.018		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	SM 9221B/E	*E. coli*	MPN/100 mL	ND		2		0
Colusa Basin Drain	02/04/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	1600	2	HT, GTE	0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	EPN	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	EPN	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	EPTC	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	EPTC	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Ethion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Ethion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 1631	Hg, total, filtered	ng/L	ND		0.16		0
Colusa Basin Drain	02/04/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	1.79	0.16		0
Colusa Basin Drain	02/04/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	14.56	0.16		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	18.53	0.16		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Malathion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Malathion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 1630	MeHg, filtered	ng/L	ND		0.0234		0
Colusa Basin Drain	02/04/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0726	0.0234		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Colusa Basin Drain	02/04/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.173	0.0234		0
Colusa Basin Drain	02/04/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.172	0.0234		1
Colusa Basin Drain	02/04/04	field duplicate	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.173	0.0234		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Merphos	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Merphos	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Naled	µg/L	ND		0.5		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Naled	µg/L	ND		0.5		0
Colusa Basin Drain	02/04/04	field blank	SM 5310C	Organic carbon, dissolved	mg/L	ND		0.049		0
Colusa Basin Drain	02/04/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	7.8	0.049		0
Colusa Basin Drain	02/04/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	9.9	0.049		0
Colusa Basin Drain	02/04/04	field duplicate	SM 5310C	Organic carbon, total	mg/L	DETECTED	8.5	0.049		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Phorate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Phorate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Phosmet	µg/L	ND		1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Phosmet	µg/L	ND		1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Prometon	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Prometon	µg/L	ND		0.1		0

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Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Simazine	µg/L	ND		0.5		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Simazine	µg/L	DETECTED	0.32	0.5	DNQ	0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 160.1	TDS	mg/L	DETECTED	301	5		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 160.1	TDS	mg/L	DETECTED	298	5		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field blank	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Colusa Basin Drain	02/04/04	environ	EPA 160.2	TSS	mg/L	DETECTED	299	5		0
Colusa Basin Drain	02/04/04	field duplicate	EPA 160.2	TSS	mg/L	DETECTED	288	5		0
Colusa Basin Drain	02/04/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.574	n/a		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Colusa Basin Drain	06/10/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	80	2		0
Colusa Basin Drain	06/10/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	220	2		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	80	2		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.75	0.16		0
Colusa Basin Drain	06/10/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	4.22	0.16		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0570	0.0234		0
Colusa Basin Drain	06/10/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.144	0.0234		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Colusa Basin Drain	06/10/04	environ	EPA 507	Molinate	µg/L	DETECTED	0.52	0.5		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Colusa Basin Drain	06/10/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	7.7	0.049		0
Colusa Basin Drain	06/10/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	8.1	0.049		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 160.1	TDS	mg/L	DETECTED	458.5	5		0
Colusa Basin Drain	06/10/04	environ	EPA 507	Thiobencarb	µg/L	DETECTED	0.15	0.5	DNQ	0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Colusa Basin Drain	06/10/04	environ	EPA 160.2	TSS	mg/L	DETECTED	71.8	5		0
Colusa Basin Drain	06/10/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.228	na		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Colusa Basin Drain	07/28/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	130	2		0
Colusa Basin Drain	07/28/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	900	2		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	17	2		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.60	0.16		0
Colusa Basin Drain	07/28/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	1.93	0.16		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0814	0.0234		0
Colusa Basin Drain	07/28/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.145	0.0234		0
Colusa Basin Drain	07/28/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.119	0.0234		1
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Colusa Basin Drain	07/28/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	5.3	0.049		0
Colusa Basin Drain	07/28/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	5.7	0.049		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 160.1	TDS	mg/L	DETECTED	376	5		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Colusa Basin Drain	07/28/04	environ	EPA 160.2	TSS	mg/L	DETECTED	46.5	5		0
Colusa Basin Drain	07/28/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.188	na		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Feather River at Nicolaus	01/21/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	2	2		0
Feather River at Nicolaus	01/21/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	30	2		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	2	2		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	3.34	0.16		0
Feather River at Nicolaus	01/21/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	5.61	0.16		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0715	0.0234		0
Feather River at Nicolaus	01/21/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.100	0.0234		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Feather River at Nicolaus	01/21/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.6	0.2		0
Feather River at Nicolaus	01/21/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.5	0.2		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 160.1	TDS	mg/L	DETECTED	83	5		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Feather River at Nicolaus	01/21/04	environ	EPA 160.2	TSS	mg/L	DETECTED	19.6	5		0
Feather River at Nicolaus	01/21/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0713	0.0001		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Feather River at Nicolaus	02/04/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	170	2		0
Feather River at Nicolaus	02/04/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	500	2		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	170	2		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	2.13	0.16		0
Feather River at Nicolaus	02/04/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	7.32	0.16		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0481	0.0234		0
Feather River at Nicolaus	02/04/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.094	0.0234		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Feather River at Nicolaus	02/04/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	3	0.049		0
Feather River at Nicolaus	02/04/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	3.7	0.049		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 160.1	TDS	mg/L	DETECTED	79.5	5		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0

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Feather River at Nicolaus	02/04/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Feather River at Nicolaus	02/04/04	environ	EPA 160.2	TSS	mg/L	DETECTED	23.1	5		0
Feather River at Nicolaus	02/04/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.172	n/a		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Feather River at Nicolaus	06/10/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	50	2		0
Feather River at Nicolaus	06/10/04	field blank	SM 9221E	Coliform, fecal	MPN/100 mL	ND		2		0
Feather River at Nicolaus	06/10/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	170	2		0
Feather River at Nicolaus	06/10/04	field blank	SM 9221B	Coliform, total	MPN/100 mL	ND		2		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Def	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Def	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	50	2		0
Feather River at Nicolaus	06/10/04	field blank	SM 9221B/E	*E. coli*	MPN/100 mL	ND		2		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	EPN	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	EPN	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	EPTC	µg/L	ND		0.1		0

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Feather River at Nicolaus	06/10/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	EPTC	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Ethion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Ethion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 1631	Hg, total, filtered	ng/L	ND		0.16		0
Feather River at Nicolaus	06/10/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.61	0.16		0
Feather River at Nicolaus	06/10/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	2.04	0.16		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	2.06	0.16		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Malathion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Malathion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0607	0.0234		0
Feather River at Nicolaus	06/10/04	field blank	EPA 1630	MeHg, filtered	ng/L	ND		0.0234		0
Feather River at Nicolaus	06/10/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0609	0.0234		0
Feather River at Nicolaus	06/10/04	field blank	EPA 1630	MeHg, unfiltered	ng/L	ND		0.0234		0
Feather River at Nicolaus	06/10/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.085	0.0234		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.067	0.0234		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Merphos	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Merphos	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 507	Molinate	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	field blank	EPA 507	Molinate	µg/L	ND		0.5	HB	0
Feather River at Nicolaus	06/10/04	environ	EPA 507	Molinate	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Naled	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Naled	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	field blank	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	0.57	0.049		0
Feather River at Nicolaus	06/10/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.4	0.049	UL	0
Feather River at Nicolaus	06/10/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.4	0.049		0
Feather River at Nicolaus	06/10/04	field duplicate	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.4	0.049		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Phorate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Phorate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 160.1	TDS	mg/L	DETECTED	53.5	5		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 160.1	TDS	mg/L	DETECTED	53.5	5		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 507	Thiobencarb	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	field blank	EPA 507	Thiobencarb	µg/L	ND		0.5	HB	0
Feather River at Nicolaus	06/10/04	environ	EPA 507	Thiobencarb	µg/L	ND		0.5		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field blank	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Feather River at Nicolaus	06/10/04	environ	EPA 160.2	TSS	mg/L	DETECTED	16.2	5		0
Feather River at Nicolaus	06/10/04	field duplicate	EPA 160.2	TSS	mg/L	DETECTED	16.4	5		0
Feather River at Nicolaus	06/10/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0403	na		0
Feather River at Nicolaus	06/10/04	field duplicate	SM 5910B	UVA254	1/cm	DETECTED	0.0405	na		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Chlorpyrifos	µg/L	DETECTED	0.051	0.018		0
Feather River at Nicolaus	07/28/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	11	2		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Feather River at Nicolaus	07/28/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	50	2		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	11	2		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.64	0.16		0
Feather River at Nicolaus	07/28/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	1.44	0.16		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0398	0.0234		0
Feather River at Nicolaus	07/28/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.065	0.0234		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Feather River at Nicolaus	07/28/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.4	0.049		0
Feather River at Nicolaus	07/28/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.5	0.049		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 160.1	TDS	mg/L	DETECTED	74.5	5		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Feather River at Nicolaus	07/28/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Feather River at Nicolaus	07/28/04	environ	EPA 160.2	TSS	mg/L	DETECTED	8.9	5		0
Feather River at Nicolaus	07/28/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0381	na		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Natomas East Main Drain	01/22/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	300	2		0
Natomas East Main Drain	01/22/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	300	2		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Natomas East Main Drain	01/22/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	5.5	0.2		0
Natomas East Main Drain	01/22/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	5.6	0.2		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 160.1	TDS	mg/L	DETECTED	320	5		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Natomas East Main Drain	01/22/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.158	0.0001	HT	0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Natomas East Main Drain	02/04/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	1600	2		0
Natomas East Main Drain	02/04/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2	GTE	0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	900	2		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Natomas East Main Drain	02/04/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	6.8	0.049		0
Natomas East Main Drain	02/04/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	9.4	0.049		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Simazine	µg/L	DETECTED	0.4	0.5	DNQ	0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 160.1	TDS	mg/L	DETECTED	79.5	5		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Natomas East Main Drain	02/04/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.327	n/a		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Natomas East Main Drain	06/10/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	220	2		0
Natomas East Main Drain	06/10/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	900	2		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	170	2		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Natomas East Main Drain	06/10/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	6.3	0.049		0
Natomas East Main Drain	06/10/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	5.9	0.049		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 160.1	TDS	mg/L	DETECTED	274.5	5		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Natomas East Main Drain	06/10/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.164	na		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Natomas East Main Drain	07/29/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	170	2		0
Natomas East Main Drain	07/29/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	220	2		0
Natomas East Main Drain	07/29/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2	GTE	0
Natomas East Main Drain	07/29/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	900	2		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	110	2		0
Natomas East Main Drain	07/29/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	220	2		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Natomas East Main Drain	07/29/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	3.8	0.049		0
Natomas East Main Drain	07/29/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	4	0.049		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 160.1	TDS	mg/L	DETECTED	206.5	5		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0

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Natomas East Main Drain	07/29/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Natomas East Main Drain	07/29/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.103	na		0
Sacramento River at Bend Bridge	01/20/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	8	2		0
Sacramento River at Bend Bridge	01/20/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	50	2		0
Sacramento River at Bend Bridge	01/20/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	8	2		0
Sacramento River at Bend Bridge	01/20/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.93	0.16		0
Sacramento River at Bend Bridge	01/20/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	5.55	0.16		0
Sacramento River at Bend Bridge	01/20/04	environ	EPA 1630	MeHg, filtered	ng/L	ND		0.0234		0
Sacramento River at Bend Bridge	01/20/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.041	0.0234		0
Sacramento River at Bend Bridge	01/20/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.2	0.2		0
Sacramento River at Bend Bridge	01/20/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.2	0.2		0
Sacramento River at Bend Bridge	01/20/04	environ	EPA 160.1	TDS	mg/L	DETECTED	101	5		0
Sacramento River at Bend Bridge	01/20/04	environ	EPA 160.2	TSS	mg/L	ND		5		0
Sacramento River at Bend Bridge	01/20/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0382	0.0001		0
Sacramento River at Bend Bridge	02/03/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	1600	2		0
Sacramento River at Bend Bridge	02/03/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	900	2		0
Sacramento River at Bend Bridge	02/03/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2	GTE	0
Sacramento River at Bend Bridge	02/03/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	900	2		0
Sacramento River at Bend Bridge	02/03/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	1600	2		0
Sacramento River at Bend Bridge	02/03/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	900	2		0
Sacramento River at Bend Bridge	02/03/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	3.38	0.16		0
Sacramento River at Bend Bridge	02/03/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	8.04	0.16		0
Sacramento River at Bend Bridge	02/03/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0418	0.0234		0
Sacramento River at Bend Bridge	02/03/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.077	0.0234		0
Sacramento River at Bend Bridge	02/03/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	3.2	0.049		0
Sacramento River at Bend Bridge	02/03/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	3.8	0.049		0
Sacramento River at Bend Bridge	02/03/04	environ	EPA 160.1	TDS	mg/L	DETECTED	59	5		0
Sacramento River at Bend Bridge	02/03/04	environ	EPA 160.2	TSS	mg/L	DETECTED	60.5	5		0
Sacramento River at Bend Bridge	02/03/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.217	n/a		0
Sacramento River at Bend Bridge	06/09/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	50	2		0
Sacramento River at Bend Bridge	06/09/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	140	2		0
Sacramento River at Bend Bridge	06/09/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	21	2		0
Sacramento River at Bend Bridge	06/09/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.64	0.16		0
Sacramento River at Bend Bridge	06/09/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	0.89	0.16		0
Sacramento River at Bend Bridge	06/09/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0299	0.0234		0
Sacramento River at Bend Bridge	06/09/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.085	0.0234		0
Sacramento River at Bend Bridge	06/09/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.1	0.049		0
Sacramento River at Bend Bridge	06/09/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.1	0.049		0
Sacramento River at Bend Bridge	06/09/04	environ	EPA 160.1	TDS	mg/L	DETECTED	113	5		0
Sacramento River at Bend Bridge	06/09/04	environ	EPA 160.2	TSS	mg/L	ND		5		0
Sacramento River at Bend Bridge	06/09/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0425	na		0
Sacramento River at Bend Bridge	07/27/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	8	2		0
Sacramento River at Bend Bridge	07/27/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	30	2		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River at Bend Bridge	07/27/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	8	2		0
Sacramento River at Bend Bridge	07/27/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.43	0.16		0
Sacramento River at Bend Bridge	07/27/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	0.75	0.16		0
Sacramento River at Bend Bridge	07/27/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0468	0.0234		0
Sacramento River at Bend Bridge	07/27/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.054	0.0234		0
Sacramento River at Bend Bridge	07/27/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1	0.049		0
Sacramento River at Bend Bridge	07/27/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.2	0.049		0
Sacramento River at Bend Bridge	07/27/04	environ	EPA 160.1	TDS	mg/L	DETECTED	96.5	5		0
Sacramento River at Bend Bridge	07/27/04	environ	EPA 160.2	TSS	mg/L	ND		5		0
Sacramento River at Bend Bridge	07/27/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0429	na		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River at Colusa	01/20/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	9	2		0
Sacramento River at Colusa	01/20/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	170	2		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	9	2		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	1.26	0.16		0
Sacramento River at Colusa	01/20/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	6.42	0.16		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0427	0.0234		0
Sacramento River at Colusa	01/20/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.088	0.0234		0
Sacramento River at Colusa	01/20/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.070	0.0234		1
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River at Colusa	01/20/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.8	0.2		0
Sacramento River at Colusa	01/20/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.7	0.2		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 160.1	TDS	mg/L	DETECTED	151	5		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River at Colusa	01/20/04	environ	EPA 160.2	TSS	mg/L	DETECTED	33	5		0
Sacramento River at Colusa	01/20/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0544	0.0001		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Diazinon	µg/L	DETECTED	0.16	0.018		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	2.57	0.16		0
Sacramento River at Colusa	02/03/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	8.14	0.16		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0547	0.0234		0
Sacramento River at Colusa	02/03/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.170	0.0234		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River at Colusa	02/03/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	3.3	0.049		0
Sacramento River at Colusa	02/03/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	3.7	0.049		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 160.1	TDS	mg/L	DETECTED	99	5		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River at Colusa	02/03/04	environ	EPA 160.2	TSS	mg/L	DETECTED	300	5		0
Sacramento River at Colusa	02/03/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.234	n/a		0
Sacramento River at Colusa	02/04/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	1600	2		0
Sacramento River at Colusa	02/04/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2	GTE	0
Sacramento River at Colusa	02/04/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	1600	2		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River at Colusa	06/09/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	22	2		0
Sacramento River at Colusa	06/09/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	240	2		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	22	2		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.77	0.16		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River at Colusa	06/09/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	1.77	0.16		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0701	0.0234		0
Sacramento River at Colusa	06/09/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0557	0.0234		1
Sacramento River at Colusa	06/09/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.175	0.0234		0
Sacramento River at Colusa	06/09/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.142	0.0234		1
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River at Colusa	06/09/04	environ	EPA 507	Molinate	µg/L	ND		0.5		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River at Colusa	06/09/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.2	0.049		0
Sacramento River at Colusa	06/09/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.3	0.049		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 160.1	TDS	mg/L	DETECTED	120	5		0
Sacramento River at Colusa	06/09/04	environ	EPA 507	Thiobencarb	µg/L	ND		0.5		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River at Colusa	06/09/04	environ	EPA 160.2	TSS	mg/L	DETECTED	20.1	5		0
Sacramento River at Colusa	06/09/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0473	na		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River at Colusa	07/27/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	8	2		0
Sacramento River at Colusa	07/27/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	50	2		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	8	2		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0

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Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.49	0.16		0
Sacramento River at Colusa	07/27/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	1.68	0.16		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.1080	0.0234		0
Sacramento River at Colusa	07/27/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.058	0.0234		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River at Colusa	07/27/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.1	0.049		0
Sacramento River at Colusa	07/27/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.2	0.049		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 160.1	TDS	mg/L	DETECTED	96	5		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River at Colusa	07/27/04	environ	EPA 160.2	TSS	mg/L	DETECTED	15.8	5		0
Sacramento River at Colusa	07/27/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0432	na		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0

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Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	01/21/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Diazinon	µg/L	DETECTED	0.13	0.018		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	02/04/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 507	Molinate	µg/L	DETECTED	0.21	0.5	HB, DNQ	0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 507	Thiobencarb	µg/L	ND		0.5	HB	0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	06/10/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River at Veterans Bridge	07/28/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River near Hamilton City	01/20/04	field blank	SM 9221E	Coliform, fecal	MPN/100 mL	ND		2		0
Sacramento River near Hamilton City	01/20/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	8	2		0
Sacramento River near Hamilton City	01/20/04	field blank	SM 9221B	Coliform, total	MPN/100 mL	ND		2		0
Sacramento River near Hamilton City	01/20/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	17	2		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	SM 9221B/E	*E. coli*	MPN/100 mL	ND		2		0
Sacramento River near Hamilton City	01/20/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	8	2		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	EPN	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.77	0.16		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	1.76	0.16	UL	0
Sacramento River near Hamilton City	01/20/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	2.60	0.16		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	2.20	0.16		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 1630	MeHg, filtered	ng/L	ND		0.0234		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0298	0.0234		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.030	0.0234	EST	0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.056	0.0234	EST	0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Naled	µg/L	ND		0.5		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River near Hamilton City	01/20/04	field blank	SM 5310C	Organic carbon, dissolved	mg/L	ND		0.2		0
Sacramento River near Hamilton City	01/20/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.3	0.2		0
Sacramento River near Hamilton City	01/20/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.4	0.2		0
Sacramento River near Hamilton City	01/20/04	field duplicate	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.2	0.2		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 160.1	TDS	mg/L	DETECTED	125	5		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 160.1	TDS	mg/L	DETECTED	112	5		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Trichloronate	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field blank	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	01/20/04	environ	EPA 160.2	TSS	mg/L	DETECTED	7.5	5		0
Sacramento River near Hamilton City	01/20/04	field duplicate	EPA 160.2	TSS	mg/L	DETECTED	7.6	5		0
Sacramento River near Hamilton City	01/20/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0437	0.0001		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Diazinon	µg/L	DETECTED	0.04	0.018	DNQ	0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	3.41	0.16		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	17.28	0.16		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.111	0.0234		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River near Hamilton City	02/03/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	4.1	0.049		0
Sacramento River near Hamilton City	02/03/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	5.2	0.049		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0

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Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 160.1	TDS	mg/L	DETECTED	97.5	5		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	02/03/04	environ	EPA 160.2	TSS	mg/L	DETECTED	200	5		0
Sacramento River near Hamilton City	02/03/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.338	n/a		0
Sacramento River near Hamilton City	02/04/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	1600	2		0
Sacramento River near Hamilton City	02/04/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2	GTE	0
Sacramento River near Hamilton City	02/04/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	1600	2		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento River near Hamilton City	06/09/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	39	2		0
Sacramento River near Hamilton City	06/09/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	71	2		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	39	2		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.48	0.16		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	1.11	0.16		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0374	0.0234		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.034	0.0234		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River near Hamilton City	06/09/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.2	0.049		0
Sacramento River near Hamilton City	06/09/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.2	0.049		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 160.1	TDS	mg/L	DETECTED	108	5		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	06/09/04	environ	EPA 160.2	TSS	mg/L	DETECTED	10.7	5		0
Sacramento River near Hamilton City	06/09/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0455	na		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Chlorpyrifos	µg/L	DETECTED	0.029	0.018	DNQ	0
Sacramento River near Hamilton City	07/27/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	13	2		0
Sacramento River near Hamilton City	07/27/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	17	2		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	8	2		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.45	0.16		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	0.90	0.16		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0435	0.0234		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.063	0.0234		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento River near Hamilton City	07/27/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1	0.049		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento River near Hamilton City	07/27/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.1	0.049		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 160.1	TDS	mg/L	DETECTED	100	5		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento River near Hamilton City	07/27/04	environ	EPA 160.2	TSS	mg/L	DETECTED	6.2	5		0
Sacramento River near Hamilton City	07/27/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0436	na		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento Slough	01/21/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	11	2		0
Sacramento Slough	01/21/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	14	2		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	11	2		0
Sacramento Slough	01/21/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	1.49	0.16		0
Sacramento Slough	01/21/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	7.43	0.16		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.1440	0.0234		0
Sacramento Slough	01/21/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.253	0.0234		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento Slough	01/21/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.258	0.0234		1
Sacramento Slough	01/21/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento Slough	01/21/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	4.6	0.2		0
Sacramento Slough	01/21/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	4.9	0.2		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 160.1	TDS	mg/L	DETECTED	184	5		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento Slough	01/21/04	environ	EPA 160.2	TSS	mg/L	DETECTED	66	5		0
Sacramento Slough	01/21/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.19	0.0001		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento Slough	02/04/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	240	2		0
Sacramento Slough	02/04/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	240	2		0
Sacramento Slough	02/04/04	environ	EPA 8141A	EPN	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento Slough	02/04/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	1.06	0.16		0
Sacramento Slough	02/04/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	7.14	0.16		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0684	0.0234		0
Sacramento Slough	02/04/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.154	0.0234		0
Sacramento Slough	02/04/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.156	0.0234		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento Slough	02/04/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	4.2	0.049		0
Sacramento Slough	02/04/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	5.4	0.049		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 160.1	TDS	mg/L	DETECTED	442	5		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1	EST	0
Sacramento Slough	02/04/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento Slough	02/04/04	environ	EPA 160.2	TSS	mg/L	DETECTED	61.3	5		0
Sacramento Slough	02/04/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.156	n/a		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento Slough	06/10/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	170	2		0
Sacramento Slough	06/10/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	900	2		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Sacramento Slough	06/10/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	170	2		0
Sacramento Slough	06/10/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.72	0.16		0
Sacramento Slough	06/10/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	5.07	0.16		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0405	0.0234		0
Sacramento Slough	06/10/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.122	0.0234		0
Sacramento Slough	06/10/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.111	0.0234		1
Sacramento Slough	06/10/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento Slough	06/10/04	environ	EPA 507	Molinate	µg/L	DETECTED	2.3	0.5		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento Slough	06/10/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	4.4	0.049		0
Sacramento Slough	06/10/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	5.3	0.049		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 160.1	TDS	mg/L	DETECTED	307.5	5		0
Sacramento Slough	06/10/04	environ	EPA 507	Thiobencarb	µg/L	DETECTED	0.5	0.5		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento Slough	06/10/04	environ	EPA 160.2	TSS	mg/L	DETECTED	80	5		0
Sacramento Slough	06/10/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.12	na		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Sacramento Slough	07/28/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	170	2		0
Sacramento Slough	07/28/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	1600	2		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0

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Sacramento Slough	07/28/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	110	2		0
Sacramento Slough	07/28/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.35	0.16		0
Sacramento Slough	07/28/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	4.12	0.16		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0487	0.0234		0
Sacramento Slough	07/28/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.139	0.0234		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Sacramento Slough	07/28/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	3.5	0.049		0
Sacramento Slough	07/28/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	3.8	0.049		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 160.1	TDS	mg/L	DETECTED	273	5		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Sacramento Slough	07/28/04	environ	EPA 160.2	TSS	mg/L	DETECTED	62.2	5		0
Sacramento Slough	07/28/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0982	na		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Yuba River at Marysville	01/21/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	50	2		0
Yuba River at Marysville	01/21/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	170	2		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	50	2		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	2.49	0.16		0
Yuba River at Marysville	01/21/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	3.12	0.16		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0550	0.0234		0
Yuba River at Marysville	01/21/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.024	0.0234		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Yuba River at Marysville	01/21/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.2	0.2		0
Yuba River at Marysville	01/21/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.2	0.2		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 160.1	TDS	mg/L	DETECTED	68.5	5		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Yuba River at Marysville	01/21/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Yuba River at Marysville	01/21/04	environ	EPA 160.2	TSS	mg/L	ND		5		0
Yuba River at Marysville	01/21/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0373	0.0001		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Yuba River at Marysville	02/03/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	300	2		0
Yuba River at Marysville	02/03/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	300	2		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	300	2		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	1.66	0.16		0
Yuba River at Marysville	02/03/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	4.51	0.16		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0406	0.0234		0
Yuba River at Marysville	02/03/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.063	0.0234		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Yuba River at Marysville	02/03/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	1.5	0.049		0
Yuba River at Marysville	02/03/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.6	0.049		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0

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Yuba River at Marysville	02/03/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 160.1	TDS	mg/L	DETECTED	79	5		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Yuba River at Marysville	02/03/04	environ	EPA 160.2	TSS	mg/L	ND		5		0
Yuba River at Marysville	02/03/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.076	n/a		0
Yuba River at Marysville	06/09/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	170	2		0
Yuba River at Marysville	06/09/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	500	2		0
Yuba River at Marysville	06/09/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	50	2		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.64	0.16		0
Yuba River at Marysville	06/10/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	1.13	0.16		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 1630	MeHg, filtered	ng/L	DETECTED	0.0448	0.0234		0
Yuba River at Marysville	06/10/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.058	0.0234		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Yuba River at Marysville	06/10/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	0.87	0.049		0
Yuba River at Marysville	06/10/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	1.1	0.049		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 160.1	TDS	mg/L	DETECTED	105	5		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Yuba River at Marysville	06/10/04	environ	EPA 160.2	TSS	mg/L	ND		5		0
Yuba River at Marysville	06/10/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0243	na		0
Yuba River at Marysville	07/27/04	environ	SM 9221E	Coliform, fecal	MPN/100 mL	DETECTED	30	2		0
Yuba River at Marysville	07/27/04	environ	SM 9221B	Coliform, total	MPN/100 mL	DETECTED	50	2		0
Yuba River at Marysville	07/27/04	environ	SM 9221B/E	*E. coli*	MPN/100 mL	DETECTED	30	2		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Azinphosmethyl	µg/L	ND		1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Bolstar	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Chlorpyrifos	µg/L	ND		0.018		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Coumaphos	µg/L	ND		0.2		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Def	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Demeton (Total)	µg/L	ND		0.2		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Diazinon	µg/L	ND		0.018		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Dichlorvos	µg/L	ND		0.2		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Dimethoate	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Diphenamid	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Disulfoton	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	EPN	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	EPTC	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Ethion	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Ethoprop	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Fensulfothion	µg/L	ND		0.5		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Fenthion	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 1631	Hg, total, filtered	ng/L	DETECTED	0.49	0.16		0
Yuba River at Marysville	07/28/04	environ	EPA 1631	Hg, total, unfiltered	ng/L	DETECTED	0.84	0.16		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Malathion	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 1630	MeHg, filtered	ng/L	ND		0.0234		0
Yuba River at Marysville	07/28/04	environ	EPA 1630	MeHg, unfiltered	ng/L	DETECTED	0.043	0.0234		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Merphos	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Methidathion	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Methyl Trithion	µg/L	ND		0.2		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Mevinphos	µg/L	ND		0.7		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Naled	µg/L	ND		0.5		0
Yuba River at Marysville	07/28/04	environ	SM 5310C	Organic carbon, dissolved	mg/L	DETECTED	0.92	0.049		0
Yuba River at Marysville	07/28/04	environ	SM 5310C	Organic carbon, total	mg/L	DETECTED	0.96	0.049		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Parathion, ethyl	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Parathion, methyl	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Pendimethalin	µg/L	ND		0.1		0

SAMPLE LOCATION	SAMPLE DATE	SAMPLE TYPE	METHOD	ANALYTE	UNITS	DETECT STATUS	RESULT	REPORTING LIMIT	DATA QUAL CODE	REP
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Phorate	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Phosalone	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Phosmet	µg/L	ND		1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Prometon	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Ronnel	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Simazine	µg/L	ND		0.5		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Stirophos	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Sulfotep	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 160.1	TDS	mg/L	DETECTED	40.5	5		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Tokuthion	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Trichloronate	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 8141A	Trifluralin	µg/L	ND		0.1		0
Yuba River at Marysville	07/28/04	environ	EPA 160.2	TSS	mg/L	ND		5		0
Yuba River at Marysville	07/28/04	environ	SM 5910B	UVA254	1/cm	DETECTED	0.0223	na		0

DATA QUAL CODES for Water Quality Data

DNQ	Detected, Not Quantified
EST	Estimated
GTE	Greater Than or Equal to
HB	High Biased
HT	Analysis performed outside of recommended Holding Time
LB	Low Biased
UL	Upper Limit concentration (potentially affected by contamination)

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
American River at Discovery Park	01/22/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	DO, high	mg/L	12.1	1		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	DO, low	mg/L	5.1	2		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	mortality, mean	%	0	7		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	mortality, s.e.	%	0	7		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	pH, high	standard units	8.6	4		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	pH, low	standard units	7.68	2		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	biomass, mean	mg	0.69	7		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	biomass, s.e.	mg	0.02	7		L
American River at Discovery Park	01/22/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	DO, high	mg/L	11	2		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	DO, low	mg/L	5.4	2		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	mortality, mean	%	0	7		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	mortality, s.e.	%	0	7		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	pH, high	standard units	8.23	7		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	pH, low	standard units	7.6	2		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	biomass, mean	mg	0.67	7		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	biomass, s.e.	mg	0.05	7		L
Colusa Basin Drain	01/21/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Lab Control	02/26/04	lab control	none	Pimephales	mortality, significance	yes/no		7		L
Lab Control	02/26/04	lab control	none	Pimephales	DO, high	mg/L	10.8	1		L
Lab Control	02/26/04	lab control	none	Pimephales	DO, low	mg/L	5.5	7		L
Lab Control	02/26/04	lab control	none	Pimephales	mortality, mean	%	0	7		L
Lab Control	02/26/04	lab control	none	Pimephales	mortality, s.e.	%	0	7		L
Lab Control	02/26/04	lab control	none	Pimephales	pH, high	standard units	8.53	0		L
Lab Control	02/26/04	lab control	none	Pimephales	pH, low	standard units	7.57	1		L
Lab Control	02/26/04	lab control	none	Pimephales	biomass, mean	mg	0.64	7		L
Lab Control	02/26/04	lab control	none	Pimephales	biomass, s.e.	mg	0.02	7		L
Lab Control	02/26/04	lab control	none	Pimephales	biomass, significance	yes/no		7		L
Lab Control	02/28/04	lab control	none	Pimephales	mortality, significance	yes/no		7		L
Lab Control	02/28/04	lab control	none	Pimephales	DO, high	mg/L	9.1	7		L
Lab Control	02/28/04	lab control	none	Pimephales	DO, low	mg/L	5.5	1		L
Lab Control	02/28/04	lab control	none	Pimephales	mortality, mean	%	5	7		L
Lab Control	02/28/04	lab control	none	Pimephales	mortality, s.e.	%	5	7		L
Lab Control	02/28/04	lab control	none	Pimephales	pH, high	standard units	8.38	4		L
Lab Control	02/28/04	lab control	none	Pimephales	pH, low	standard units	7.63	2		L
Lab Control	02/28/04	lab control	none	Pimephales	biomass, mean	mg	0.596	7		L
Lab Control	02/28/04	lab control	none	Pimephales	biomass, s.e.	mg	0.06	7		L
Lab Control	02/28/04	lab control	none	Pimephales	biomass, significance	yes/no		7		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	DO, high	mg/L	12.1	1		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	DO, low	mg/L	5.1	1		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	mortality, mean	%	10	7		L

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	mortality, s.e.	%	6	7		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	pH, high	standard units	8.29	4		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	pH, low	standard units	7.67	6		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	biomass, mean	mg	0.64	7		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	biomass, s.e.	mg	0.05	7		L
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Sacramento Slough	01/21/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
Sacramento Slough	01/21/04	environ	none	Pimephales	DO, high	mg/L	11.4	1		L
Sacramento Slough	01/21/04	environ	none	Pimephales	DO, low	mg/L	5.3	1		L
Sacramento Slough	01/21/04	environ	none	Pimephales	mortality, mean	%	7	7		L
Sacramento Slough	01/21/04	environ	none	Pimephales	mortality, s.e.	%	7	7		L
Sacramento Slough	01/21/04	environ	none	Pimephales	pH, high	standard units	8.11	7		L
Sacramento Slough	01/21/04	environ	none	Pimephales	pH, low	standard units	7.64	0		L
Sacramento Slough	01/21/04	environ	none	Pimephales	biomass, mean	mg	0.67	7		L
Sacramento Slough	01/21/04	environ	none	Pimephales	biomass, s.e.	mg	0.06	7		L
Sacramento Slough	01/21/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	DO, high	mg/L	12.2	3		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	DO, low	mg/L	4.9	7		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	mortality, mean	%	0	7		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	mortality, s.e.	%	0	7		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	pH, high	standard units	8.69	0		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	pH, low	standard units	7.53	1		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	biomass, mean	mg	0.68	7		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	biomass, s.e.	mg	0.02	7		L
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	DO, high	mg/L	12	1		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	DO, low	mg/L	5	5		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	mortality, mean	%	30	7		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	mortality, s.e.	%	12	7		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	pH, high	standard units	8.1	4		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	pH, low	standard units	7.6	2		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	biomass, mean	mg	0.52	7		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	biomass, s.e.	mg	0.1	7		L
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	DO, high	mg/L	12.4	1		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	DO, low	mg/L	5.1	7		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	mortality, mean	%	10	7		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	mortality, s.e.	%	6	7		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	pH, high	standard units	8.31	1		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	pH, low	standard units	7.52	1		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	biomass, mean	mg	0.58	7		L

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	biomass, s.e.	mg	0.04	7		L
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	mortality, significance	yes/no		7		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	DO, high	mg/L	12.9	1		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	DO, low	mg/L	4.8	7		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	mortality, mean	%	15	7		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	mortality, s.e.	%	10	7		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	pH, high	standard units	8.27	1		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	pH, low	standard units	7.52	1		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	biomass, mean	mg	0.58	7		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	biomass, s.e.	mg	0.08	7		L
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	biomass, significance	yes/no		7		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	DO, high	mg/L	12	1		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	DO, low	mg/L	5.4	1		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	mortality, mean	%	5	7		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	mortality, s.e.	%	5	7		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	pH, high	standard units	8.36	4		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	pH, low	standard units	7.76	6		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	biomass, mean	mg	0.66	7		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	biomass, s.e.	mg	0.03	7		L
Yuba River at Marysville	01/21/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	DO, high	mg/L	12	2		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	DO, low	mg/L	7	6		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	mortality, mean	%	10	6		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	mortality, s.e.	%	10	6		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	pH, high	standard units	8.31	4		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	pH, low	standard units	7.42	3		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	12.4	6		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.32	6		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Arcade Creek at Norwood Av	01/22/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	DO, high	mg/L	9.3	3		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	DO, low	mg/L	5.9	5		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	pH, high	standard units	8.56	5		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	pH, low	standard units	7.53	4		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	11.8	6		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.84	6		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
American River at Discovery Park	01/22/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.3	3		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.9	1		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units		Result	Test Day	Data Qual Code	Remark Code
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	mortality, mean	%		0	6		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	mortality, s.e.	%		0	6		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	pH, high	standard units		8.47	5		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	pH, low	standard units		7.66	3		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult		21	6		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		1.32	6		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes		6		
Colusa Basin Drain	01/21/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no		6		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	DO, high	mg/L		8.9	3		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	DO, low	mg/L		7.2	2		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	mortality, mean	%		0	6		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	mortality, s.e.	%		0	6		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	pH, high	standard units		8.16	3		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	pH, low	standard units		7.51	1		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult		31.3	6		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		1.4	6		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no		6		
Lab Control	01/21/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no		6		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	DO, high	mg/L		8.9	2		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	DO, low	mg/L		5.9	6		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	mortality, mean	%		0	6		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	mortality, s.e.	%		0	6		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	pH, high	standard units		8.19	1		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	pH, low	standard units		7.5	0		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult		26.8	6		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		1.61	6		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no		6		
Lab Control	01/22/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no		6		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	DO, high	mg/L		9.3	3		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	DO, low	mg/L		5.9	5		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	mortality, mean	%		0	6		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	mortality, s.e.	%		0	6		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	pH, high	standard units		8.56	5		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	pH, low	standard units		7.71	0		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult		23.6	6		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		1.49	6		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no		6		
Lab Control	01/23/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no		6		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	DO, high	mg/L		13.1	3		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	DO, low	mg/L		6.6	6		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	mortality, mean	%		10	6		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	mortality, s.e.	%		10	6		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	pH, high	standard units		8.54	2		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	pH, low	standard units		7.81	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	21.4	6		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.57	6		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Feather River at Nicolaus	01/21/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.5	3		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.2	6		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	pH, high	standard units	8.45	1		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	pH, low	standard units	7.83	3		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	23.7	6		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.37	6		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento Slough	01/21/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.7	4		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.2	2		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	pH, high	standard units	8.32	3		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	pH, low	standard units	7.7	1		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	29.8	6		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.25	6		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Bend Bridge	01/20/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.9	4		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.1	1		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	pH, high	standard units	8.39	2		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	pH, low	standard units	7.71	1		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	28.6	6		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.22	6		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	DO, high	mg/L	13.1	4		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.9	2		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	pH, high	standard units	8.18	3		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	pH, low	standard units	7.75	0		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	31.5	6		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.89	6		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Colusa	01/20/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.6	2		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.9	5		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	pH, high	standard units	8.14	4		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	pH, low	standard units	7.62	1		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	21.8	6		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.9	6		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Freeport	01/22/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	DO, high	mg/L	13.2	4		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	DO, low	mg/L	7	2		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	mortality, mean	%	10	6		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	mortality, s.e.	%	10	6		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	pH, high	standard units	8.27	3		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	pH, low	standard units	7.74	1		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	19.7	6		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.7	6		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River near Hamilton City	01/20/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	DO, high	mg/L	13.2	4		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	DO, low	mg/L	7	2		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	pH, high	standard units	8.26	3		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	pH, low	standard units	7.85	2		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	reproduction, mean	neonates/adult	28.6	6		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.97	6		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.9	3		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.5	6		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	pH, high	standard units	8.61	1		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	pH, low	standard units	7.96	4		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	23.4	6		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.75	6		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Yuba River at Marysville	01/21/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	DO, high	mg/L	11.2	4		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	DO, low	mg/L	5.6	7		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	mortality, mean	%	2.5	7		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	mortality, s.e.	%	2	7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	pH, high	standard units	7.92	1		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	pH, low	standard units	7.48	4		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	biomass, mean	mg	0.39	7		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	biomass, s.e.	mg	0.03	7		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Arcade Creek at Norwood Av	01/22/04	environ	none	Pimephales	mortality, significance	yes/no		7		
American River at Discovery Park	01/22/04	environ	none	Pimephales	DO, high	mg/L	12.2	2		
American River at Discovery Park	01/22/04	environ	none	Pimephales	DO, low	mg/L	4.8	7		
American River at Discovery Park	01/22/04	environ	none	Pimephales	mortality, mean	%	45	7		
American River at Discovery Park	01/22/04	environ	none	Pimephales	mortality, s.e.	%	15	7		
American River at Discovery Park	01/22/04	environ	none	Pimephales	pH, high	standard units	8.23	1		
American River at Discovery Park	01/22/04	environ	none	Pimephales	pH, low	standard units	7.48	4		
American River at Discovery Park	01/22/04	environ	none	Pimephales	biomass, mean	mg	0.32	7		
American River at Discovery Park	01/22/04	environ	none	Pimephales	biomass, s.e.	mg	0.05	7		
American River at Discovery Park	01/22/04	environ	none	Pimephales	biomass, significance	yes/no		7		
American River at Discovery Park	01/22/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	DO, high	mg/L	11.7	3		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	DO, low	mg/L	5.6	6		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	mortality, mean	%	17.5	7		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	mortality, s.e.	%	9	7		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	pH, high	standard units	8.39	6		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	pH, low	standard units	7.38	2		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	biomass, mean	mg	0.4	7		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	biomass, s.e.	mg	0.04	7		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Colusa Basin Drain	01/21/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	01/21/04	lab control	none	Pimephales	DO, high	mg/L	9.2	6		
Lab Control	01/21/04	lab control	none	Pimephales	DO, low	mg/L	4.7	7		
Lab Control	01/21/04	lab control	none	Pimephales	mortality, mean	%	0	7		
Lab Control	01/21/04	lab control	none	Pimephales	mortality, s.e.	%	0	7		
Lab Control	01/21/04	lab control	none	Pimephales	pH, high	standard units	8.51	4		
Lab Control	01/21/04	lab control	none	Pimephales	pH, low	standard units	7.12	3		
Lab Control	01/21/04	lab control	none	Pimephales	biomass, mean	mg	0.56	7		
Lab Control	01/21/04	lab control	none	Pimephales	biomass, s.e.	mg	0.04	7		
Lab Control	01/21/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	01/21/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	01/22/04	lab control	none	Pimephales	DO, high	mg/L	9.8	4		
Lab Control	01/22/04	lab control	none	Pimephales	DO, low	mg/L	5.8	7		
Lab Control	01/22/04	lab control	none	Pimephales	mortality, mean	%	0	7		
Lab Control	01/22/04	lab control	none	Pimephales	mortality, s.e.	%	0	7		
Lab Control	01/22/04	lab control	none	Pimephales	pH, high	standard units	8.21	6		
Lab Control	01/22/04	lab control	none	Pimephales	pH, low	standard units	7.46	2		
Lab Control	01/22/04	lab control	none	Pimephales	biomass, mean	mg	0.51	7		
Lab Control	01/22/04	lab control	none	Pimephales	biomass, s.e.	mg	0.04	7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	01/22/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	01/22/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	01/23/04	lab control	none	Pimephales	DO, high	mg/L	9.8	3		
Lab Control	01/23/04	lab control	none	Pimephales	DO, low	mg/L	6	6		
Lab Control	01/23/04	lab control	none	Pimephales	mortality, mean	%	0	7		
Lab Control	01/23/04	lab control	none	Pimephales	mortality, s.e.	%	0	7		
Lab Control	01/23/04	lab control	none	Pimephales	pH, high	standard units	8.25	5		
Lab Control	01/23/04	lab control	none	Pimephales	pH, low	standard units	7.53	4		
Lab Control	01/23/04	lab control	none	Pimephales	biomass, mean	mg	0.44	7		
Lab Control	01/23/04	lab control	none	Pimephales	biomass, s.e.	mg	0.3	7		
Lab Control	01/23/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	01/23/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	DO, high	mg/L	12.6	3		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	DO, low	mg/L	4.5	6		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	mortality, mean	%	32.5	7		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	mortality, s.e.	%	10	7		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	pH, high	standard units	8.34	1		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	pH, low	standard units	7.67	7		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	biomass, mean	mg	0.29	7		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	biomass, s.e.	mg	0.1	7		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Feather River at Nicolaus	01/21/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento Slough	01/21/04	environ	none	Pimephales	DO, high	mg/L	12	3		
Sacramento Slough	01/21/04	environ	none	Pimephales	DO, low	mg/L	5.7	7		
Sacramento Slough	01/21/04	environ	none	Pimephales	mortality, mean	%	15	7		
Sacramento Slough	01/21/04	environ	none	Pimephales	mortality, s.e.	%	12	7		
Sacramento Slough	01/21/04	environ	none	Pimephales	pH, high	standard units	8.3	6		
Sacramento Slough	01/21/04	environ	none	Pimephales	pH, low	standard units	7.57	2		
Sacramento Slough	01/21/04	environ	none	Pimephales	biomass, mean	mg	0.41	7		
Sacramento Slough	01/21/04	environ	none	Pimephales	biomass, s.e.	mg	0.05	7		
Sacramento Slough	01/21/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento Slough	01/21/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	DO, high	mg/L	12	3		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	DO, low	mg/L	4.2	7		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	mortality, mean	%	42.5	7		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	mortality, s.e.	%	15	7		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	pH, high	standard units	8.45	4		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	pH, low	standard units	7.38	3		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	biomass, mean	mg	0.36	7		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	biomass, s.e.	mg	0.1	7		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	DO, high	mg/L	12.5	0		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	DO, low	mg/L	4.3	7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	mortality, mean	%	0	7		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	mortality, s.e.	%	0	7		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	pH, high	standard units	8.39	4		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	pH, low	standard units	7.46	3		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	biomass, mean	mg	0.54	7		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	biomass, s.e.	mg	0.03	7		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	DO, high	mg/L	12.5	6		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	DO, low	mg/L	4.5	7		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	mortality, mean	%	30	7		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	mortality, s.e.	%	23	7		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	pH, high	standard units	8.17	4		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	pH, low	standard units	7.39	3		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	biomass, mean	mg	0.43	7		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	biomass, s.e.	mg	0.15	7		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Colusa	01/20/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	DO, high	mg/L	12.1	2		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	DO, low	mg/L	5	6		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	mortality, mean	%	40	7		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	mortality, s.e.	%	18	7		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	pH, high	standard units	7.93	5		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	pH, low	standard units	7.62	1		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	biomass, mean	mg	0.35	7		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	biomass, s.e.	mg	0.1	7		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Freeport	01/22/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	DO, high	mg/L	12.5	4		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	DO, low	mg/L	4.2	7		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	mortality, mean	%	40	7		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	mortality, s.e.	%	12	7		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	pH, high	standard units	8.33	4		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	pH, low	standard units	7.29	3		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	biomass, mean	mg	0.38	7		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	biomass, s.e.	mg	0.09	7		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River near Hamilton City	01/20/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	DO, high	mg/L	12.6	6		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	DO, low	mg/L	4.8	7		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	mortality, mean	%	42.5	7		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	mortality, s.e.	%	11	7		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	pH, high	standard units	8.45	4		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	pH, low	standard units	7.23	3		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	biomass, mean	mg	0.38	7		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	biomass, s.e.	mg	0.07	7		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Pimephales	mortality, significance	yes/no		7		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	DO, high	mg/L	12.4	3		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	DO, low	mg/L	5.3	7		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	mortality, mean	%	15	7		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	mortality, s.e.	%	6	7		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	pH, high	standard units	8.51	1		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	pH, low	standard units	7.86	2		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	biomass, mean	mg	0.39	7		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	biomass, s.e.	mg	0.03	7		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Yuba River at Marysville	01/21/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Arcade Creek at Norwood Av	01/22/04	environ	none	Selenastrum	DO, high	mg/L	12.6	4		
Arcade Creek at Norwood Av	01/22/04	environ	none	Selenastrum	DO, low	mg/L	9.1	0		
Arcade Creek at Norwood Av	01/22/04	environ	none	Selenastrum	cell density	cells/ml x 106	2.07	4		
Arcade Creek at Norwood Av	01/22/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	71987.27	4		
Arcade Creek at Norwood Av	01/22/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Arcade Creek at Norwood Av	01/22/04	environ	none	Selenastrum	pH, high	standard units	10.9	4		
Arcade Creek at Norwood Av	01/22/04	environ	none	Selenastrum	pH, low	standard units	7.7	0		
American River at Discovery Park	01/22/04	environ	none	Selenastrum	DO, high	mg/L	11.7	4		
American River at Discovery Park	01/22/04	environ	none	Selenastrum	DO, low	mg/L	9.6	0		
American River at Discovery Park	01/22/04	environ	none	Selenastrum	cell density	cells/ml x 106	1.365	4		
American River at Discovery Park	01/22/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	36399.4	4		
American River at Discovery Park	01/22/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
American River at Discovery Park	01/22/04	environ	none	Selenastrum	pH, high	standard units	10.06	4		
American River at Discovery Park	01/22/04	environ	none	Selenastrum	pH, low	standard units	7.96	1		
Colusa Basin Drain	01/21/04	environ	none	Selenastrum	DO, high	mg/L	14.9	4		
Colusa Basin Drain	01/21/04	environ	none	Selenastrum	DO, low	mg/L	9.1	0		
Colusa Basin Drain	01/21/04	environ	none	Selenastrum	cell density	cells/ml x 106	1.777	4		
Colusa Basin Drain	01/21/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	110366.44	4		
Colusa Basin Drain	01/21/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Colusa Basin Drain	01/21/04	environ	none	Selenastrum	pH, high	standard units	9.56	4		
Colusa Basin Drain	01/21/04	environ	none	Selenastrum	pH, low	standard units	7.98	0		
Lab Control	01/21/04	lab control	none	Selenastrum	DO, high	mg/L	12.2	4		
Lab Control	01/21/04	lab control	none	Selenastrum	DO, low	mg/L	8.8	0		
Lab Control	01/21/04	lab control	none	Selenastrum	cell density	cells/ml x 106	1.272	4		
Lab Control	01/21/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	59264.24	4		
Lab Control	01/21/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	01/21/04	lab control	none	Selenastrum	pH, high	standard units	9.56	4		
Lab Control	01/21/04	lab control	none	Selenastrum	pH, low	standard units	7.9	0		
Lab Control	01/22/04	lab control	none	Selenastrum	DO, high	mg/L	9.1	4		
Lab Control	01/22/04	lab control	none	Selenastrum	DO, low	mg/L	8.7	0		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	01/22/04	lab control	none	Selenastrum	cell density	cells/ml x 106	0.57	4		
Lab Control	01/22/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	13984.37	4		
Lab Control	01/22/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	01/22/04	lab control	none	Selenastrum	pH, high	standard units	8.74	3		
Lab Control	01/22/04	lab control	none	Selenastrum	pH, low	standard units	8.15	2		
Lab Control	01/23/04	lab control	none	Selenastrum	DO, high	mg/L	12.6	4		
Lab Control	01/23/04	lab control	none	Selenastrum	DO, low	mg/L	9.1	0		
Lab Control	01/23/04	lab control	none	Selenastrum	cell density	cells/ml x 106	0.531	4		
Lab Control	01/23/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	10094.35	4		
Lab Control	01/23/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	01/23/04	lab control	none	Selenastrum	pH, high	standard units	10.09	4		
Lab Control	01/23/04	lab control	none	Selenastrum	pH, low	standard units	7.7	0		
Feather River at Nicolaus	01/21/04	environ	none	Selenastrum	DO, high	mg/L	13	4		
Feather River at Nicolaus	01/21/04	environ	none	Selenastrum	DO, low	mg/L	9.7	0		
Feather River at Nicolaus	01/21/04	environ	none	Selenastrum	cell density	cells/ml x 106	1.615	4		
Feather River at Nicolaus	01/21/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	100115.25	4		
Feather River at Nicolaus	01/21/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Feather River at Nicolaus	01/21/04	environ	none	Selenastrum	pH, high	standard units	9.6	4		
Feather River at Nicolaus	01/21/04	environ	none	Selenastrum	pH, low	standard units	8.1	0		
Sacramento Slough	01/21/04	environ	none	Selenastrum	DO, high	mg/L	14	4		
Sacramento Slough	01/21/04	environ	none	Selenastrum	DO, low	mg/L	9.4	0		
Sacramento Slough	01/21/04	environ	none	Selenastrum	cell density	cells/ml x 106	1.655	4		
Sacramento Slough	01/21/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	69162.25	4		
Sacramento Slough	01/21/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento Slough	01/21/04	environ	none	Selenastrum	pH, high	standard units	9.67	4		
Sacramento Slough	01/21/04	environ	none	Selenastrum	pH, low	standard units	7.27	0		
Sacramento River at Bend Bridge	01/20/04	environ	none	Selenastrum	DO, high	mg/L	11.3	4		
Sacramento River at Bend Bridge	01/20/04	environ	none	Selenastrum	DO, low	mg/L	9.2	0		
Sacramento River at Bend Bridge	01/20/04	environ	none	Selenastrum	cell density	cells/ml x 106	2.27	4		
Sacramento River at Bend Bridge	01/20/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	50702.56	4		
Sacramento River at Bend Bridge	01/20/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Bend Bridge	01/20/04	environ	none	Selenastrum	pH, high	standard units	9.75	4		
Sacramento River at Bend Bridge	01/20/04	environ	none	Selenastrum	pH, low	standard units	8.04	0		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Selenastrum	DO, high	mg/L	10	4		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Selenastrum	DO, low	mg/L	9.1	0		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Selenastrum	cell density	cells/ml x 106	1.635	4		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	19001.64	4		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Selenastrum	pH, high	standard units	9.4	4		
Sacramento River below Keswick Reservoir	01/20/04	environ	none	Selenastrum	pH, low	standard units	8.03	0		
Sacramento River at Colusa	01/20/04	environ	none	Selenastrum	DO, high	mg/L	11.6	4		
Sacramento River at Colusa	01/20/04	environ	none	Selenastrum	DO, low	mg/L	9.2	0		
Sacramento River at Colusa	01/20/04	environ	none	Selenastrum	cell density	cells/ml x 106	2.305	4		
Sacramento River at Colusa	01/20/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	54538.02	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Colusa	01/20/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Colusa	01/20/04	environ	none	Selenastrum	pH, high	standard units	9.66	4		
Sacramento River at Colusa	01/20/04	environ	none	Selenastrum	pH, low	standard units	7.91	0		
Sacramento River at Freeport	01/22/04	environ	none	Selenastrum	DO, high	mg/L	12.7	4		
Sacramento River at Freeport	01/22/04	environ	none	Selenastrum	DO, low	mg/L	9.4	0		
Sacramento River at Freeport	01/22/04	environ	none	Selenastrum	cell density	cells/ml x 106	2.095	4		
Sacramento River at Freeport	01/22/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	149203.44	4		
Sacramento River at Freeport	01/22/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Freeport	01/22/04	environ	none	Selenastrum	pH, high	standard units	10.03	4		
Sacramento River at Freeport	01/22/04	environ	none	Selenastrum	pH, low	standard units	7.89	0		
Sacramento River near Hamilton City	01/20/04	environ	none	Selenastrum	DO, high	mg/L	10.6	4		
Sacramento River near Hamilton City	01/20/04	environ	none	Selenastrum	DO, low	mg/L	9	0		
Sacramento River near Hamilton City	01/20/04	environ	none	Selenastrum	cell density	cells/ml x 106	2.274	4		
Sacramento River near Hamilton City	01/20/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	73165.77	4		
Sacramento River near Hamilton City	01/20/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River near Hamilton City	01/20/04	environ	none	Selenastrum	pH, high	standard units	9.46	4		
Sacramento River near Hamilton City	01/20/04	environ	none	Selenastrum	pH, low	standard units	8	0		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Selenastrum	DO, high	mg/L	11.8	4		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Selenastrum	DO, low	mg/L	8.9	0		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Selenastrum	cell density	cells/ml x 106	2.581	4		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Selenastrum	cell density, s.e.	cells/ml	43988.64	4		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Selenastrum	pH, high	standard units	9.66	4		
Sacramento River near Hamilton City	01/20/04	field duplicate	none	Selenastrum	pH, low	standard units	7.91	0		
Yuba River at Marysville	01/21/04	environ	none	Selenastrum	DO, high	mg/L	12.5	4		
Yuba River at Marysville	01/21/04	environ	none	Selenastrum	DO, low	mg/L	9.8	0		
Yuba River at Marysville	01/21/04	environ	none	Selenastrum	cell density	cells/ml x 106	1.284	4		
Yuba River at Marysville	01/21/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	53973.76	4		
Yuba River at Marysville	01/21/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Yuba River at Marysville	01/21/04	environ	none	Selenastrum	pH, high	standard units	9.64	4		
Yuba River at Marysville	01/21/04	environ	none	Selenastrum	pH, low	standard units	8.04	0		
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	DO, high	mg/L	13	1		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	DO, low	mg/L	4.8	7		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	mortality, mean	%	10	7		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	mortality, s.e.	%	10	7		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	pH, high	standard units	8.38	0		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	pH, low	standard units	7.54	1		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	biomass, mean	mg	0.69	7		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	biomass, s.e.	mg	0.067	7		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	biomass, significance	yes/no		7		L
Sacramento River at Bend Bridge	01/20/04	environ	none	Pimephales	mortality, significance	yes/no		7		L
Lab Control	02/04/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	02/04/04	lab control	none	Pimephales	DO, high	mg/L	9.4	0		
Lab Control	02/04/04	lab control	none	Pimephales	DO, low	mg/L	6.1	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	02/04/04	lab control	none	Pimephales	mortality, mean	%	0	7		
Lab Control	02/04/04	lab control	none	Pimephales	mortality, s.e.	%	0	7		
Lab Control	02/04/04	lab control	none	Pimephales	pH, high	standard units	8.32	7		
Lab Control	02/04/04	lab control	none	Pimephales	pH, low	standard units	7.72	4		
Lab Control	02/04/04	lab control	none	Pimephales	biomass, mean	mg	0.2747503	7		
Lab Control	02/04/04	lab control	none	Pimephales	biomass, s.e.	mg	0.0047674	7		
Lab Control	02/04/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	DO, high	mg/L	12.6	3		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	DO, low	mg/L	5.6	6		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	mortality, mean	%	12.5	7		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	mortality, s.e.	%	6.29153	7		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	pH, high	standard units	8.25	7		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	pH, low	standard units	7.74	4		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.32	7		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.0132	7		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	DO, high	mg/L	12.7	5		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	DO, low	mg/L	5.6	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	mortality, mean	%	80	7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	mortality, s.e.	%	7.07107	7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	pH, high	standard units	8.24	7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	pH, low	standard units	7.69	4		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.1192493	7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.0412764	7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	DO, high	mg/L	12.4	5		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	DO, low	mg/L	5.4	6		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	mortality, mean	%	65	7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	mortality, s.e.	%	10.40833	7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	pH, high	standard units	8.08	0		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	pH, low	standard units	7.56	2		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.1497509	7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.033937	7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	DO, high	mg/L	12.8	5		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	DO, low	mg/L	5.4	6		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	mortality, mean	%	47.5	7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	mortality, s.e.	%	19.31105	7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	pH, high	standard units	8.15	7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	pH, low	standard units	7.67	2		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.218	7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.0768516	7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	DO, high	mg/L	12.6	5		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	DO, low	mg/L	5.2	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	mortality, mean	%	67.5	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	mortality, s.e.	%	14.36141	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	pH, high	standard units	7.96	0		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	pH, low	standard units	7.61	2		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.1590004	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.0673761	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	02/05/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	02/05/04	lab control	none	Pimephales	DO, high	mg/L	9.8	4		
Lab Control	02/05/04	lab control	none	Pimephales	DO, low	mg/L	5.7	5		
Lab Control	02/05/04	lab control	none	Pimephales	mortality, mean	%	0	7		
Lab Control	02/05/04	lab control	none	Pimephales	mortality, s.e.	%	0	7		
Lab Control	02/05/04	lab control	none	Pimephales	pH, high	standard units	8.3	1		
Lab Control	02/05/04	lab control	none	Pimephales	pH, low	standard units	7.71	7		
Lab Control	02/05/04	lab control	none	Pimephales	biomass, mean	mg	0.4497498	7		
Lab Control	02/05/04	lab control	none	Pimephales	biomass, s.e.	mg	0.0210452	7		
Lab Control	02/05/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	DO, high	mg/L	12.5	2		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	DO, low	mg/L	4.8	7		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	mortality, mean	%	10	7		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	mortality, s.e.	%	4.08248	7		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	pH, high	standard units	8.1	4		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	pH, low	standard units	7.58	7		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	biomass, mean	mg	0.3497498	7		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	biomass, s.e.	mg	0.0210452	7		
Colusa Basin Drain	02/04/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	mortality, significance	yes/no		7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	DO, high	mg/L	13.4	6		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	DO, low	mg/L	3	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	mortality, mean	%	35	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	mortality, s.e.	%	6.45497	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	pH, high	standard units	8.16	5		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	pH, low	standard units	7.67	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	biomass, mean	mg	0.3315002	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	biomass, s.e.	mg	0.0336661	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	biomass, significance	yes/no		7		
Sacramento Slough	02/04/04	environ	none	Pimephales	mortality, significance	yes/no		7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento Slough	02/04/04	environ	none	Pimephales	DO, high	mg/L	13.5	6		
Sacramento Slough	02/04/04	environ	none	Pimephales	DO, low	mg/L	3.6	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	mortality, mean	%	12.5	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	mortality, s.e.	%	9.46485	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	pH, high	standard units	8.35	2		
Sacramento Slough	02/04/04	environ	none	Pimephales	pH, low	standard units	7.8	4		
Sacramento Slough	02/04/04	environ	none	Pimephales	biomass, mean	mg	0.41675	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	biomass, s.e.	mg	0.0270905	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	DO, high	mg/L	13.3	6		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	DO, low	mg/L	3.5	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	mortality, mean	%	50	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	mortality, s.e.	%	14.7196	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	pH, high	standard units	8.46	4		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	pH, low	standard units	7.75	6		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	biomass, mean	mg	0.2517498	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	biomass, s.e.	mg	0.0652768	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	DO, high	mg/L	13.3	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	DO, low	mg/L	2.5	7		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	mortality, mean	%	20	7		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	mortality, s.e.	%	10	4		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	pH, high	standard units	8.64	5		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	pH, low	standard units	7.88	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	biomass, mean	mg	0.362	7		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	biomass, s.e.	mg	0.0235264	7		
Arcade Creek at Norwood Av	02/04/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	02/06/04	lab control	none	Pimephales	mortality, significance	yes/no		3		
Lab Control	02/06/04	lab control	none	Pimephales	DO, high	mg/L	10.3	5		
Lab Control	02/06/04	lab control	none	Pimephales	DO, low	mg/L	5.8	4		
Lab Control	02/06/04	lab control	none	Pimephales	mortality, mean	%	0	7		
Lab Control	02/06/04	lab control	none	Pimephales	mortality, s.e.	%	0	7		
Lab Control	02/06/04	lab control	none	Pimephales	pH, high	standard units	8.34	4		
Lab Control	02/06/04	lab control	none	Pimephales	pH, low	standard units	7.73	5		
Lab Control	02/06/04	lab control	none	Pimephales	biomass, mean	mg	0.3807503	7		
Lab Control	02/06/04	lab control	none	Pimephales	biomass, s.e.	mg	0.0349028	7		
Lab Control	02/06/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	mortality, significance	yes/no		3		
American River at Discovery Park	02/05/04	environ	none	Pimephales	DO, high	mg/L	12.3	3		
American River at Discovery Park	02/05/04	environ	none	Pimephales	DO, low	mg/L	5.5	7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	mortality, mean	%	12.5	6		
American River at Discovery Park	02/05/04	environ	none	Pimephales	mortality, s.e.	%	0.0946485	5		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
American River at Discovery Park	02/05/04	environ	none	Pimephales	pH, high	standard units	8.36	5		
American River at Discovery Park	02/05/04	environ	none	Pimephales	pH, low	standard units	7.73	5		
American River at Discovery Park	02/05/04	environ	none	Pimephales	biomass, mean	mg	0.3697502	7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	biomass, s.e.	mg	0.0354574	7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	mortality, significance	yes/no		3		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	DO, high	mg/L	11.8	5		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	DO, low	mg/L	4.3	4		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	mortality, mean	%	50	6		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	mortality, s.e.	%	23.80476	3		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	pH, high	standard units	8.25	5		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	pH, low	standard units	7.73	5		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	biomass, mean	mg	0.2287498	7		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	biomass, s.e.	mg	0.1040701	7		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	02/26/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	02/26/04	lab control	none	Pimephales	DO, high	mg/L	10.4	1		
Lab Control	02/26/04	lab control	none	Pimephales	DO, low	mg/L	5	5		
Lab Control	02/26/04	lab control	none	Pimephales	mortality, mean	%	5	7		
Lab Control	02/26/04	lab control	none	Pimephales	mortality, s.e.	%	5	7		
Lab Control	02/26/04	lab control	none	Pimephales	pH, high	standard units	8.38	6		
Lab Control	02/26/04	lab control	none	Pimephales	pH, low	standard units	7.54	4		
Lab Control	02/26/04	lab control	none	Pimephales	biomass, mean	mg	0.611	7		
Lab Control	02/26/04	lab control	none	Pimephales	biomass, s.e.	mg	0.0510674	7		
Lab Control	02/26/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		3		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	DO, high	mg/L	12.4	1		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	DO, low	mg/L	5.5	4		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	mortality, mean	%	20	7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	mortality, s.e.	%	5	7		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	pH, high	standard units	8.11	3		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	pH, low	standard units	7.58	4		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.5174999	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.0572714	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		6		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		3		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	DO, high	mg/L	12.5	1		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	DO, low	mg/L	4.5	5		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	mortality, mean	%	20	7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	mortality, s.e.	%	5	7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	pH, high	standard units	8.05	0		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	pH, low	standard units	7.46	4		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.58	7		
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.0321228	7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Colusa	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		3		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	DO, high	mg/L	12.5	1		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	DO, low	mg/L	5.2	3		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	mortality, mean	%	5	6		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	mortality, s.e.	%	5	1		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	pH, high	standard units	8.08	0		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	pH, low	standard units	7.58	4		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.6965	7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.0474645	7		
Sacramento River near Hamilton City	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	mortality, significance	yes/no		4		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	DO, high	mg/L	11.9	1		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	DO, low	mg/L	5.6	4		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	mortality, mean	%	5	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	mortality, s.e.	%	5	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	pH, high	standard units	8.23	0		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	pH, low	standard units	7.49	4		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	biomass, mean	mg	0.7485	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	biomass, s.e.	mg	0.055585	7		
Yuba River at Marysville	02/03/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	mortality, significance	yes/no		7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	DO, high	mg/L	12.4	1		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	DO, low	mg/L	4.7	5		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	mortality, mean	%	20	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	mortality, s.e.	%	5	2		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	pH, high	standard units	8.01	1		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	pH, low	standard units	7.58	1		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	biomass, mean	mg	0.6029998	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	biomass, s.e.	mg	0.0264268	7		
Colusa Basin Drain	02/04/04	field duplicate	none	Pimephales	biomass, significance	yes/no		7		
Sacramento Slough	02/04/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento Slough	02/04/04	environ	none	Pimephales	DO, high	mg/L	12.2	1		
Sacramento Slough	02/04/04	environ	none	Pimephales	DO, low	mg/L	5.2	4		
Sacramento Slough	02/04/04	environ	none	Pimephales	mortality, mean	%	0	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	mortality, s.e.	%	0	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	pH, high	standard units	8.25	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	pH, low	standard units	743	6		
Sacramento Slough	02/04/04	environ	none	Pimephales	biomass, mean	mg	0.6975001	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	biomass, s.e.	mg	0.0334197	7		
Sacramento Slough	02/04/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	mortality, significance	yes/no		2		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	DO, high	mg/L	12.6	1		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	DO, low	mg/L	5.5	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	mortality, mean	%	30	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	mortality, s.e.	%	5	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	pH, high	standard units	8.43	6		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	pH, low	standard units	7.72	4		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	biomass, mean	mg	0.472999	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	biomass, s.e.	mg	0.0322044	7		
Feather River at Nicolaus	02/04/04	environ	none	Pimephales	biomass, significance	yes/no		7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	mortality, significance	yes/no		4		
American River at Discovery Park	02/05/04	environ	none	Pimephales	DO, high	mg/L	12.2	1		
American River at Discovery Park	02/05/04	environ	none	Pimephales	DO, low	mg/L	5.5	4		
American River at Discovery Park	02/05/04	environ	none	Pimephales	mortality, mean	%	0	7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	mortality, s.e.	%	0	7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	pH, high	standard units	8.42	3		
American River at Discovery Park	02/05/04	environ	none	Pimephales	pH, low	standard units	7.96	4		
American River at Discovery Park	02/05/04	environ	none	Pimephales	biomass, mean	mg	0.6675	7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	biomass, s.e.	mg	0.0588696	7		
American River at Discovery Park	02/05/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	mortality, significance	yes/no		4		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	DO, high	mg/L	12.4	1		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	DO, low	mg/L	5.4	3		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	mortality, mean	%	0	7		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	mortality, s.e.	%	0	7		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	pH, high	standard units	8.14	3		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	pH, low	standard units	7.53	4		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	biomass, mean	mg	0.735499	7		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	biomass, s.e.	mg	0.0461411	7		
Sacramento River at Freeport	02/05/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	DO, high	mg/L	9.5	0		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	DO, low	mg/L	7.2	1		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.61	1		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.71	5		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	20.2	6		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.75	6		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	02/04/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.1	5		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.1	2		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	mortality, mean	%	22.2	6		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	mortality, s.e.	%	14.69862	6		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	pH, high	standard units	8.75	1		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	pH, low	standard units	7.6	2		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	12.375	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	3.57	6		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.2	5		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.4	3		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	pH, high	standard units	8.74	1		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	pH, low	standard units	7.61	3		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	15.7	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.338328	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Bend Bridge	02/03/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.3	5		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	DO, low	mg/L	6	6		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	mortality, mean	%	10	6		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	mortality, s.e.	%	10	6		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	pH, high	standard units	8.53	1		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	pH, low	standard units	7.58	2		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	21.5	6		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.5265259	6		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Colusa	02/03/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.3	5		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	DO, low	mg/L	7	3		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	pH, high	standard units	8.66	1		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	pH, low	standard units	7.64	2		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	19.8	6		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.7920522	6		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River near Hamilton City	02/03/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.3	5		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.1	3		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	pH, high	standard units	8.56	1		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	pH, low	standard units	7.63	3		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	19.4	6		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.4635489	6		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Yuba River at Marysville	02/03/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	DO, high	mg/L	9.6	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	02/05/04	lab control	none	Ceriodaphnia	DO, low	mg/L	6.7	2		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.6	5		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.71	4		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	22.9	6		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.7343469	6		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	02/05/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.3	6		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	DO, low	mg/L	5.6	5		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	pH, high	standard units	8.53	5		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	pH, low	standard units	7.71	6		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	12.9	6		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.0893912	6		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Colusa Basin Drain	02/04/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	DO, high	mg/L	12.7	6		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	DO, low	mg/L	7.2	1		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	mortality, mean	%	10	6		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	mortality, s.e.	%	10	6		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	pH, high	standard units	8.52	2		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	pH, low	standard units	7.79	4		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	reproduction, mean	neonates/adult	12.3	6		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.8015425	6		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Colusa Basin Drain	02/04/04	field duplicate	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.8	6		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.2	5		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	pH, high	standard units	8.68	2		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	pH, low	standard units	7.78	4		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	15.3	6		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.5849991	6		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento Slough	02/04/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.9	6		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	DO, low	mg/L	5.9	5		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	mortality, mean	%	10	6		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	mortality, s.e.	%	10	6		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	pH, high	standard units	8.64	1		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	pH, low	standard units	7.98	2		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	18.6	6		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.688246	6		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Feather River at Nicolaus	02/04/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.6	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	DO, low	mg/L	5.6	5		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	pH, high	standard units	8.6	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	pH, low	standard units	7.81	2		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	21.7	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.1278576	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Arcade Creek at Norwood Av	02/04/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	DO, high	mg/L	9.6	5		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	DO, low	mg/L	6.5	0		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.56	4		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.71	3		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	18.3	6		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.8764624	6		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	02/06/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.1	3		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	DO, low	mg/L	7	1		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	mortality, mean	%	10	6		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	mortality, s.e.	%	10	6		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	pH, high	standard units	8.52	5		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	pH, low	standard units	7.79	2		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	12.9	6		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.8764624	6		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
American River at Discovery Park	02/05/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.1	5		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.2	4		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	pH, high	standard units	8.23	4		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	pH, low	standard units	7.63	2		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	16.3	6		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.2565385	6		
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Freeport	02/05/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	02/04/04	lab control	none	Selenastrum	DO, high	mg/L	13.8	4		
Lab Control	02/04/04	lab control	none	Selenastrum	DO, low	mg/L	11.7	0		
Lab Control	02/04/04	lab control	none	Selenastrum	cell density	cells/ml	766250	4		
Lab Control	02/04/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	64020	4		
Lab Control	02/04/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	02/04/04	lab control	none	Selenastrum	pH, high	standard units	9.96	4		
Lab Control	02/04/04	lab control	none	Selenastrum	pH, low	standard units	8.26	0		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Selenastrum	DO, high	mg/L	12.1	4		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Selenastrum	DO, low	mg/L	11.3	0		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Selenastrum	cell density	cells/ml	842250	4		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	31481	4		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Selenastrum	pH, high	standard units	9.46	4		
Sacramento River below Keswick Reservoir	02/03/04	environ	none	Selenastrum	pH, low	standard units	7.89	0		
Sacramento River at Bend Bridge	02/03/04	environ	none	Selenastrum	DO, high	mg/L	16.8	4		
Sacramento River at Bend Bridge	02/03/04	environ	none	Selenastrum	DO, low	mg/L	11.3	0		
Sacramento River at Bend Bridge	02/03/04	environ	none	Selenastrum	cell density	cells/ml	1416750	4		
Sacramento River at Bend Bridge	02/03/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	32353	4		
Sacramento River at Bend Bridge	02/03/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Bend Bridge	02/03/04	environ	none	Selenastrum	pH, high	standard units	10.39	4		
Sacramento River at Bend Bridge	02/03/04	environ	none	Selenastrum	pH, low	standard units	7.94	0		
Sacramento River at Colusa	02/03/04	environ	none	Selenastrum	DO, high	mg/L	13.9	4		
Sacramento River at Colusa	02/03/04	environ	none	Selenastrum	DO, low	mg/L	10.9	0		
Sacramento River at Colusa	02/03/04	environ	none	Selenastrum	cell density	cells/ml	1455500	4		
Sacramento River at Colusa	02/03/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	39223	4		
Sacramento River at Colusa	02/03/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Colusa	02/03/04	environ	none	Selenastrum	pH, high	standard units	9.72	4		
Sacramento River at Colusa	02/03/04	environ	none	Selenastrum	pH, low	standard units	7.81	0		
Sacramento River near Hamilton City	02/03/04	environ	none	Selenastrum	DO, high	mg/L	15.7	4		
Sacramento River near Hamilton City	02/03/04	environ	none	Selenastrum	DO, low	mg/L	11.1	0		
Sacramento River near Hamilton City	02/03/04	environ	none	Selenastrum	cell density	cells/ml	1472000	4		
Sacramento River near Hamilton City	02/03/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	76789	4		
Sacramento River near Hamilton City	02/03/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River near Hamilton City	02/03/04	environ	none	Selenastrum	pH, high	standard units	10.04	4		
Sacramento River near Hamilton City	02/03/04	environ	none	Selenastrum	pH, low	standard units	7.89	0		
Yuba River at Marysville	02/03/04	environ	none	Selenastrum	DO, high	mg/L	12.8	4		
Yuba River at Marysville	02/03/04	environ	none	Selenastrum	DO, low	mg/L	11.3	0		
Yuba River at Marysville	02/03/04	environ	none	Selenastrum	cell density	cells/ml	1019250	4		
Yuba River at Marysville	02/03/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	35245	4		
Yuba River at Marysville	02/03/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Yuba River at Marysville	02/03/04	environ	none	Selenastrum	pH, high	standard units	9.63	4		
Yuba River at Marysville	02/03/04	environ	none	Selenastrum	pH, low	standard units	7.93	0		
Lab Control	02/05/04	lab control	none	Selenastrum	DO, high	mg/L	15.3	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	02/05/04	lab control	none	Selenastrum	DO, low	mg/L	7	0		
Lab Control	02/05/04	lab control	none	Selenastrum	cell density	cells/ml	610250	4		
Lab Control	02/05/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	24618	4		
Lab Control	02/05/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	02/05/04	lab control	none	Selenastrum	pH, high	standard units	9.43	4		
Lab Control	02/05/04	lab control	none	Selenastrum	pH, low	standard units	7.9	0		
Colusa Basin Drain	02/04/04	environ	none	Selenastrum	DO, high	mg/L	13.7	4		
Colusa Basin Drain	02/04/04	environ	none	Selenastrum	DO, low	mg/L	8.2	0		
Colusa Basin Drain	02/04/04	environ	none	Selenastrum	cell density	cells/ml	1468250	4		
Colusa Basin Drain	02/04/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	17764	4		
Colusa Basin Drain	02/04/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Colusa Basin Drain	02/04/04	environ	none	Selenastrum	pH, high	standard units	9.45	4		
Colusa Basin Drain	02/04/04	environ	none	Selenastrum	pH, low	standard units	7.74	0		
Colusa Basin Drain	02/04/04	field duplicate	none	Selenastrum	DO, high	mg/L	14.1	4		
Colusa Basin Drain	02/04/04	field duplicate	none	Selenastrum	DO, low	mg/L	8.2	0		
Colusa Basin Drain	02/04/04	field duplicate	none	Selenastrum	cell density	cells/ml	1397000	4		
Colusa Basin Drain	02/04/04	field duplicate	none	Selenastrum	cell density, s.e.	cells/ml	55502	4		
Colusa Basin Drain	02/04/04	field duplicate	none	Selenastrum	cell density, significance	yes/no		4		
Colusa Basin Drain	02/04/04	field duplicate	none	Selenastrum	pH, high	standard units	9.51	4		
Colusa Basin Drain	02/04/04	field duplicate	none	Selenastrum	pH, low	standard units	7.77	0		
Sacramento Slough	02/04/04	environ	none	Selenastrum	DO, high	mg/L	17.7	4		
Sacramento Slough	02/04/04	environ	none	Selenastrum	DO, low	mg/L	8.1	0		
Sacramento Slough	02/04/04	environ	none	Selenastrum	cell density	cells/ml	1999500	4		
Sacramento Slough	02/04/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	131794	4		
Sacramento Slough	02/04/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento Slough	02/04/04	environ	none	Selenastrum	pH, high	standard units	9.39	4		
Sacramento Slough	02/04/04	environ	none	Selenastrum	pH, low	standard units	7.85	0		
Feather River at Nicolaus	02/04/04	environ	none	Selenastrum	DO, high	mg/L	13.3	4		
Feather River at Nicolaus	02/04/04	environ	none	Selenastrum	DO, low	mg/L	8	0		
Feather River at Nicolaus	02/04/04	environ	none	Selenastrum	cell density	cells/ml	1529250	4		
Feather River at Nicolaus	02/04/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	103514	4		
Feather River at Nicolaus	02/04/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Feather River at Nicolaus	02/04/04	environ	none	Selenastrum	pH, high	standard units	9.58	4		
Feather River at Nicolaus	02/04/04	environ	none	Selenastrum	pH, low	standard units	8.35	0		
Arcade Creek at Norwood Av	02/04/04	environ	none	Selenastrum	DO, high	mg/L	10.2	4		
Arcade Creek at Norwood Av	02/04/04	environ	none	Selenastrum	DO, low	mg/L	7.6	0		
Arcade Creek at Norwood Av	02/04/04	environ	none	Selenastrum	cell density	cells/ml	706250	4		
Arcade Creek at Norwood Av	02/04/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	8664	4		
Arcade Creek at Norwood Av	02/04/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Arcade Creek at Norwood Av	02/04/04	environ	none	Selenastrum	pH, high	standard units	9.06	4		
Arcade Creek at Norwood Av	02/04/04	environ	none	Selenastrum	pH, low	standard units	8.06	1		
American River at Discovery Park	02/05/04	environ	none	Selenastrum	DO, high	mg/L	18	4		
American River at Discovery Park	02/05/04	environ	none	Selenastrum	DO, low	mg/L	7.2	0		
American River at Discovery Park	02/05/04	environ	none	Selenastrum	cell density	cells/ml	899000	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
American River at Discovery Park	02/05/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	65763	4		
American River at Discovery Park	02/05/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
American River at Discovery Park	02/05/04	environ	none	Selenastrum	pH, high	standard units	10.08	4		
American River at Discovery Park	02/05/04	environ	none	Selenastrum	pH, low	standard units	8.09	0		
Sacramento River at Freeport	02/05/04	environ	none	Selenastrum	DO, high	mg/L	19.6	4		
Sacramento River at Freeport	02/05/04	environ	none	Selenastrum	DO, low	mg/L	7.2	0		
Sacramento River at Freeport	02/05/04	environ	none	Selenastrum	cell density	cells/ml	1447250	4		
Sacramento River at Freeport	02/05/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	38243	4		
Sacramento River at Freeport	02/05/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Freeport	02/05/04	environ	none	Selenastrum	pH, high	standard units	9.75	4		
Sacramento River at Freeport	02/05/04	environ	none	Selenastrum	pH, low	standard units	7.92	0		
Lab Control	06/10/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	06/10/04	lab control	none	Pimephales	DO, high	mg/L	10.2	2		
Lab Control	06/10/04	lab control	none	Pimephales	DO, low	mg/L	6	6		
Lab Control	06/10/04	lab control	none	Pimephales	mortality, mean	%	10	7		
Lab Control	06/10/04	lab control	none	Pimephales	mortality, s.e.	%	6.67	7		
Lab Control	06/10/04	lab control	none	Pimephales	pH, high	standard units	8.52	1		
Lab Control	06/10/04	lab control	none	Pimephales	pH, low	standard units	7.8	2		
Lab Control	06/10/04	lab control	none	Pimephales	biomass, mean	mg	0.45	7		
Lab Control	06/10/04	lab control	none	Pimephales	biomass, s.e.	mg	0.03	7		
Lab Control	06/10/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	DO, high	mg/L	12.1	2		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	DO, low	mg/L	6.2	6		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	mortality, mean	%	15	7		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	mortality, s.e.	%	7.64	7		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	pH, high	standard units	8.24	3		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	pH, low	standard units	7.74	5		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	biomass, mean	mg	0.404	7		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	biomass, s.e.	mg	0.032	7		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	DO, high	mg/L	12.9	2		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	DO, low	mg/L	5.8	6		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	mortality, mean	%	65	7		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	mortality, s.e.	%	10.7	7		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	pH, high	standard units	8.2	3		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	pH, low	standard units	7.69	5		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	biomass, mean	mg	0.2	7		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	biomass, s.e.	mg	0.076	7		
Sacramento River at Bend Bridge	06/09/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	DO, high	mg/L	13.3	2		
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	DO, low	mg/L	6.2	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	mortality, mean	%	85	7		
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	mortality, s.e.	%	10.7	7		
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	pH, high	standard units	8.14	3		
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	pH, low	standard units	7.67	5		
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	biomass, mean	mg	0.068	7		
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	biomass, s.e.	mg	0.068	7		
Sacramento River near Hamilton City	06/09/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	DO, high	mg/L	12.7	2		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	DO, low	mg/L	5.6	7		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	mortality, mean	%	30	7		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	mortality, s.e.	%	8.16	7		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	pH, high	standard units	8.09	1		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	pH, low	standard units	7.64	5		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	biomass, mean	mg	0.348	7		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	biomass, s.e.	mg	0.014	7		
Sacramento River at Colusa	06/09/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	06/11/04	lab control	none	Pimephales	mortality, significance	yes/no		7		E
Lab Control	06/11/04	lab control	none	Pimephales	DO, high	mg/L	9.4	1		
Lab Control	06/11/04	lab control	none	Pimephales	DO, low	mg/L	5.2	7		
Lab Control	06/11/04	lab control	none	Pimephales	mortality, mean	%	40	7		E
Lab Control	06/11/04	lab control	none	Pimephales	mortality, s.e.	%	14.5	7		E
Lab Control	06/11/04	lab control	none	Pimephales	pH, high	standard units	8.72	6		
Lab Control	06/11/04	lab control	none	Pimephales	pH, low	standard units	7.72	3		
Lab Control	06/11/04	lab control	none	Pimephales	biomass, mean	mg	0.354	7		E
Lab Control	06/11/04	lab control	none	Pimephales	biomass, s.e.	mg	0.102	7		E
Lab Control	06/11/04	lab control	none	Pimephales	biomass, significance	yes/no		7		E
Colusa Basin Drain	06/10/04	environ	none	Pimephales	mortality, significance	yes/no				
Colusa Basin Drain	06/10/04	environ	none	Pimephales	DO, high	mg/L	10.6	6		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	DO, low	mg/L	5.3	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	mortality, mean	%	5	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	mortality, s.e.	%	5	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	pH, high	standard units	8.43	1		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	pH, low	standard units	7.6	3		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.777	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.053	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento Slough	06/10/04	environ	none	Pimephales	DO, high	mg/L	10.5	6		
Sacramento Slough	06/10/04	environ	none	Pimephales	DO, low	mg/L	4.7	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, mean	%	5	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, s.e.	%	5	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	pH, high	standard units	8.4	1		
Sacramento Slough	06/10/04	environ	none	Pimephales	pH, low	standard units	7.66	3		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.672	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.057	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	DO, high	mg/L	11	6		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	DO, low	mg/L	4.6	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	mortality, mean	%	15	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	mortality, s.e.	%	10.7	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	pH, high	standard units	8.56	1		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	pH, low	standard units	8.04	0		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.615	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.087	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	DO, high	mg/L	11.3	6		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	DO, low	mg/L	6.2	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, mean	%	10	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, s.e.	%	6.67	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	pH, high	standard units	8.48	6		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	pH, low	standard units	7.98	0		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.673	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.062	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	mortality, significance	yes/no		7		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	DO, high	mg/L	11	6		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	DO, low	mg/L	5.9	7		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	mortality, mean	%	5	7		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	mortality, s.e.	%	5	7		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	pH, high	standard units	8.28	6		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	pH, low	standard units	7.89	5		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	biomass, mean	mg	0.656	7		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	biomass, s.e.	mg	0.044	7		
Feather River at Nicolaus	06/10/04	field duplicate	none	Pimephales	biomass, significance	yes/no		7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	DO, high	mg/L	11.4	6		
American River at Discovery Park	06/10/04	environ	none	Pimephales	DO, low	mg/L	4.9	6		
American River at Discovery Park	06/10/04	environ	none	Pimephales	mortality, mean	%	10	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	mortality, s.e.	%	6.67	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	pH, high	standard units	8.35	6		
American River at Discovery Park	06/10/04	environ	none	Pimephales	pH, low	standard units	7.89	0		
American River at Discovery Park	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.523	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.027	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	06/12/04	lab control	none	Pimephales	mortality, significance	yes/no		7		E

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	06/12/04	lab control	none	Pimephales	DO, high	mg/L	10.7	0		
Lab Control	06/12/04	lab control	none	Pimephales	DO, low	mg/L	5.8	3		
Lab Control	06/12/04	lab control	none	Pimephales	mortality, mean	%	35	7		E
Lab Control	06/12/04	lab control	none	Pimephales	mortality, s.e.	%	13	7		E
Lab Control	06/12/04	lab control	none	Pimephales	pH, high	standard units	8.76	4		
Lab Control	06/12/04	lab control	none	Pimephales	pH, low	standard units	7.86	1		
Lab Control	06/12/04	lab control	none	Pimephales	biomass, mean	mg	0.425	7		E
Lab Control	06/12/04	lab control	none	Pimephales	biomass, s.e.	mg	0.124	7		E
Lab Control	06/12/04	lab control	none	Pimephales	biomass, significance	yes/no		7		E
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	DO, high	mg/L	10.3	0		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	DO, low	mg/L	5.1	3		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	mortality, mean	%	10	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	mortality, s.e.	%	6.67	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	pH, high	standard units	8.26	4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	pH, low	standard units	7.6	3		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	biomass, mean	mg	0.76	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	biomass, s.e.	mg	0.065	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	DO, high	mg/L	10.6	5		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	DO, low	mg/L	4.7	3		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, mean	%	10	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, s.e.	%	10	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	pH, high	standard units	8.47	4		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	pH, low	standard units	7.81	3		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, mean	mg	0.718	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, s.e.	mg	0.077	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	06/18/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	06/18/04	lab control	none	Pimephales	DO, high	mg/L	8.6	3		
Lab Control	06/18/04	lab control	none	Pimephales	DO, low	mg/L	5.5	6		
Lab Control	06/18/04	lab control	none	Pimephales	mortality, mean	%	10	7		
Lab Control	06/18/04	lab control	none	Pimephales	mortality, s.e.	%	0.1	7		
Lab Control	06/18/04	lab control	none	Pimephales	pH, high	standard units	8.46	7		
Lab Control	06/18/04	lab control	none	Pimephales	pH, low	standard units	7.46	4		
Lab Control	06/18/04	lab control	none	Pimephales	biomass, mean	mg	0.502	7		
Lab Control	06/18/04	lab control	none	Pimephales	biomass, s.e.	mg	0.052	7		
Lab Control	06/18/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	DO, high	mg/L	10.9	3		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	DO, low	mg/L	5.1	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	mortality, mean	%	5	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	mortality, s.e.	%	0.05	7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Colusa Basin Drain	06/10/04	environ	none	Pimephales	pH, high	standard units	8.29	2		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	pH, low	standard units	7.72	4		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.538	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.017	7		
Colusa Basin Drain	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		M
Sacramento Slough	06/10/04	environ	none	Pimephales	DO, high	mg/L	10.8	3		
Sacramento Slough	06/10/04	environ	none	Pimephales	DO, low	mg/L	5.8	4		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, mean	%	50	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, s.e.	%	12.9	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	pH, high	standard units	8.3	2		
Sacramento Slough	06/10/04	environ	none	Pimephales	pH, low	standard units	7.78	4		
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.256	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.079	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Yuba River at Marysville	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	DO, high	mg/L	11.2	3		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	DO, low	mg/L	4.8	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	mortality, mean	%	0	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	mortality, s.e.	%	0	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	pH, high	standard units	8.69	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	pH, low	standard units	7.68	4		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.51	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.02	7		
Yuba River at Marysville	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		M
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	DO, high	mg/L	11.3	3		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	DO, low	mg/L	4.3	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, mean	%	90	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, s.e.	%	6.67	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	pH, high	standard units	8.57	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	pH, low	standard units	7.68	4		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.058	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.036	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
American River at Discovery Park	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	DO, high	mg/L	11.2	3		
American River at Discovery Park	06/10/04	environ	none	Pimephales	DO, low	mg/L	4.5	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	mortality, mean	%	5	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	mortality, s.e.	%	5	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	pH, high	standard units	8.73	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	pH, low	standard units	7.73	4		
American River at Discovery Park	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.484	7		
American River at Discovery Park	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.029	7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
American River at Discovery Park	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	DO, high	mg/L	10.6	2		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	DO, low	mg/L	5.5	6		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	mortality, mean	%	10	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	mortality, s.e.	%	6.67	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	pH, high	standard units	8.15	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	pH, low	standard units	7.68	4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	biomass, mean	mg	0.47	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	biomass, s.e.	mg	0.036	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, significance	yes/no		7		M
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	DO, high	mg/L	11	3		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	DO, low	mg/L	5.6	4		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, mean	%	65	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, s.e.	%	13	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	pH, high	standard units	8.35	2		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	pH, low	standard units	7.76	4		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, mean	mg	0.176	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, s.e.	mg	0.086	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Lab Control	06/29/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	06/29/04	lab control	none	Pimephales	DO, high	mg/L	10.5	4		
Lab Control	06/29/04	lab control	none	Pimephales	DO, low	mg/L	5.8	2		
Lab Control	06/29/04	lab control	none	Pimephales	mortality, mean	%	80	7		
Lab Control	06/29/04	lab control	none	Pimephales	mortality, s.e.	%	13.3	7		
Lab Control	06/29/04	lab control	none	Pimephales	pH, high	standard units	8.57	2		
Lab Control	06/29/04	lab control	none	Pimephales	pH, low	standard units	7.77	7		
Lab Control	06/29/04	lab control	none	Pimephales	biomass, mean	mg	0.49	7		
Lab Control	06/29/04	lab control	none	Pimephales	biomass, s.e.	mg	0.075	7		
Lab Control	06/29/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		M
Sacramento Slough	06/10/04	environ	none	Pimephales	DO, high	mg/L	12.9	4		
Sacramento Slough	06/10/04	environ	none	Pimephales	DO, low	mg/L	4.9	5		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, mean	%	100	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	mortality, s.e.	%	0	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	pH, high	standard units	8.23	1		
Sacramento Slough	06/10/04	environ	none	Pimephales	pH, low	standard units	7.76	2		
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, mean	mg	0	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0	7		
Sacramento Slough	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, significance	yes/no		7		M
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	DO, high	mg/L	12.7	4		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	DO, low	mg/L	4.9	5		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, mean	%	90	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	mortality, s.e.	%	6.67	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	pH, high	standard units	8.57	5		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	pH, low	standard units	7.62	5		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, mean	mg	0.044	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, s.e.	mg	0.027	7		
Feather River at Nicolaus	06/10/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, significance	yes/no		7		M
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	DO, high	mg/L	13.4	4		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	DO, low	mg/L	5.7	5		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, mean	%	100	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	mortality, s.e.	%	0	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	pH, high	standard units	8.63	5		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	pH, low	standard units	7.74	5		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, mean	mg	0	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, s.e.	mg	0	7		
Sacramento River at Freeport	06/11/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Lab Control	06/10/04	lab control	none	Ceriodaphnia	DO, high	mg/L	10.2	2		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	DO, low	mg/L	7.7	6		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.33	3		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.69	4		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	26.8	6		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.975	6		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	06/10/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.4	2		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.7	1		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	mortality, mean	%	30	6		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	mortality, s.e.	%	15	6		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	pH, high	standard units	8.45	3		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	pH, low	standard units	7.85	1		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	7.2	6		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.29	6		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	DO, high	mg/L	14	2		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.6	1		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	mortality, mean	%	100	6		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	pH, high	standard units	8.26	2		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	pH, low	standard units	7.86	1		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	0	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0	6		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		I
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	yes	6		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	DO, high	mg/L	10.6	5		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.3	5		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	mortality, mean	%	22.2	6		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	mortality, s.e.	%	14.7	6		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	pH, high	standard units	8.32	3		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	pH, low	standard units	7.86	1		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	10	6		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.3	6		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River near Hamilton City	06/09/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	DO, high	mg/L	13.6	2		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.4	5		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	mortality, mean	%	10	6		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0.1	6		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	pH, high	standard units	8.26	3		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	pH, low	standard units	7.85	1		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	14	6		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.35	6		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River at Colusa	06/09/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	DO, high	mg/L	10.2	1		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	DO, low	mg/L	7.6	5		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.45	1		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.69	3		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	26.1	6		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	3.3	6		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	06/11/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	DO, high	mg/L	9.9	1		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.6	0		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	mortality, mean	%	30	6		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	mortality, s.e.	%	15.3	6		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	pH, high	standard units	8.61	1		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	pH, low	standard units	7.8	3		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	1.7	6		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.12	6		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Colusa Basin Drain	06/10/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	DO, high	mg/L	9.5	3		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units		Result	Test Day	Data Qual Code	Remark Code
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	DO, low	mg/L		7.2	5		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	mortality, mean	%		70	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	mortality, s.e.	%		15.3	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	pH, high	standard units		8.59	5		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	pH, low	standard units		7.84	3		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult		0.3	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		0.213	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no		6		I
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	yes		6		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	DO, high	mg/L		10.2	1		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	DO, low	mg/L		7.3	5		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	mortality, mean	%		30	6		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	mortality, s.e.	%		15.3	6		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	pH, high	standard units		8.76	6		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	pH, low	standard units		7.99	0		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult		4.9	6		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		1.34	6		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes		6		
Yuba River at Marysville	06/10/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no		6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	DO, high	mg/L		10	1		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	DO, low	mg/L		7.1	5		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	mortality, mean	%		90	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	mortality, s.e.	%		10	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	pH, high	standard units		8.5	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	pH, low	standard units		7.89	0		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult		1.6	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		1.08	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no		6		I
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	yes		6		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	DO, high	mg/L		10.3	1		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	DO, low	mg/L		7.4	5		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	mortality, mean	%		50	6		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	mortality, s.e.	%		17	6		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	pH, high	standard units		8.47	5		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	pH, low	standard units		7.85	0		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	reproduction, mean	neonates/adult		3.9	6		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		1.78	6		
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	reproduction, significance	yes/no	no		6		I
Feather River at Nicolaus	06/10/04	field duplicate	none	Ceriodaphnia	mortality, significance	yes/no	yes		6		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	DO, high	mg/L		10.9	1		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	DO, low	mg/L		7.5	6		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	mortality, mean	%		40	6		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	mortality, s.e.	%		16.3	6		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	pH, high	standard units		8.4	2		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	pH, low	standard units	7.85	0		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	3.2	6		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.31	6		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
American River at Discovery Park	06/10/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	DO, high	mg/L	10.2	0		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	DO, low	mg/L	7.6	5		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	7		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	7		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.45	6		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.69	2		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	26.1	7		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.61	7		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	7		
Lab Control	06/12/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	DO, high	mg/L	10.3	5		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.4	4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	mortality, mean	%	66.7	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	mortality, s.e.	%	16.7	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	pH, high	standard units	8.37	5		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	pH, low	standard units	7.49	2		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	13.1	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.58	7		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	7		I
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	yes	7		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	DO, high	mg/L	10.8	5		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.6	5		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	mortality, mean	%	60	7		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	mortality, s.e.	%	16.3	7		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	pH, high	standard units	8.42	4		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	pH, low	standard units	7.71	2		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	5.6	7		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.14	7		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	7		I
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	yes	7		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	DO, high	mg/L	10.2	0		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	DO, low	mg/L	5.9	4		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	pH, high	standard units	8.45	6		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	pH, low	standard units	7.69	2		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	reproduction, mean	neonates/adult	22.9	6		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.849	6		
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	reproduction, significance	yes/no	no	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units		Result	Test Day	Data Qual Code	Remark Code
Lab Control	06/12/04	lab control	retest	Ceriodaphnia	mortality, significance	yes/no	no		6		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	DO, high	mg/L		14	0		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	DO, low	mg/L		6	4		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	mortality, mean	%		60	6		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	mortality, s.e.	%		16.3	6		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	pH, high	standard units		8.34	6		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	pH, low	standard units		7.9	0		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	reproduction, mean	neonates/adult		2.2	6		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	reproduction, s.e.	neonates/adult		0.879	6		
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	reproduction, significance	yes/no	no		6		I
Sacramento River at Bend Bridge	06/09/04	environ	retest	Ceriodaphnia	mortality, significance	yes/no	yes		6		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	DO, high	mg/L		9.1	1		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	DO, low	mg/L		7.7	1		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	mortality, mean	%		0	5		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	mortality, s.e.	%		0	5		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	pH, high	standard units		8.49	1		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	pH, low	standard units		7.49	5		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult		18.1	5		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		2.52	5		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no		5		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no		5		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	DO, high	mg/L		10.9	0		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	DO, low	mg/L		7.1	1		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	mortality, mean	%		0	5		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	mortality, s.e.	%		0	5		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	pH, high	standard units		8.35	5		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	pH, low	standard units		8.01	4		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	reproduction, mean	neonates/adult		0.2	5		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	reproduction, s.e.	neonates/adult		0.2	5		
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	reproduction, significance	yes/no	no		5		I
Sacramento River at Bend Bridge	06/09/04	environ	retest2	Ceriodaphnia	mortality, significance	yes/no	yes		5		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	DO, high	mg/L		10.4	4		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	DO, low	mg/L		7.3	1		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	mortality, mean	%		0	5		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	mortality, s.e.	%		0	5		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	pH, high	standard units		8.53	3		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	pH, low	standard units		7.93	1		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult		6.1	5		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		0.85	5		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes		5		
Sacramento Slough	06/16/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no		5		
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	DO, high	mg/L		10.3	4		
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	DO, low	mg/L		7.4	1		
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	mortality, mean	%		70	5		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	mortality, s.e.	%	15.3	5		
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	pH, high	standard units	8.53	2		
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	pH, low	standard units	7.74	0		
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	1.9	5		
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.72	5		
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	5		I
Feather River at Nicolaus	06/16/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	yes	5		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	DO, high	mg/L	9.2	2		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	DO, low	mg/L	7.9	6		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.51	2		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.75	5		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	16	6		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.41	6		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	06/17/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	DO, high	mg/L	11.5	4		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	DO, low	mg/L	7.8	2		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	pH, high	standard units	8.43	2		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	pH, low	standard units	7.97	3		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	reproduction, mean	neonates/adult	21.3	6		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.44	6		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	06/17/04	lab control	centrifuged	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	DO, high	mg/L	11.5	4		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	DO, low	mg/L	7.7	6		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	mortality, mean	%	20	6		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	mortality, s.e.	%	20	6		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	pH, high	standard units	8.42	2		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	pH, low	standard units	7.92	6		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	reproduction, mean	neonates/adult	9.4	6		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	reproduction, s.e.	neonates/adult	3.5	6		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	06/17/04	lab control	centrifuged+C8	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	DO, high	mg/L	9.6	5		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	DO, low	mg/L	7.7	1		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	mortality, mean	%	20	6		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	mortality, s.e.	%	20	6		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	pH, high	standard units	8.44	1		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	pH, low	standard units	7.98	4		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	reproduction, mean	neonates/adult	9.4	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.77	6		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	06/17/04	lab control	PBO 100 ppb	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	DO, high	mg/L	11.1	1		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	DO, low	mg/L	7.8	3		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	mortality, mean	%	100	6		O
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	pH, high	standard units	8.31	3		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	pH, low	standard units	7.71	3		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	0.2	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.2	6		
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		I
Sacramento Slough	06/10/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	yes	6		
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	DO, high	mg/L	11.6	1		
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	DO, low	mg/L	8	1		
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	mortality, mean	%	100	6		S
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	pH, high	standard units	8.25	2		
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	pH, low	standard units	7.79	3		
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	reproduction, mean	neonates/adult	0	6		
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	reproduction, s.e.	neonates/adult	0	6		
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	reproduction, significance	yes/no	no	6		I
Sacramento Slough	06/10/04	environ	centrifuged	Ceriodaphnia	mortality, significance	yes/no	yes	6		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	DO, high	mg/L	11	1		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	DO, low	mg/L	5.9	3		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	mortality, mean	%	20	6		U
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	mortality, s.e.	%	20	6		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	pH, high	standard units	8.34	1		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	pH, low	standard units	7.8	5		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, mean	neonates/adult	1.8	6		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.49	6		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento Slough	06/10/04	environ	centrifuged+C8	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	DO, high	mg/L	11.1	2		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	DO, low	mg/L	7.7	3		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, mean	%	40	6		N
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, s.e.	%	24.4	6		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	pH, high	standard units	8.31	4		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	pH, low	standard units	7.78	0		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, mean	neonates/adult	6.6	6		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, s.e.	neonates/adult	3.08	6		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento Slough	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, significance	yes/no	yes	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	DO, high	mg/L	11.4	1		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	DO, low	mg/L	8.2	1		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	mortality, mean	%	100	6		P
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	pH, high	standard units	8.35	1		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	pH, low	standard units	7.94	3		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	0	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0	6		
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		I
Feather River at Nicolaus	06/10/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	yes	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	DO, high	mg/L	11.8	2		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	DO, low	mg/L	7.8	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	mortality, mean	%	20	6		D
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	mortality, s.e.	%	20	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	pH, high	standard units	8.21	3		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	pH, low	standard units	8.62	2		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	reproduction, mean	neonates/adult	10.2	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	reproduction, s.e.	neonates/adult	4.2	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged	Ceriodaphnia	mortality, significance	yes/no	no	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	DO, high	mg/L	11.7	2		
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	DO, low	mg/L	7.6	3		
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	mortality, mean	%	80	6		K
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	mortality, s.e.	%	20	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	pH, high	standard units	8.61	2		
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	pH, low	standard units	8.19	2		
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, mean	neonates/adult	2.6	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.94	6		
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, significance	yes/no	no	6		G
Feather River at Nicolaus	06/10/04	environ	centrifuged+C8	Ceriodaphnia	mortality, significance	yes/no	no	6		H
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	DO, high	mg/L	10.8	2		
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	DO, low	mg/L	7.6	3		
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, mean	%	80	6		Q
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, s.e.	%	20	6		
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	pH, high	standard units	8.54	2		
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	pH, low	standard units	8.2	3		
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, mean	neonates/adult	13.2	6		
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.02	6		
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, significance	yes/no	no	6		H
Feather River at Nicolaus	06/10/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	09/28/04	lab control	none	Ceriodaphnia	DO, high	mg/L	8.8	0		
Lab Control	09/28/04	lab control	none	Ceriodaphnia	DO, low	mg/L	4.1	3		
Lab Control	09/28/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	4		
Lab Control	09/28/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	4		
Lab Control	09/28/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.43	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	09/28/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.8	2		
Lab Control	09/28/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	0	4		A
Lab Control	09/28/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0	4		A
Lab Control	09/28/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	4		A
Lab Control	09/28/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	4		
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	DO, high	mg/L	9.1	0		
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	DO, low	mg/L	4.2	3		
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	mortality, mean	%	0	4		
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	mortality, s.e.	%	0	4		
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	pH, high	standard units	8.44	4		
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	pH, low	standard units	7.86	2		
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	reproduction, mean	neonates/adult	0	4		A
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	reproduction, s.e.	neonates/adult	0	4		A
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	reproduction, significance	yes/no	no	4		A
Lab Control	09/28/04	lab control	4x (MeOH Blar	Ceriodaphnia	mortality, significance	yes/no	no	4		
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	DO, high	mg/L	9.3	0		
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	DO, low	mg/L	4.1	3		
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	mortality, mean	%	0	4		
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	mortality, s.e.	%	0	4		
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	pH, high	standard units	8.38	4		
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	pH, low	standard units	7.82	2		
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	reproduction, mean	neonates/adult	0	4		A
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	reproduction, s.e.	neonates/adult	0	4		A
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	reproduction, significance	yes/no	no	4		A
Lab Control	09/28/04	lab control	4x (Column Bl	Ceriodaphnia	mortality, significance	yes/no	no	4		
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	DO, high	mg/L	9.6	0		
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	DO, low	mg/L	4.1	3		
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	mortality, mean	%	0	4		R
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	mortality, s.e.	%	0	4		
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	pH, high	standard units	8.36	4		
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	pH, low	standard units	7.87	2		
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	reproduction, mean	neonates/adult	0	4		A
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	reproduction, s.e.	neonates/adult	0	4		A
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	reproduction, significance	yes/no	no	4		A
Sacramento Slough	06/10/04	environ	2x	Ceriodaphnia	mortality, significance	yes/no	no	4		
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	DO, high	mg/L	9.5	0		
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	DO, low	mg/L	5	3		
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	mortality, mean	%	75	4		T
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	mortality, s.e.	%	25	4		
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	pH, high	standard units	8.35	4		
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	pH, low	standard units	7.84	2		
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	reproduction, mean	neonates/adult	0	4		A
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	reproduction, s.e.	neonates/adult	0	4		A
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	reproduction, significance	yes/no	no	4		A

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units		Result	Test Day	Data Qual Code	Remark Code
Sacramento Slough	06/10/04	environ	4x	Ceriodaphnia	mortality, significance	yes/no	no		4		F
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	DO, high	mg/L		9.5	0		
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	DO, low	mg/L		5.1	3		
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	mortality, mean	%		25	4		R
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	mortality, s.e.	%		25	4		
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	pH, high	standard units		8.33	4		
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	pH, low	standard units		7.88	2		
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	reproduction, mean	neonates/adult		0	4		A
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	reproduction, s.e.	neonates/adult		0	4		A
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	reproduction, significance	yes/no	no		4		A
Feather River at Nicolaus	06/10/04	environ	2x	Ceriodaphnia	mortality, significance	yes/no	no		4		
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	DO, high	mg/L		9.7	0		
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	DO, low	mg/L		4.1	3		
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	mortality, mean	%		0	4		T
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	mortality, s.e.	%		0	4		
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	pH, high	standard units		8.31	3		
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	pH, low	standard units		7.84	2		
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	reproduction, mean	neonates/adult		0	4		A
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	reproduction, s.e.	neonates/adult		0	4		A
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	reproduction, significance	yes/no	no		4		A
Feather River at Nicolaus	06/10/04	environ	4x	Ceriodaphnia	mortality, significance	yes/no	no		4		
Lab Control	06/24/04	lab control	none	Ceriodaphnia	DO, high	mg/L		14	3		
Lab Control	06/24/04	lab control	none	Ceriodaphnia	DO, low	mg/L		7.1	3		
Lab Control	06/24/04	lab control	none	Ceriodaphnia	mortality, mean	%		100	6		E
Lab Control	06/24/04	lab control	none	Ceriodaphnia	mortality, s.e.	%		0	6		E
Lab Control	06/24/04	lab control	none	Ceriodaphnia	pH, high	standard units		8.6	3		
Lab Control	06/24/04	lab control	none	Ceriodaphnia	pH, low	standard units		8.08	2		
Lab Control	06/24/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult		0	6		E
Lab Control	06/24/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult		0	6		E
Lab Control	06/24/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no		6		E
Lab Control	06/24/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no		6		E
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	DO, high	mg/L		14	3		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	DO, low	mg/L		6.9	3		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	mortality, mean	%		0	6		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	mortality, s.e.	%		0	6		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	pH, high	standard units		8.42	3		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	pH, low	standard units		8	2		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	reproduction, mean	neonates/adult		16	6		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	reproduction, s.e.	neonates/adult		0.548	6		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	reproduction, significance	yes/no	no		6		
Lab Control	06/24/04	lab control	centrifuged	Ceriodaphnia	mortality, significance	yes/no	no		6		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	DO, high	mg/L		14.8	3		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	DO, low	mg/L		7.8	3		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	mortality, mean	%		0	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	pH, high	standard units	8.36	3		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	pH, low	standard units	8.03	6		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	reproduction, mean	neonates/adult	8.2	6		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.15	6		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	06/24/04	lab control	centrifuged+C8	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	DO, high	mg/L	13.4	3		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	DO, low	mg/L	7.4	2		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	pH, high	standard units	8.27	2		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	pH, low	standard units	8.03	6		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	reproduction, mean	neonates/adult	4.6	6		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.927	6		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	06/24/04	lab control	PBO 100 ppb	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	DO, high	mg/L	15	3		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.8	1		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		B
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		B
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	pH, high	standard units	8.34	3		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	pH, low	standard units	7.87	2		
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	14.8	6		B
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.8	6		B
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		B
Sacramento River at Bend Bridge	06/09/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		B
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	DO, high	mg/L	14.9	3		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	DO, low	mg/L	6.7	1		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	pH, high	standard units	8.32	3		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	pH, low	standard units	7.87	2		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	reproduction, mean	neonates/adult	12.6	6		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	reproduction, s.e.	neonates/adult	3.84	6		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Bend Bridge	06/09/04	environ	centrifuged	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	DO, high	mg/L	14.5	3		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	DO, low	mg/L	6.6	1		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	pH, high	standard units	8.28	1		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	pH, low	standard units	7.88	2		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	reproduction, mean	neonates/adult	17.8	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	reproduction, s.e.	neonates/adult	3.43	6		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Bend Bridge	06/09/04	environ	C8	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	DO, high	mg/L	13.6	3		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	DO, low	mg/L	6.4	2		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	pH, high	standard units	8.26	1		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	pH, low	standard units	7.85	2		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, mean	neonates/adult	15.6	6		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.52	6		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Bend Bridge	06/09/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	DO, high	mg/L	13.3	3		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.9	1		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	pH, high	standard units	8.21	3		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	pH, low	standard units	7.37	1		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	14.6	6		B
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.6	6		B
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Freeport	06/11/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	DO, high	mg/L	13.8	3		B
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	DO, low	mg/L	6.6	1		B
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	mortality, mean	%	0	6		B
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	mortality, s.e.	%	0	6		B
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	pH, high	standard units	8.2	3		
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	pH, low	standard units	7.83	2		
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	reproduction, mean	neonates/adult	8.4	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.84	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	DO, high	mg/L	14	3		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	DO, low	mg/L	6.6	1		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	pH, high	standard units	8.18	3		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	pH, low	standard units	7.87	0		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, mean	neonates/adult	9.8	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.22	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Freeport	06/11/04	environ	centrifuged+C8	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	DO, high	mg/L	12.4	3		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	DO, low	mg/L	6.7	1		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	pH, high	standard units	8.15	3		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	pH, low	standard units	7.83	2		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, mean	neonates/adult	8.4	6		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.89	6		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Sacramento River at Freeport	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, significance	yes/no	no	6		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	DO, high	mg/L	13.6	3		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.6	1		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		B
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		B
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	pH, high	standard units	8.19	4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	pH, low	standard units	7.64	2		
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	18.8	6		B
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.39	6		B
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		B
Arcade Creek at Norwood Av	06/11/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		B
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	DO, high	mg/L	13.7	3		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	DO, low	mg/L	6.6	1		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, mean	%	0	6		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, s.e.	%	0	6		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	pH, high	standard units	8.14	5		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	pH, low	standard units	7.52	0		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, mean	neonates/adult	20.2	6		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.83	6		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Arcade Creek at Norwood Av	06/11/04	environ	PBO 100 ppb	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	06/10/04	lab control	none	Selenastrum	DO, high	mg/L	9.3	4		
Lab Control	06/10/04	lab control	none	Selenastrum	DO, low	mg/L	8.6	1		
Lab Control	06/10/04	lab control	none	Selenastrum	cell density	cells/ml	665000	4		
Lab Control	06/10/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	48800	4		
Lab Control	06/10/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	06/10/04	lab control	none	Selenastrum	pH, high	standard units	10.33	4		
Lab Control	06/10/04	lab control	none	Selenastrum	pH, low	standard units	8.01	1		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Selenastrum	DO, high	mg/L	10.5	4		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Selenastrum	DO, low	mg/L	9.7	1		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Selenastrum	cell density	cells/ml	1592000	4		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	49700	4		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Selenastrum	pH, high	standard units	10.03	4		
Sacramento River below Keswick Reservoir	06/09/04	environ	none	Selenastrum	pH, low	standard units	8.06	1		
Sacramento River at Bend Bridge	06/09/04	environ	none	Selenastrum	DO, high	mg/L	10.8	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Bend Bridge	06/09/04	environ	none	Selenastrum	DO, low	mg/L	10.4	1		
Sacramento River at Bend Bridge	06/09/04	environ	none	Selenastrum	cell density	cells/ml	1848000	4		
Sacramento River at Bend Bridge	06/09/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	88400	4		
Sacramento River at Bend Bridge	06/09/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Bend Bridge	06/09/04	environ	none	Selenastrum	pH, high	standard units	10.27	4		
Sacramento River at Bend Bridge	06/09/04	environ	none	Selenastrum	pH, low	standard units	7.99	1		
Sacramento River near Hamilton City	06/09/04	environ	none	Selenastrum	DO, high	mg/L	10.4	4		
Sacramento River near Hamilton City	06/09/04	environ	none	Selenastrum	DO, low	mg/L	12	1		
Sacramento River near Hamilton City	06/09/04	environ	none	Selenastrum	cell density	cells/ml	1890000	4		
Sacramento River near Hamilton City	06/09/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	38200	4		
Sacramento River near Hamilton City	06/09/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River near Hamilton City	06/09/04	environ	none	Selenastrum	pH, high	standard units	8	4		
Sacramento River near Hamilton City	06/09/04	environ	none	Selenastrum	pH, low	standard units	10.35	1		
Sacramento River at Colusa	06/09/04	environ	none	Selenastrum	DO, high	mg/L	11.6	4		
Sacramento River at Colusa	06/09/04	environ	none	Selenastrum	DO, low	mg/L	10.2	1		
Sacramento River at Colusa	06/09/04	environ	none	Selenastrum	cell density	cells/ml	1783000	4		
Sacramento River at Colusa	06/09/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	27900	4		
Sacramento River at Colusa	06/09/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Colusa	06/09/04	environ	none	Selenastrum	pH, high	standard units	9.3	4		
Sacramento River at Colusa	06/09/04	environ	none	Selenastrum	pH, low	standard units	8.6	1		
Lab Control	06/11/04	lab control	none	Selenastrum	DO, high	mg/L	9.7	1		
Lab Control	06/11/04	lab control	none	Selenastrum	DO, low	mg/L	8.6	4		
Lab Control	06/11/04	lab control	none	Selenastrum	cell density	cells/ml	375000	4		
Lab Control	06/11/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	40100	4		
Lab Control	06/11/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	06/11/04	lab control	none	Selenastrum	pH, high	standard units	8.95	4		
Lab Control	06/11/04	lab control	none	Selenastrum	pH, low	standard units	8.16	1		
Colusa Basin Drain	06/10/04	environ	none	Selenastrum	DO, high	mg/L	11.2	4		
Colusa Basin Drain	06/10/04	environ	none	Selenastrum	DO, low	mg/L	10.3	1		
Colusa Basin Drain	06/10/04	environ	none	Selenastrum	cell density	cells/ml	1038000	4		
Colusa Basin Drain	06/10/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	42600	4		
Colusa Basin Drain	06/10/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Colusa Basin Drain	06/10/04	environ	none	Selenastrum	pH, high	standard units	9.25	4		
Colusa Basin Drain	06/10/04	environ	none	Selenastrum	pH, low	standard units	7.93	1		
Sacramento Slough	06/10/04	environ	none	Selenastrum	DO, high	mg/L	10.7	1		
Sacramento Slough	06/10/04	environ	none	Selenastrum	DO, low	mg/L	9.4	4		
Sacramento Slough	06/10/04	environ	none	Selenastrum	cell density	cells/ml	842000	4		
Sacramento Slough	06/10/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	13800	4		
Sacramento Slough	06/10/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento Slough	06/10/04	environ	none	Selenastrum	pH, high	standard units	9.05	4		
Sacramento Slough	06/10/04	environ	none	Selenastrum	pH, low	standard units	8.01	1		
Yuba River at Marysville	06/10/04	environ	none	Selenastrum	DO, high	mg/L	12.5	1		
Yuba River at Marysville	06/10/04	environ	none	Selenastrum	DO, low	mg/L	10.2	4		
Yuba River at Marysville	06/10/04	environ	none	Selenastrum	cell density	cells/ml	871000	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Yuba River at Marysville	06/10/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	47000	4		
Yuba River at Marysville	06/10/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Yuba River at Marysville	06/10/04	environ	none	Selenastrum	pH, high	standard units	9.49	4		
Yuba River at Marysville	06/10/04	environ	none	Selenastrum	pH, low	standard units	8.08	1		
Feather River at Nicolaus	06/10/04	environ	none	Selenastrum	DO, high	mg/L	11.6	1		
Feather River at Nicolaus	06/10/04	environ	none	Selenastrum	DO, low	mg/L	10	4		
Feather River at Nicolaus	06/10/04	environ	none	Selenastrum	cell density	cells/ml	858000	4		
Feather River at Nicolaus	06/10/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	39300	4		
Feather River at Nicolaus	06/10/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Feather River at Nicolaus	06/10/04	environ	none	Selenastrum	pH, high	standard units	9.47	4		
Feather River at Nicolaus	06/10/04	environ	none	Selenastrum	pH, low	standard units	7.95	1		
Feather River at Nicolaus	06/10/04	field duplicate	none	Selenastrum	DO, high	mg/L	12.1	1		
Feather River at Nicolaus	06/10/04	field duplicate	none	Selenastrum	DO, low	mg/L	10.3	4		
Feather River at Nicolaus	06/10/04	field duplicate	none	Selenastrum	cell density	cells/ml	845000	4		
Feather River at Nicolaus	06/10/04	field duplicate	none	Selenastrum	cell density, s.e.	cells/ml	25800	4		
Feather River at Nicolaus	06/10/04	field duplicate	none	Selenastrum	cell density, significance	yes/no		4		
Feather River at Nicolaus	06/10/04	field duplicate	none	Selenastrum	pH, high	standard units	9.4	4		
Feather River at Nicolaus	06/10/04	field duplicate	none	Selenastrum	pH, low	standard units	8.11	1		
American River at Discovery Park	06/10/04	environ	none	Selenastrum	DO, high	mg/L	11.2	1		
American River at Discovery Park	06/10/04	environ	none	Selenastrum	DO, low	mg/L	10	4		
American River at Discovery Park	06/10/04	environ	none	Selenastrum	cell density	cells/ml	879000	4		
American River at Discovery Park	06/10/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	62000	4		
American River at Discovery Park	06/10/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
American River at Discovery Park	06/10/04	environ	none	Selenastrum	pH, high	standard units	9.31	4		
American River at Discovery Park	06/10/04	environ	none	Selenastrum	pH, low	standard units	8.05	1		
Lab Control	06/12/04	lab control	none	Selenastrum	DO, high	mg/L	12.4	1		
Lab Control	06/12/04	lab control	none	Selenastrum	DO, low	mg/L	7	4		
Lab Control	06/12/04	lab control	none	Selenastrum	cell density	cells/ml	1108000	4		
Lab Control	06/12/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	180000	4		
Lab Control	06/12/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	06/12/04	lab control	none	Selenastrum	pH, high	standard units	9.84	4		
Lab Control	06/12/04	lab control	none	Selenastrum	pH, low	standard units	7.82	1		
Arcade Creek at Norwood Av	06/11/04	environ	none	Selenastrum	DO, high	mg/L	10.6	1		
Arcade Creek at Norwood Av	06/11/04	environ	none	Selenastrum	DO, low	mg/L	7.3	4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Selenastrum	cell density	cells/ml	2537000	4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	42800	4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Selenastrum	pH, high	standard units	9.97	4		
Arcade Creek at Norwood Av	06/11/04	environ	none	Selenastrum	pH, low	standard units	7.61	1		
Sacramento River at Freeport	06/11/04	environ	none	Selenastrum	DO, high	mg/L	10.9	1		
Sacramento River at Freeport	06/11/04	environ	none	Selenastrum	DO, low	mg/L	7.6	4		
Sacramento River at Freeport	06/11/04	environ	none	Selenastrum	cell density	cells/ml	1753000	4		
Sacramento River at Freeport	06/11/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	108000	4		
Sacramento River at Freeport	06/11/04	environ	none	Selenastrum	cell density, significance	yes/no		4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Freeport	06/11/04	environ	none	Selenastrum	pH, high	standard units	10.17	4		
Sacramento River at Freeport	06/11/04	environ	none	Selenastrum	pH, low	standard units	7.89	1		
Lab Control	06/18/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	06/18/04	lab control	none	Pimephales	DO, high	mg/L	8.6	3		
Lab Control	06/18/04	lab control	none	Pimephales	DO, low	mg/L	5.5	6		
Lab Control	06/18/04	lab control	none	Pimephales	mortality, mean	%	20	7		
Lab Control	06/18/04	lab control	none	Pimephales	mortality, s.e.	%	11.06	7		
Lab Control	06/18/04	lab control	none	Pimephales	pH, high	standard units	8.46	7		
Lab Control	06/18/04	lab control	none	Pimephales	pH, low	standard units	7.46	4		
Lab Control	06/18/04	lab control	none	Pimephales	biomass, mean	mg	0.386	7		
Lab Control	06/18/04	lab control	none	Pimephales	biomass, s.e.	mg	0.059	7		
Lab Control	06/18/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Lab Control	07/28/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	07/28/04	lab control	none	Pimephales	DO, high	mg/L	10.2	3		
Lab Control	07/28/04	lab control	none	Pimephales	DO, low	mg/L	4.8	7		
Lab Control	07/28/04	lab control	none	Pimephales	mortality, mean	%	15	7		
Lab Control	07/28/04	lab control	none	Pimephales	mortality, s.e.	%	7.63	7		
Lab Control	07/28/04	lab control	none	Pimephales	pH, high	standard units	8.5	6		
Lab Control	07/28/04	lab control	none	Pimephales	pH, low	standard units	7.64	7		
Lab Control	07/28/04	lab control	none	Pimephales	biomass, mean	mg	0.604	7		
Lab Control	07/28/04	lab control	none	Pimephales	biomass, s.e.	mg	0.084	7		
Lab Control	07/28/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	DO, high	mg/L	12.5	3		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	DO, low	mg/L	4.3	7		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	mortality, mean	%	75	7		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	mortality, s.e.	%	11.18	7		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	pH, high	standard units	8.46	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	pH, low	standard units	7.49	1		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	biomass, mean	mg	0.157	7		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	biomass, s.e.	mg	0.053	7		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	DO, high	mg/L	12	3		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	DO, low	mg/L	5	7		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	mortality, mean	%	75	7		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	mortality, s.e.	%	13.43	7		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	pH, high	standard units	8.33	1		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	pH, low	standard units	7.54	1		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	biomass, mean	mg	0.166	7		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	biomass, s.e.	mg	0.073	7		
Sacramento River at Bend Bridge	07/27/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	DO, high	mg/L	11.7	3		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	DO, low	mg/L	5.7	4		
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	mortality, mean	%	35	7		
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	mortality, s.e.	%	10.67	7		
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	pH, high	standard units	8.26	1		
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	pH, low	standard units	7.48	1		
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	biomass, mean	mg	0.38	7		
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	biomass, s.e.	mg	0.082	7		
Sacramento River at Colusa	07/27/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	DO, high	mg/L	11.9	3		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	DO, low	mg/L	5.3	6		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	mortality, mean	%	95	7		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	mortality, s.e.	%	15.81	7		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	pH, high	standard units	8.3	1		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	pH, low	standard units	7.54	1		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	biomass, mean	mg	0.022	7		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	biomass, s.e.	mg	0.022	7		
Sacramento River near Hamilton City	07/27/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Lab Control	07/30/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	07/30/04	lab control	none	Pimephales	DO, high	mg/L	10	3		
Lab Control	07/30/04	lab control	none	Pimephales	DO, low	mg/L	5	6		
Lab Control	07/30/04	lab control	none	Pimephales	mortality, mean	%	0	7		
Lab Control	07/30/04	lab control	none	Pimephales	mortality, s.e.	%	0	7		
Lab Control	07/30/04	lab control	none	Pimephales	pH, high	standard units	8.31	2		
Lab Control	07/30/04	lab control	none	Pimephales	pH, low	standard units	7.56	4		
Lab Control	07/30/04	lab control	none	Pimephales	biomass, mean	mg	0.475	7		
Lab Control	07/30/04	lab control	none	Pimephales	biomass, s.e.	mg	0.018	7		
Lab Control	07/30/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	DO, high	mg/L	11.4	2		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	DO, low	mg/L	5.2	5		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	mortality, mean	%	10	7		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	mortality, s.e.	%	6.67	7		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	pH, high	standard units	8.66	1		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	pH, low	standard units	7.32	6		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	biomass, mean	mg	0.387	7		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	biomass, s.e.	mg	0.026	7		
Colusa Basin Drain	07/28/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Sacramento Slough	07/28/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Sacramento Slough	07/28/04	environ	none	Pimephales	DO, high	mg/L	11.6	1		
Sacramento Slough	07/28/04	environ	none	Pimephales	DO, low	mg/L	5.2	6		
Sacramento Slough	07/28/04	environ	none	Pimephales	mortality, mean	%	30	7		
Sacramento Slough	07/28/04	environ	none	Pimephales	mortality, s.e.	%	8.17	7		
Sacramento Slough	07/28/04	environ	none	Pimephales	pH, high	standard units	8.31	1		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento Slough	07/28/04	environ	none	Pimephales	pH, low	standard units	7.47	6		
Sacramento Slough	07/28/04	environ	none	Pimephales	biomass, mean	mg	0.331	7		
Sacramento Slough	07/28/04	environ	none	Pimephales	biomass, s.e.	mg	0.035	7		
Sacramento Slough	07/28/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Yuba River at Marysville	07/28/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	DO, high	mg/L	12.6	1		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	DO, low	mg/L	5.3	5		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	mortality, mean	%	35	7		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	mortality, s.e.	%	12.47	7		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	pH, high	standard units	9.94	7		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	pH, low	standard units	7.74	4		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	biomass, mean	mg	0.192	7		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	biomass, s.e.	mg	0.057	7		
Yuba River at Marysville	07/28/04	environ	none	Pimephales	biomass, significance	yes/no		7		C
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	DO, high	mg/L	11.9	1		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	DO, low	mg/L	5.2	7		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	mortality, mean	%	15	7		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	mortality, s.e.	%	7.64	7		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	pH, high	standard units	8.32	1		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	pH, low	standard units	7.79	6		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	biomass, mean	mg	0.349	7		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	biomass, s.e.	mg	0.041	7		
Feather River at Nicolaus	07/28/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	mortality, significance	yes/no		7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	DO, high	mg/L	10.7	1		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	DO, low	mg/L	5	5		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	mortality, mean	%	0	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	mortality, s.e.	%	0	4		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	pH, high	standard units	8.25	1		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	pH, low	standard units	7.34	6		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	biomass, mean	mg	0.446	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	biomass, s.e.	mg	0.043	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Pimephales	biomass, significance	yes/no		7		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	mortality, significance	yes/no		7		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	DO, high	mg/L	10.7	1		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	DO, low	mg/L	5.1	5		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	mortality, mean	%	0	7		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	mortality, s.e.	%	0	4		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	pH, high	standard units	8.29	1		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	pH, low	standard units	7.3	6		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	biomass, mean	mg	0.3985	7		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	biomass, s.e.	mg	0.022	7		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Pimephales	biomass, significance	yes/no		7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	08/03/04	lab control	none	Pimephales	mortality, significance	yes/no		3		
Lab Control	08/03/04	lab control	none	Pimephales	DO, high	mg/L	10	6		
Lab Control	08/03/04	lab control	none	Pimephales	DO, low	mg/L	5.7	1		
Lab Control	08/03/04	lab control	none	Pimephales	mortality, mean	%	15	7		
Lab Control	08/03/04	lab control	none	Pimephales	mortality, s.e.	%	10.67	7		
Lab Control	08/03/04	lab control	none	Pimephales	pH, high	standard units	8.8	1		
Lab Control	08/03/04	lab control	none	Pimephales	pH, low	standard units	7.16	3		
Lab Control	08/03/04	lab control	none	Pimephales	biomass, mean	mg	0.49	7		
Lab Control	08/03/04	lab control	none	Pimephales	biomass, s.e.	mg	0.05	7		
Lab Control	08/03/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
American River at Discovery Park	07/29/04	environ	none	Pimephales	mortality, significance	yes/no		3	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	DO, high	mg/L	12.4	4	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	DO, low	mg/L	5.2	1	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	mortality, mean	%	20	6	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	mortality, s.e.	%	11.06	5	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	pH, high	standard units	8.86	5	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	pH, low	standard units	7.24	5	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	biomass, mean	mg	0.35	7	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	biomass, s.e.	mg	0.094	7	HT	
American River at Discovery Park	07/29/04	environ	none	Pimephales	biomass, significance	yes/no		7	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	mortality, significance	yes/no		3	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	DO, high	mg/L	13	6	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	DO, low	mg/L	5.2	1	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	mortality, mean	%	5	6	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	mortality, s.e.	%	5	3	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	pH, high	standard units	8.54	1	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	pH, low	standard units	7.19	3	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	biomass, mean	mg	0.489	7	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	biomass, s.e.	mg	0.028	7	HT	
Sacramento River at Freeport	07/29/04	environ	none	Pimephales	biomass, significance	yes/no		7	HT	
Lab Control	08/05/04	lab control	none	Pimephales	mortality, significance	yes/no		7		
Lab Control	08/05/04	lab control	none	Pimephales	DO, high	mg/L	11.5	5		
Lab Control	08/05/04	lab control	none	Pimephales	DO, low	mg/L	5	1		
Lab Control	08/05/04	lab control	none	Pimephales	mortality, mean	%	5	7		
Lab Control	08/05/04	lab control	none	Pimephales	mortality, s.e.	%	5	7		
Lab Control	08/05/04	lab control	none	Pimephales	pH, high	standard units	8.5	6		
Lab Control	08/05/04	lab control	none	Pimephales	pH, low	standard units	7.11	1		
Lab Control	08/05/04	lab control	none	Pimephales	biomass, mean	mg	0.389	7		
Lab Control	08/05/04	lab control	none	Pimephales	biomass, s.e.	mg	0.02	7		
Lab Control	08/05/04	lab control	none	Pimephales	biomass, significance	yes/no		7		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	mortality, significance	yes/no		7		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	DO, high	mg/L	12	4		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	DO, low	mg/L	5.3	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	mortality, mean	%	65	7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	mortality, s.e.	%	10.7	7		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	pH, high	standard units	8.25	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	pH, low	standard units	7.15	1		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	biomass, mean	mg	0.11	7		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	biomass, s.e.	mg	0.03	7		
Sacramento River below Keswick Reservoir	07/27/04	environ	retest	Pimephales	biomass, significance	yes/no		7		C
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	DO, high	mg/L	12	4		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	DO, low	mg/L	5	1		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	mortality, mean	%	40	7		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	mortality, s.e.	%	12.5	7		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	pH, high	standard units	8.08	6		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	pH, low	standard units	7.21	1		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	biomass, mean	mg	0.213	7		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	biomass, s.e.	mg	0.036	7		
Sacramento River at Bend Bridge	07/27/04	environ	retest	Pimephales	biomass, significance	yes/no		7		C
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	mortality, significance	yes/no		7		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	DO, high	mg/L	12	4		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	DO, low	mg/L	5	5		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	mortality, mean	%	0	7		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	mortality, s.e.	%	0	7		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	pH, high	standard units	8.02	4		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	pH, low	standard units	7.22	1		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	biomass, mean	mg	0.4105	7		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	biomass, s.e.	mg	0.018	7		
Sacramento River at Colusa	07/27/04	environ	retest	Pimephales	biomass, significance	yes/no		7		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	mortality, significance	yes/no		7		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	DO, high	mg/L	11.7	4		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	DO, low	mg/L	5.6	1		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	mortality, mean	%	20	7		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	mortality, s.e.	%	11.1	7		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	pH, high	standard units	7.99	4		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	pH, low	standard units	7.22	1		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	biomass, mean	mg	0.261	7		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	biomass, s.e.	mg	0.041	7		
Sacramento River near Hamilton City	07/27/04	environ	retest	Pimephales	biomass, significance	yes/no		7		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	DO, high	mg/L	9.6	3		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	DO, low	mg/L	7.1	6		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.66	1		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.58	6		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	17.9	6		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.795	6		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	07/28/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	07/28/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.4	3		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.8	4		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	mortality, mean	%	20	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	mortality, s.e.	%	13.33	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	pH, high	standard units	8.39	5		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	pH, low	standard units	7.75	5		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	10.2	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.56	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	DO, high	mg/L	11.8	3		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.5	4		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	mortality, mean	%	0	6		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	pH, high	standard units	8.29	5		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	pH, low	standard units	7.76	5		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	12.7	6		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.956	6		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River at Bend Bridge	07/27/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.5	3		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.8	4		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	mortality, mean	%	10	6		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	mortality, s.e.	%	10	6		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	pH, high	standard units	8.18	5		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	pH, low	standard units	7.81	6		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	11.1	6		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.17	6		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River at Colusa	07/27/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.3	3		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.6	4		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	mortality, mean	%	20	6		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	mortality, s.e.	%	13.3	6		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	pH, high	standard units	8.12	1		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	pH, low	standard units	7.81	5		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	11.9	6		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.69	6		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento River near Hamilton City	07/27/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	DO, high	mg/L	9.3	4		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	DO, low	mg/L	5.2	7		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Lab Control	07/29/04	lab control	none	Ceriodaphnia	mortality, mean	%	11	6		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	11	6		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.92	3		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.43	0		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	24.6	6		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	3.27	6		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	07/29/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	DO, high	mg/L	10.5	4		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.4	7		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	mortality, mean	%	20	7		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	mortality, s.e.	%	13.3	7		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	pH, high	standard units	8.79	5		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	pH, low	standard units	7.39	7		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	15.1	7		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.24	7		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	7		
Colusa Basin Drain	07/28/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	7		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	DO, high	mg/L	12.5	2		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.9	6		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	mortality, mean	%	30	6		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	mortality, s.e.	%	15.3	6		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	pH, high	standard units	8.71	4		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	pH, low	standard units	7.67	7		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	9	6		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.72	6		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	6		
Sacramento Slough	07/28/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	DO, high	mg/L	13.4	2		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.2	3		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	mortality, mean	%	0	7		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	7		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	pH, high	standard units	8.87	4		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	pH, low	standard units	8.03	7		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	8.9	7		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.03	7		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	7		
Yuba River at Marysville	07/28/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	DO, high	mg/L	10.8	2		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	DO, low	mg/L	5.6	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	mortality, mean	%	10	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	mortality, s.e.	%	10	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	pH, high	standard units	8.56	4		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	pH, low	standard units	7.39	3		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	16.2	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	2.52	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	7		
Arcade Creek at Norwood Av	07/28/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	7		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	DO, high	mg/L	9.3	0		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	DO, low	mg/L	6	4		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	mortality, mean	%	0	6		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	mortality, s.e.	%	0	6		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	pH, high	standard units	8.43	7		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	pH, low	standard units	7.14	4		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	reproduction, mean	neonates/adult	16.2	6		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.867	6		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Lab Control	08/02/04	lab control	none	Ceriodaphnia	mortality, significance	yes/no	no	6		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	DO, high	mg/L	11.7	5		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	DO, low	mg/L	5.4	4		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	mortality, mean	%	0	7		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	mortality, s.e.	%	0	7		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	pH, high	standard units	8.65	6		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	pH, low	standard units	7.2	4		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	reproduction, mean	neonates/adult	11.1	7		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	reproduction, s.e.	neonates/adult	0.924	7		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	reproduction, significance	yes/no	yes	7		
Feather River at Nicolaus	07/28/04	environ	retest	Ceriodaphnia	mortality, significance	yes/no	no	7		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	DO, high	mg/L	11.3	5		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	DO, low	mg/L	6.1	4		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	mortality, mean	%	0	6		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	mortality, s.e.	%	0	6		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	pH, high	standard units	8.11	6		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	pH, low	standard units	7.09	4		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	reproduction, mean	neonates/adult	21.8	6		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.09	6		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	reproduction, significance	yes/no	no	6		
Arcade Creek at Norwood Av	07/28/04	environ	retest	Ceriodaphnia	mortality, significance	yes/no	no	6		
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	DO, high	mg/L	12	7	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	DO, low	mg/L	6.1	4	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	mortality, mean	%	20	7	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	mortality, s.e.	%	13.3	7	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	pH, high	standard units	8.56	6	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	pH, low	standard units	7.33	4	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	8.3	7	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.87	7	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	yes	7	HT	
American River at Discovery Park	07/29/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	7	HT	

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	DO, high	mg/L	12	5	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	DO, low	mg/L	5.7	4	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	mortality, mean	%	0	7	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	mortality, s.e.	%	0	7	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	pH, high	standard units	8.32	6	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	pH, low	standard units	7.21	4	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	reproduction, mean	neonates/adult	13.9	7	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	reproduction, s.e.	neonates/adult	1.04	7	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	reproduction, significance	yes/no	no	7	HT	
Sacramento River at Freeport	07/29/04	environ	none	Ceriodaphnia	mortality, significance	yes/no	no	7	HT	
Lab Control	07/28/04	lab control	none	Selenastrum	DO, high	mg/L	7.7	4		
Lab Control	07/28/04	lab control	none	Selenastrum	DO, low	mg/L	7	1		
Lab Control	07/28/04	lab control	none	Selenastrum	cell density	cells/ml	816000	4		
Lab Control	07/28/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	16857	4		
Lab Control	07/28/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	07/28/04	lab control	none	Selenastrum	pH, high	standard units	8.93	4		
Lab Control	07/28/04	lab control	none	Selenastrum	pH, low	standard units	7.97	1		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Selenastrum	DO, high	mg/L	7.8	4		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Selenastrum	DO, low	mg/L	7.2	1		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Selenastrum	cell density	cells/ml	1040250	4		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	63694	4		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Selenastrum	pH, high	standard units	7.81	1		
Sacramento River below Keswick Reservoir	07/27/04	environ	none	Selenastrum	pH, low	standard units	10.14	4		
Sacramento River at Bend Bridge	07/27/04	environ	none	Selenastrum	DO, high	mg/L	8	1		
Sacramento River at Bend Bridge	07/27/04	environ	none	Selenastrum	DO, low	mg/L	7.9	4		
Sacramento River at Bend Bridge	07/27/04	environ	none	Selenastrum	cell density	cells/ml	1026750	4		
Sacramento River at Bend Bridge	07/27/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	32061	4		
Sacramento River at Bend Bridge	07/27/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Bend Bridge	07/27/04	environ	none	Selenastrum	pH, high	standard units	9.93	4		
Sacramento River at Bend Bridge	07/27/04	environ	none	Selenastrum	pH, low	standard units	7.83	1		
Sacramento River at Colusa	07/27/04	environ	none	Selenastrum	DO, high	mg/L	7.8	1		
Sacramento River at Colusa	07/27/04	environ	none	Selenastrum	DO, low	mg/L	7.3	4		
Sacramento River at Colusa	07/27/04	environ	none	Selenastrum	cell density	cells/ml	1140000	4		
Sacramento River at Colusa	07/27/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	41900	4		
Sacramento River at Colusa	07/27/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River at Colusa	07/27/04	environ	none	Selenastrum	pH, high	standard units	7.87	1		
Sacramento River at Colusa	07/27/04	environ	none	Selenastrum	pH, low	standard units	10.3	4		
Sacramento River near Hamilton City	07/27/04	environ	none	Selenastrum	DO, high	mg/L	7.9	1		
Sacramento River near Hamilton City	07/27/04	environ	none	Selenastrum	DO, low	mg/L	7.8	4		
Sacramento River near Hamilton City	07/27/04	environ	none	Selenastrum	cell density	cells/ml	1133000	4		
Sacramento River near Hamilton City	07/27/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	20087	4		
Sacramento River near Hamilton City	07/27/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento River near Hamilton City	07/27/04	environ	none	Selenastrum	pH, high	standard units	7.95	1		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Sacramento River near Hamilton City	07/27/04	environ	none	Selenastrum	pH, low	standard units	10.23	4		
Lab Control	07/29/04	lab control	none	Selenastrum	DO, high	mg/L	8.4	4		
Lab Control	07/29/04	lab control	none	Selenastrum	DO, low	mg/L	5.2	1		
Lab Control	07/29/04	lab control	none	Selenastrum	cell density	cells/ml	1125250	4		
Lab Control	07/29/04	lab control	none	Selenastrum	cell density, s.e.	cells/ml	70333	4		
Lab Control	07/29/04	lab control	none	Selenastrum	cell density, significance	yes/no		4		
Lab Control	07/29/04	lab control	none	Selenastrum	pH, high	standard units	9.65	1		
Lab Control	07/29/04	lab control	none	Selenastrum	pH, low	standard units	8.19	4		
Colusa Basin Drain	07/28/04	environ	none	Selenastrum	DO, high	mg/L	8.8	4		
Colusa Basin Drain	07/28/04	environ	none	Selenastrum	DO, low	mg/L	5.8	1		
Colusa Basin Drain	07/28/04	environ	none	Selenastrum	cell density	cells/ml	2161250	4		
Colusa Basin Drain	07/28/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	142233	4		
Colusa Basin Drain	07/28/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Colusa Basin Drain	07/28/04	environ	none	Selenastrum	pH, high	standard units	9.39	4		
Colusa Basin Drain	07/28/04	environ	none	Selenastrum	pH, low	standard units	7.91	1		
Sacramento Slough	07/28/04	environ	none	Selenastrum	DO, high	mg/L	9.6	4		
Sacramento Slough	07/28/04	environ	none	Selenastrum	DO, low	mg/L	5.7	1		
Sacramento Slough	07/28/04	environ	none	Selenastrum	cell density	cells/ml	1957750	4		
Sacramento Slough	07/28/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	123489	4		
Sacramento Slough	07/28/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Sacramento Slough	07/28/04	environ	none	Selenastrum	pH, high	standard units	9.49	4		
Sacramento Slough	07/28/04	environ	none	Selenastrum	pH, low	standard units	7.76	1		
Yuba River at Marysville	07/28/04	environ	none	Selenastrum	DO, high	mg/L	8.9	4		
Yuba River at Marysville	07/28/04	environ	none	Selenastrum	DO, low	mg/L	5.7	1		
Yuba River at Marysville	07/28/04	environ	none	Selenastrum	cell density	cells/ml	1005750	4		
Yuba River at Marysville	07/28/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	240125	4		
Yuba River at Marysville	07/28/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Yuba River at Marysville	07/28/04	environ	none	Selenastrum	pH, high	standard units	9.89	4		
Yuba River at Marysville	07/28/04	environ	none	Selenastrum	pH, low	standard units	8.08	1		
Feather River at Nicolaus	07/28/04	environ	none	Selenastrum	DO, high	mg/L	9.1	4		
Feather River at Nicolaus	07/28/04	environ	none	Selenastrum	DO, low	mg/L	5.6	1		
Feather River at Nicolaus	07/28/04	environ	none	Selenastrum	cell density	cells/ml	1408750	4		
Feather River at Nicolaus	07/28/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	63077	4		
Feather River at Nicolaus	07/28/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Feather River at Nicolaus	07/28/04	environ	none	Selenastrum	pH, high	standard units	10.01	4		
Feather River at Nicolaus	07/28/04	environ	none	Selenastrum	pH, low	standard units	8.03	1		
Arcade Creek at Norwood Av	07/28/04	environ	none	Selenastrum	DO, high	mg/L	9.5	4		
Arcade Creek at Norwood Av	07/28/04	environ	none	Selenastrum	DO, low	mg/L	5.3	1		
Arcade Creek at Norwood Av	07/28/04	environ	none	Selenastrum	cell density	cells/ml	2213000	4		
Arcade Creek at Norwood Av	07/28/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	73007	4		
Arcade Creek at Norwood Av	07/28/04	environ	none	Selenastrum	cell density, significance	yes/no		4		
Arcade Creek at Norwood Av	07/28/04	environ	none	Selenastrum	pH, high	standard units	9.82	4		
Arcade Creek at Norwood Av	07/28/04	environ	none	Selenastrum	pH, low	standard units	7.61	1		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Selenastrum	DO, high	mg/L	8.9	4		

Sample Location	Sample Date	Sample Type	Treatment	Test Organism	Result Type	Units	Result	Test Day	Data Qual Code	Remark Code
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Selenastrum	DO, low	mg/L	5.4	1		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Selenastrum	cell density	cells/ml	2070500	4		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Selenastrum	cell density, s.e.	cells/ml	19255	4		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Selenastrum	cell density, significance	yes/no		4		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Selenastrum	pH, high	standard units	9.84	4		
Arcade Creek at Norwood Av	07/28/04	field duplicate	none	Selenastrum	pH, low	standard units	7.47	1		
American River at Discovery Park	07/29/04	environ	none	Selenastrum	DO, high	mg/L	9.2	4	HT	
American River at Discovery Park	07/29/04	environ	none	Selenastrum	DO, low	mg/L	6.5	1	HT	
American River at Discovery Park	07/29/04	environ	none	Selenastrum	cell density	cells/ml	1374000	4	HT	
American River at Discovery Park	07/29/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	69692	4	HT	
American River at Discovery Park	07/29/04	environ	none	Selenastrum	cell density, significance	yes/no		4	HT	
American River at Discovery Park	07/29/04	environ	none	Selenastrum	pH, high	standard units	10.46	4	HT	
American River at Discovery Park	07/29/04	environ	none	Selenastrum	pH, low	standard units	8.06	1	HT	
Sacramento River at Freeport	07/29/04	environ	none	Selenastrum	DO, high	mg/L	8.6	4	HT	
Sacramento River at Freeport	07/29/04	environ	none	Selenastrum	DO, low	mg/L	6.5	1	HT	
Sacramento River at Freeport	07/29/04	environ	none	Selenastrum	cell density	cells/ml	1515750	4	HT	
Sacramento River at Freeport	07/29/04	environ	none	Selenastrum	cell density, s.e.	cells/ml	45313	4	HT	
Sacramento River at Freeport	07/29/04	environ	none	Selenastrum	cell density, significance	yes/no		4	HT	
Sacramento River at Freeport	07/29/04	environ	none	Selenastrum	pH, high	standard units	9.94	4	HT	
Sacramento River at Freeport	07/29/04	environ	none	Selenastrum	pH, low	standard units	7.96	1	HT	

Remark Code	Result Remarks
A	Acute test - reproduction is not an endpoint
B	Baseline treatment not toxic
C	Biomass significance not assessed when mortality significant as per EPA manual (4th ed.)
D	centrifugation removed survival toxicity
E	Controls did not meet test acceptability criteria
F	Despite high mortality, mortality not significant due to high CV (141.4%)
G	Despite high mortality, mortality not significant due to high CV (166.77%)
H	Despite high mortality, mortality not significant due to high CV (223.61%)
I	Reproduction significance not assessed when mortality significant as per EPA manual (4th ed.)
K	results suggest test interference, as toxicity was removed in centrifugation treatment
L	re-tested due to the presence of pathogen related mortality in original test
M	sample not toxic during initial testing
N	survival improved, suggesting a metabolically activated contaminant (e.g., pesticide) is responsible for toxicity
O	toxic at day 5 of testing
P	toxic within 48 hours
Q	toxicity delayed (sample toxic at day 6 as opposed to within 48 hours in untreated sample
R	toxicity not recovered
S	toxicity not removed
T	toxicity recovered
U	toxicity removed, suggesting a non-polar organic contaminant

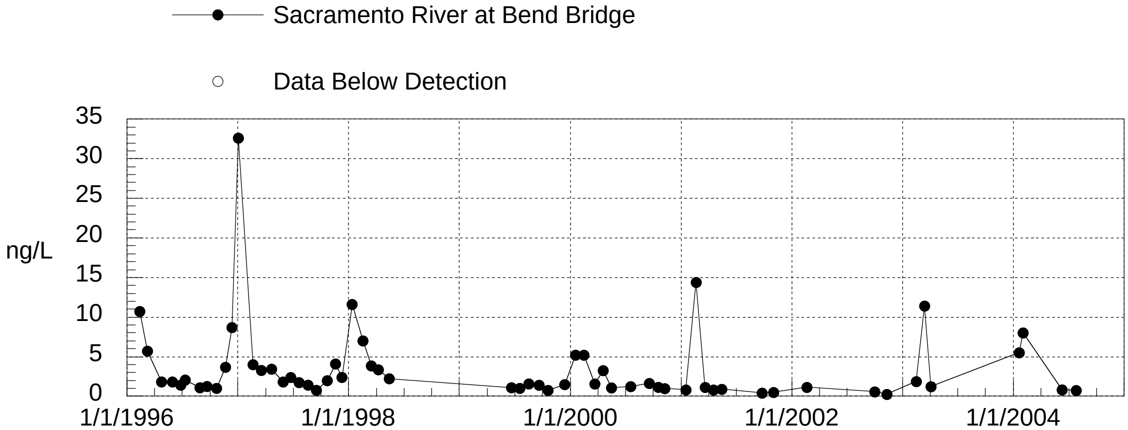
Data Qual Code	Qualification
HT	Initial test initiated after 36-hour hold time objective

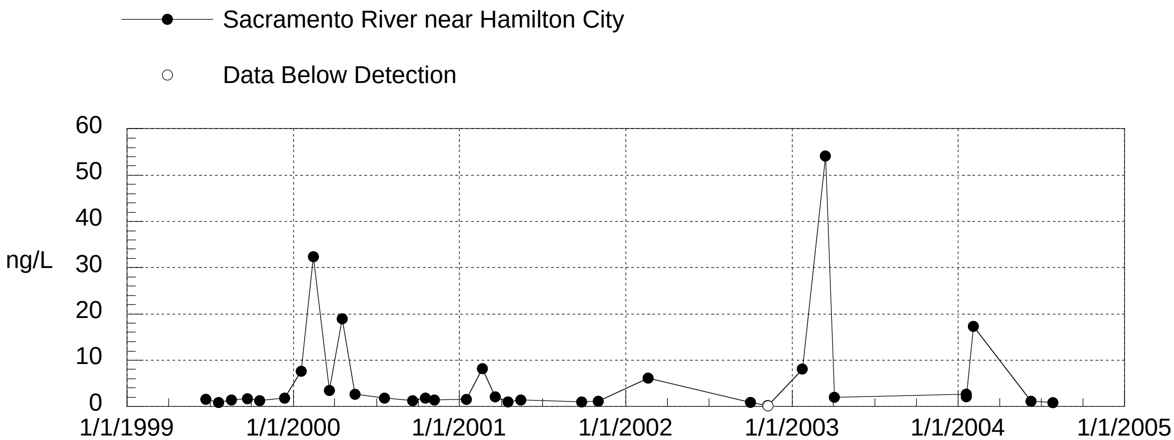
APPENDIX B:

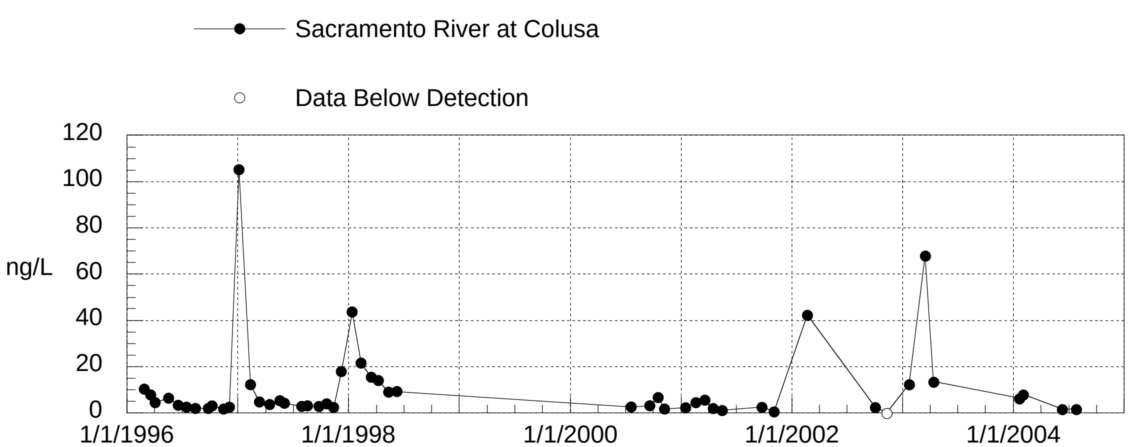
TIME SERIES PLOTS OF WATER QUALITY DATA

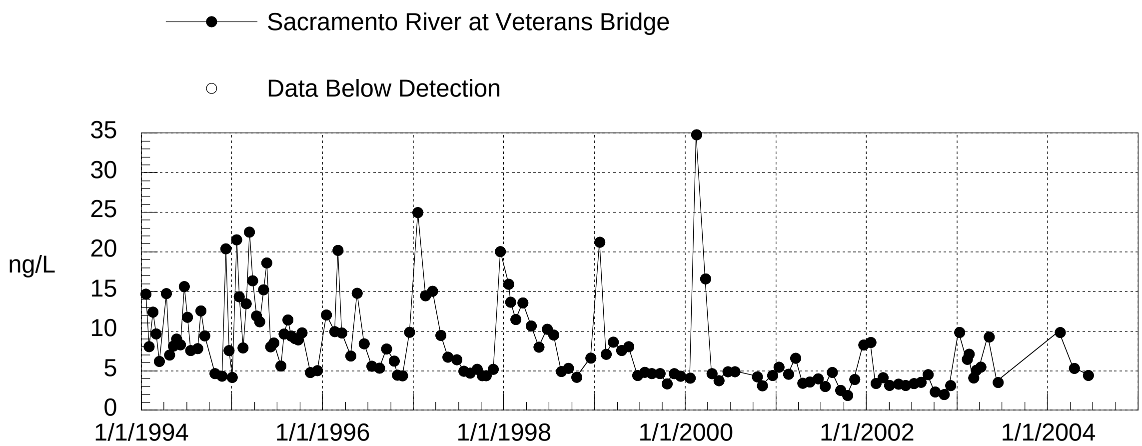
Time Series Plots are presented in the following order:

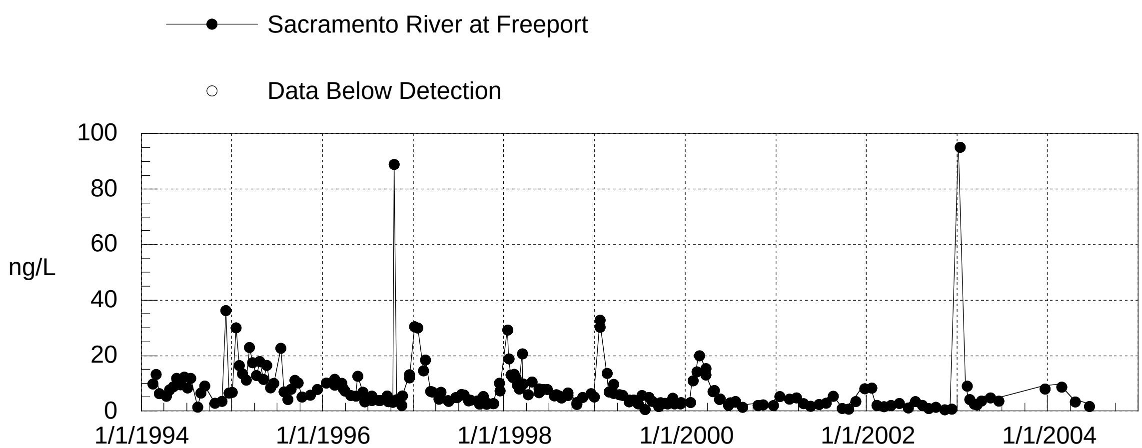
- Unfiltered and Filtered Total Mercury
- Unfiltered and Filtered Methylmercury
- Total Dissolved Solids
- Total Suspended Solids
- Organic Carbon and Ultraviolet Absorbance (UVA_{254})
- Alkalinity
- Hardness
- Total Coliform Bacteria
- Fecal Coliform Bacteria
- *E. coli* Bacteria

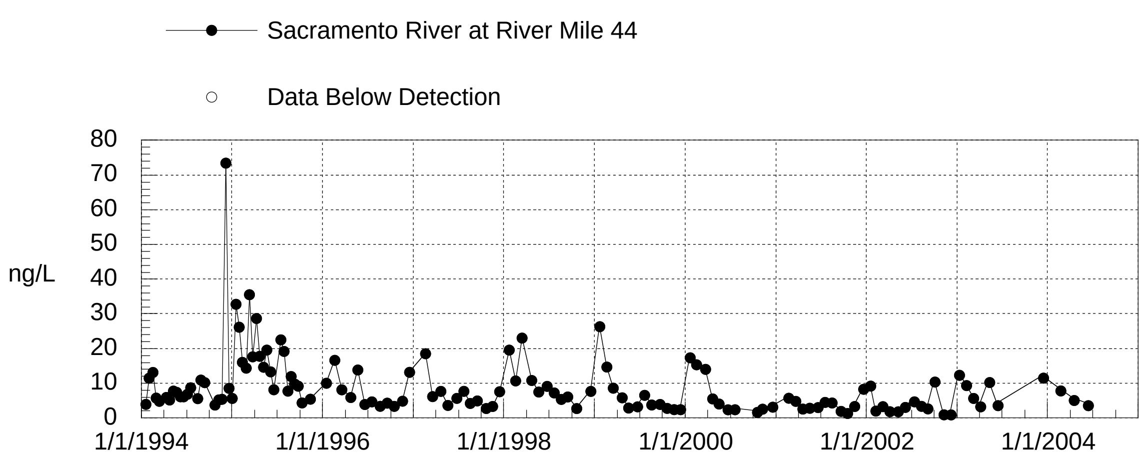

Sacramento River at Bend Bridge
Data Below Detection
ng/L
35
30
25
20
15
10
5
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004


Sacramento River near Hamilton City
Data Below Detection
ng/L
60
50
40
30
20
10
0
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Sacramento River at Colusa
Data Below Detection
ng/L
120
100
80
60
40
20
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

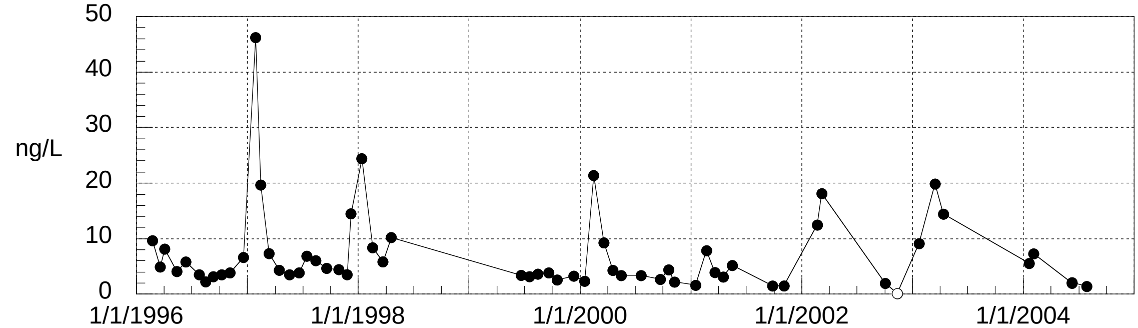

Sacramento River at Veterans Bridge
Data Below Detection
ng/L
35
30
25
20
15
10
5
0
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004


Sacramento River at Freeport
Data Below Detection
ng/L
100
80
60
40
20
0
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004


Sacramento River at River Mile 44
Data Below Detection
ng/L
80
70
60
50
40
30
20
10
0
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

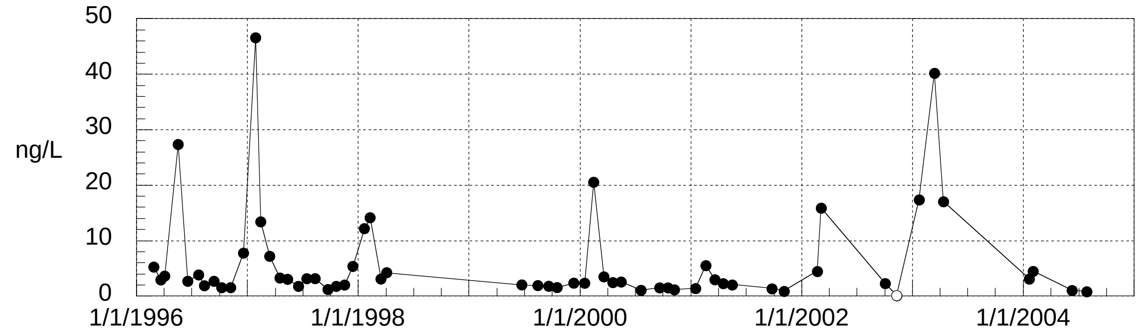
Feather River at Nicolaus

Data Below Detection



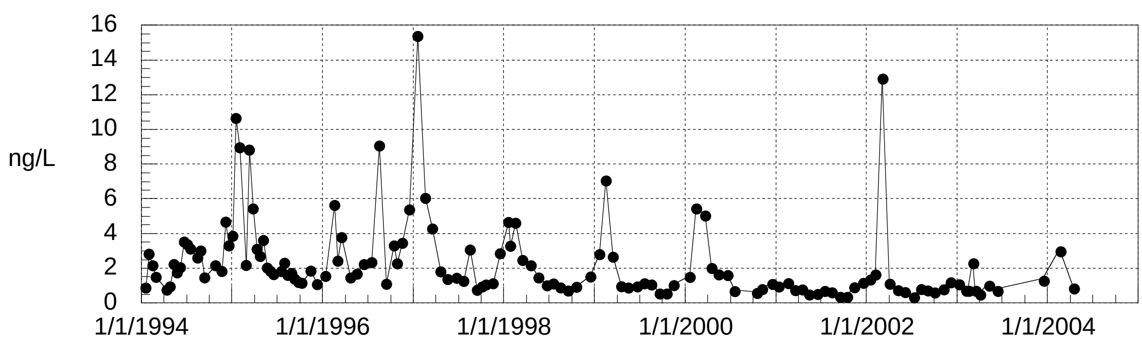
Yuba River Marysville

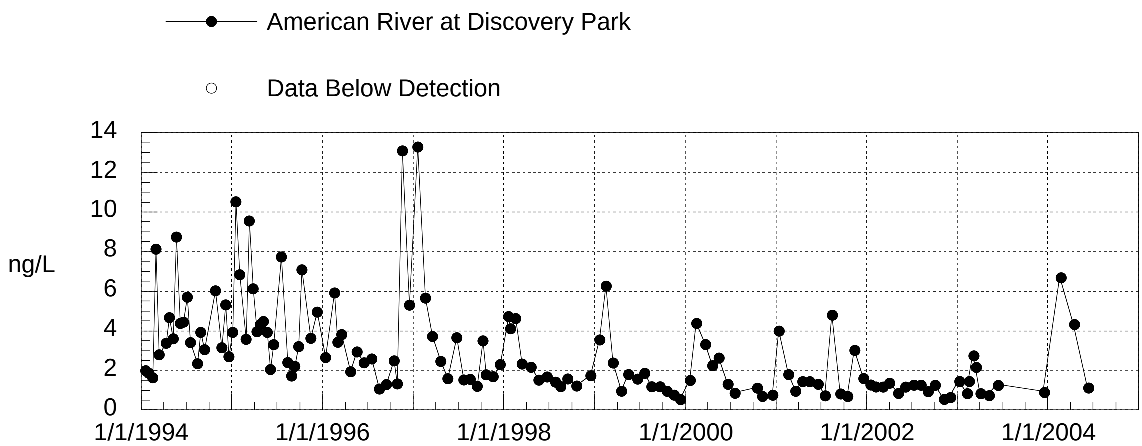
Data Below Detection

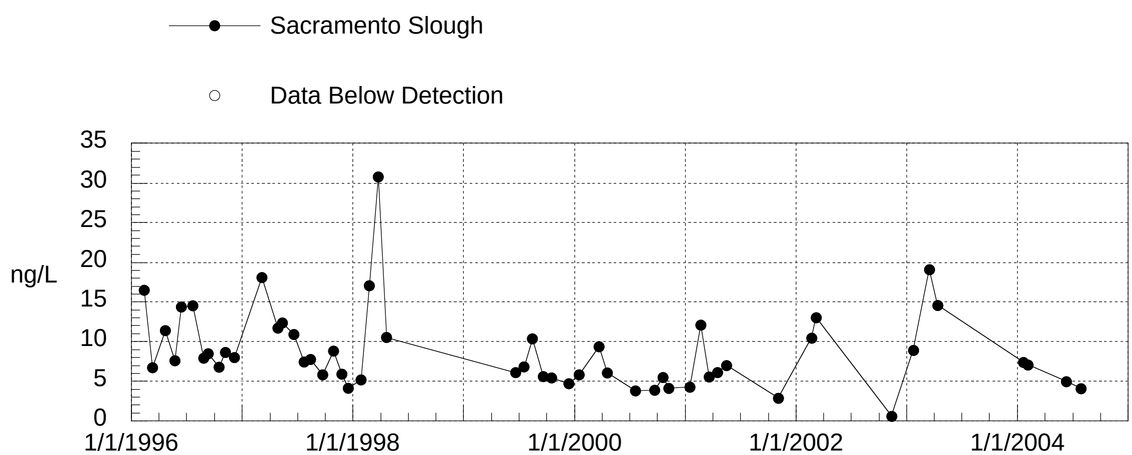


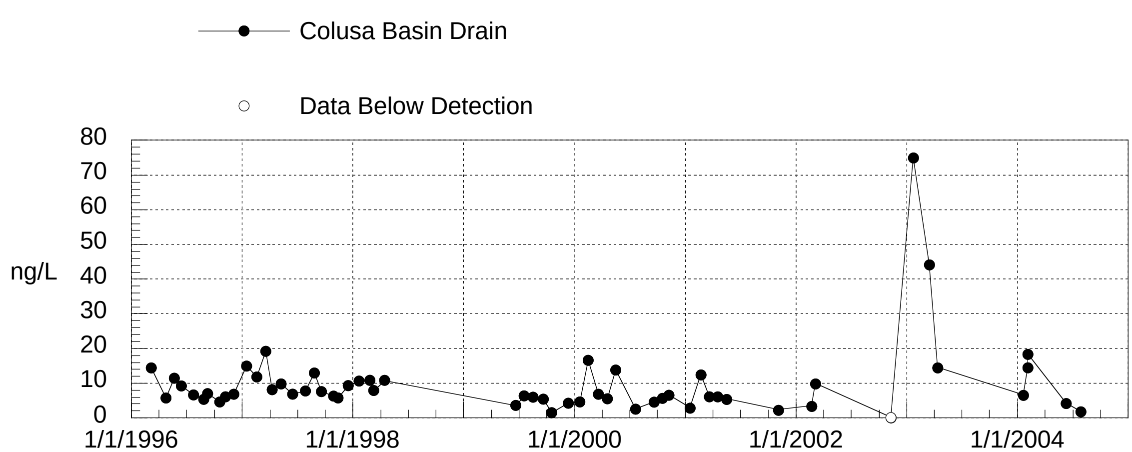
American River at Nimbus Dam

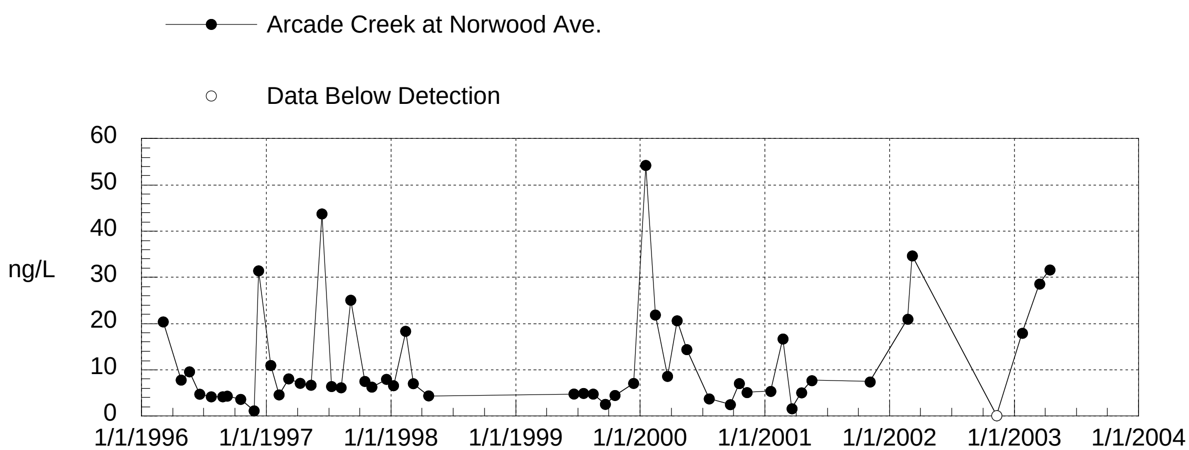
Data Below Detection

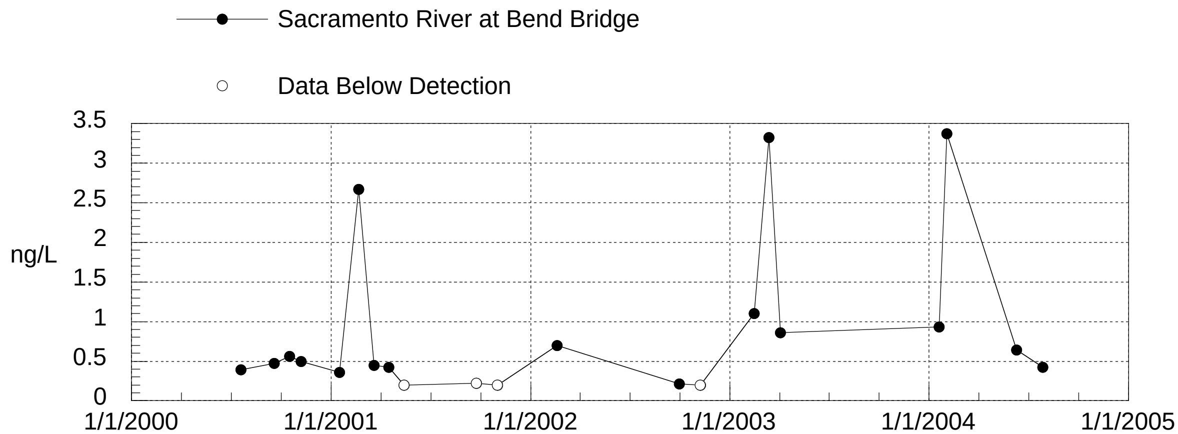



American River at Discovery Park
Data Below Detection
ng/L
0
2
4
6
8
10
12
14
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

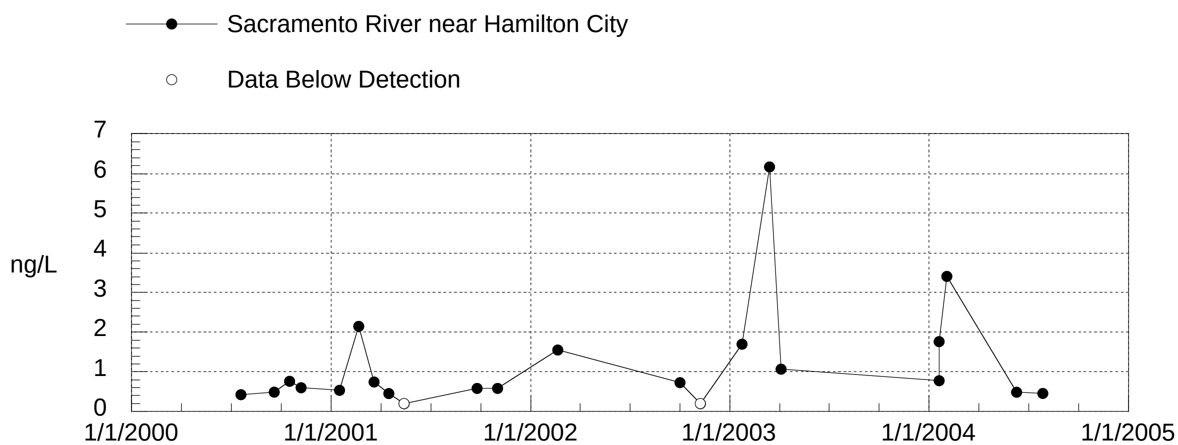

Sacramento Slough
Data Below Detection
ng/L
0
5
10
15
20
25
30
35
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004


Colusa Basin Drain
Data Below Detection
ng/L
0
10
20
30
40
50
60
70
80
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

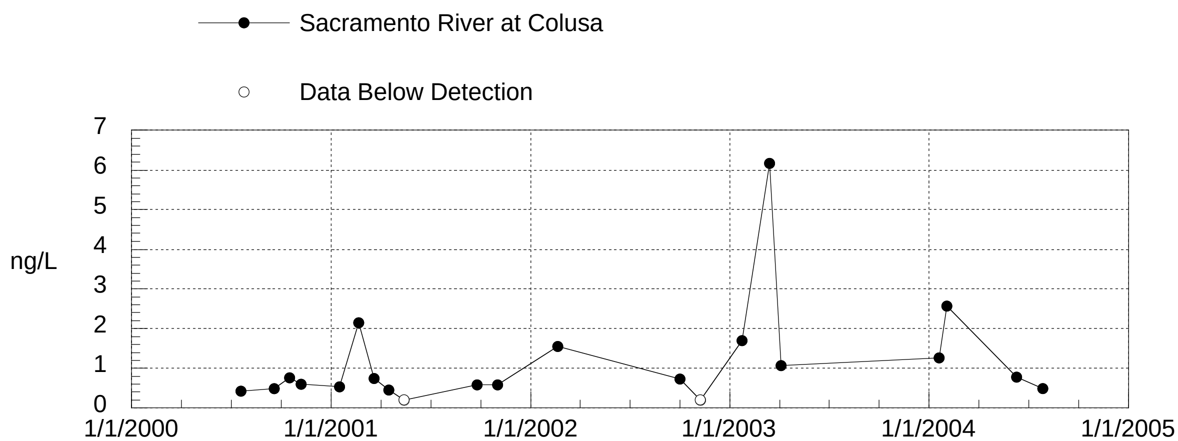

Arcade Creek at Norwood Ave.
Data Below Detection
ng/L
0
10
20
30
40
50
60
1/1/1996
1/1/1997
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004



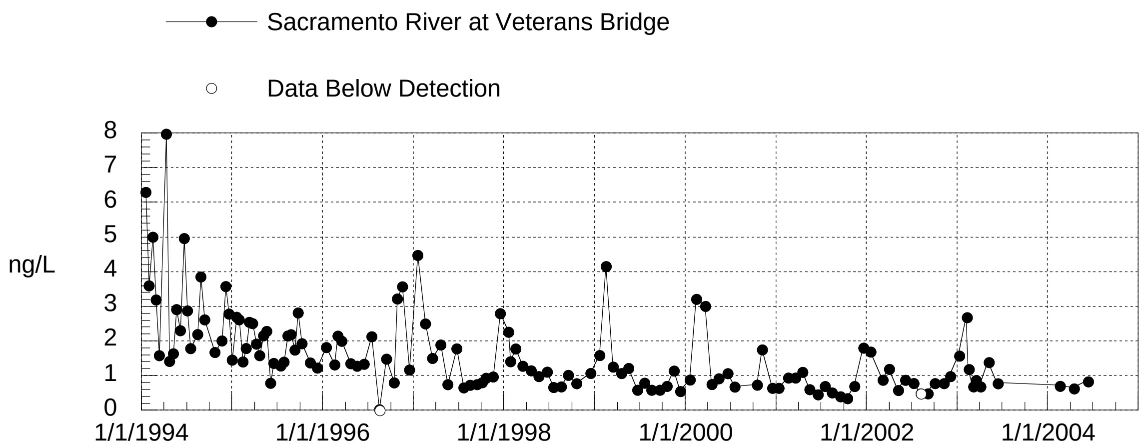
Sacramento River at Bend Bridge
Data Below Detection
ng/L
3.5
3
2.5
2
1.5
1
0.5
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

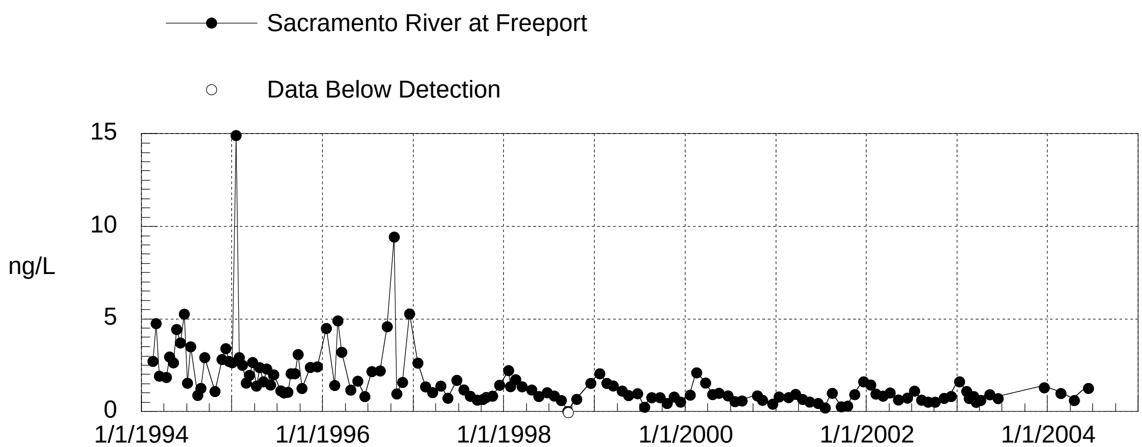


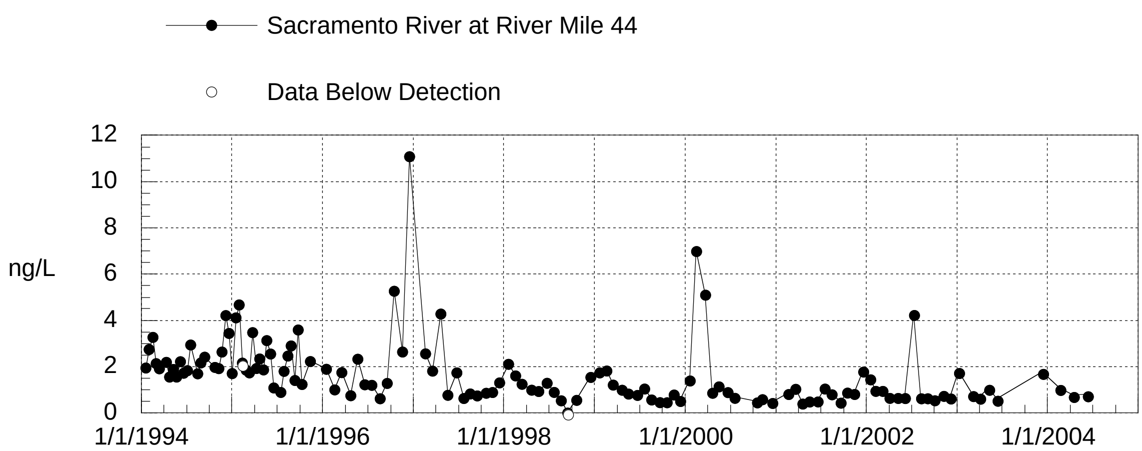
Sacramento River near Hamilton City
Data Below Detection
ng/L
7
6
5
4
3
2
1
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

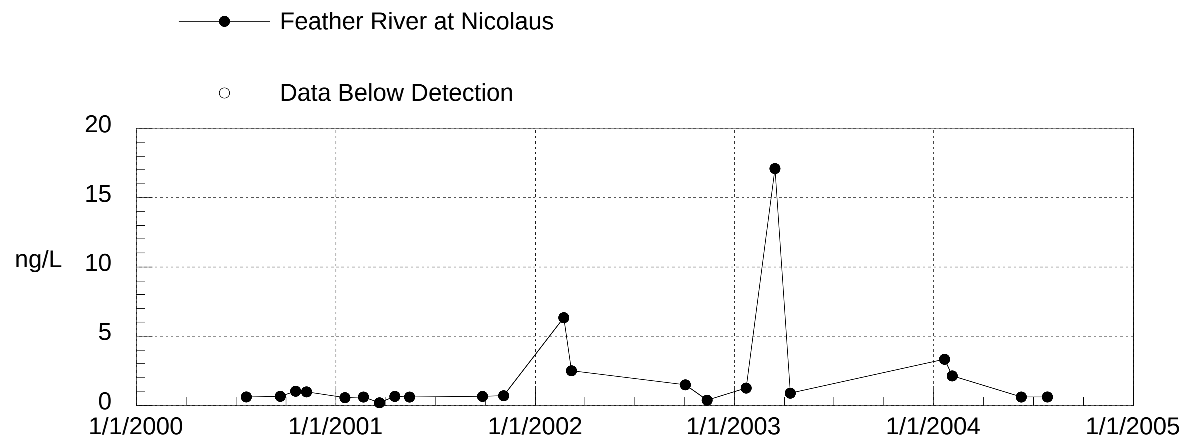


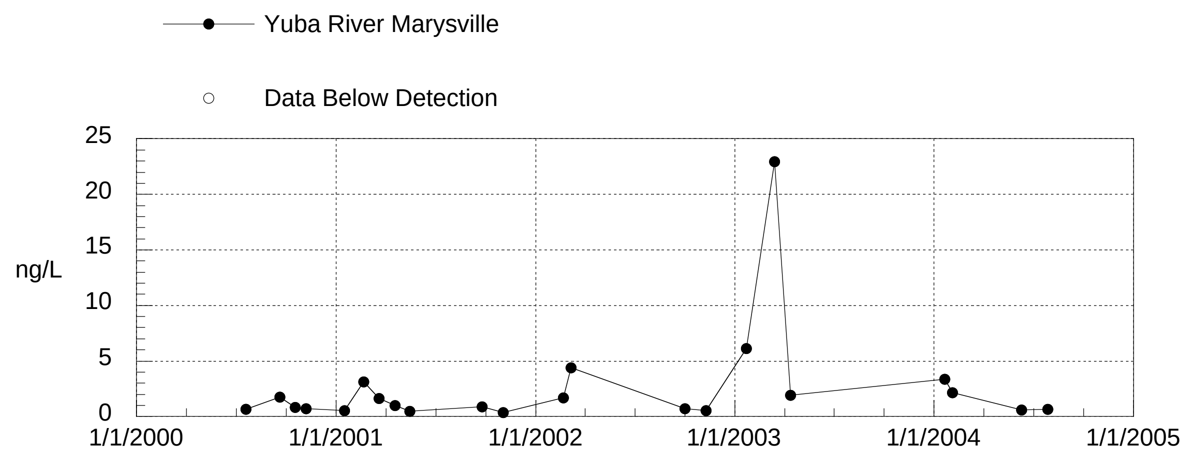
Sacramento River at Colusa
Data Below Detection
ng/L
7
6
5
4
3
2
1
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

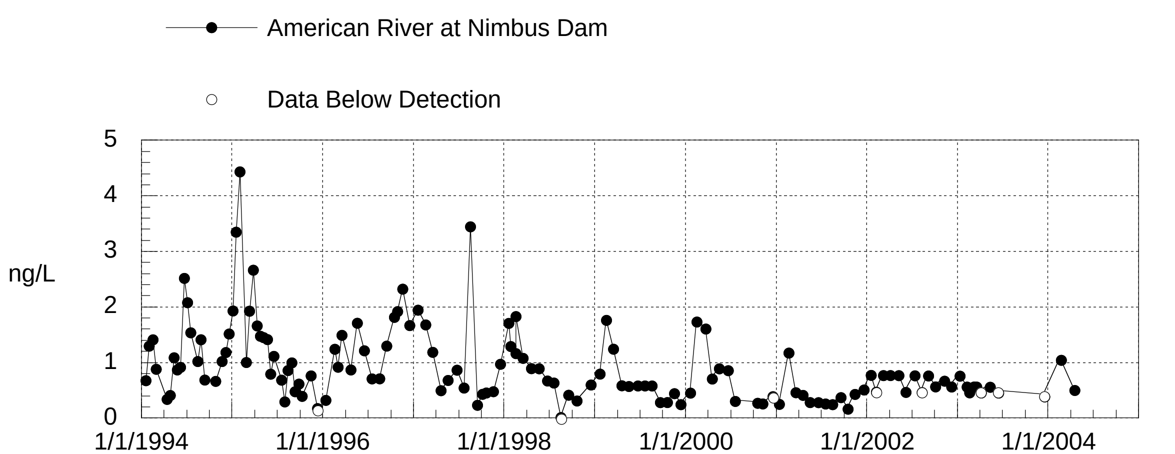

Sacramento River at Veterans Bridge
Data Below Detection
ng/L
0
1
2
3
4
5
6
7
8
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

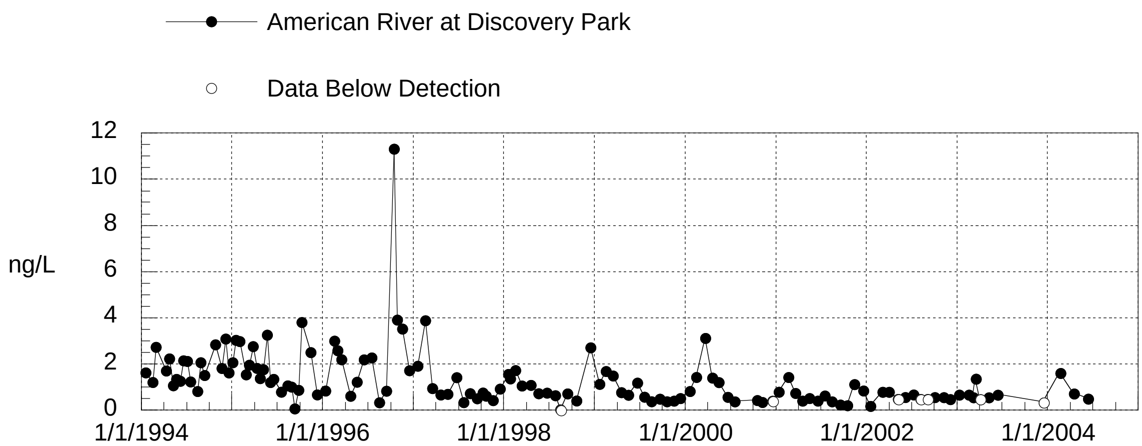

Sacramento River at Freeport
Data Below Detection
ng/L
0
5
10
15
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

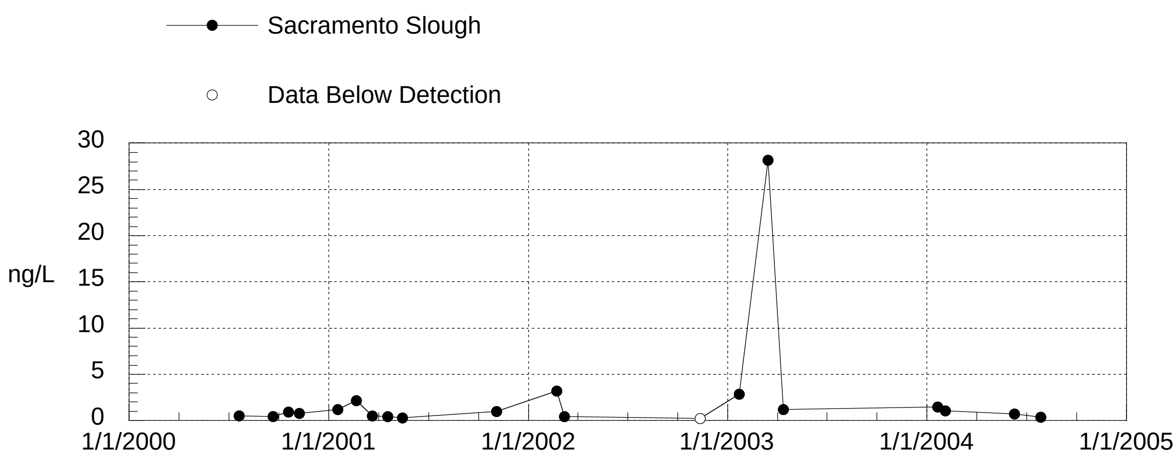

Sacramento River at River Mile 44
Data Below Detection
ng/L
0
2
4
6
8
10
12
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

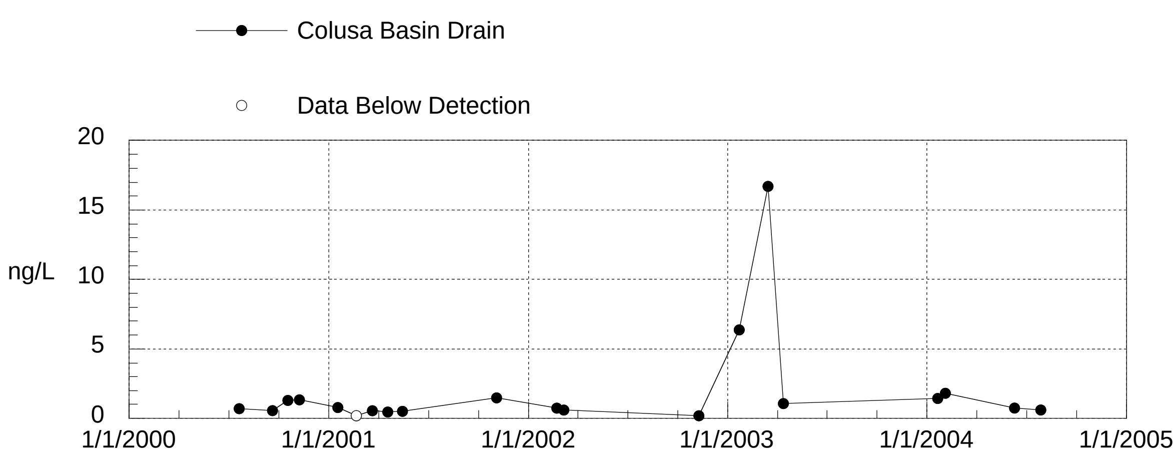

Feather River at Nicolaus
Data Below Detection
ng/L
20
15
10
5
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

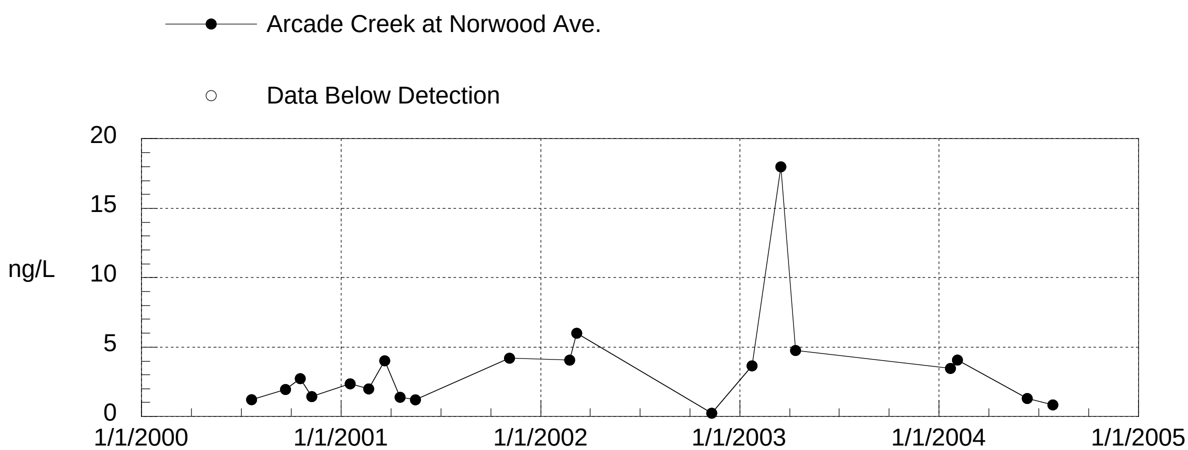

Yuba River Marysville
Data Below Detection
ng/L
25
20
15
10
5
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

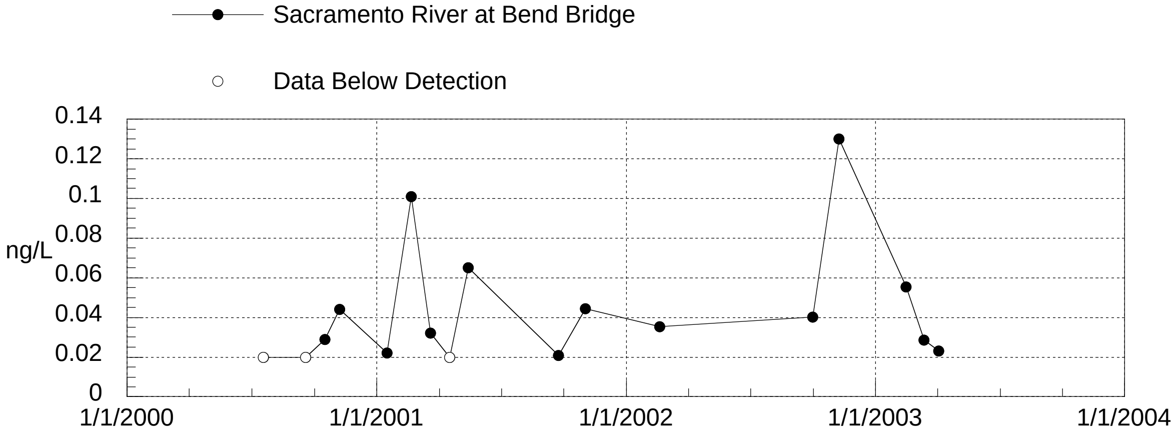

American River at Nimbus Dam
Data Below Detection
ng/L
5
4
3
2
1
0
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

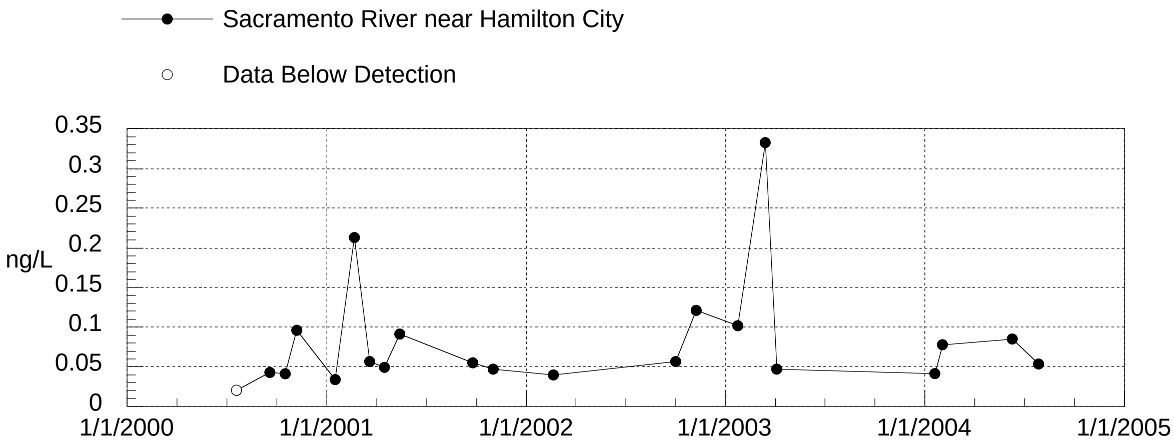

American River at Discovery Park
Data Below Detection
ng/L
0
2
4
6
8
10
12
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

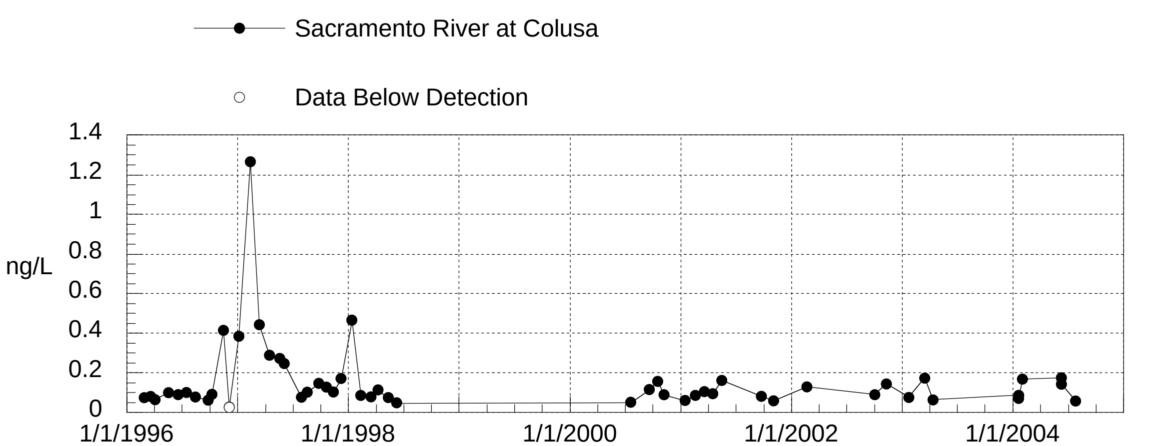

Sacramento Slough
Data Below Detection
ng/L
0
5
10
15
20
25
30
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

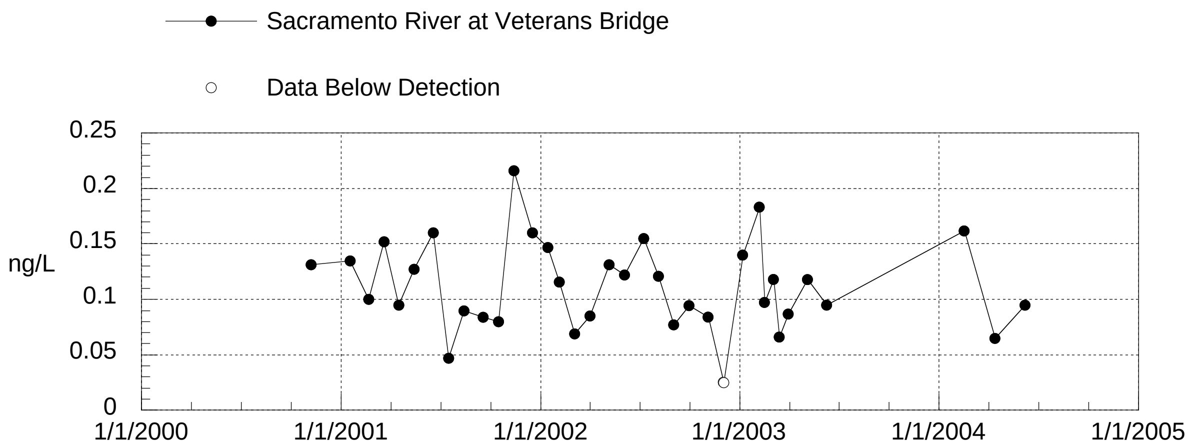

Colusa Basin Drain
Data Below Detection
ng/L
0
5
10
15
20
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

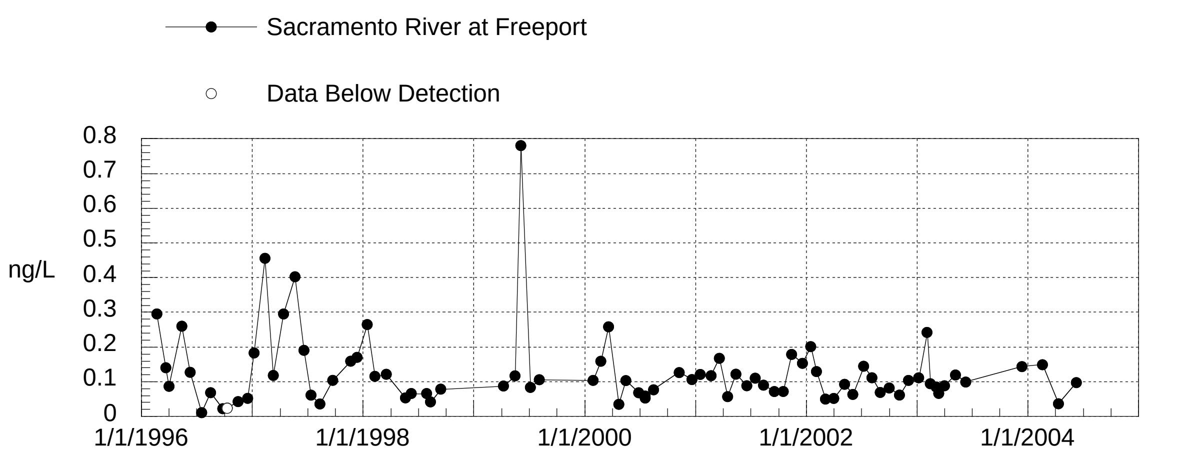

Arcade Creek at Norwood Ave.
Data Below Detection
ng/L
20
15
10
5
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

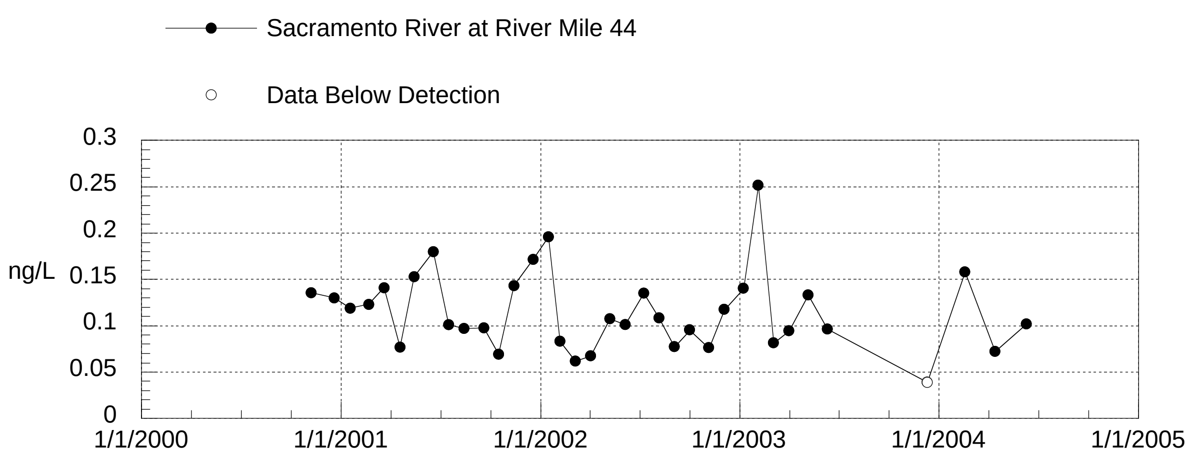

Sacramento River at Bend Bridge
Data Below Detection
ng/L
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004

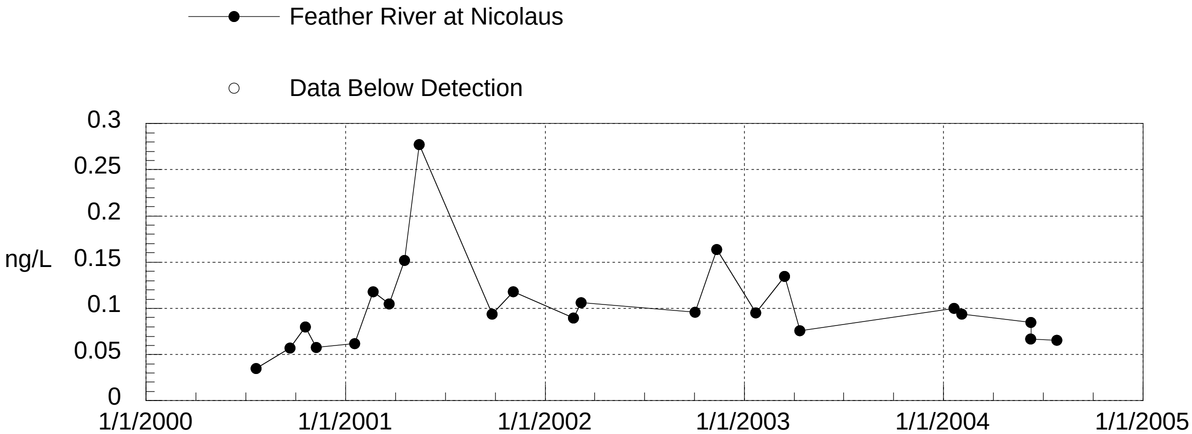

Sacramento River near Hamilton City
Data Below Detection
ng/L
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

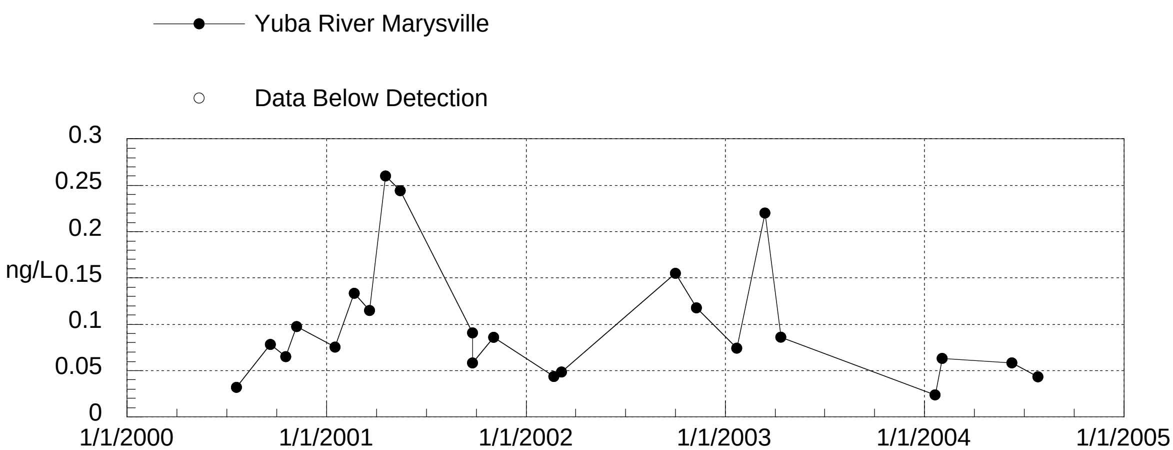

Sacramento River at Colusa
Data Below Detection
ng/L
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

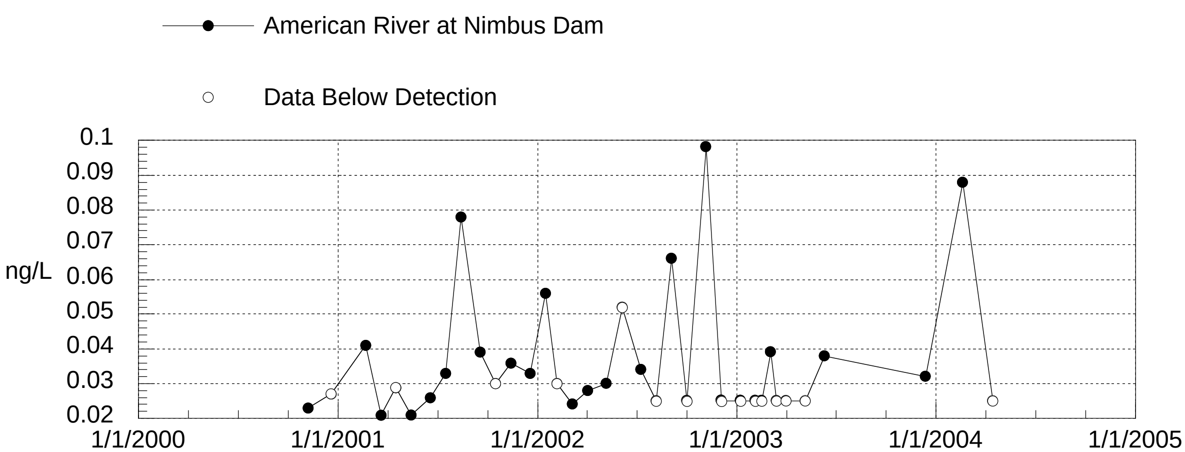

Sacramento River at Veterans Bridge
Data Below Detection
ng/L
0.25
0.2
0.15
0.1
0.05
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

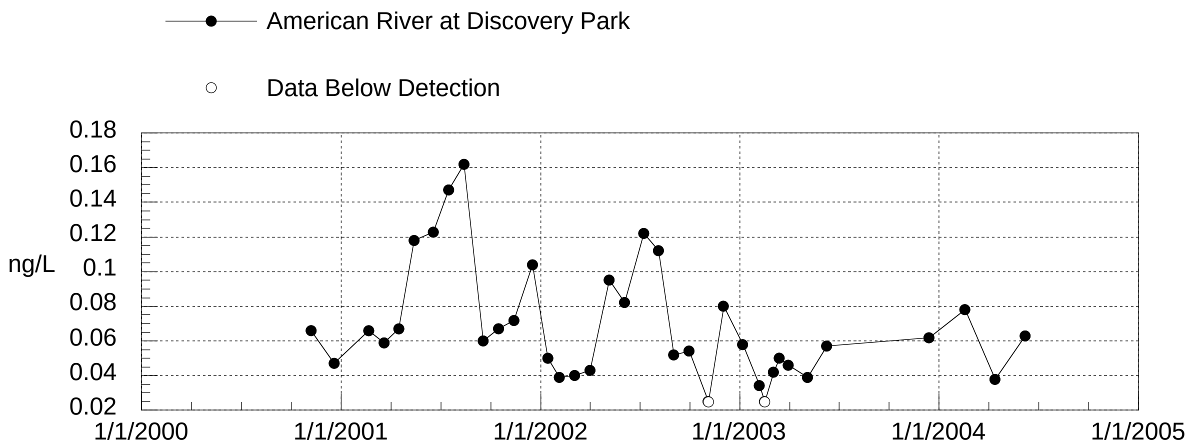

Sacramento River at Freeport
Data Below Detection
ng/L
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

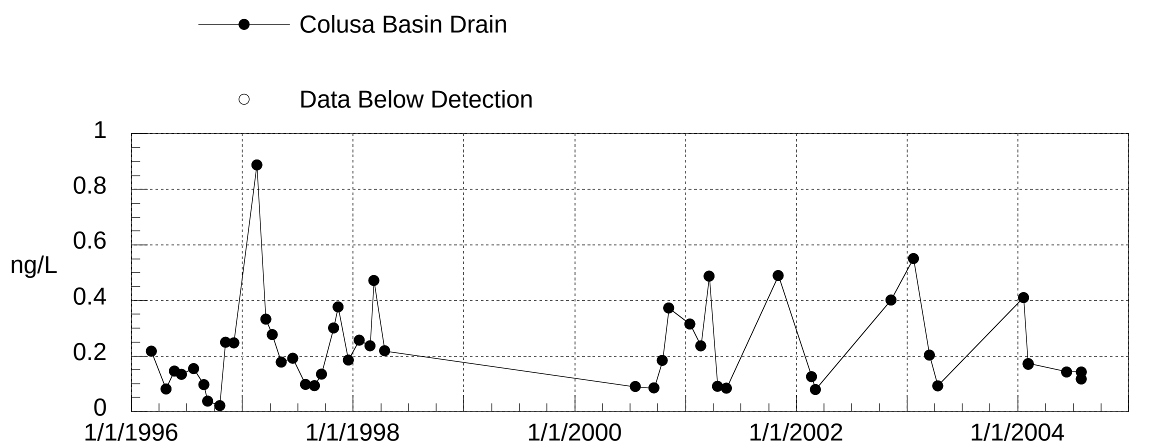

Sacramento River at River Mile 44
Data Below Detection
ng/L
0.3
0.25
0.2
0.15
0.1
0.05
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

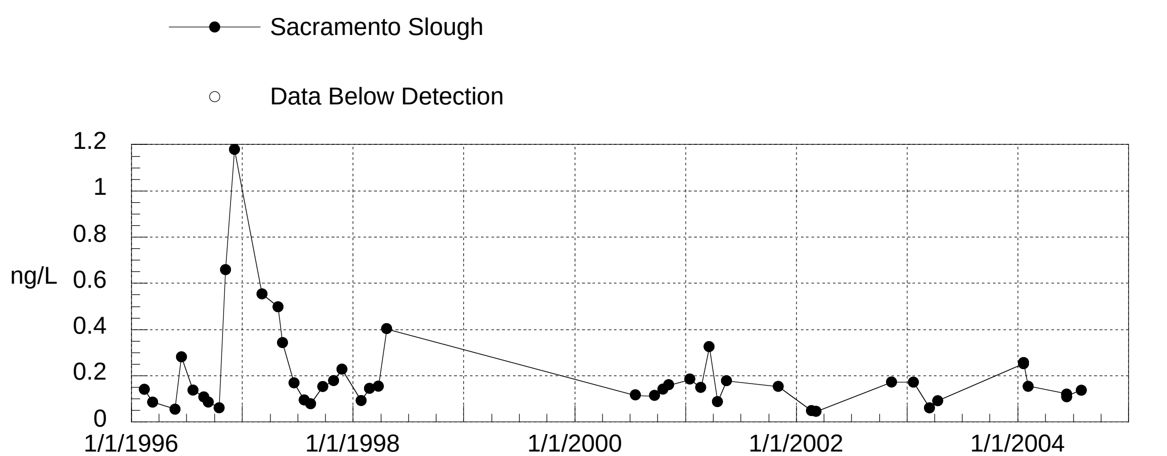

Feather River at Nicolaus
Data Below Detection
ng/L
0.3
0.25
0.2
0.15
0.1
0.05
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

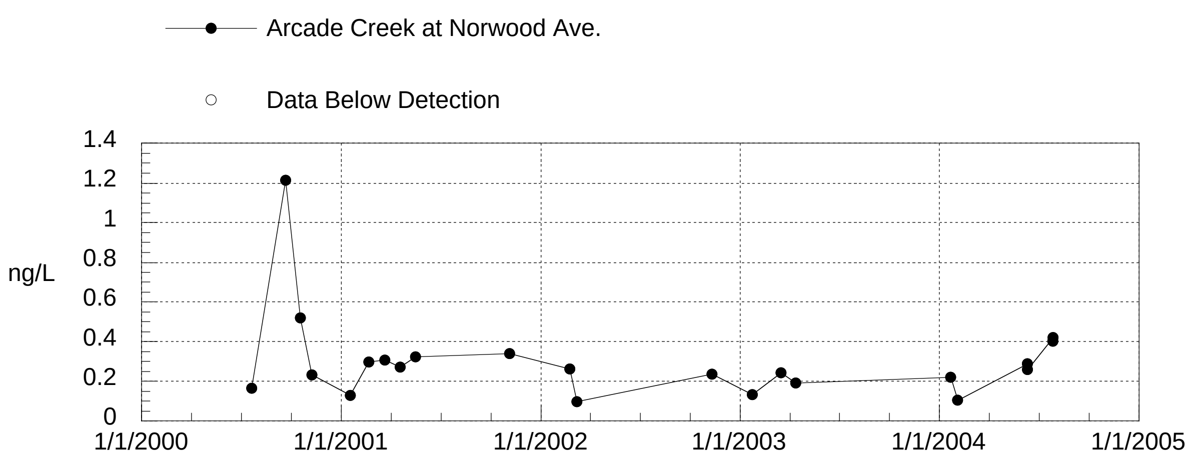

Yuba River Marysville
Data Below Detection
ng/L
0.3
0.25
0.2
0.15
0.1
0.05
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

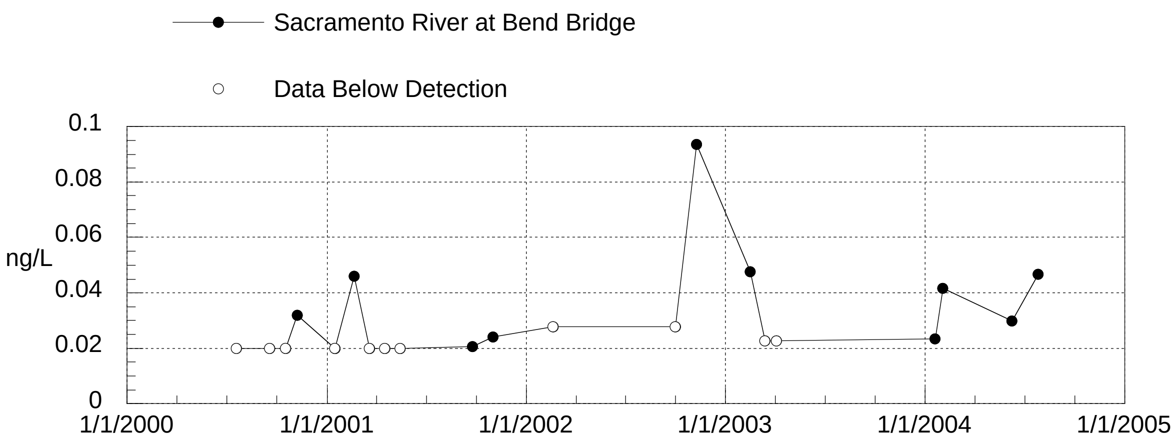

American River at Nimbus Dam
Data Below Detection
ng/L
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

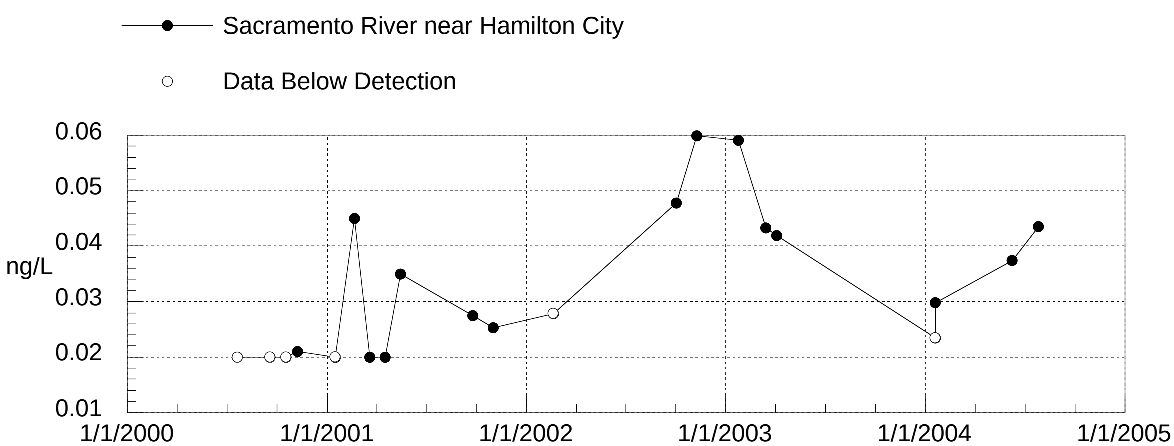

American River at Discovery Park
Data Below Detection
ng/L
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

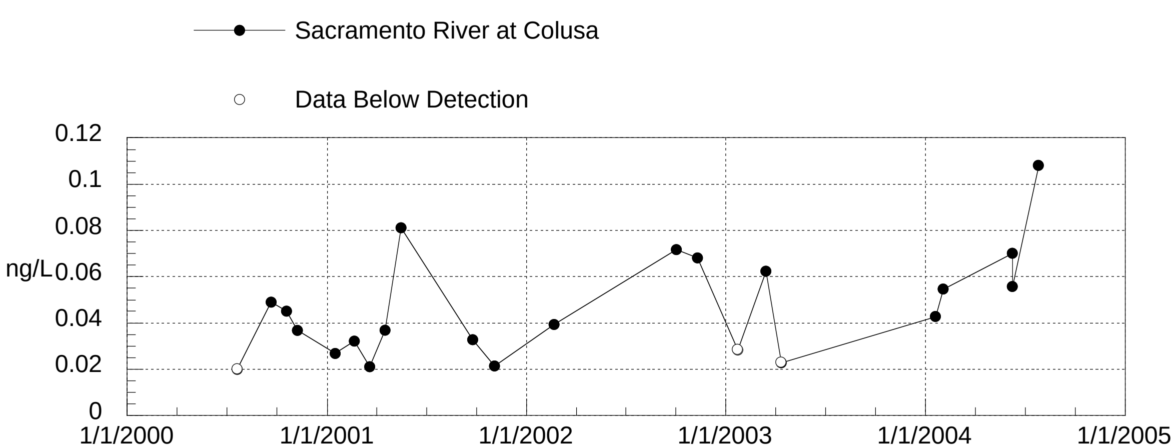

Colusa Basin Drain
Data Below Detection
ng/L
1
0.8
0.6
0.4
0.2
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

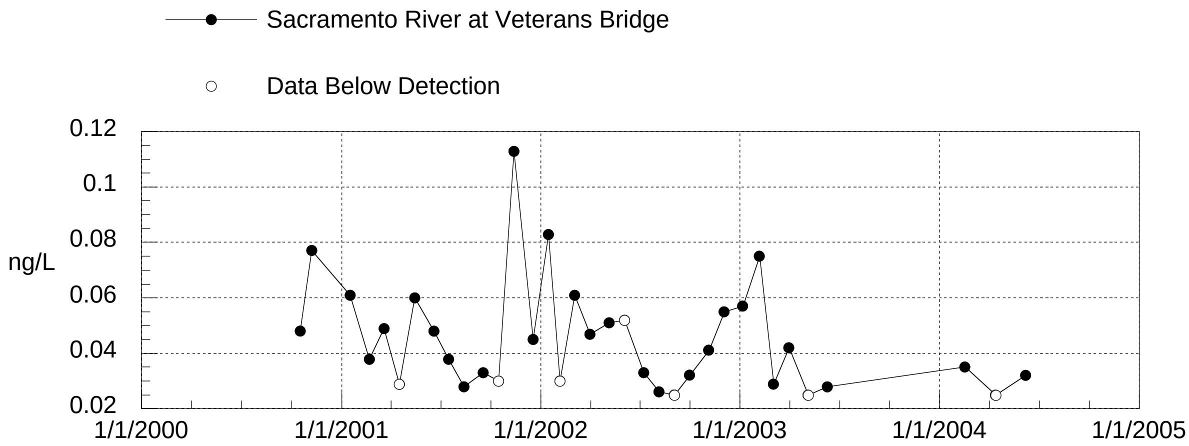

Sacramento Slough
Data Below Detection
ng/L
1.2
1
0.8
0.6
0.4
0.2
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004


Arcade Creek at Norwood Ave.
Data Below Detection
1.4
1.2
1
0.8
0.6
0.4
0.2
0
ng/L
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

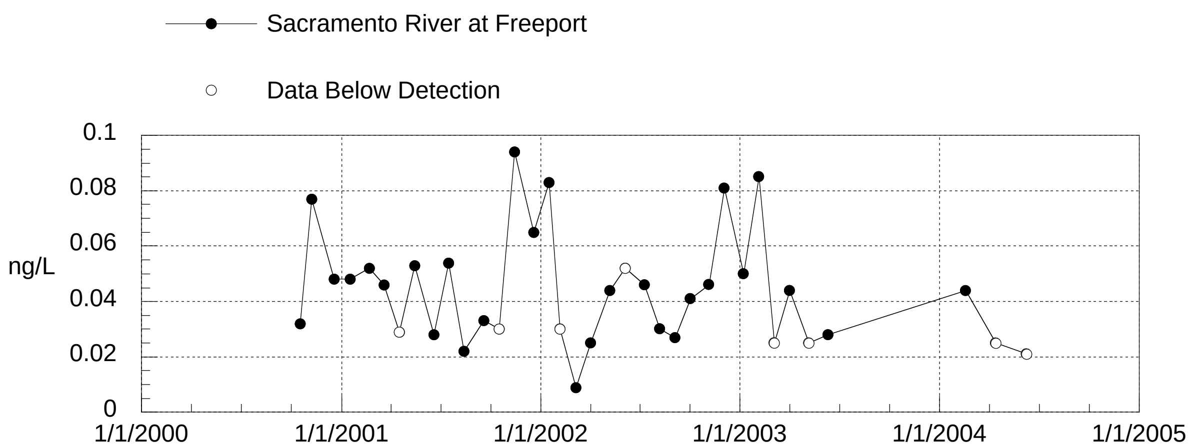

Sacramento River at Bend Bridge
Data Below Detection
0.1
0.08
0.06
ng/L
0.04
0.02
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Sacramento River near Hamilton City
Data Below Detection
0.06
0.05
0.04
ng/L
0.03
0.02
0.01
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

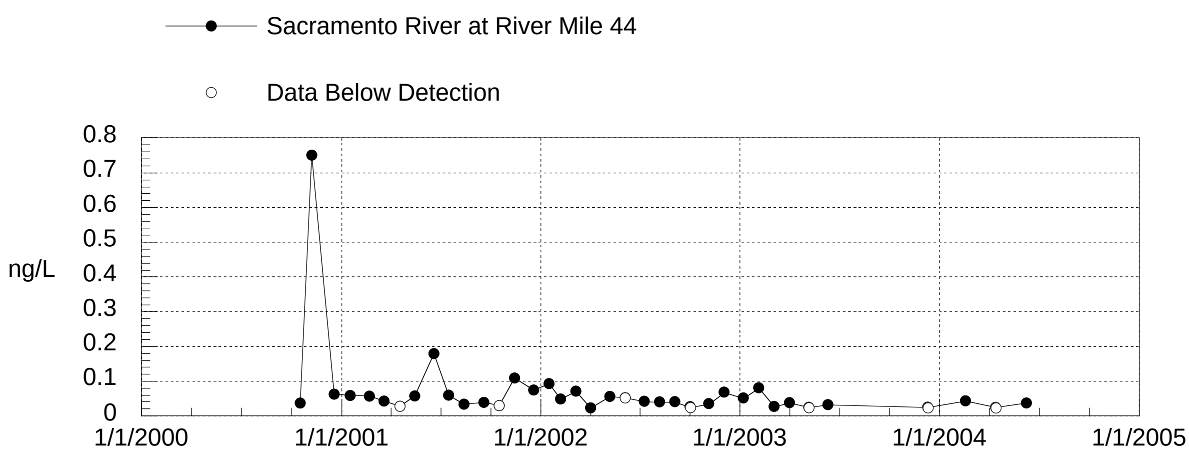

Sacramento River at Colusa
Data Below Detection
0.12
0.1
0.08
ng/L
0.06
0.04
0.02
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005



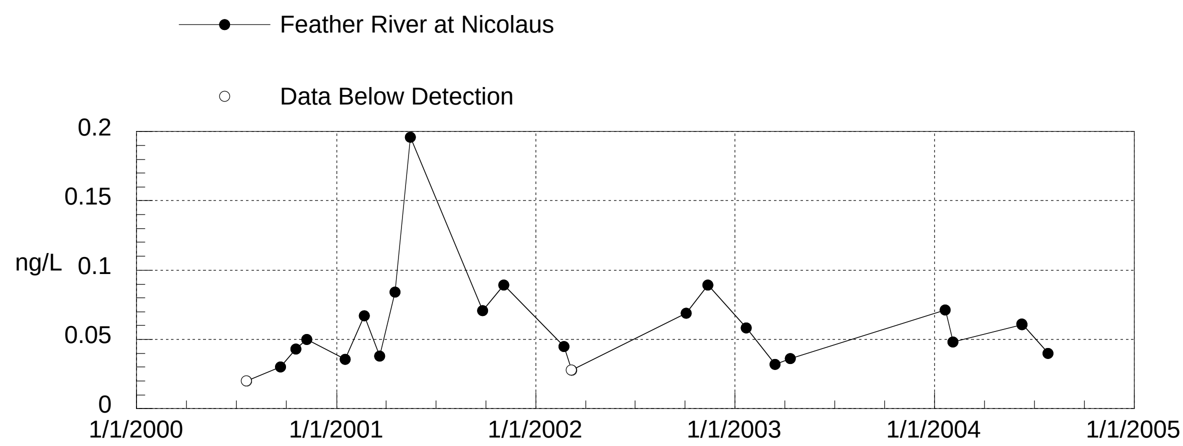
Sacramento River at Veterans Bridge
Data Below Detection
ng/L
0.12
0.1
0.08
0.06
0.04
0.02
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

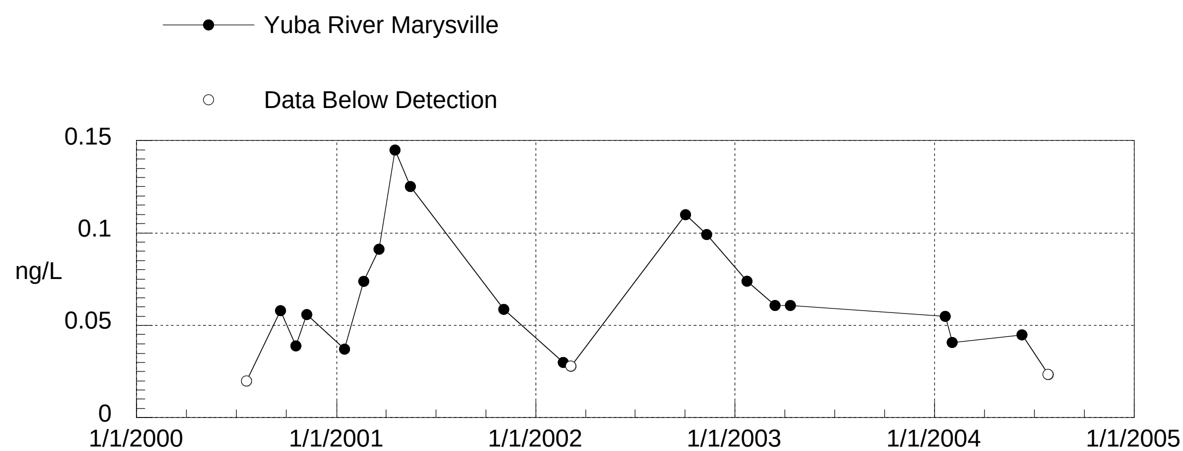


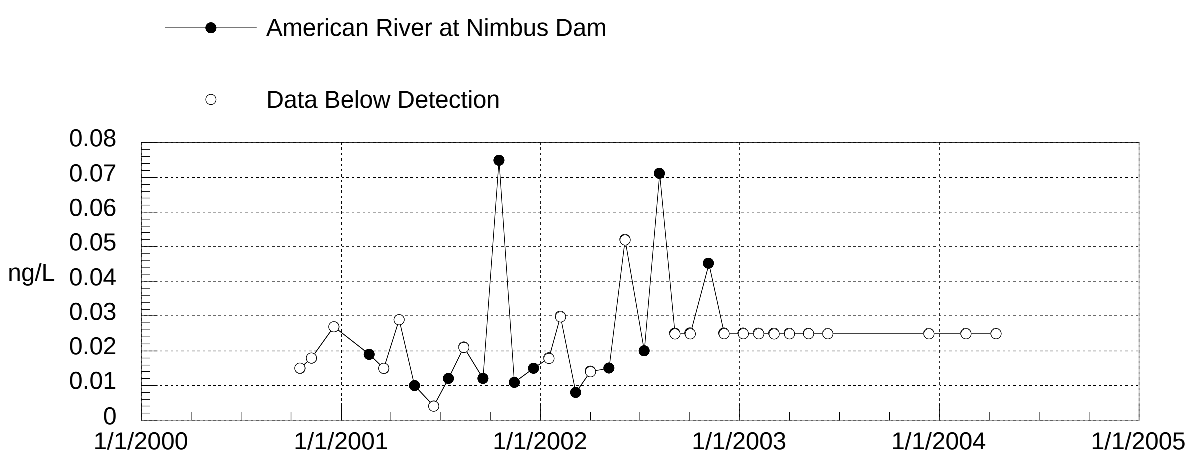
Sacramento River at Freeport
Data Below Detection
ng/L
0.1
0.08
0.06
0.04
0.02
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

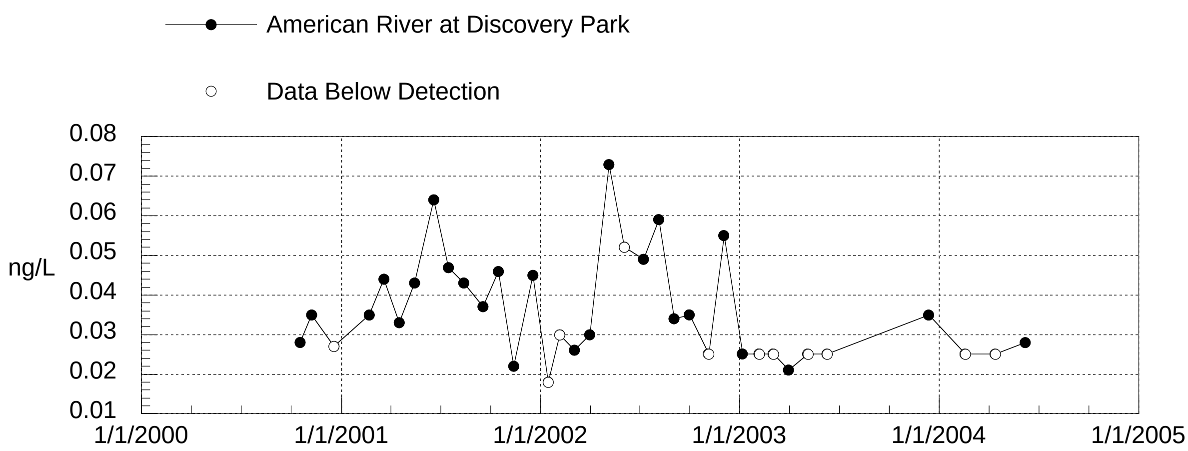


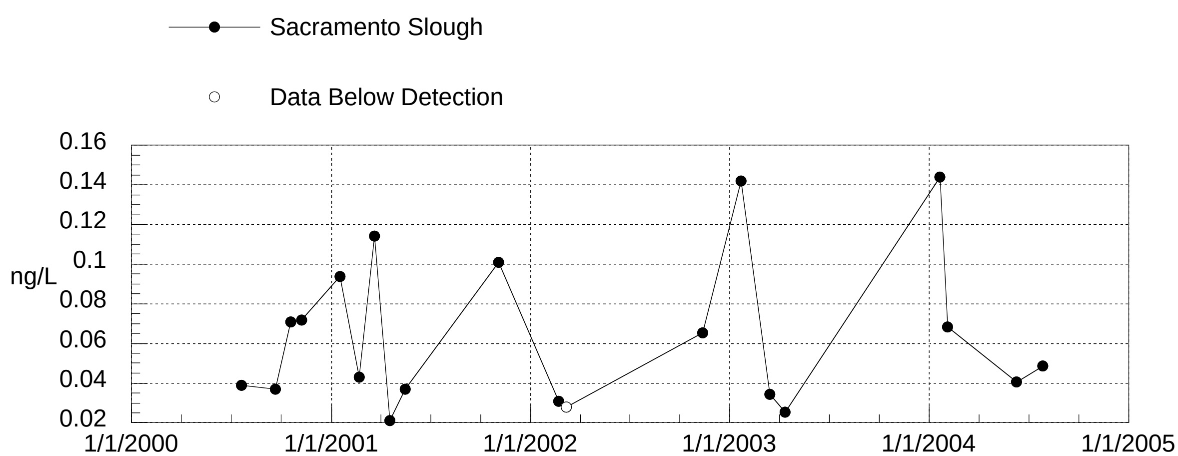
Sacramento River at River Mile 44
Data Below Detection
ng/L
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

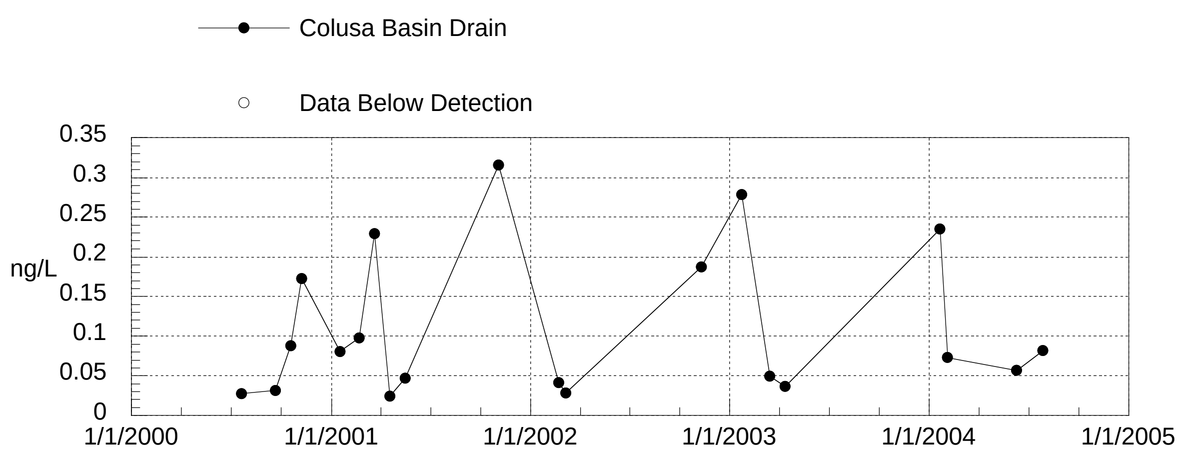

Feather River at Nicolaus
Data Below Detection
ng/L
0.2
0.15
0.1
0.05
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

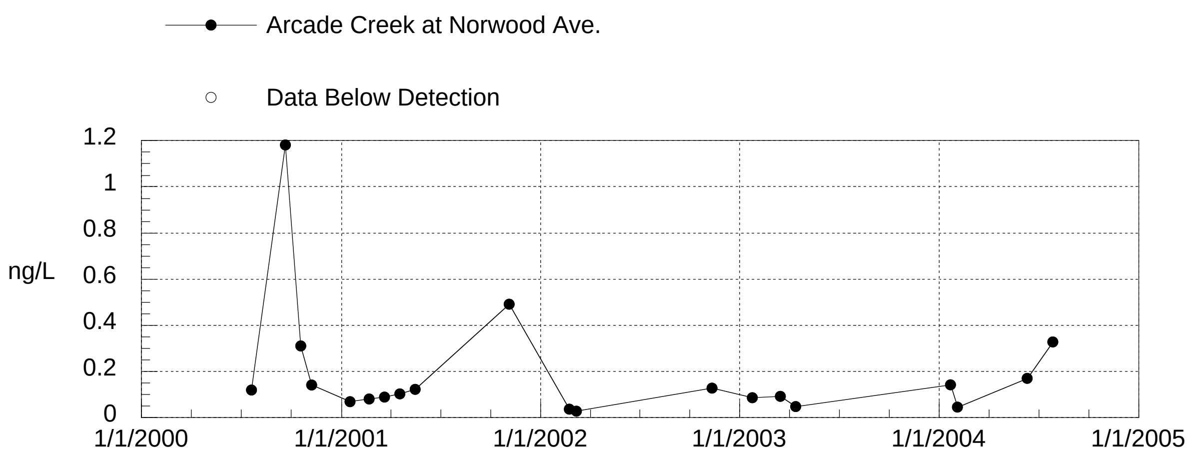

Yuba River Marysville
Data Below Detection
ng/L
0.15
0.1
0.05
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


American River at Nimbus Dam
Data Below Detection
ng/L
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

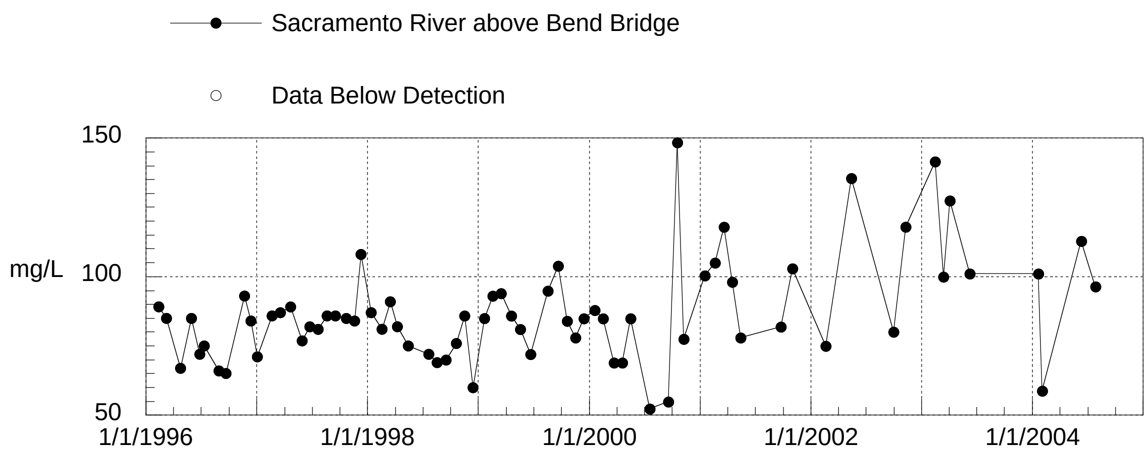

American River at Discovery Park
Data Below Detection
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
ng/L
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

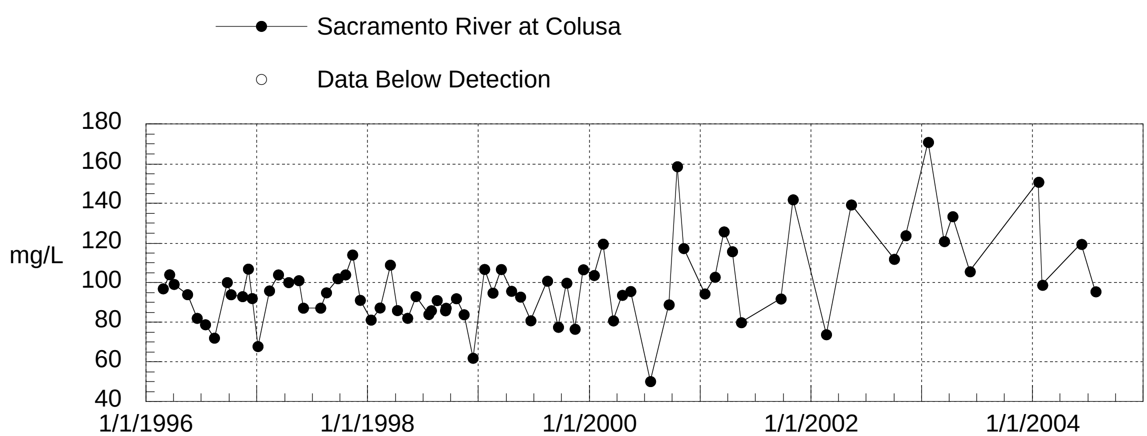

Sacramento Slough
Data Below Detection
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
ng/L
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

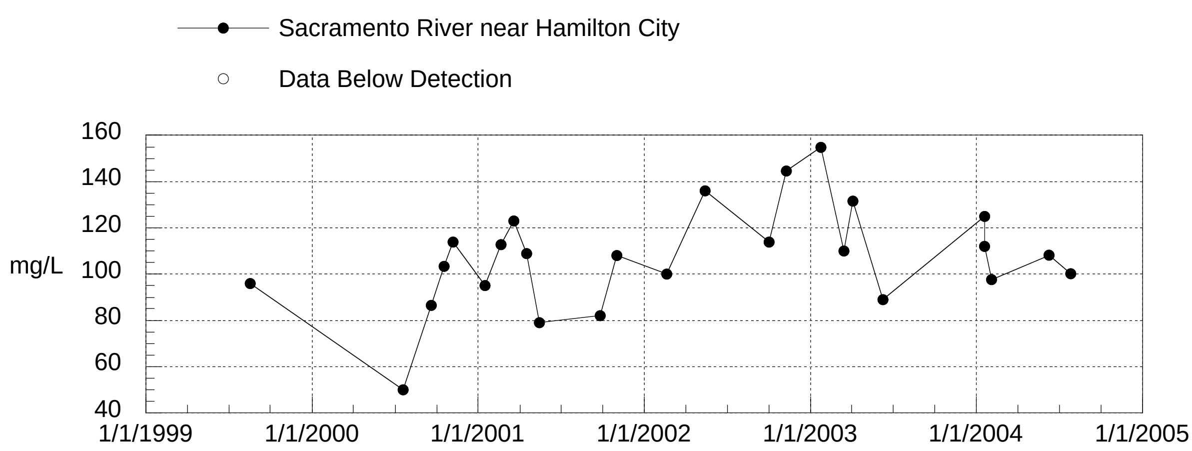

Colusa Basin Drain
Data Below Detection
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
ng/L
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

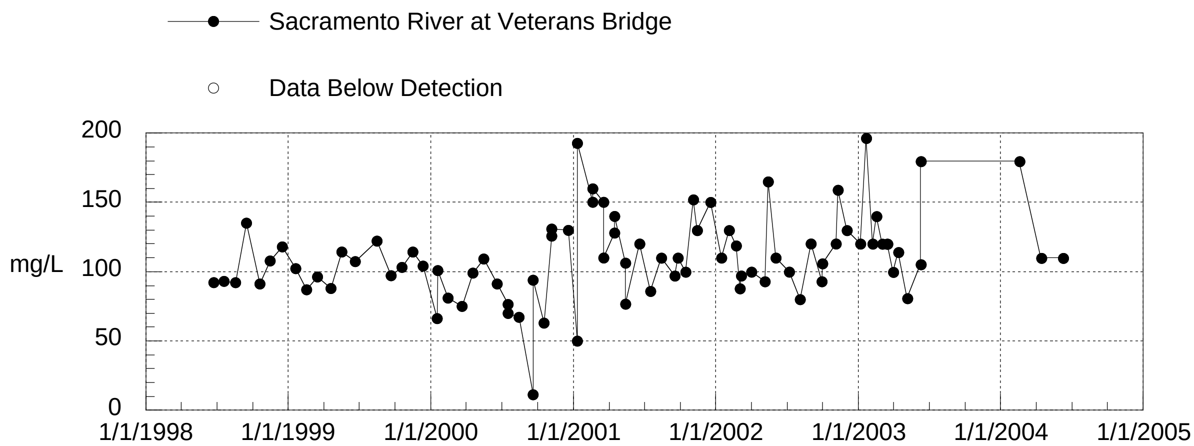


Arcade Creek at Norwood Ave.
Data Below Detection
ng/L
1.2
1
0.8
0.6
0.4
0.2
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

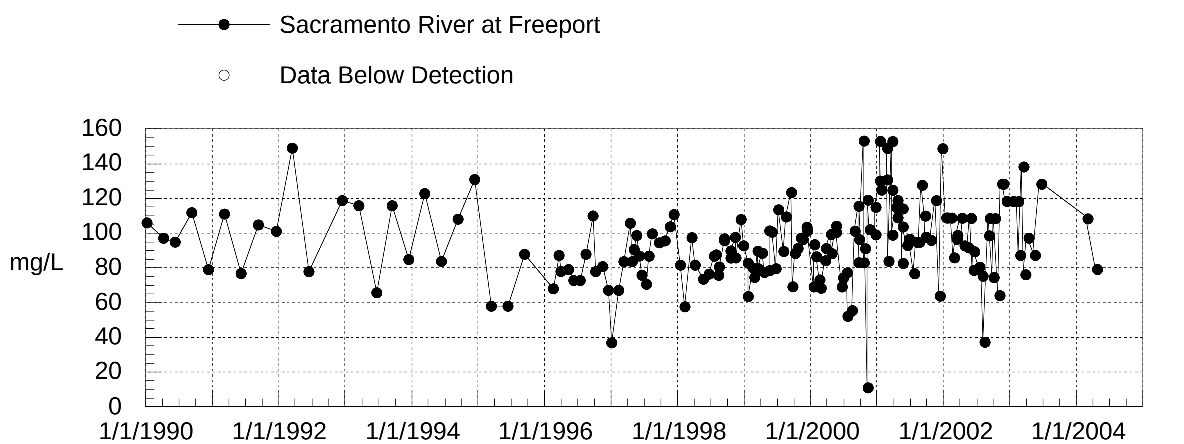

Sacramento River above Bend Bridge
Data Below Detection
mg/L
150
100
50
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004


Sacramento River at Colusa
Data Below Detection
mg/L
180
160
140
120
100
80
60
40
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

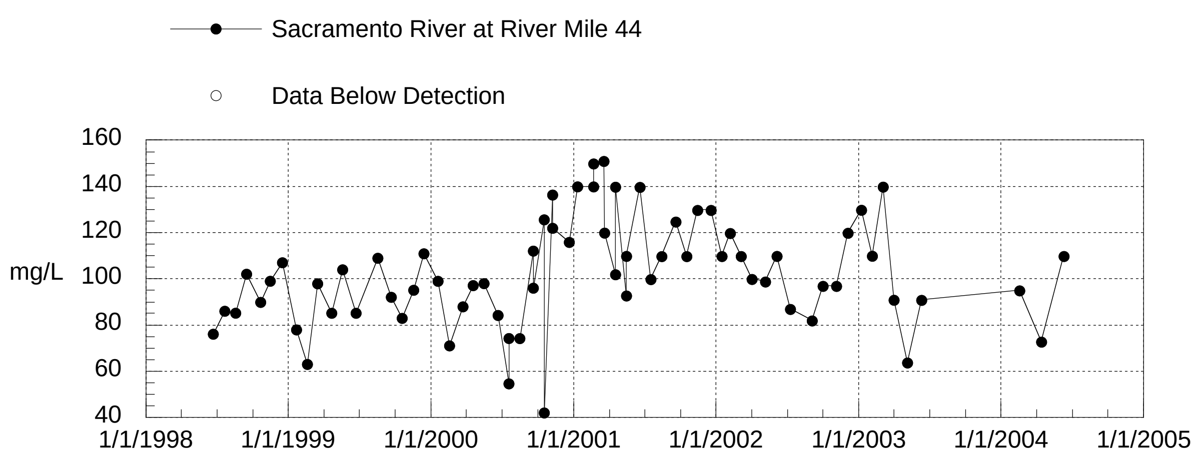

Sacramento River near Hamilton City
Data Below Detection
mg/L
160
140
120
100
80
60
40
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005



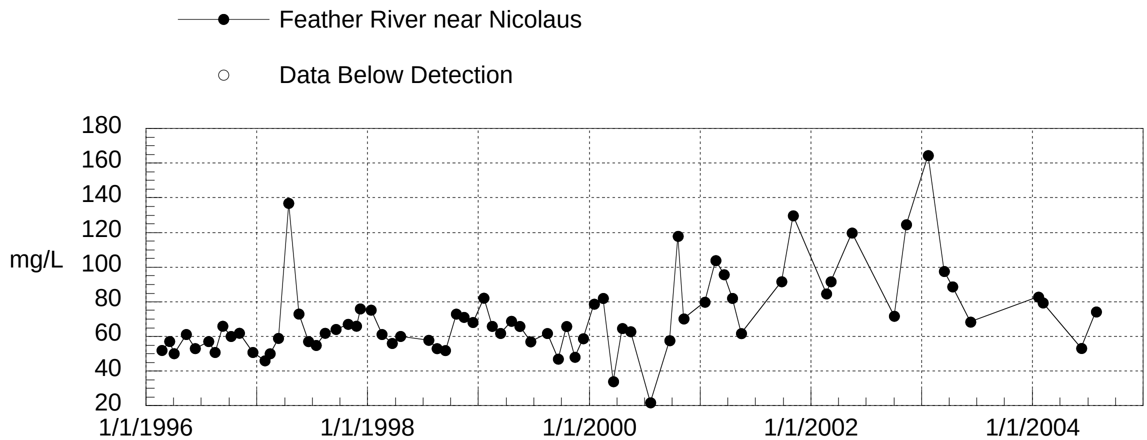
Sacramento River at Veterans Bridge
Data Below Detection
mg/L
200
150
100
50
0
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

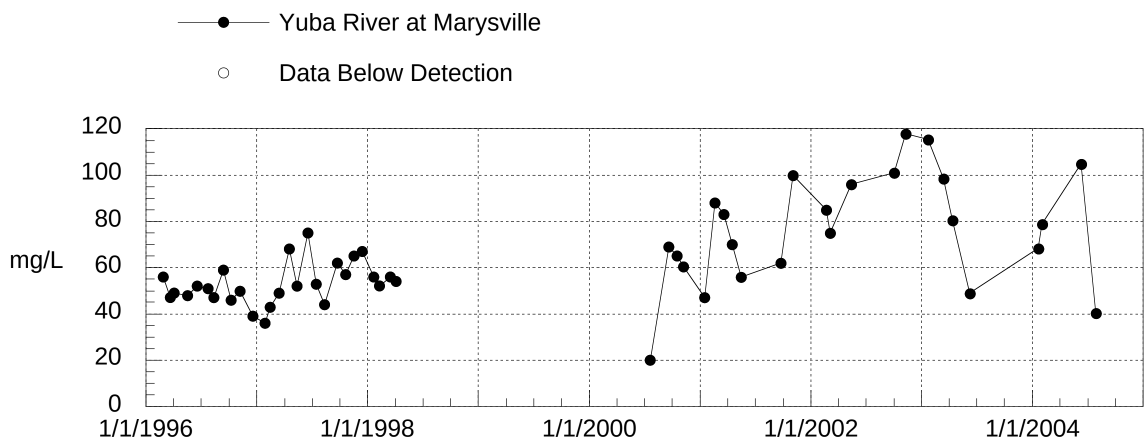


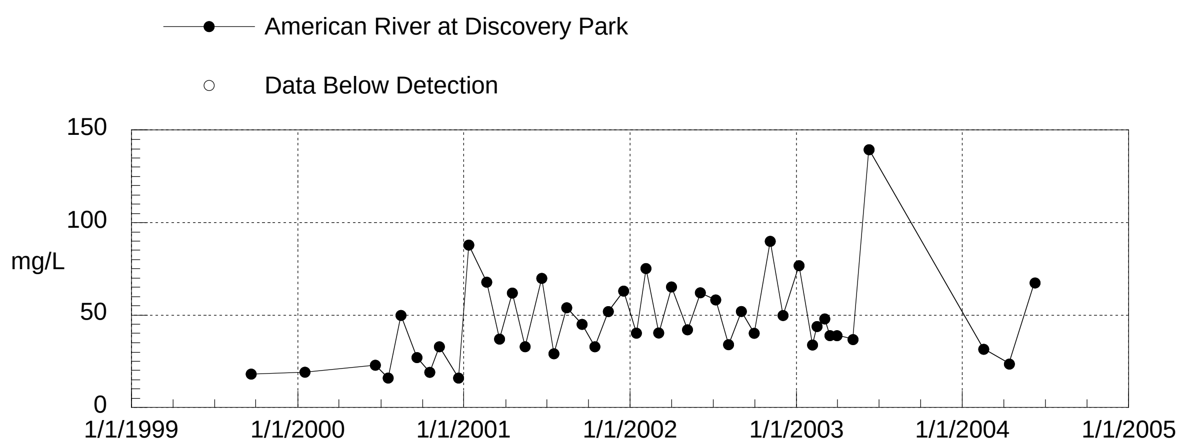
Sacramento River at Freeport
Data Below Detection
mg/L
160
140
120
100
80
60
40
20
0
1/1/1990
1/1/1992
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

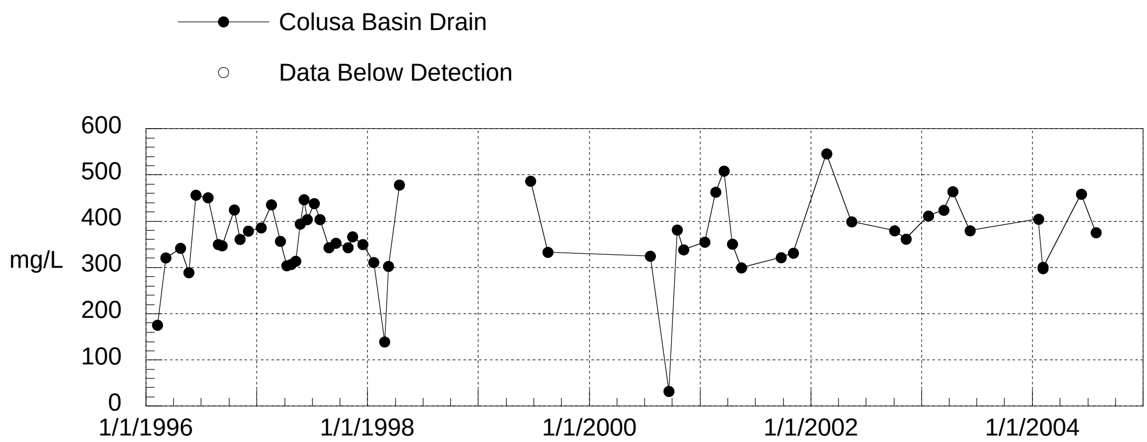


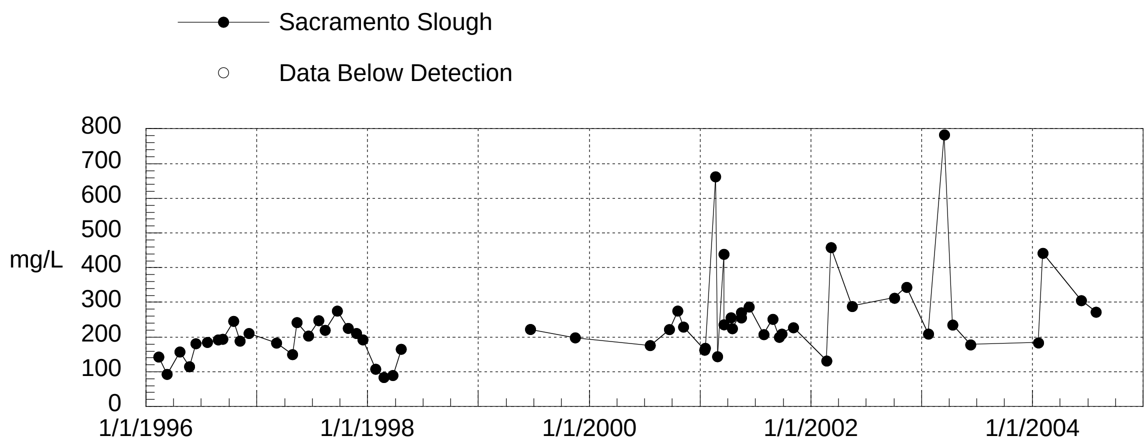
Sacramento River at River Mile 44
Data Below Detection
mg/L
160
140
120
100
80
60
40
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

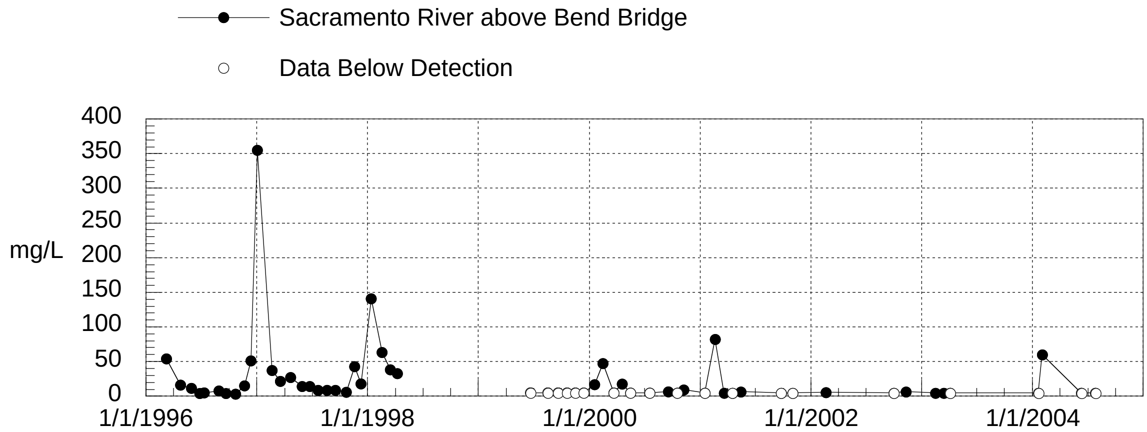

Feather River near Nicolaus
Data Below Detection
mg/L
180
160
140
120
100
80
60
40
20
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

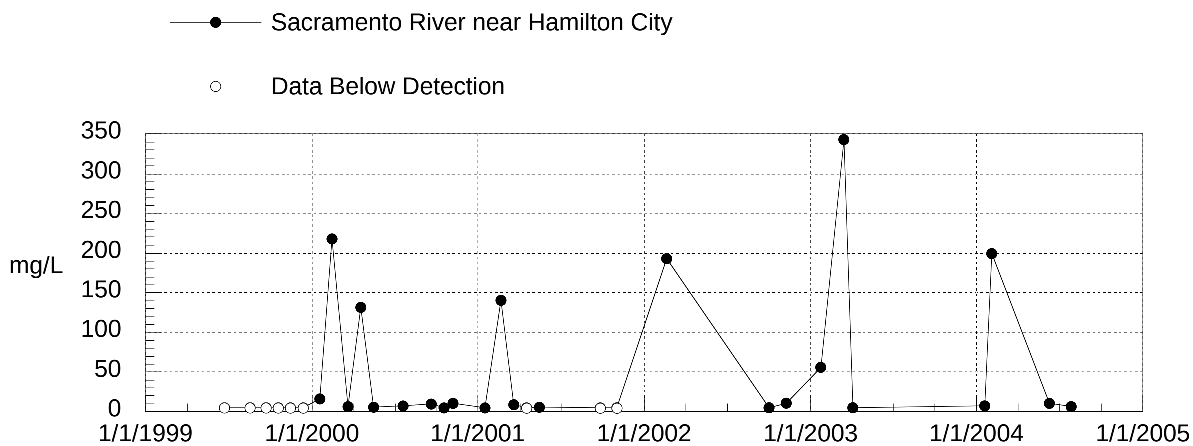

Yuba River at Marysville
Data Below Detection
mg/L
120
100
80
60
40
20
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

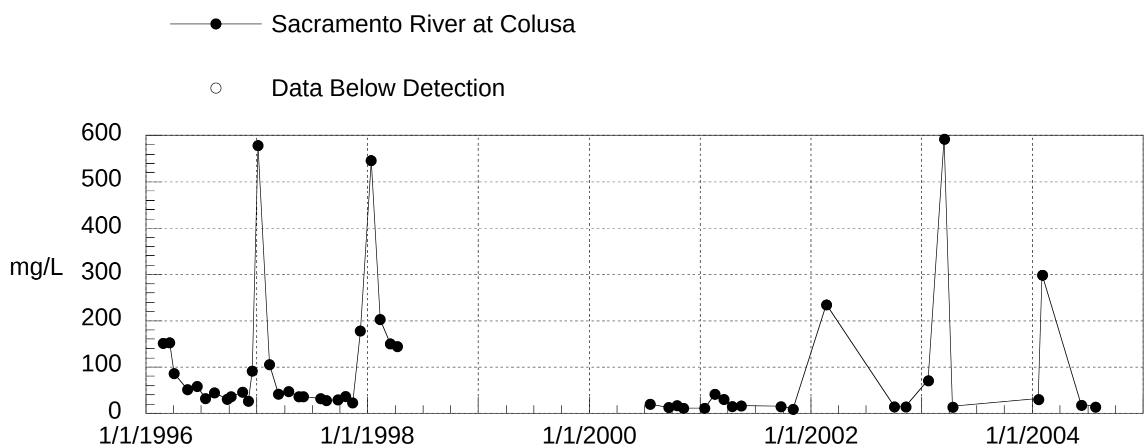

American River at Discovery Park
Data Below Detection
mg/L
150
100
50
0
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

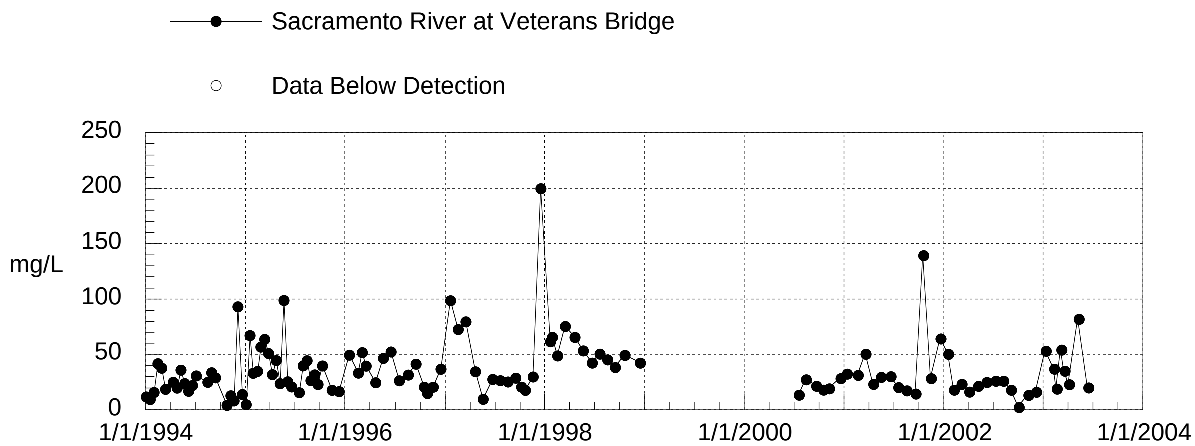

Colusa Basin Drain
Data Below Detection
mg/L
600
500
400
300
200
100
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

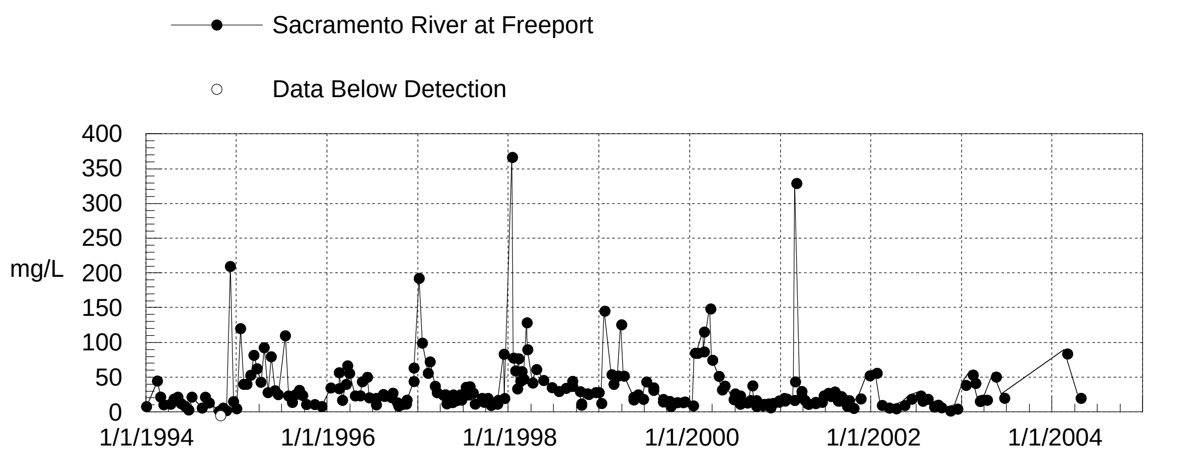

Sacramento Slough
Data Below Detection
mg/L
800
700
600
500
400
300
200
100
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

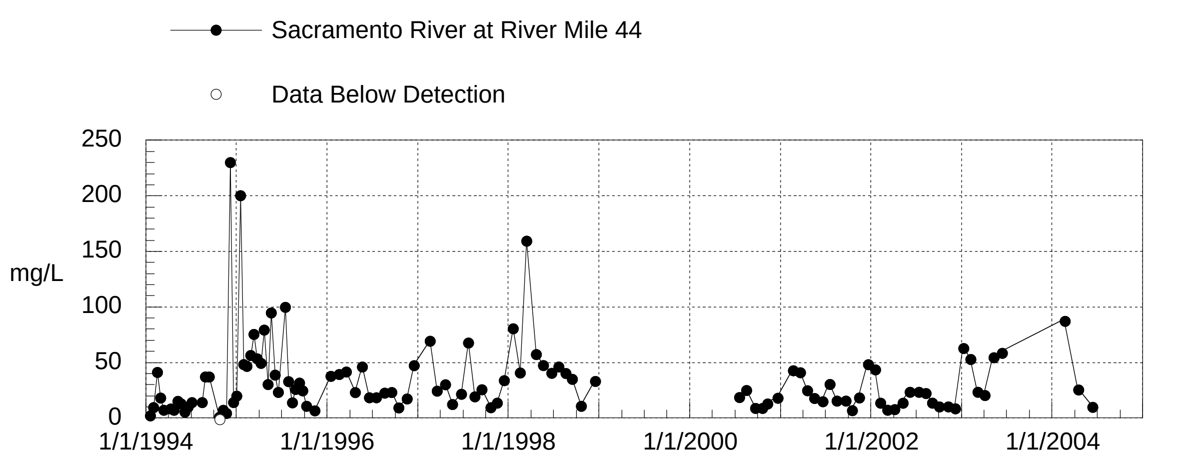

Sacramento River above Bend Bridge
Data Below Detection
mg/L
400
350
300
250
200
150
100
50
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

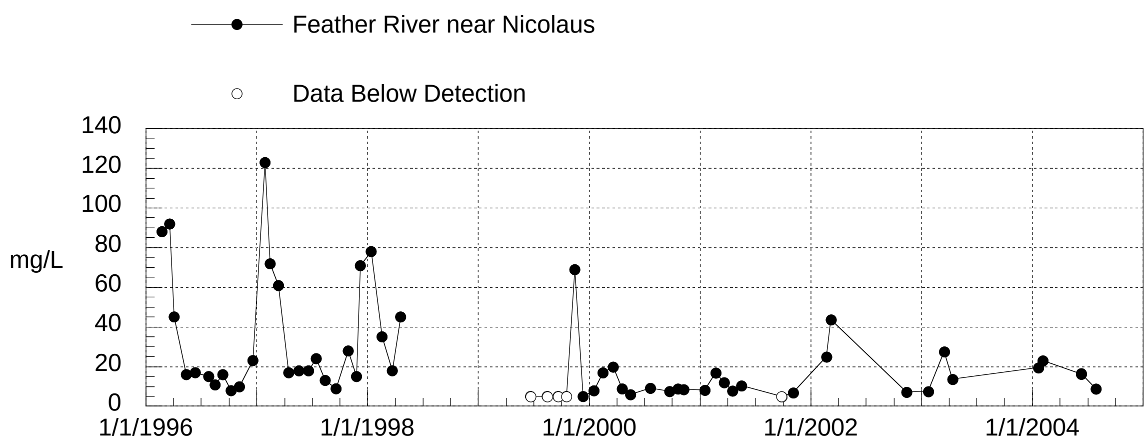

Sacramento River near Hamilton City
Data Below Detection
mg/L
350
300
250
200
150
100
50
0
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

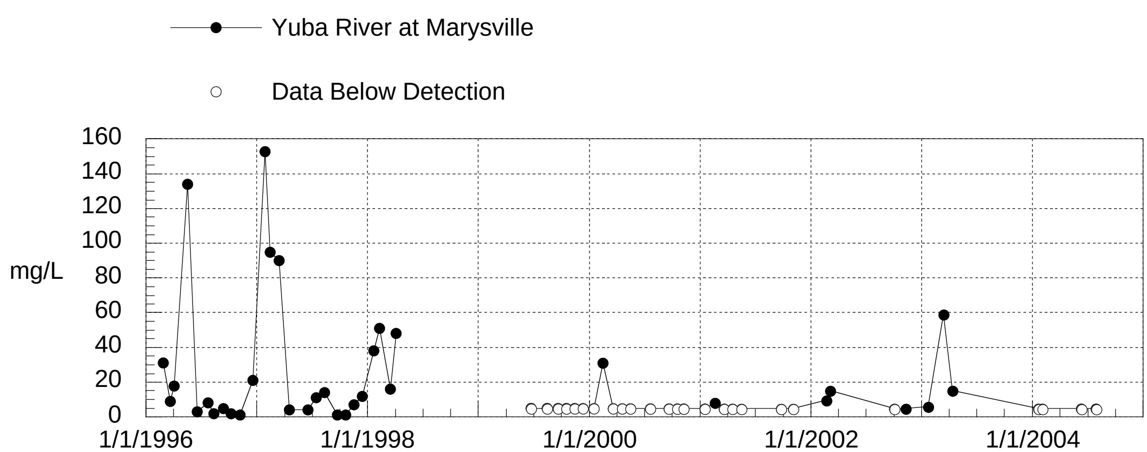

Sacramento River at Colusa
Data Below Detection
mg/L
600
500
400
300
200
100
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

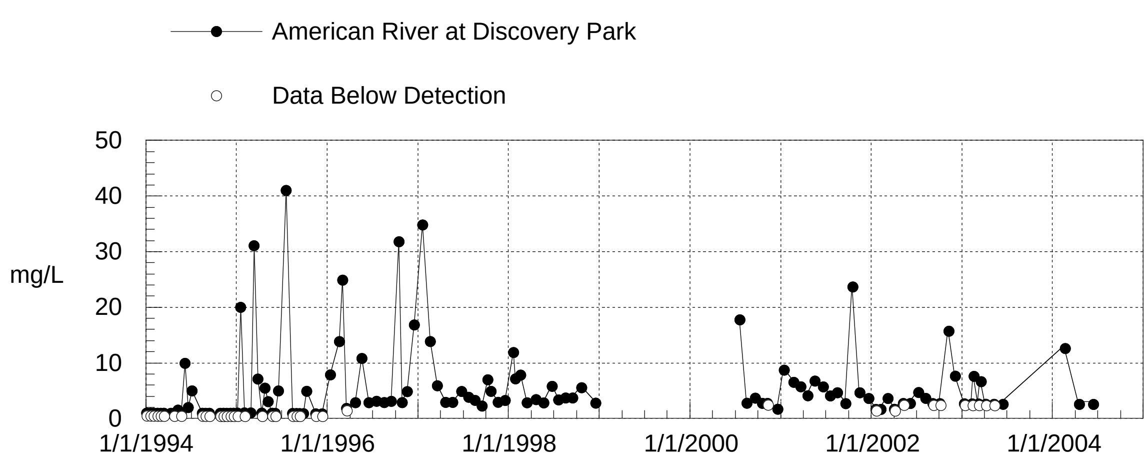

Sacramento River at Veterans Bridge
Data Below Detection
mg/L
250
200
150
100
50
0
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

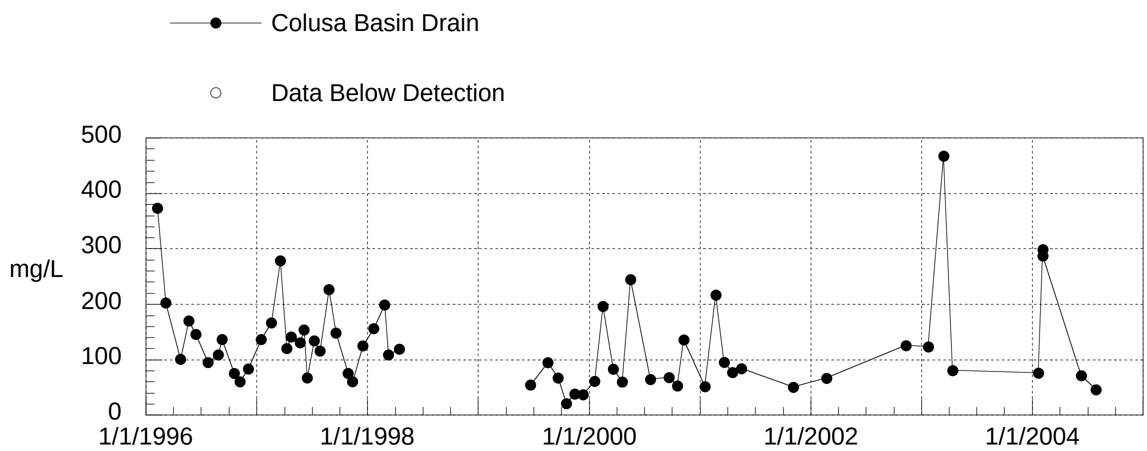

Sacramento River at Freeport
Data Below Detection
mg/L
400
350
300
250
200
150
100
50
0
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

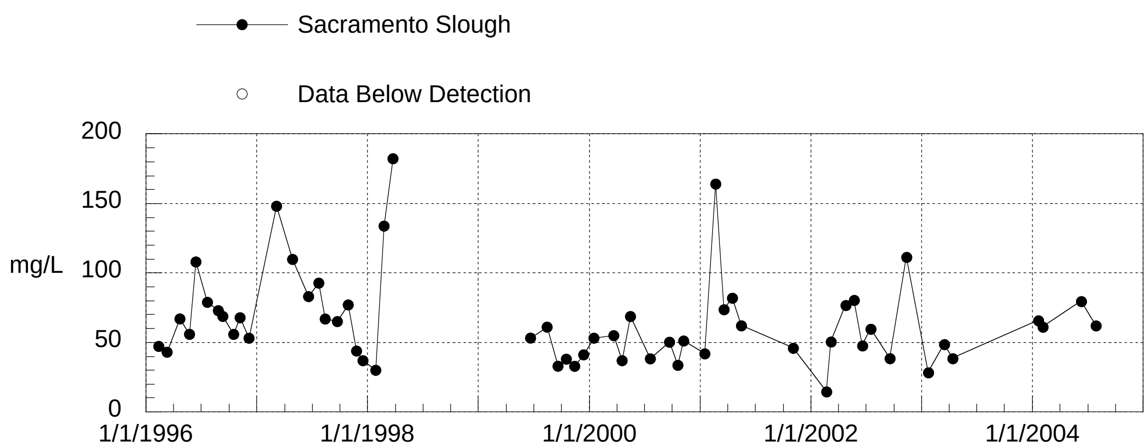

Sacramento River at River Mile 44
Data Below Detection
mg/L
250
200
150
100
50
0
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

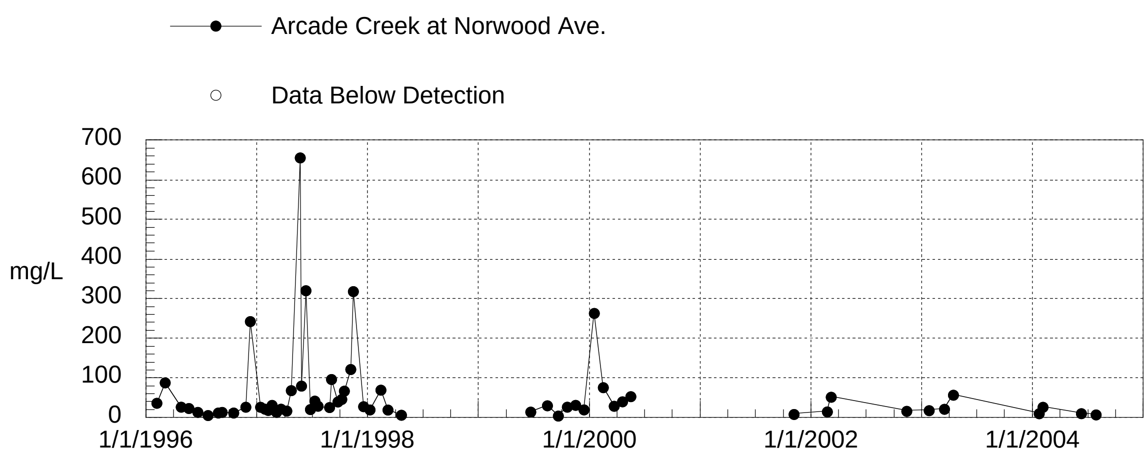

Feather River near Nicolaus
Data Below Detection
140
120
100
80
60
40
20
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

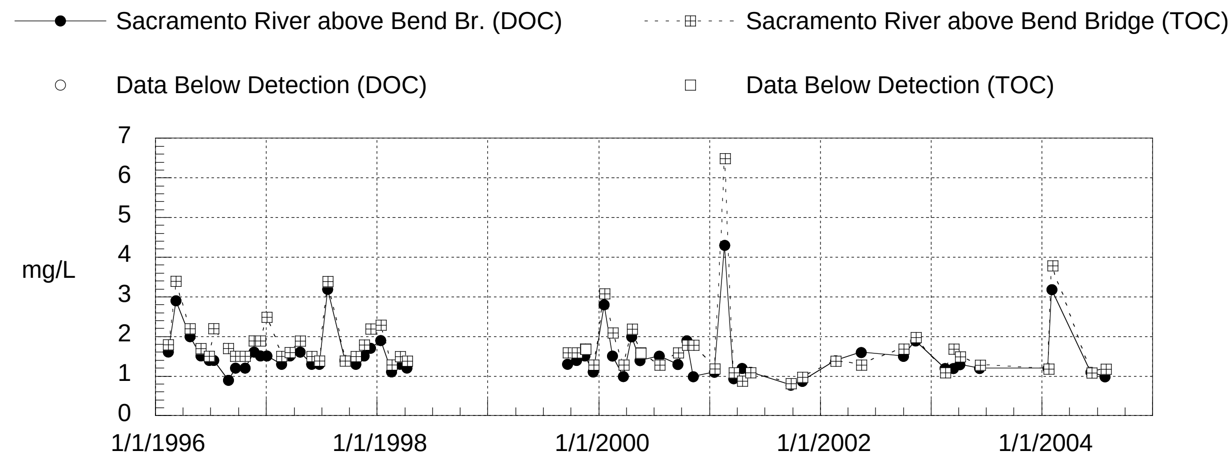

Yuba River at Marysville
Data Below Detection
160
140
120
100
80
60
40
20
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

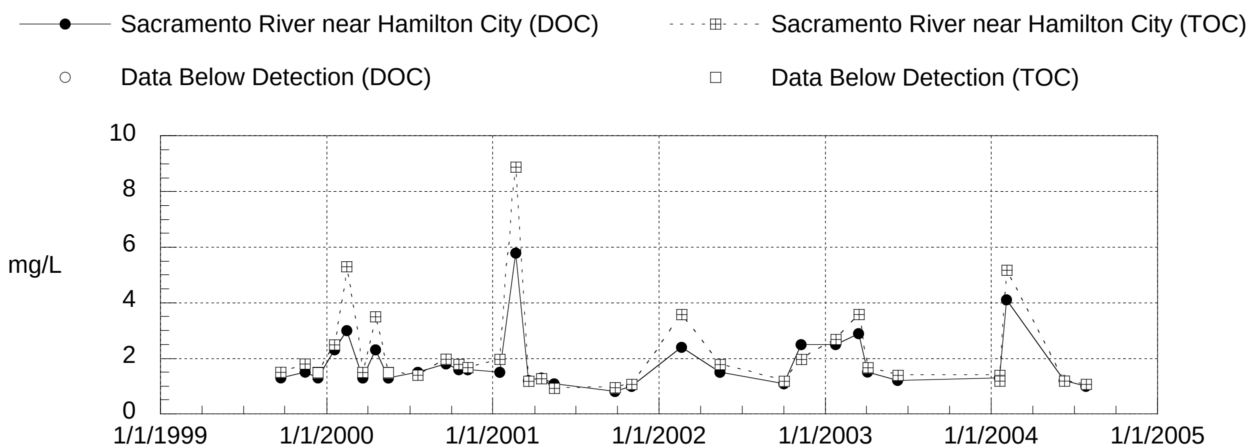

American River at Discovery Park
Data Below Detection
50
40
30
20
10
0
mg/L
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

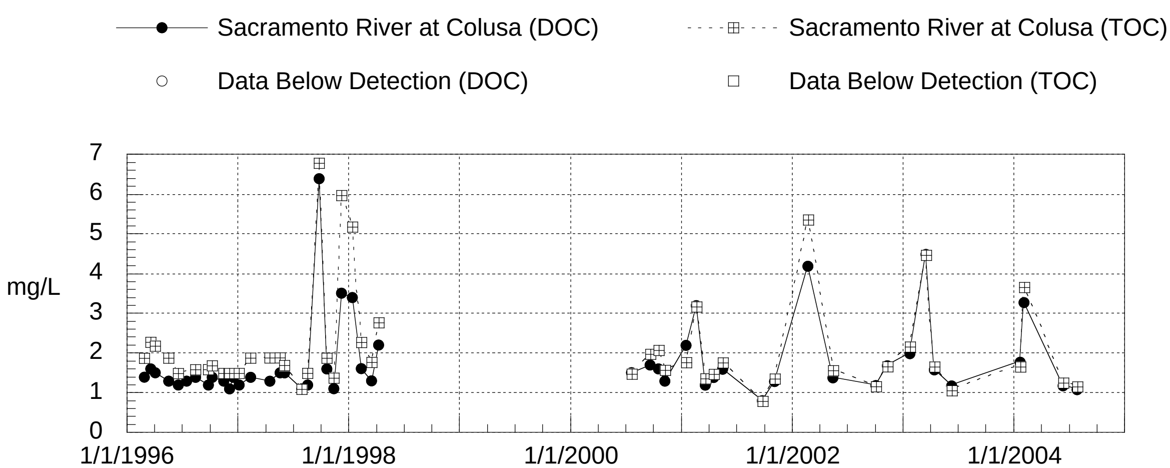

Colusa Basin Drain
Data Below Detection
500
400
300
200
100
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

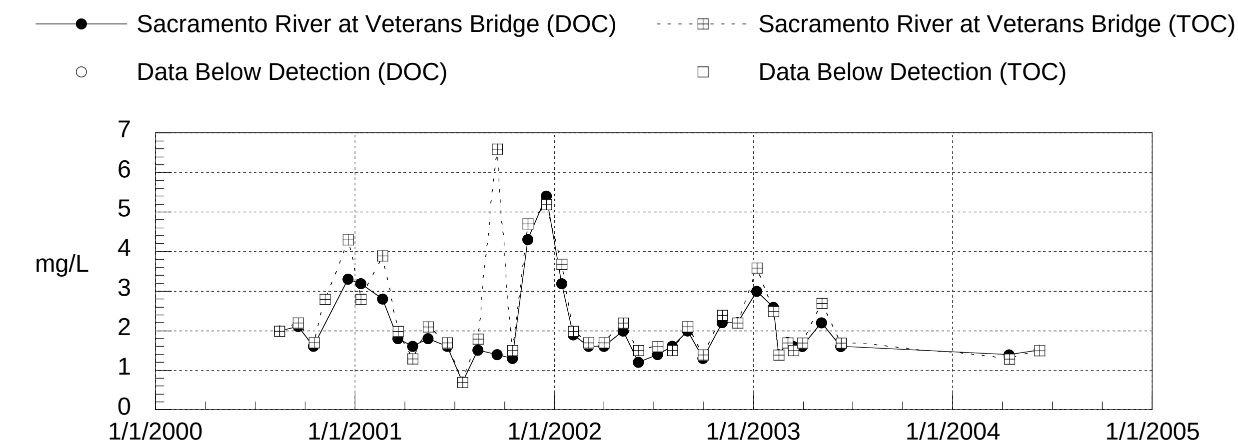

Sacramento Slough
Data Below Detection
200
150
100
50
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

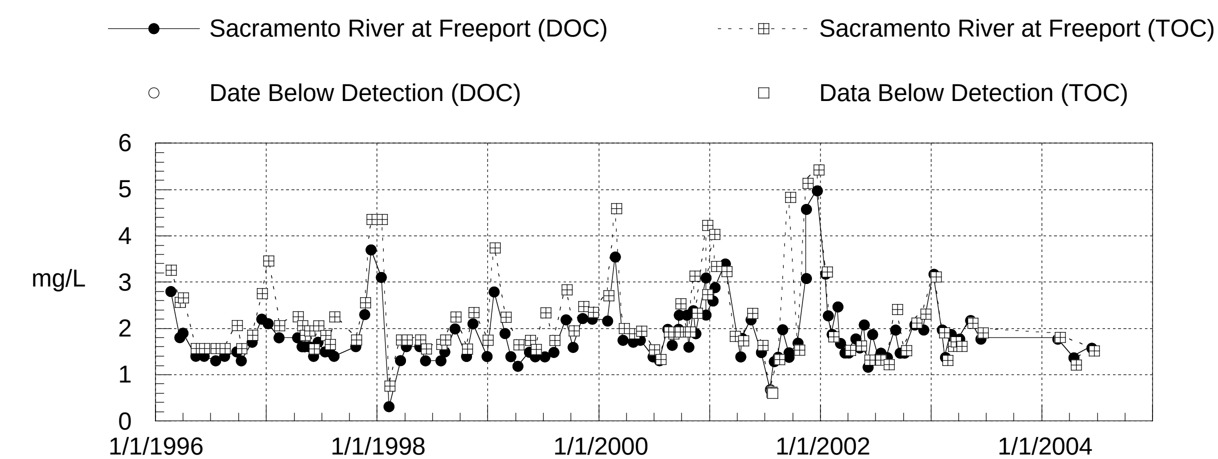

Arcade Creek at Norwood Ave.
Data Below Detection
700
600
500
400
300
200
100
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

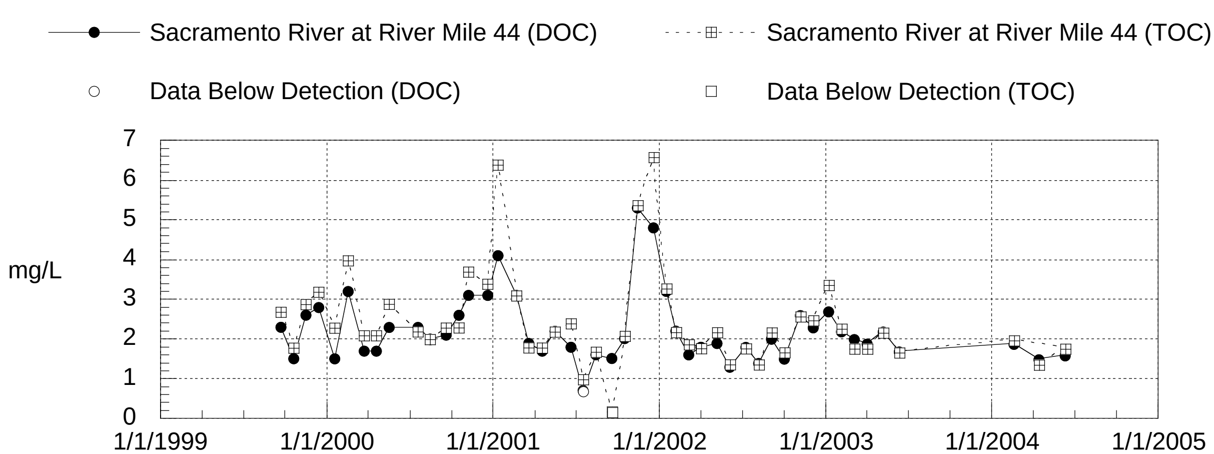

Sacramento River above Bend Br. (DOC)
Sacramento River above Bend Bridge (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
mg/L
0
1
2
3
4
5
6
7
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

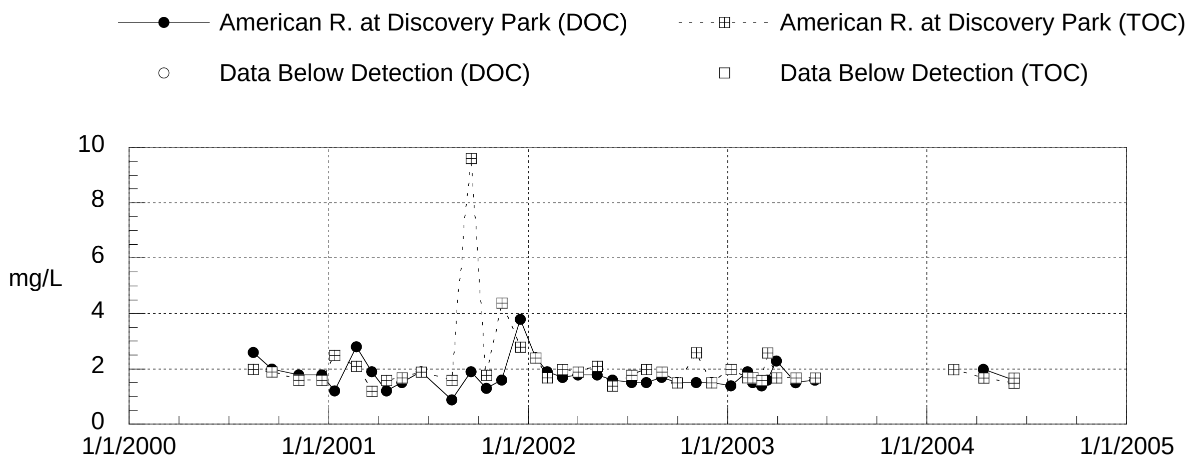

Sacramento River near Hamilton City (DOC)
Sacramento River near Hamilton City (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
mg/L
0
2
4
6
8
10
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

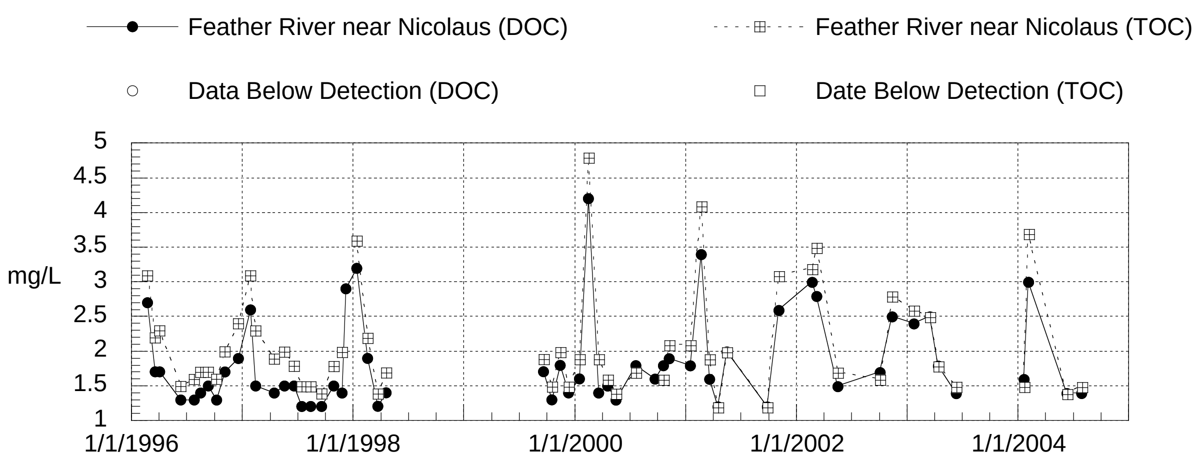

Sacramento River at Colusa (DOC)
Sacramento River at Colusa (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
mg/L
0
1
2
3
4
5
6
7
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

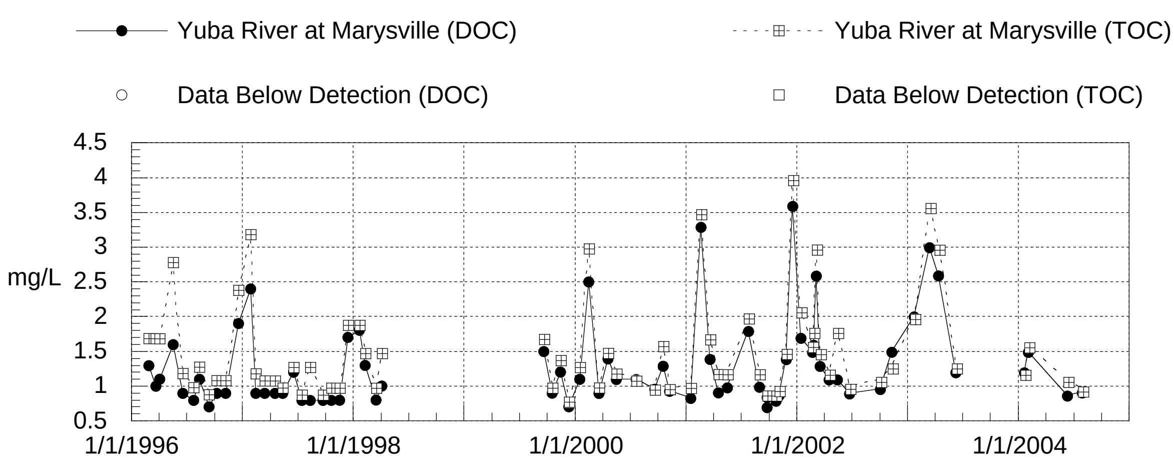

Sacramento River at Veterans Bridge (DOC)
Sacramento River at Veterans Bridge (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
mg/L
0
1
2
3
4
5
6
7
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

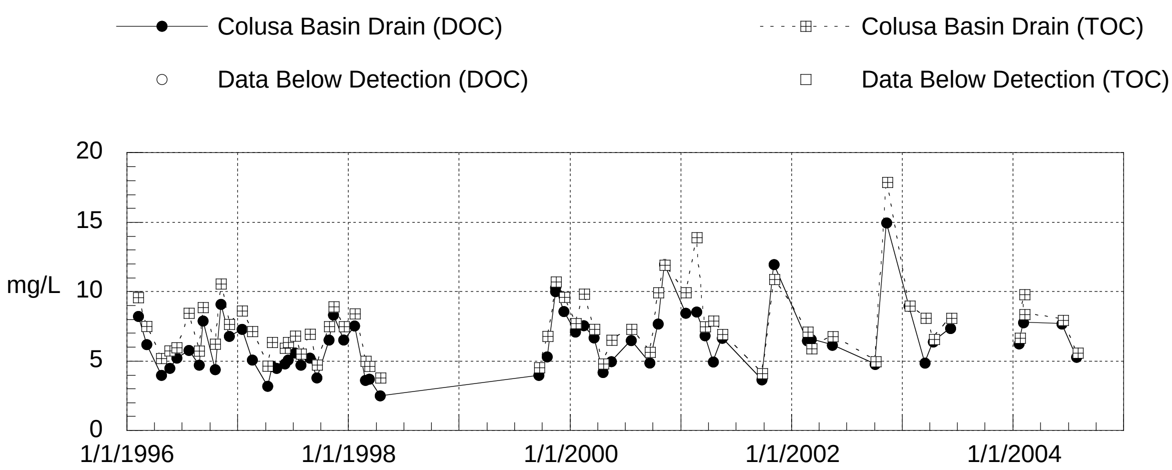

Sacramento River at Freeport (DOC)
Sacramento River at Freeport (TOC)
Date Below Detection (DOC)
Data Below Detection (TOC)
mg/L
0
1
2
3
4
5
6
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

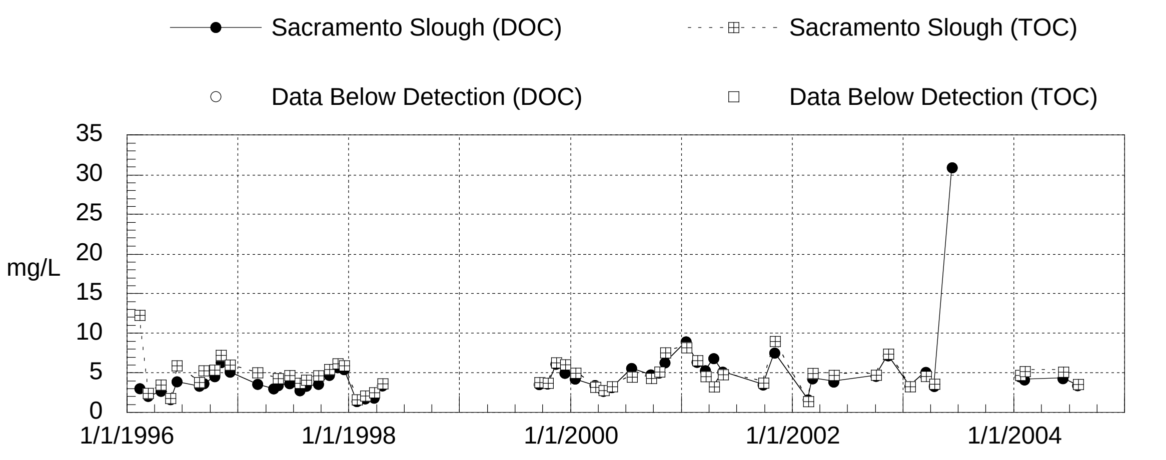

Sacramento River at River Mile 44 (DOC)
Sacramento River at River Mile 44 (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
mg/L
0
1
2
3
4
5
6
7
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

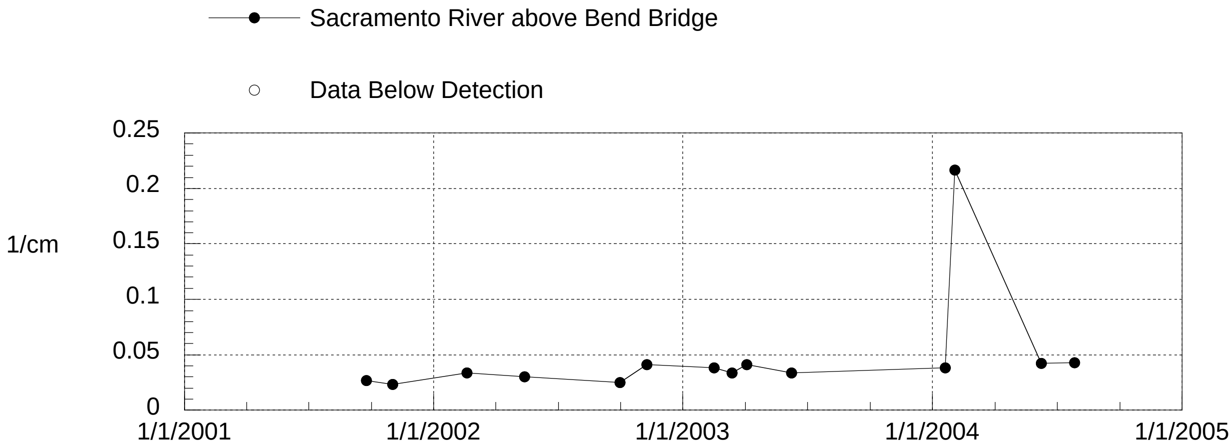

American R. at Discovery Park (DOC)
American R. at Discovery Park (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
mg/L
10
8
6
4
2
0
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Feather River near Nicolaus (DOC)
Feather River near Nicolaus (TOC)
Data Below Detection (DOC)
Date Below Detection (TOC)
mg/L
5
4.5
4
3.5
3
2.5
2
1.5
1
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

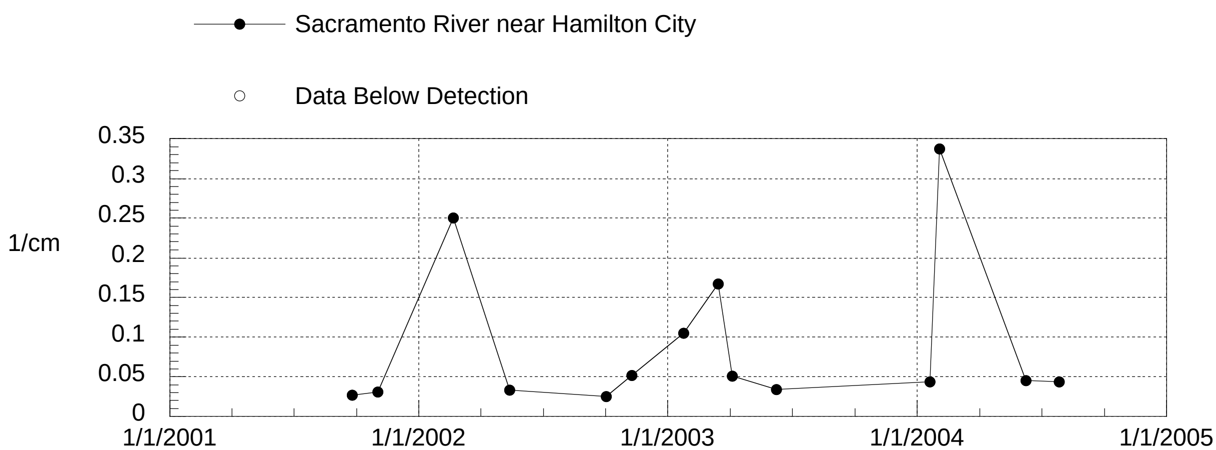

Yuba River at Marysville (DOC)
Yuba River at Marysville (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
mg/L
4.5
4
3.5
3
2.5
2
1.5
1
0.5
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004


Colusa Basin Drain (DOC)
Colusa Basin Drain (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
20
15
10
5
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

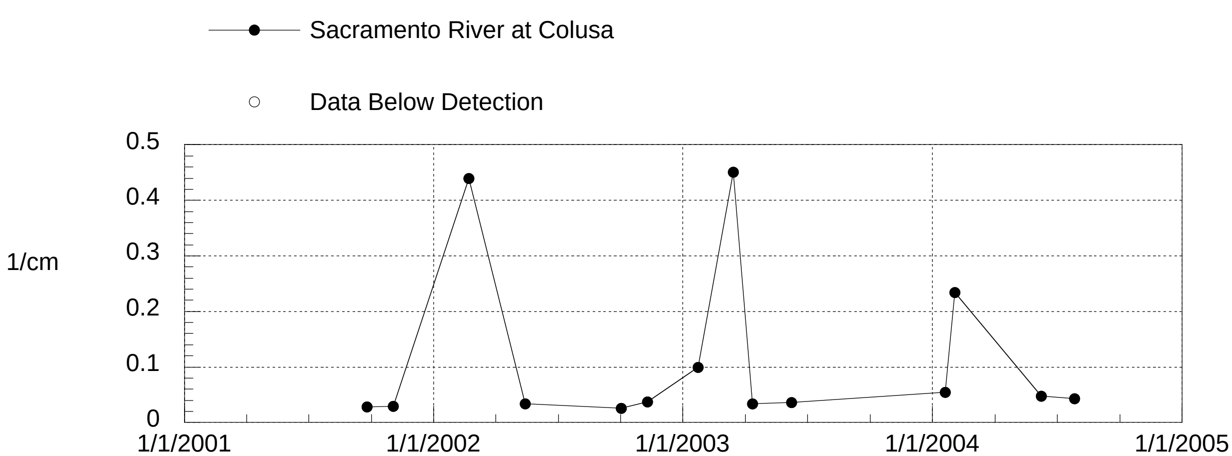

Sacramento Slough (DOC)
Sacramento Slough (TOC)
Data Below Detection (DOC)
Data Below Detection (TOC)
35
30
25
20
15
10
5
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004



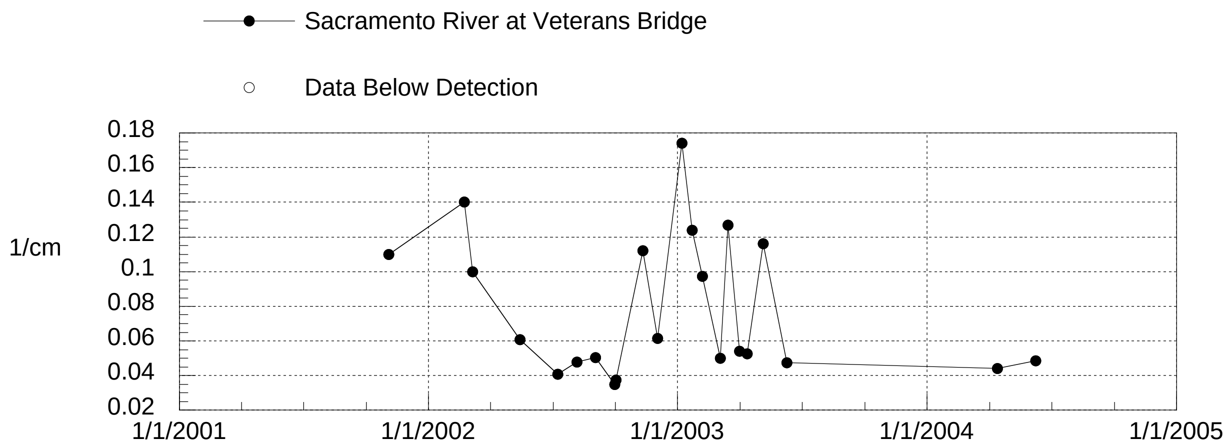
Sacramento River above Bend Bridge
Data Below Detection
1/cm
0.25
0.2
0.15
0.1
0.05
0
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

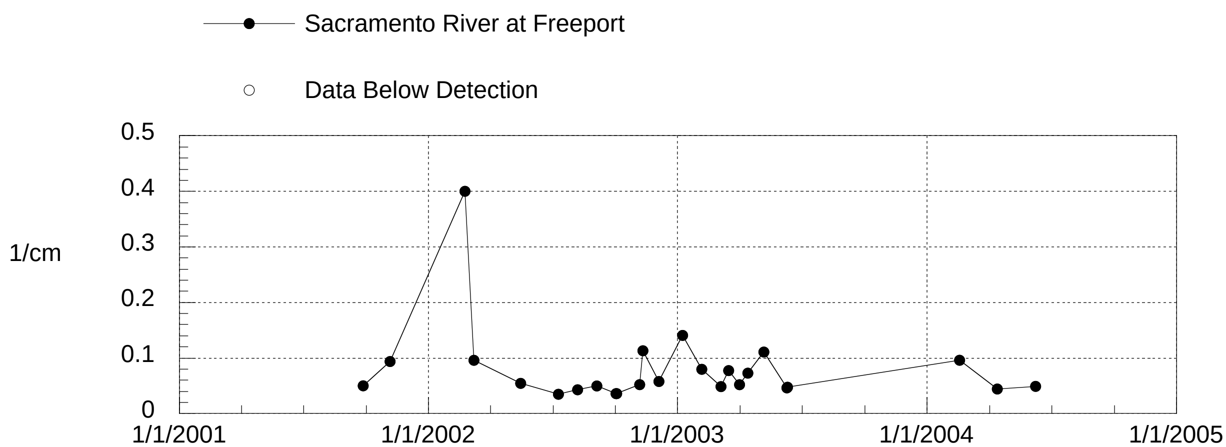


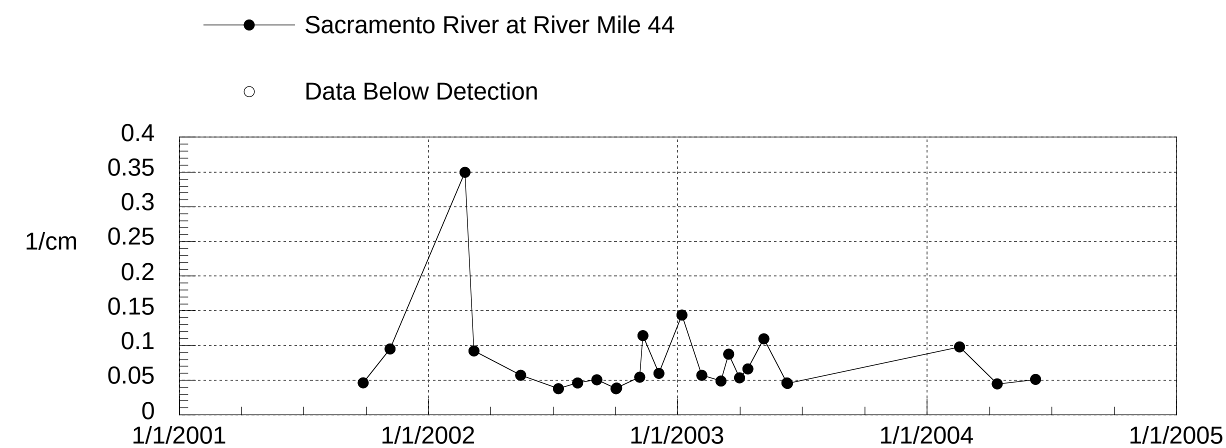
Sacramento River near Hamilton City
Data Below Detection
1/cm
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

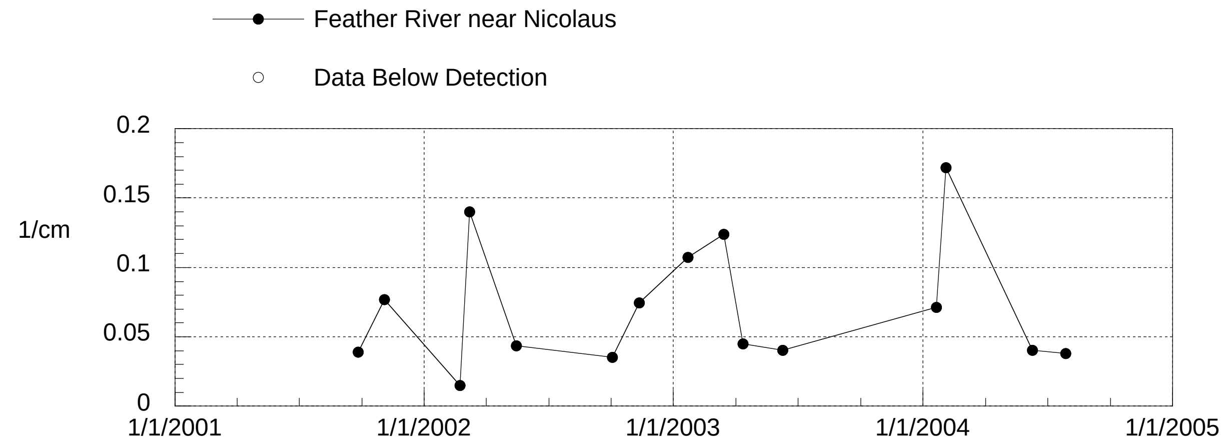


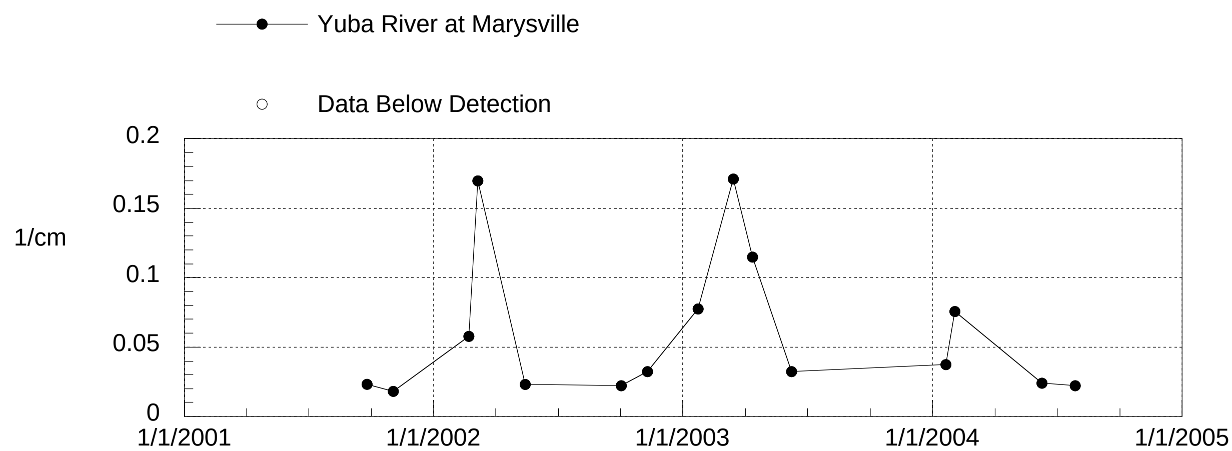
Sacramento River at Colusa
Data Below Detection
1/cm
0.5
0.4
0.3
0.2
0.1
0
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

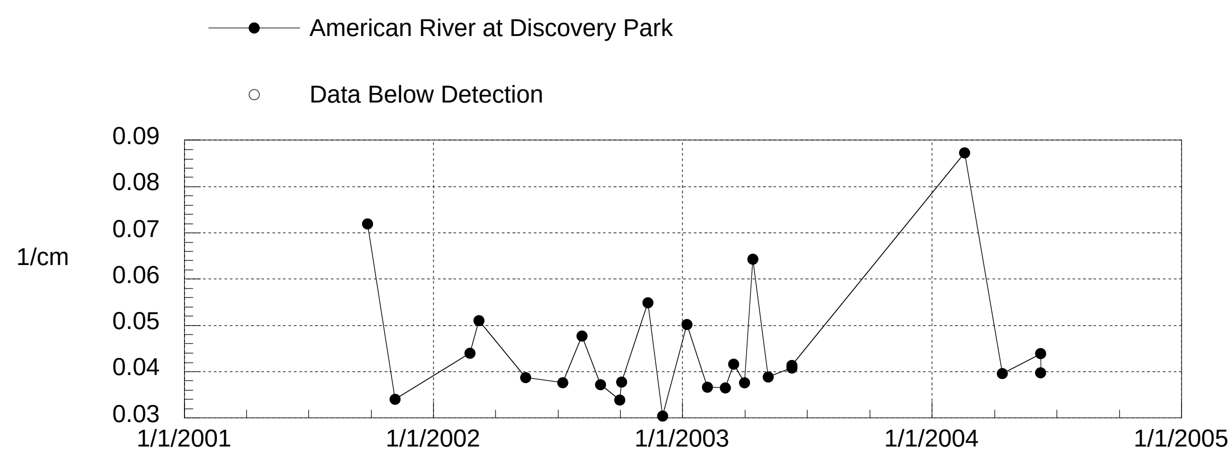

Sacramento River at Veterans Bridge
Data Below Detection
1/cm
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

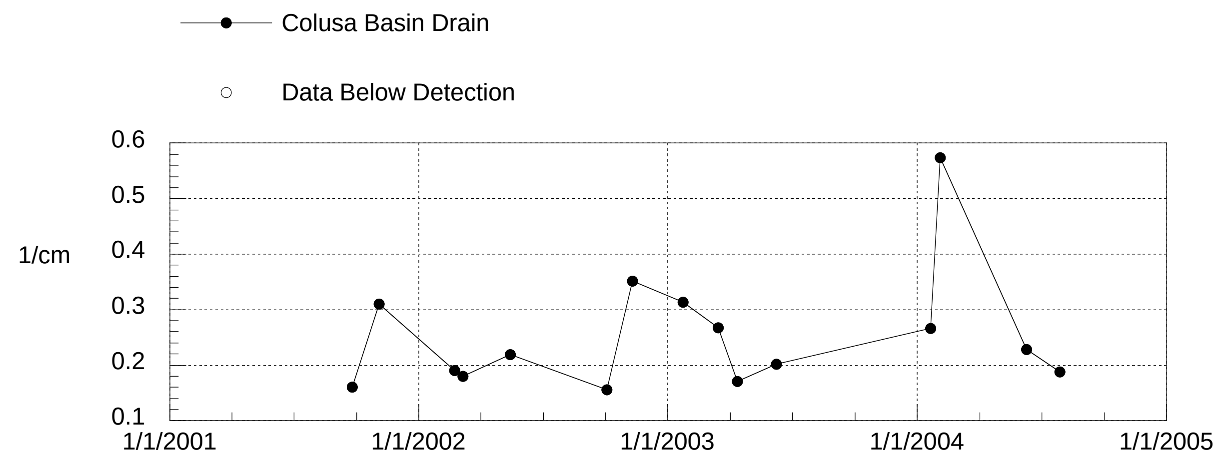

Sacramento River at Freeport
Data Below Detection
1/cm
0.5
0.4
0.3
0.2
0.1
0
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Sacramento River at River Mile 44
Data Below Detection
1/cm
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

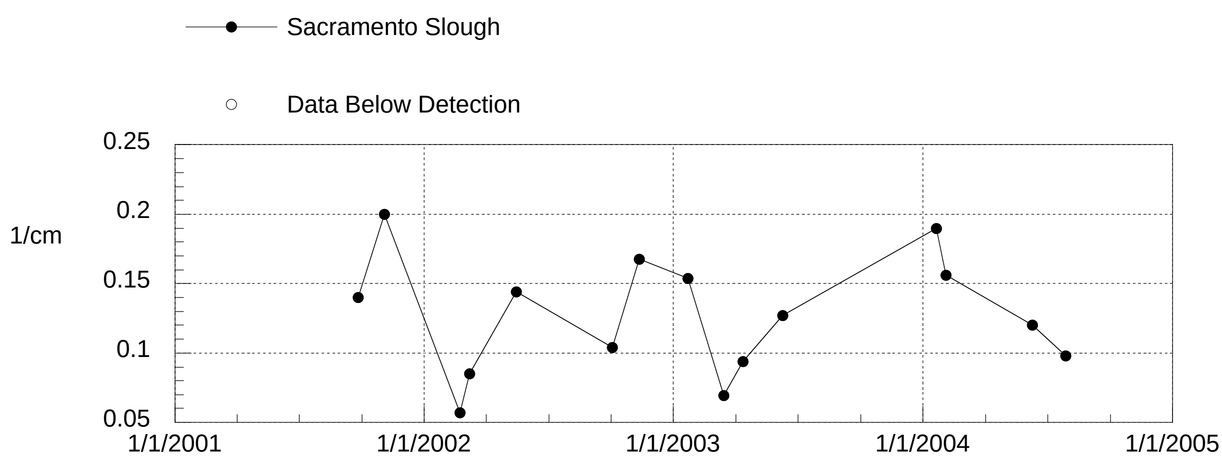

Feather River near Nicolaus
Data Below Detection
0.2
0.15
0.1
0.05
0
1/cm
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Yuba River at Marysville
Data Below Detection
0.2
0.15
0.1
0.05
0
1/cm
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

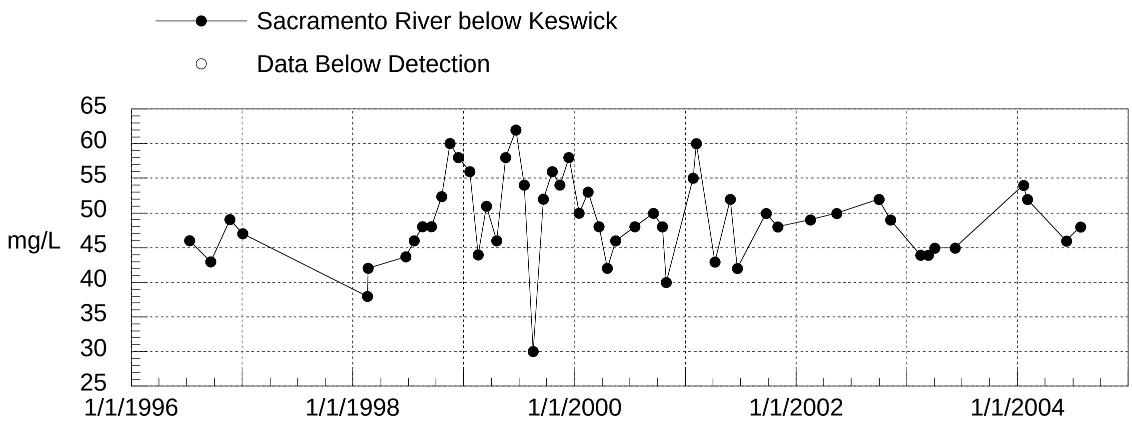

American River at Discovery Park
Data Below Detection
0.09
0.08
0.07
0.06
0.05
0.04
0.03
1/cm
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

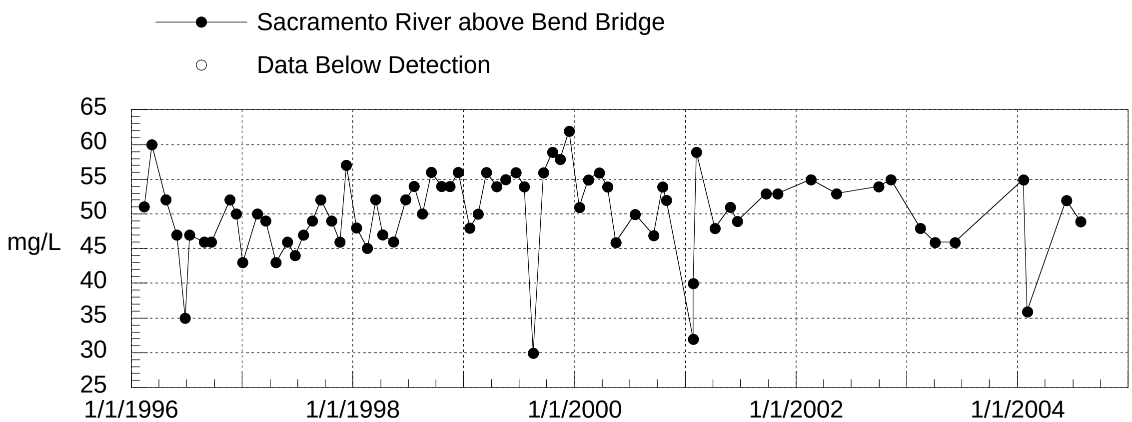


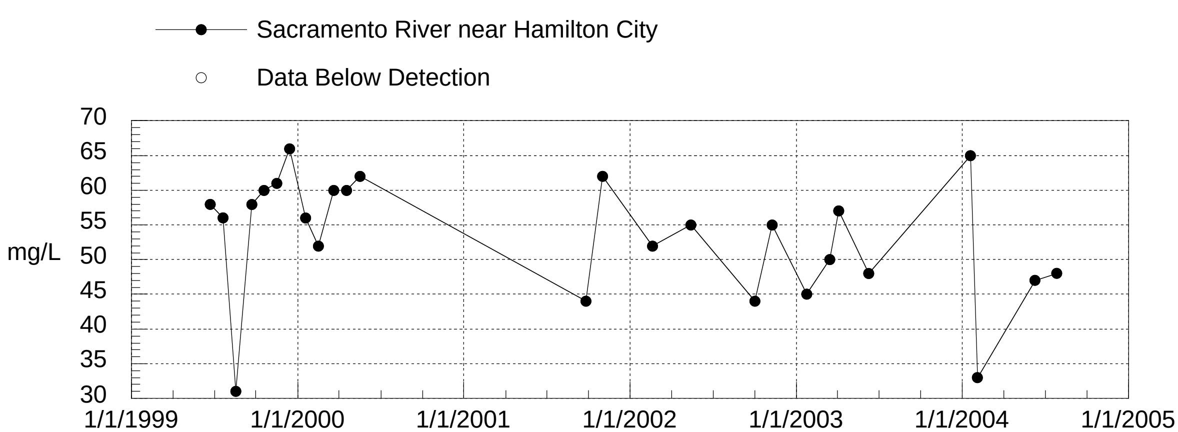
Colusa Basin Drain
Data Below Detection
1/cm
0.6
0.5
0.4
0.3
0.2
0.1
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

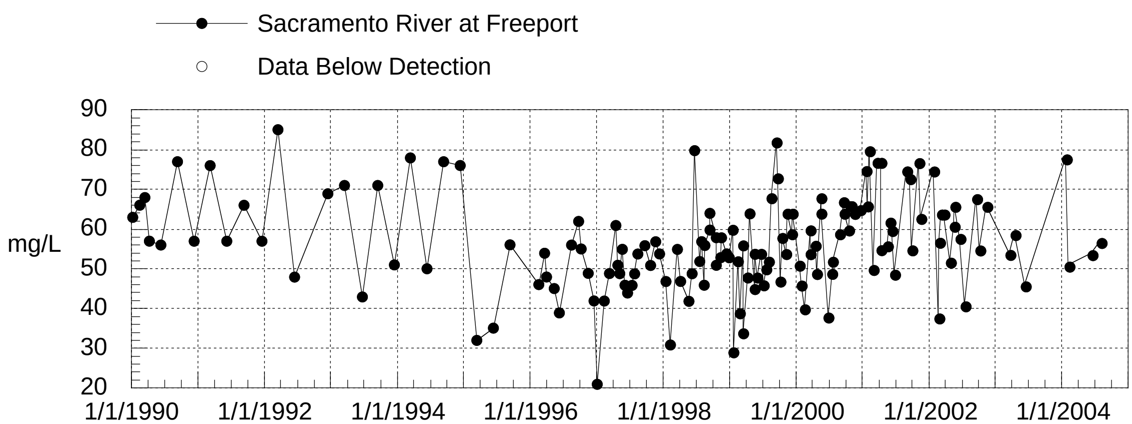


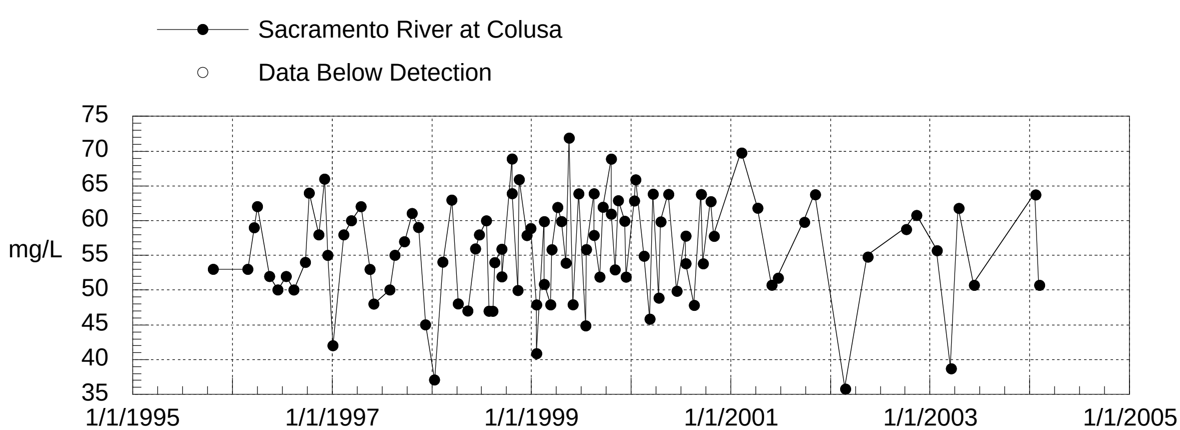
Sacramento Slough
Data Below Detection
1/cm
0.25
0.2
0.15
0.1
0.05
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

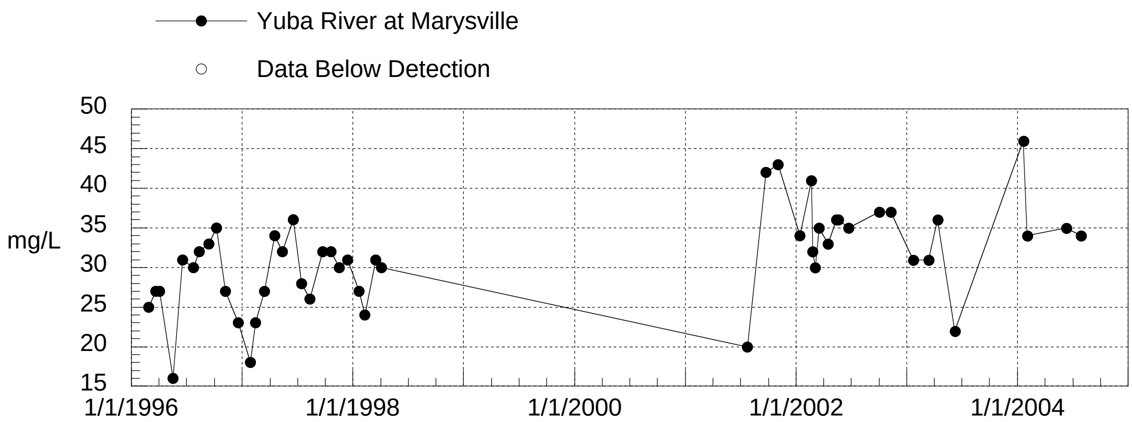

Sacramento River below Keswick
Data Below Detection
mg/L
65
60
55
50
45
40
35
30
25
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

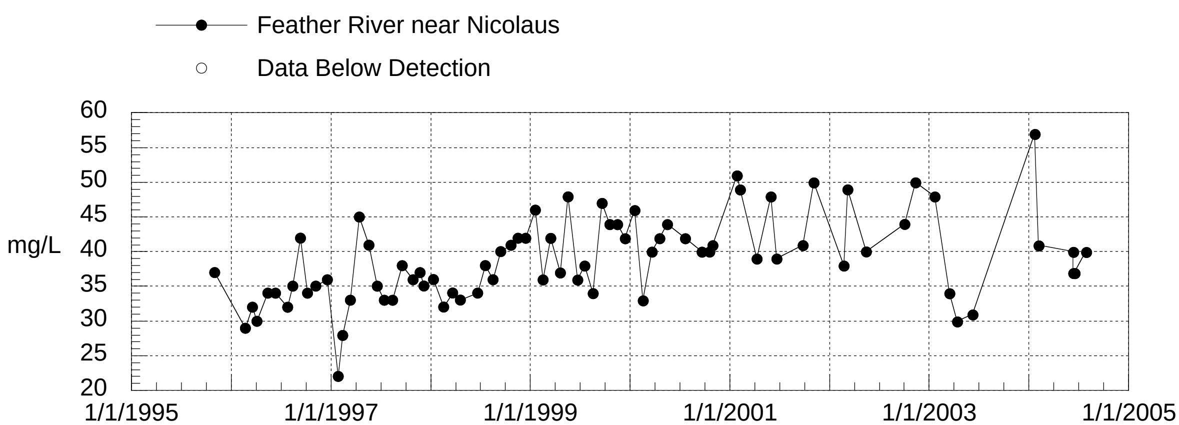

Sacramento River above Bend Bridge
Data Below Detection
mg/L
65
60
55
50
45
40
35
30
25
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

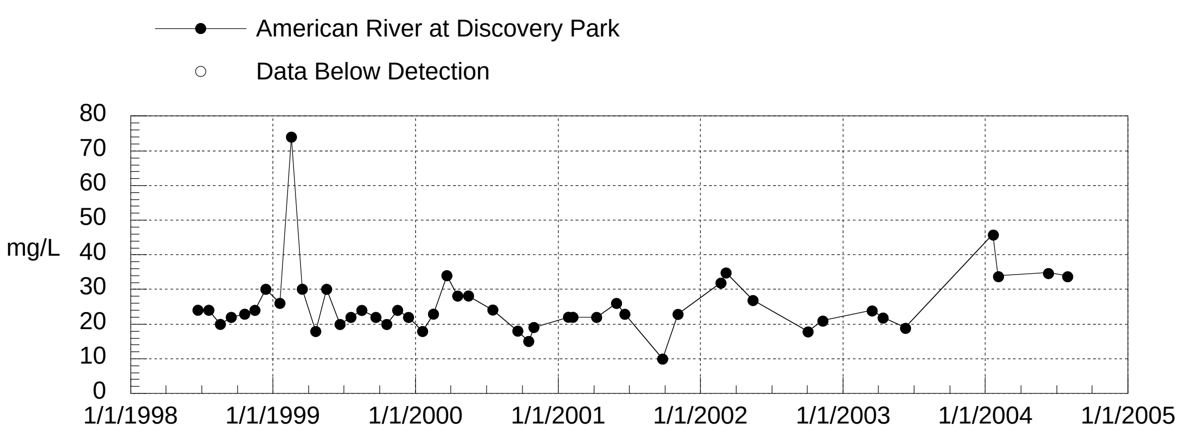

Sacramento River near Hamilton City
Data Below Detection
mg/L
70
65
60
55
50
45
40
35
30
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

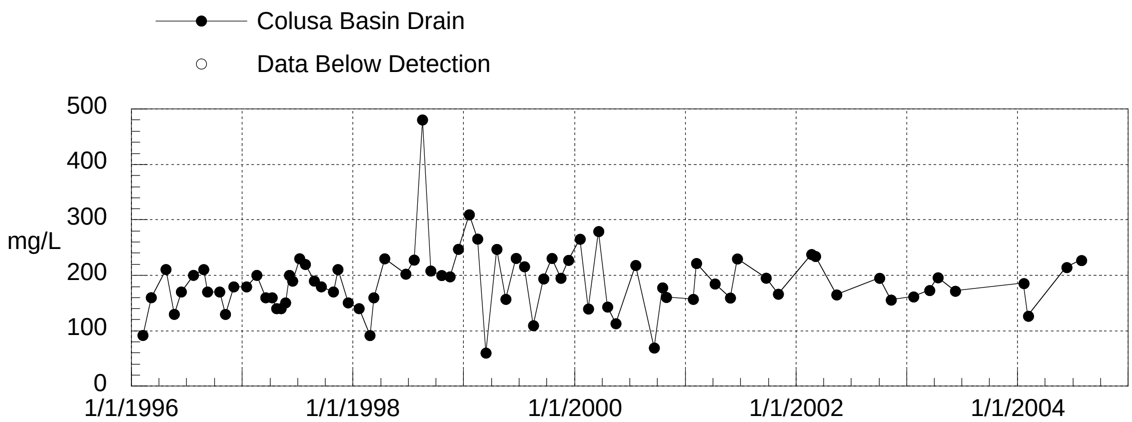

Sacramento River at Freeport
Data Below Detection
90
80
70
60
50
40
30
20
mg/L
1/1/1990
1/1/1992
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

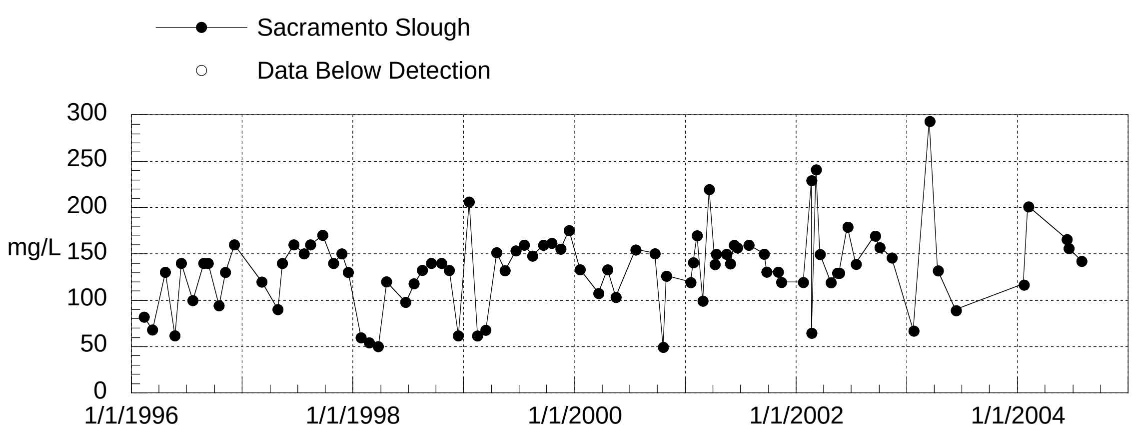

Sacramento River at Colusa
Data Below Detection
75
70
65
60
55
50
45
40
35
mg/L
1/1/1995
1/1/1997
1/1/1999
1/1/2001
1/1/2003
1/1/2005

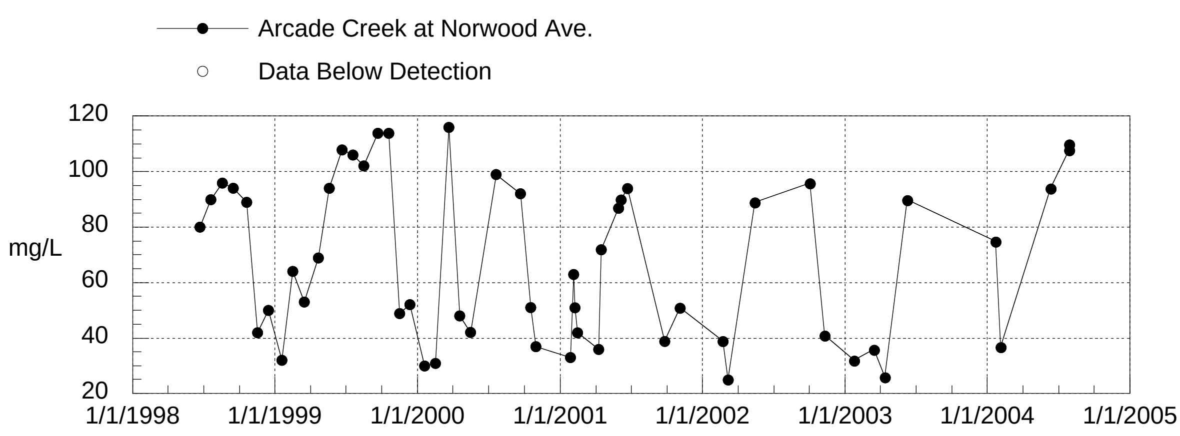

Yuba River at Marysville
Data Below Detection
mg/L
50
45
40
35
30
25
20
15
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

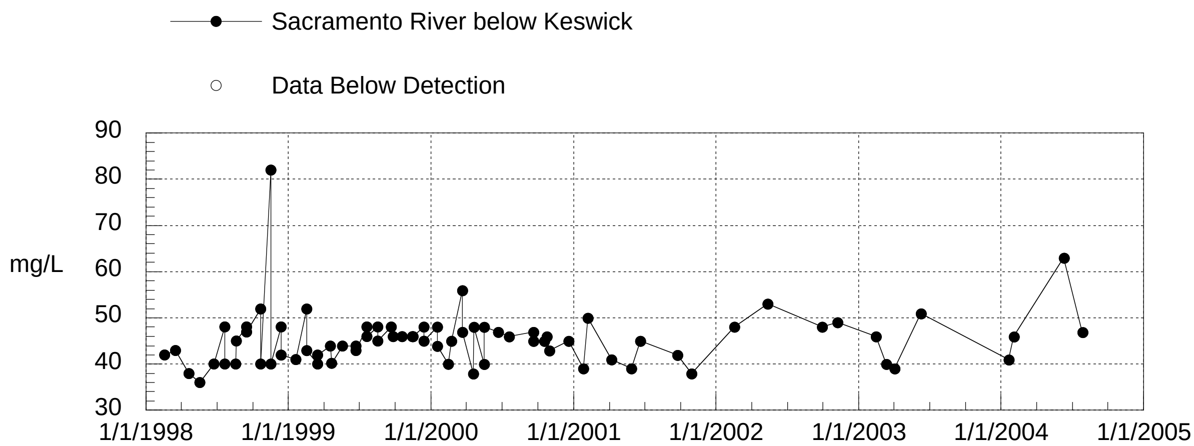

Feather River near Nicolaus
Data Below Detection
mg/L
60
55
50
45
40
35
30
25
20
1/1/1995
1/1/1997
1/1/1999
1/1/2001
1/1/2003
1/1/2005

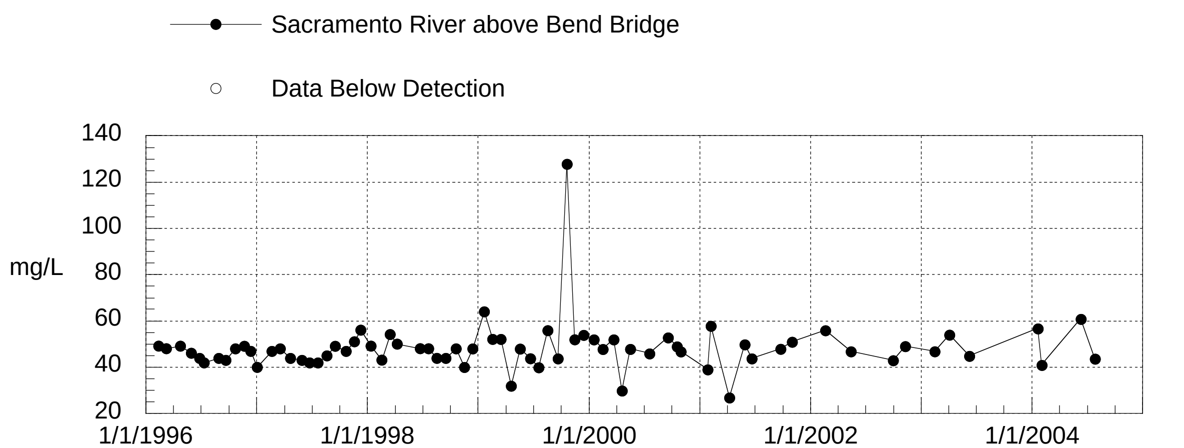

American River at Discovery Park
Data Below Detection
mg/L
80
70
60
50
40
30
20
10
0
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

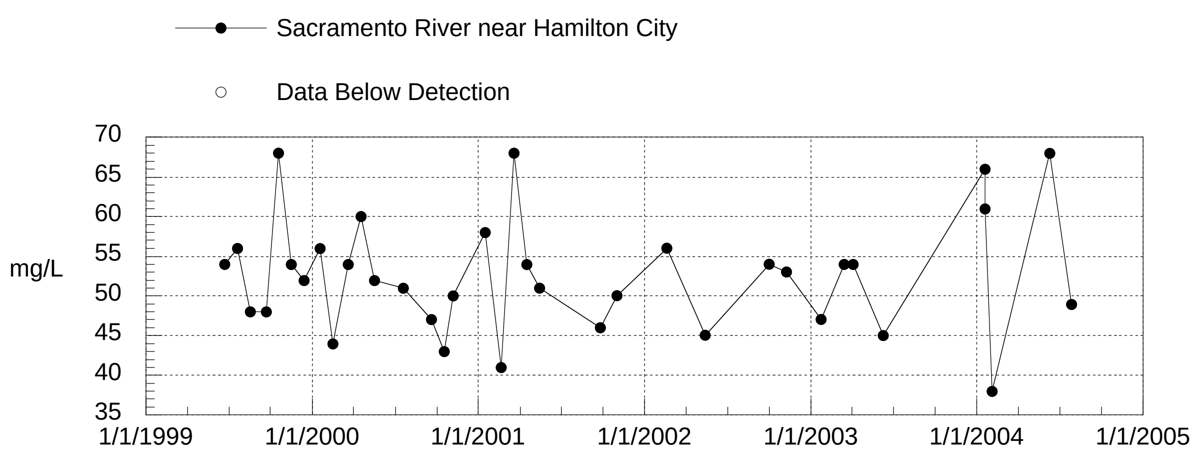

Colusa Basin Drain
Data Below Detection
500
400
300
200
100
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

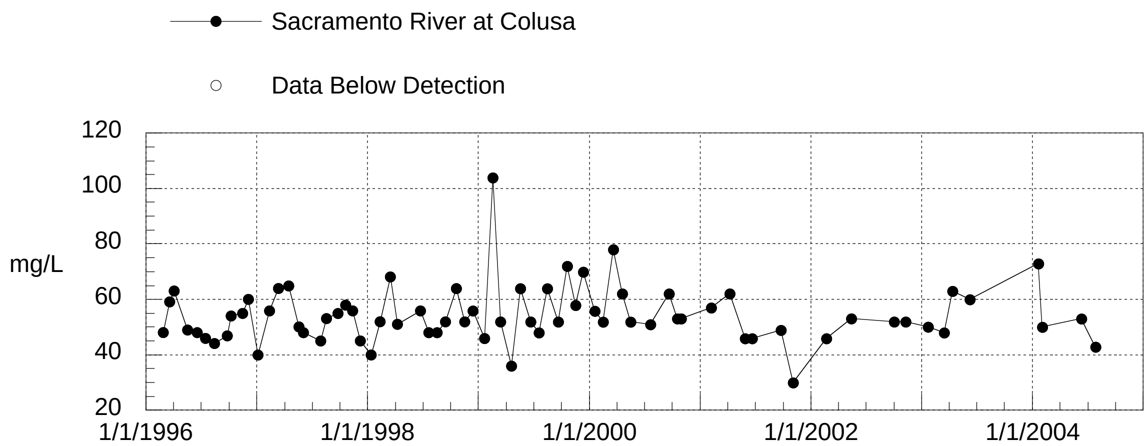

Sacramento Slough
Data Below Detection
300
250
200
150
100
50
0
mg/L
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

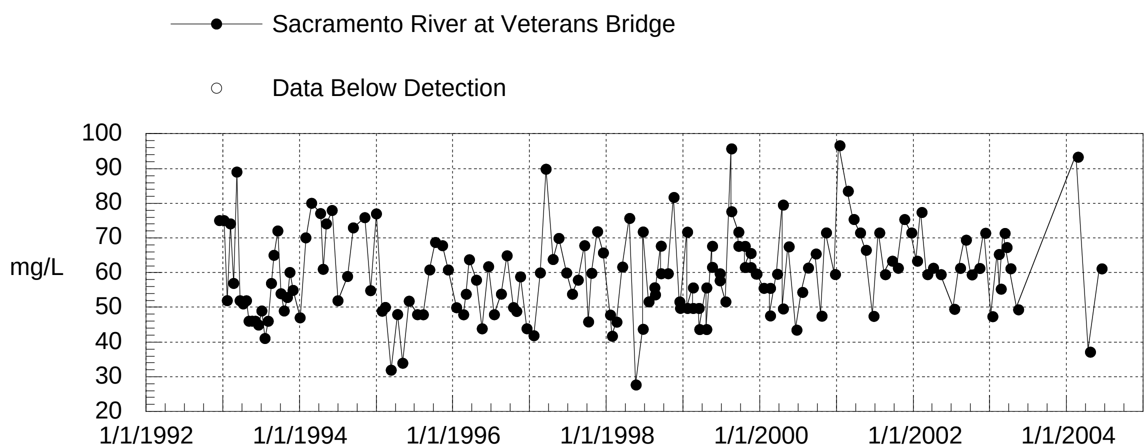

Arcade Creek at Norwood Ave.
Data Below Detection
120
100
80
60
40
20
mg/L
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

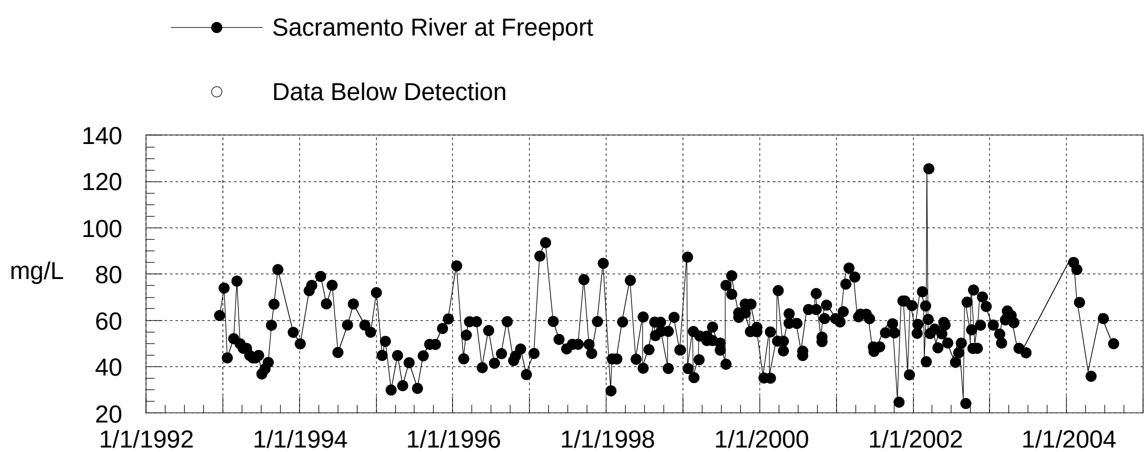

Sacramento River below Keswick
Data Below Detection
mg/L
90
80
70
60
50
40
30
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

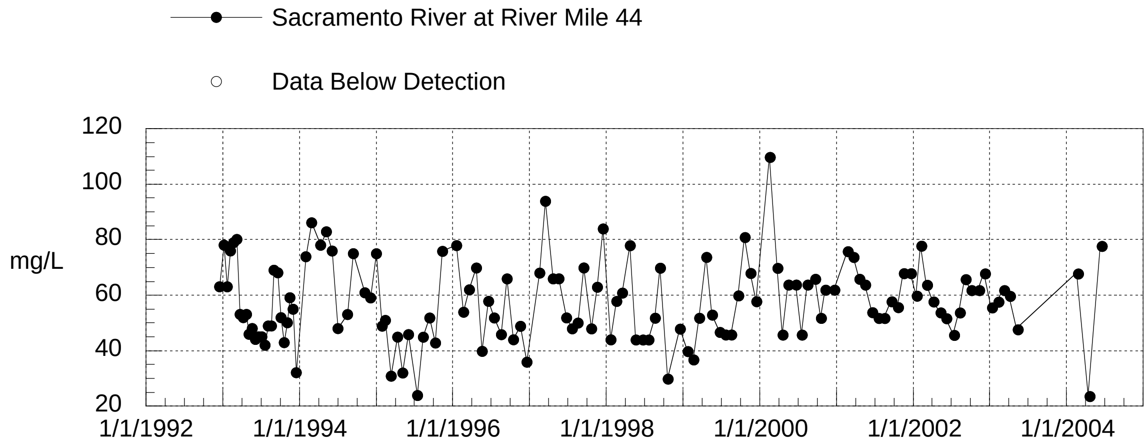

Sacramento River above Bend Bridge
Data Below Detection
mg/L
140
120
100
80
60
40
20
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

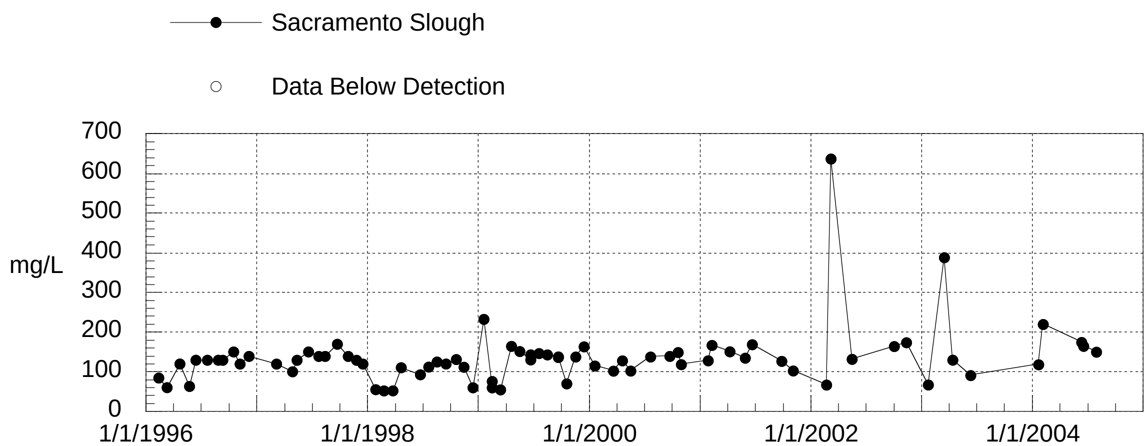

Sacramento River near Hamilton City
Data Below Detection
mg/L
70
65
60
55
50
45
40
35
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

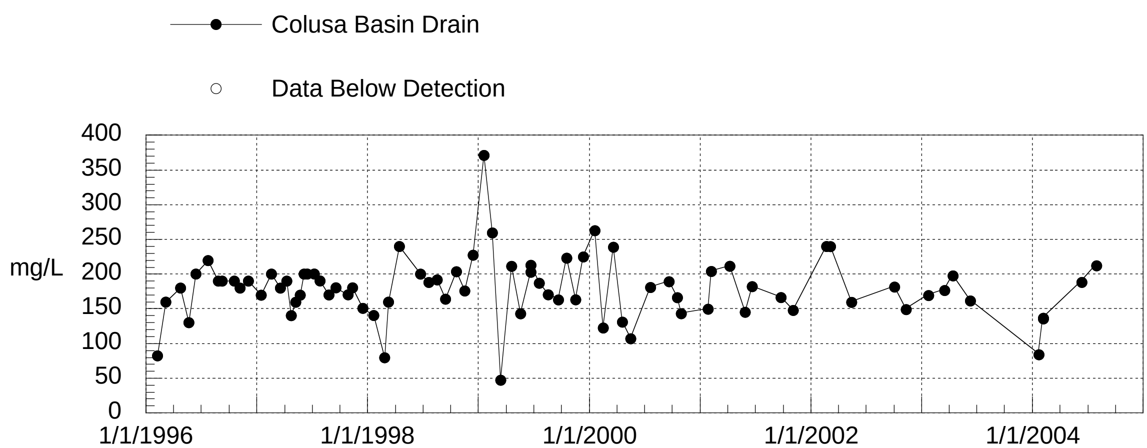

Sacramento River at Colusa
Data Below Detection
mg/L
120
100
80
60
40
20
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

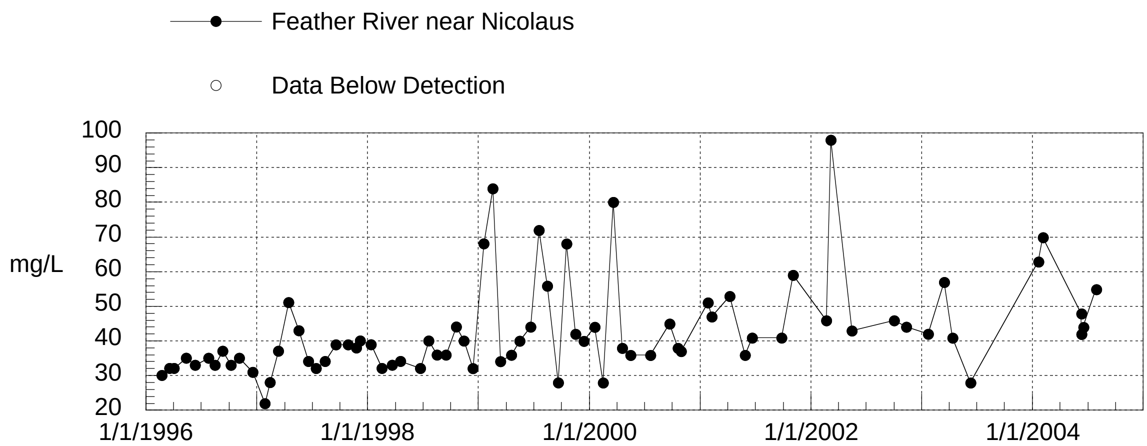

Sacramento River at Veterans Bridge
Data Below Detection
mg/L
100
90
80
70
60
50
40
30
20
1/1/1992
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

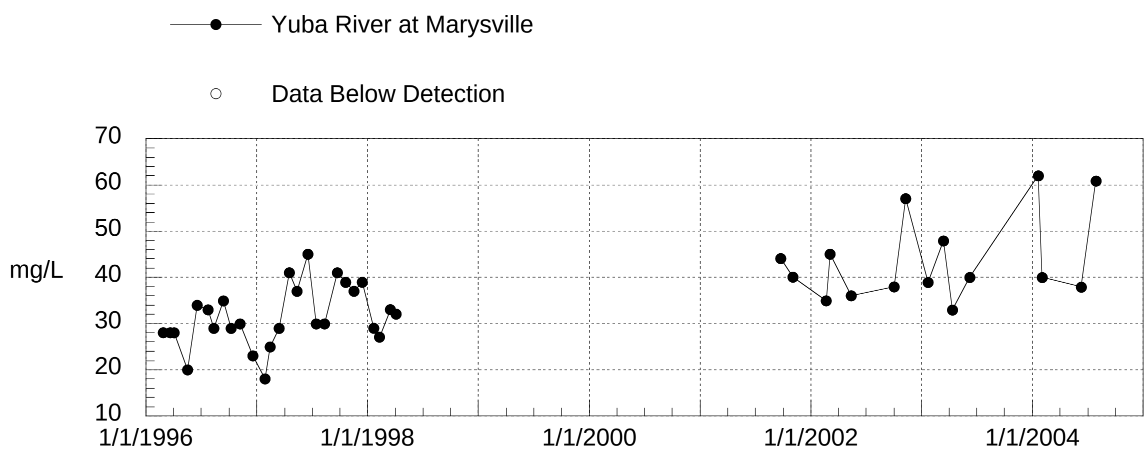

Sacramento River at Freeport
Data Below Detection
mg/L
140
120
100
80
60
40
20
1/1/1992
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

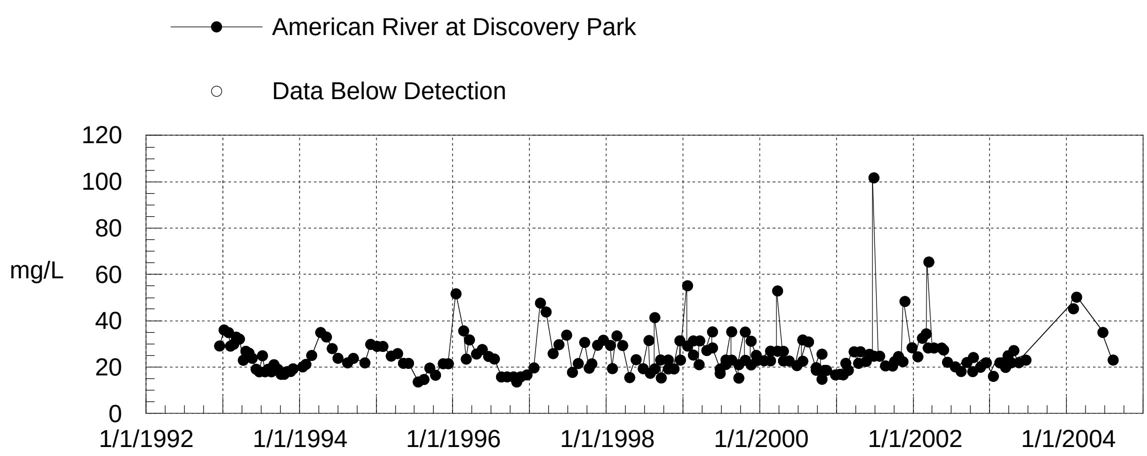

Sacramento River at River Mile 44
Data Below Detection
mg/L
120
100
80
60
40
20
1/1/1992
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

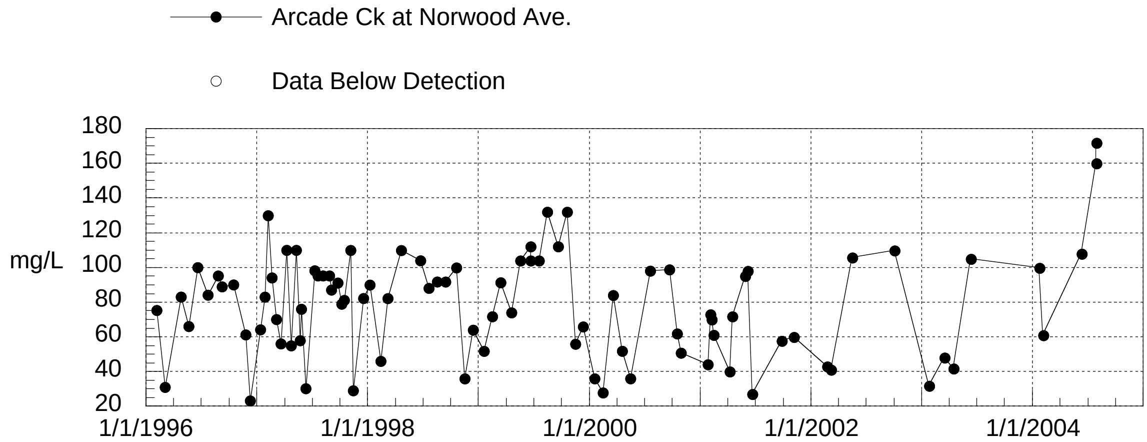

Sacramento Slough
Data Below Detection
mg/L
700
600
500
400
300
200
100
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

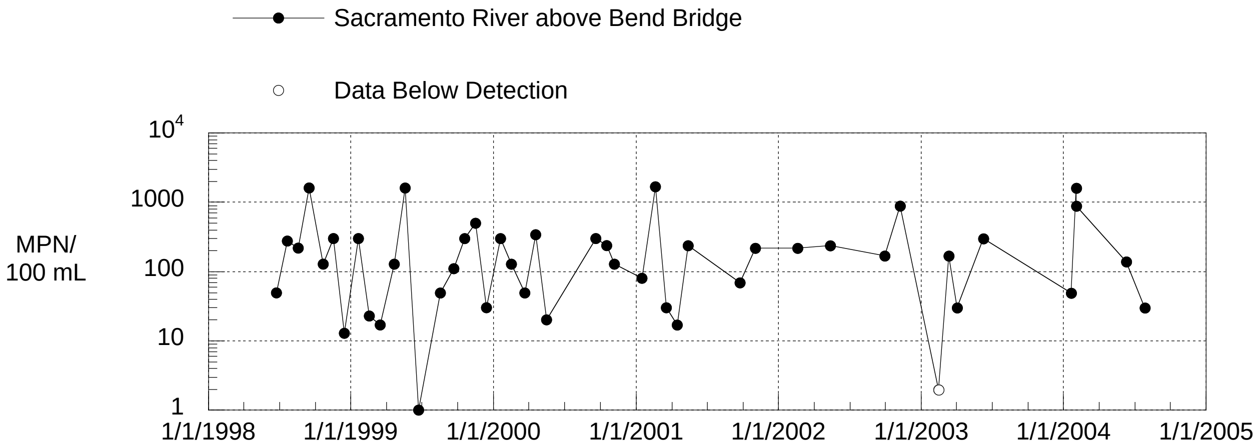

Colusa Basin Drain
Data Below Detection
mg/L
400
350
300
250
200
150
100
50
0
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

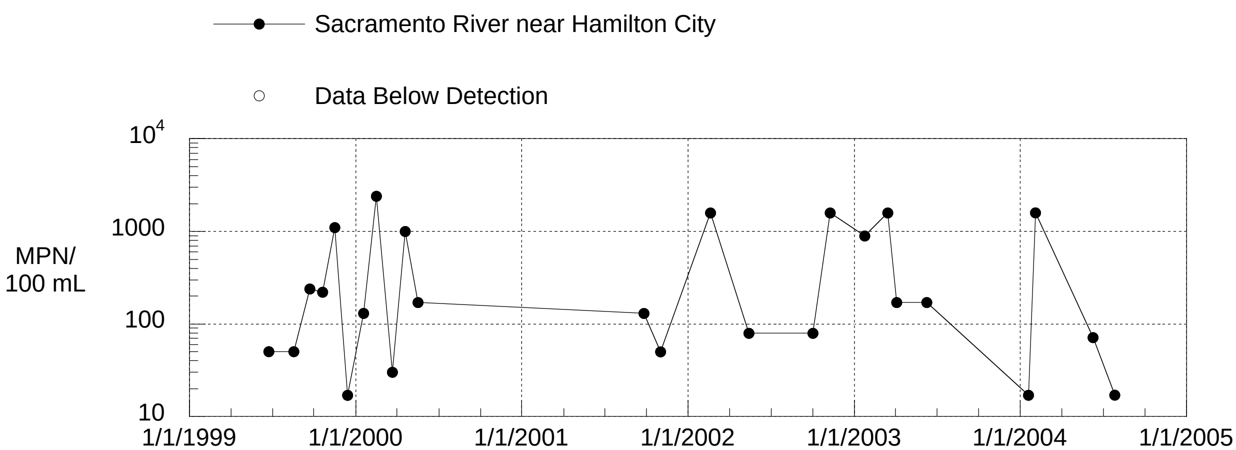

Feather River near Nicolaus
Data Below Detection
mg/L
100
90
80
70
60
50
40
30
20
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

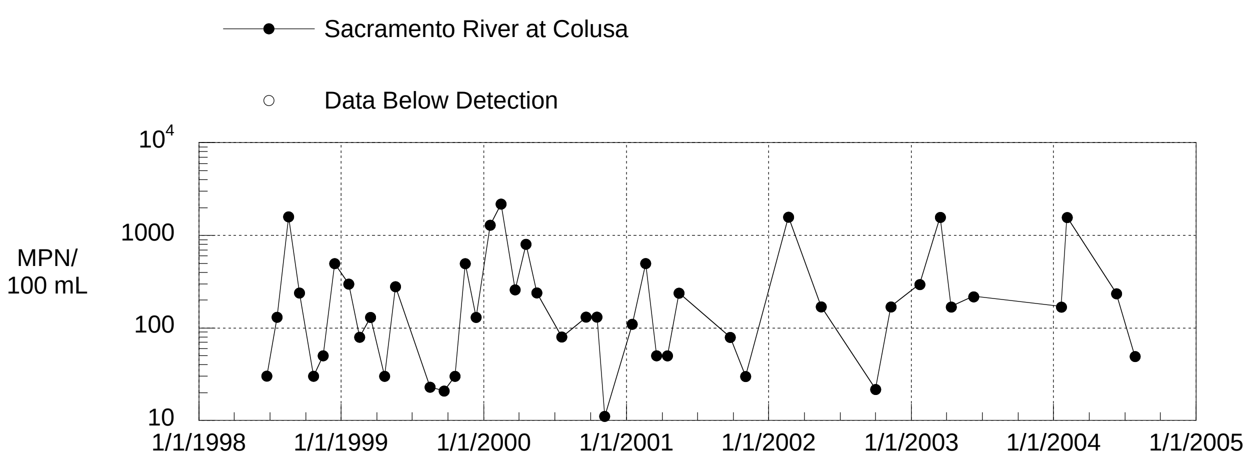

Yuba River at Marysville
Data Below Detection
mg/L
70
60
50
40
30
20
10
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

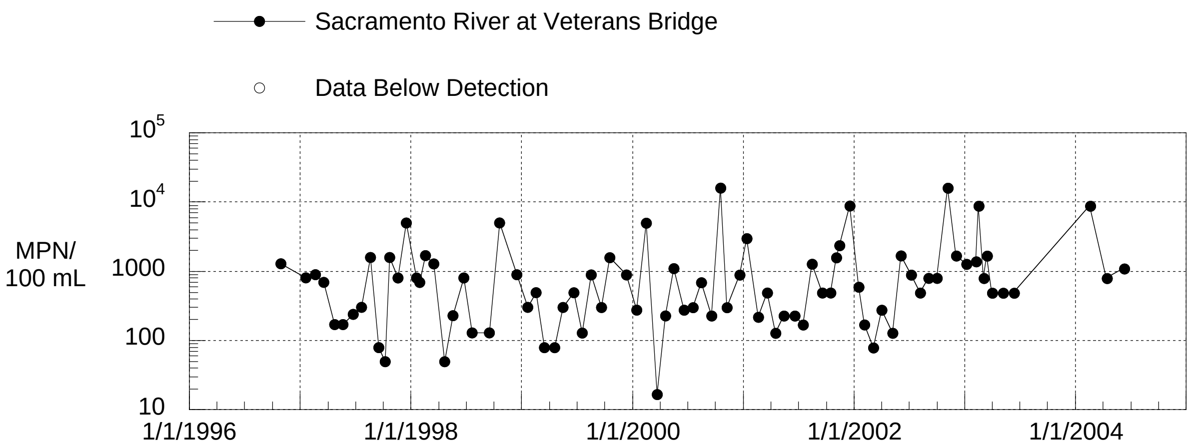

American River at Discovery Park
Data Below Detection
mg/L
120
100
80
60
40
20
0
1/1/1992
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004


Arcade Ck at Norwood Ave.
Data Below Detection
mg/L
180
160
140
120
100
80
60
40
20
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

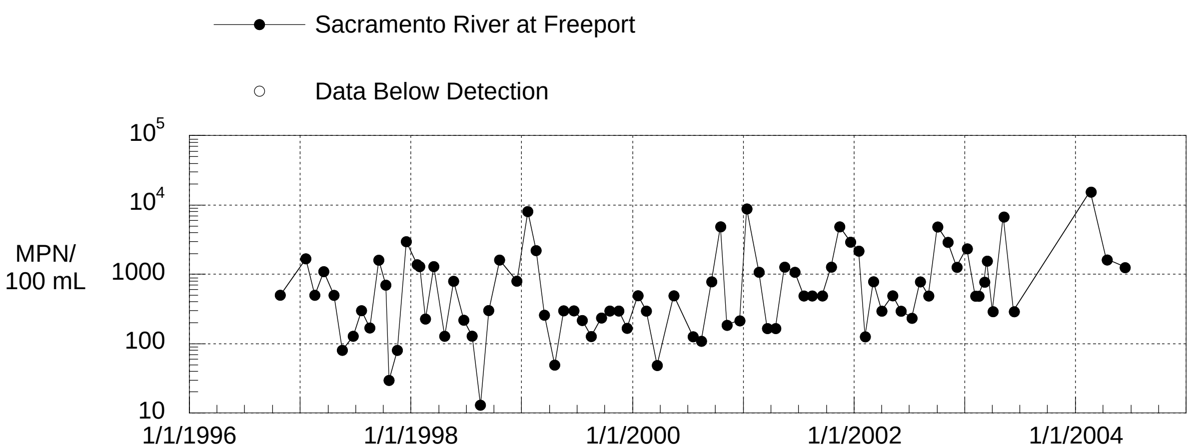

Sacramento River above Bend Bridge
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Sacramento River near Hamilton City
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

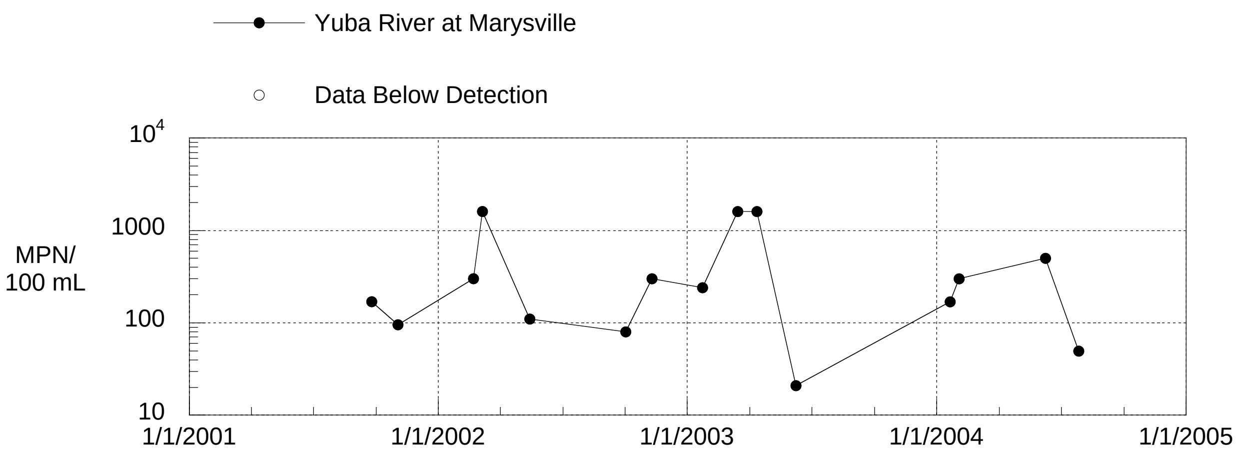

Sacramento River at Colusa
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

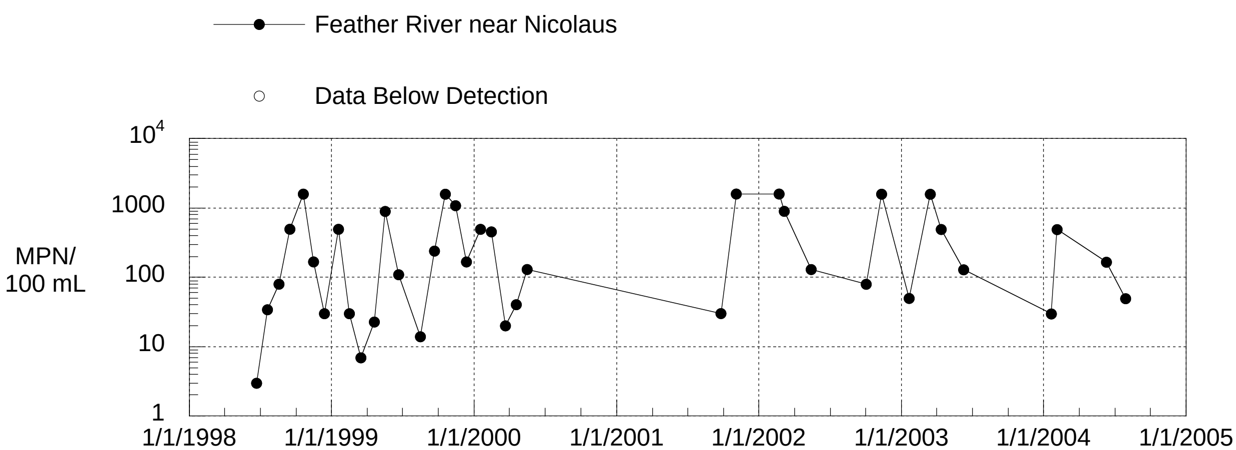


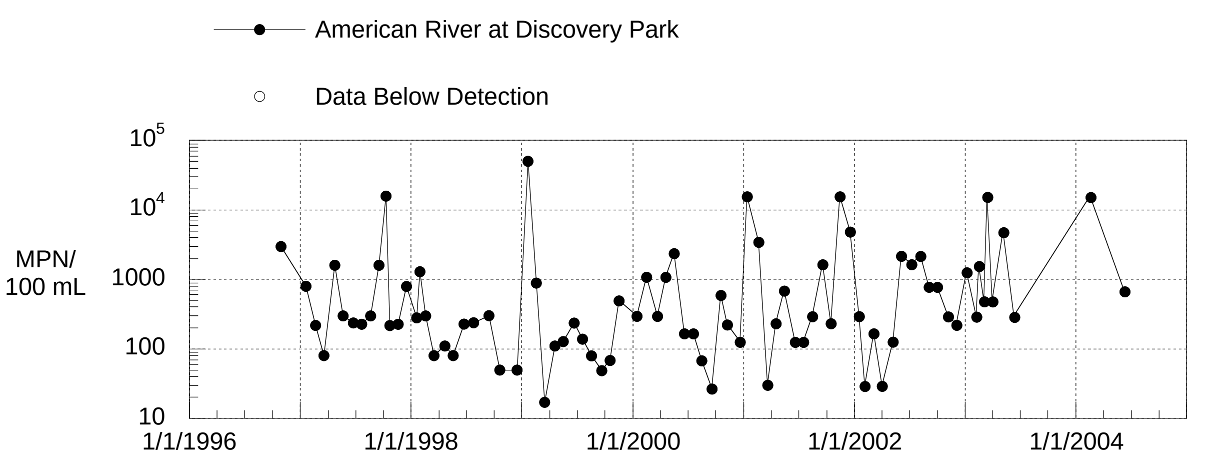
Sacramento River at Veterans Bridge
Data Below Detection
MPN/
100 mL
10^5
10^4
1000
100
10
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

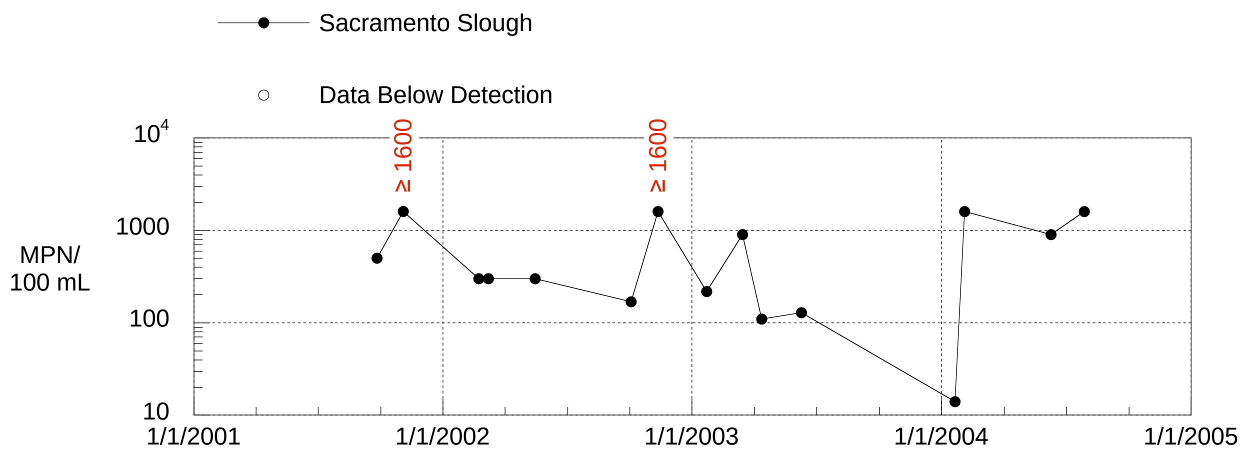


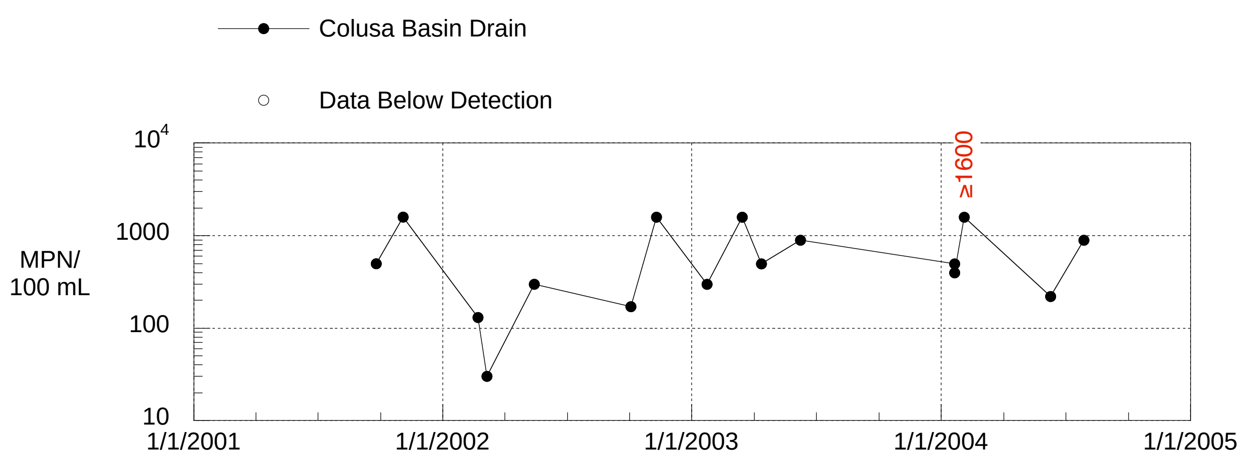
Sacramento River at Freeport
Data Below Detection
MPN/
100 mL
10^5
10^4
1000
100
10
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

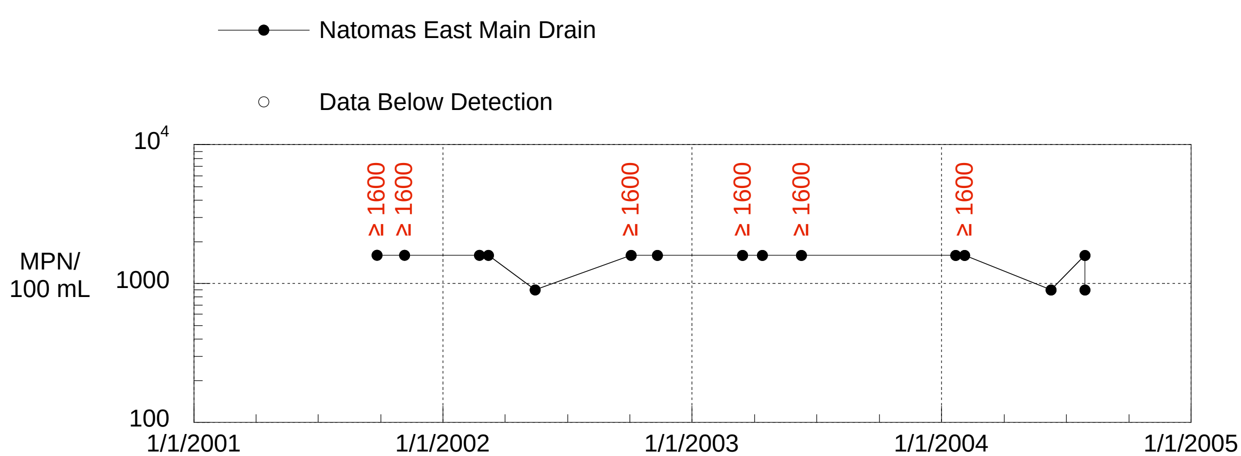

Yuba River at Marysville
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

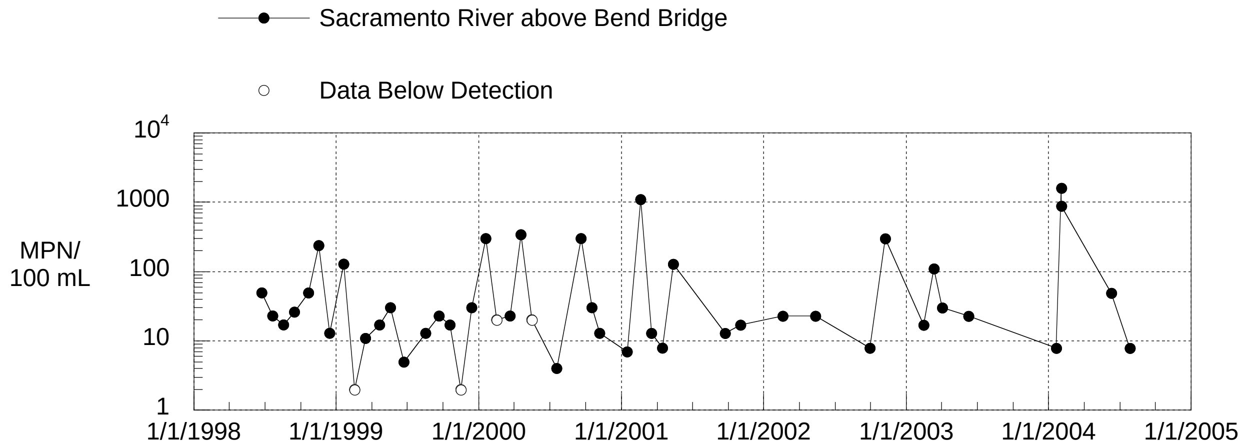

Feather River near Nicolaus
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

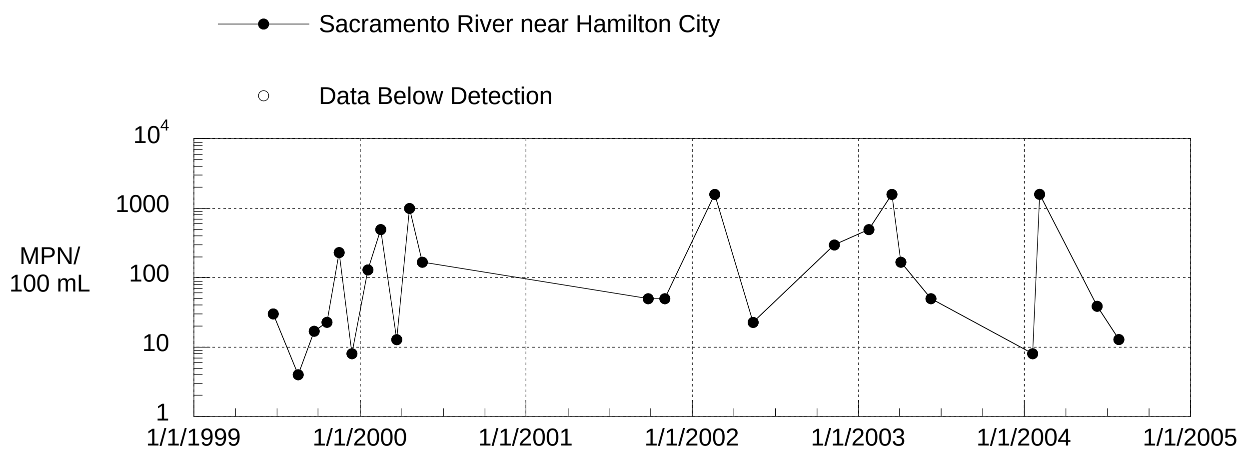

American River at Discovery Park
Data Below Detection
MPN/
100 mL
10^5
10^4
1000
100
10
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

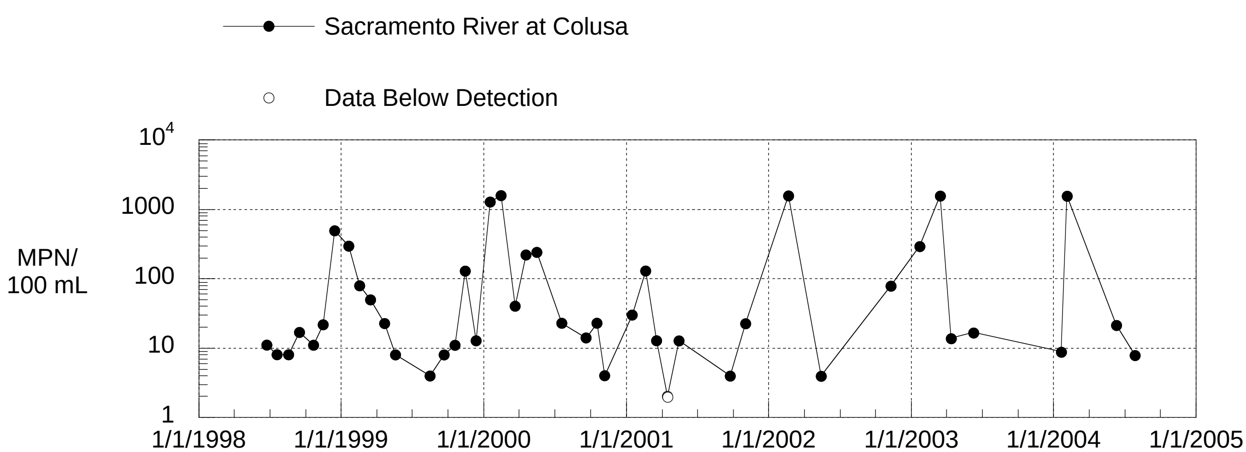

Sacramento Slough
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
≥ 1600
≥ 1600
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

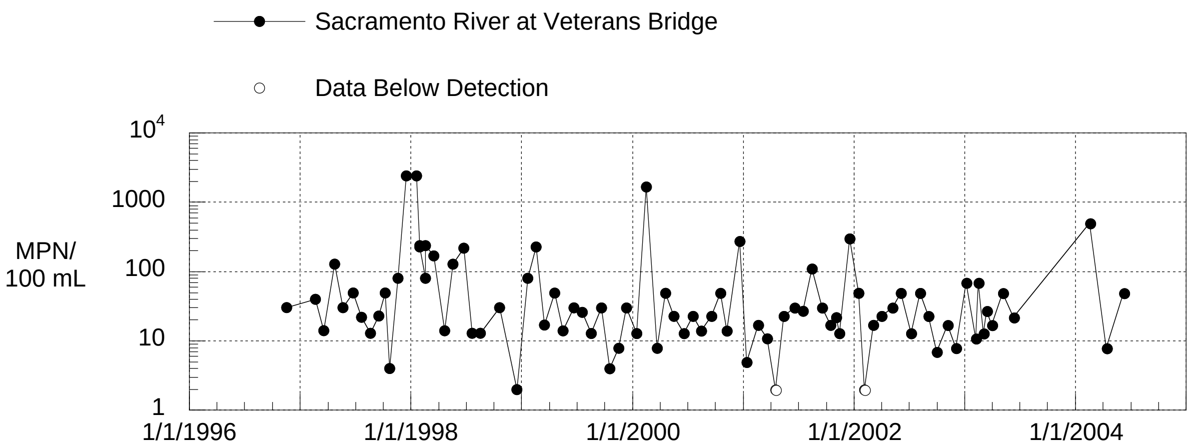

Colusa Basin Drain
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
≥1600
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Natomas East Main Drain
Data Below Detection
MPN/
100 mL
10^4
1000
100
≥ 1600
≥ 1600
≥ 1600
≥ 1600
≥ 1600
≥ 1600
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

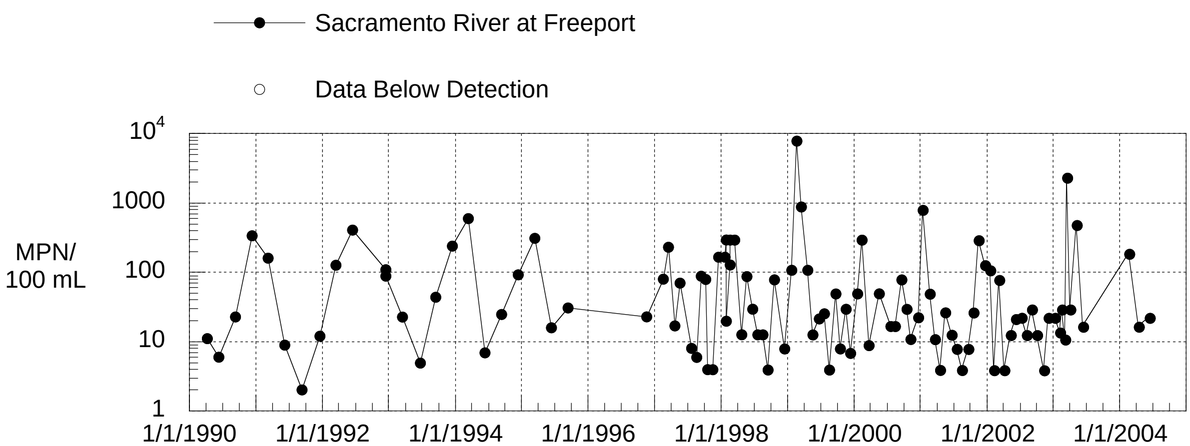

Sacramento River above Bend Bridge
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Sacramento River near Hamilton City
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

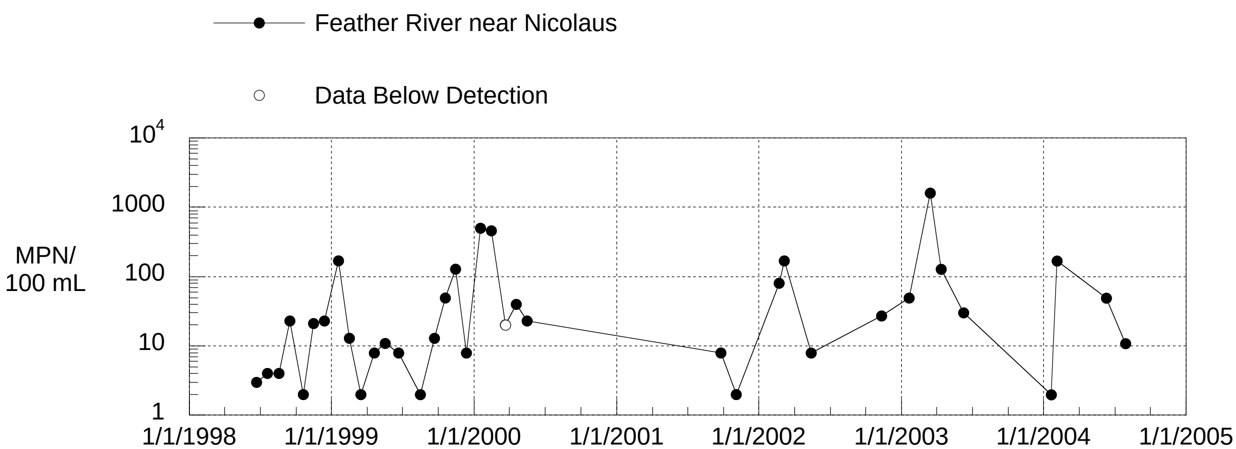

Sacramento River at Colusa
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

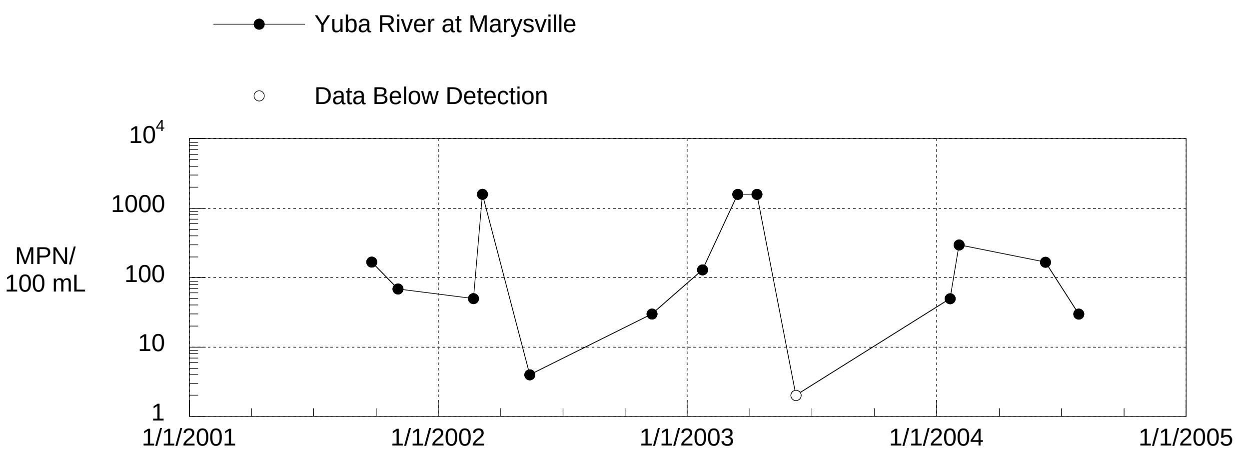


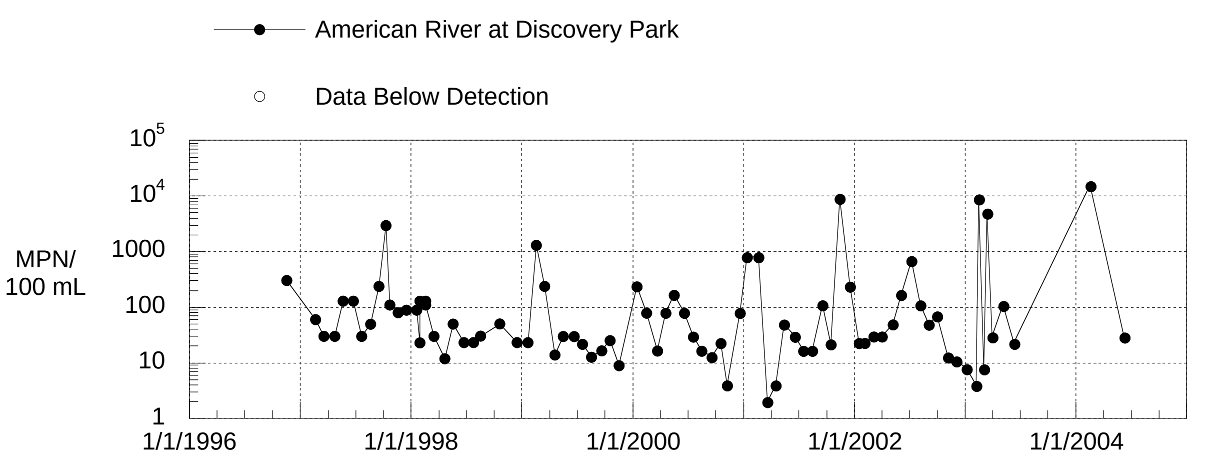
Sacramento River at Veterans Bridge
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

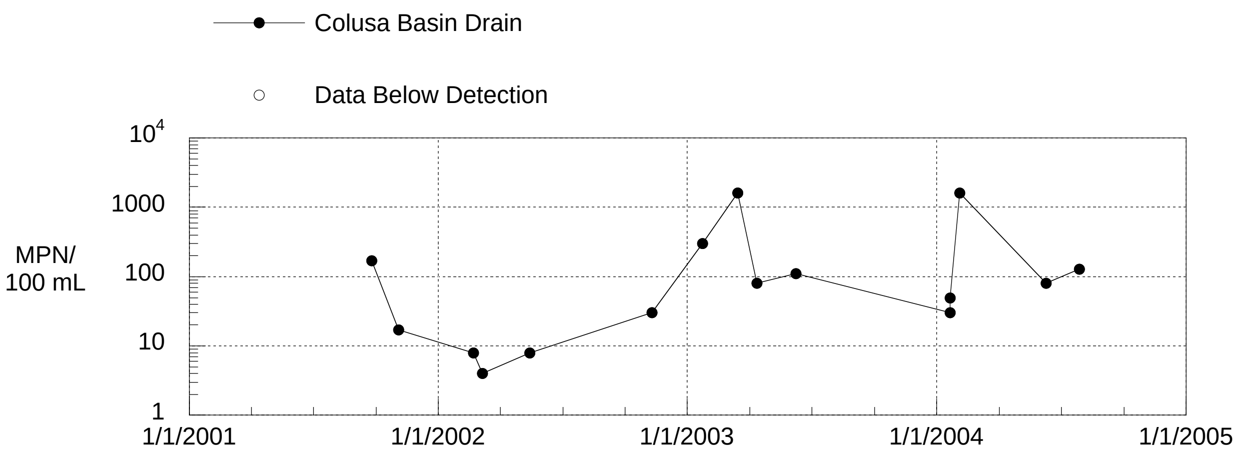


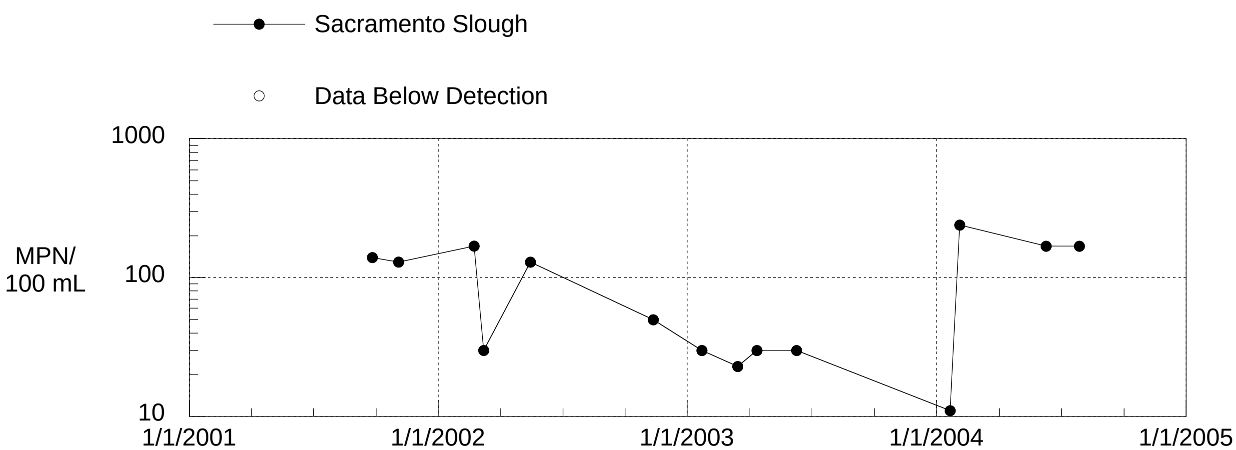
Sacramento River at Freeport
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/1990
1/1/1992
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

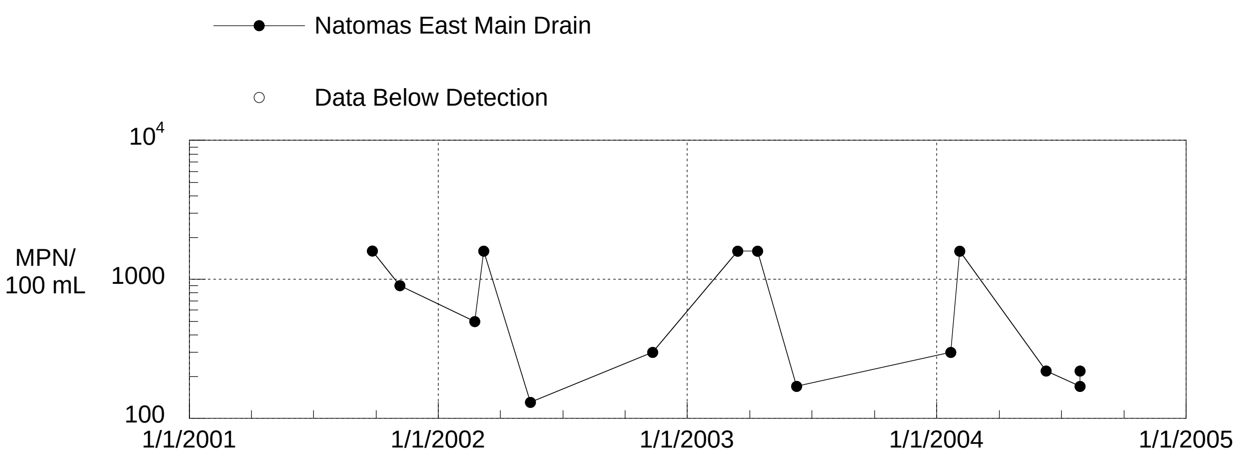

Feather River near Nicolaus
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

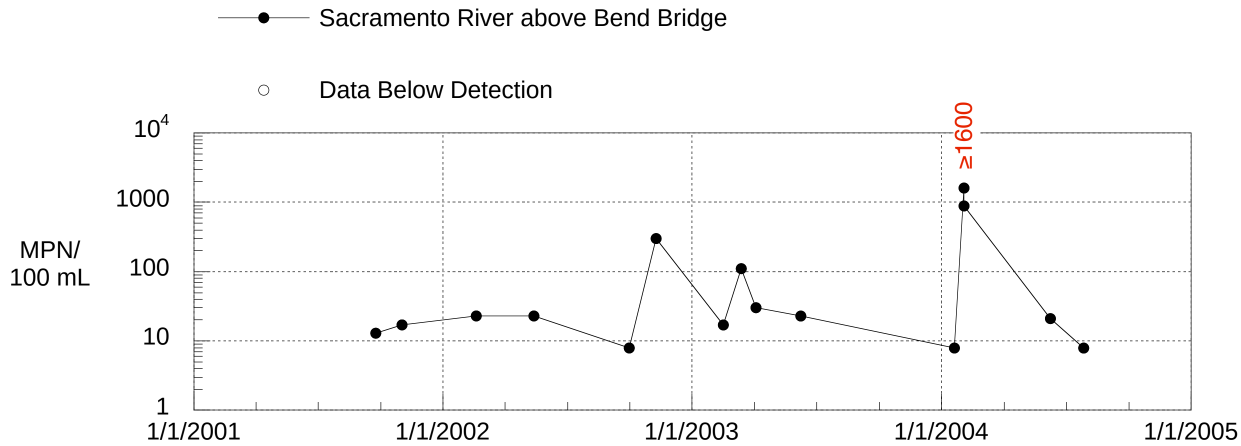

Yuba River at Marysville
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

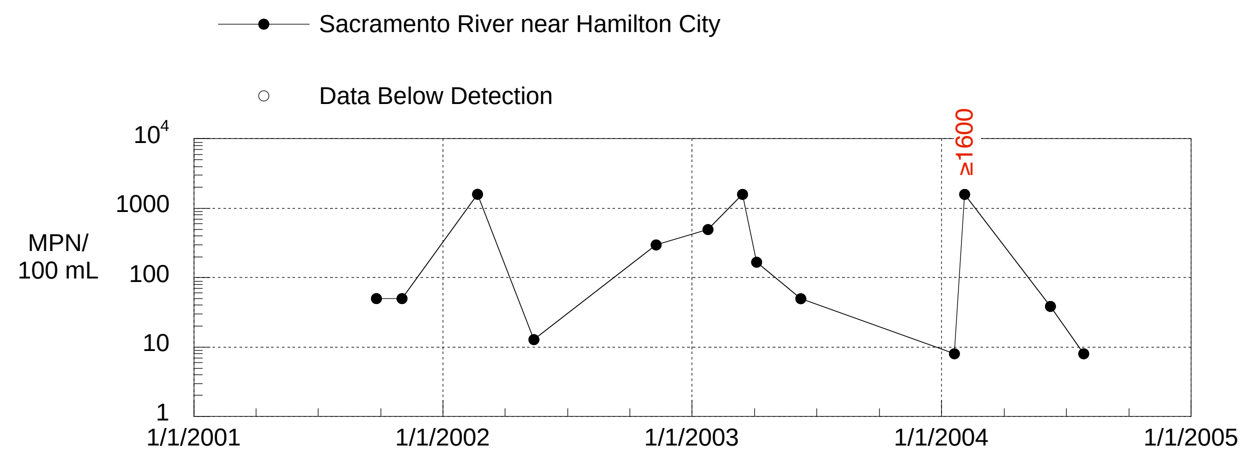

American River at Discovery Park
Data Below Detection
MPN/
100 mL
10^5
10^4
1000
100
10
1
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004

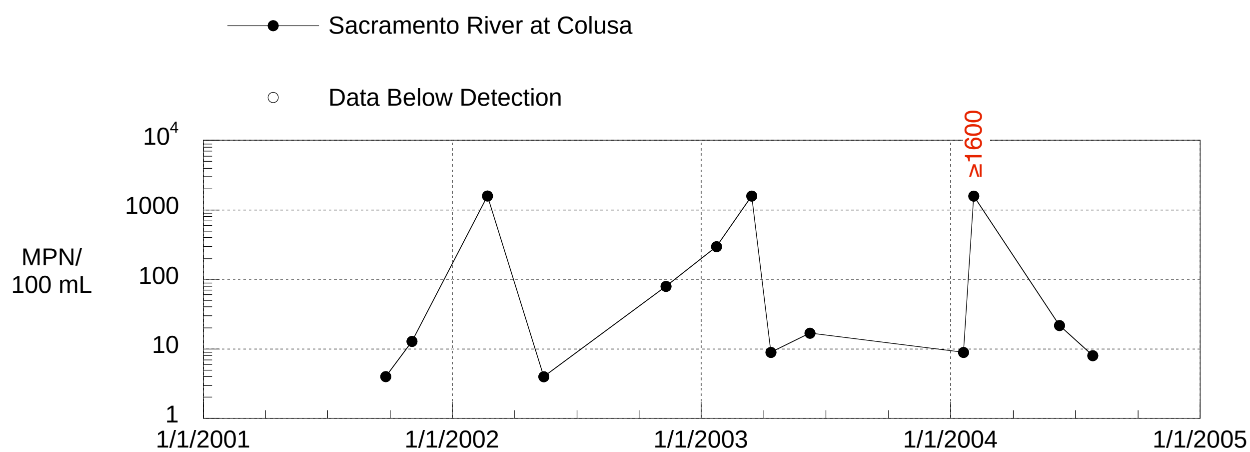

Colusa Basin Drain
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

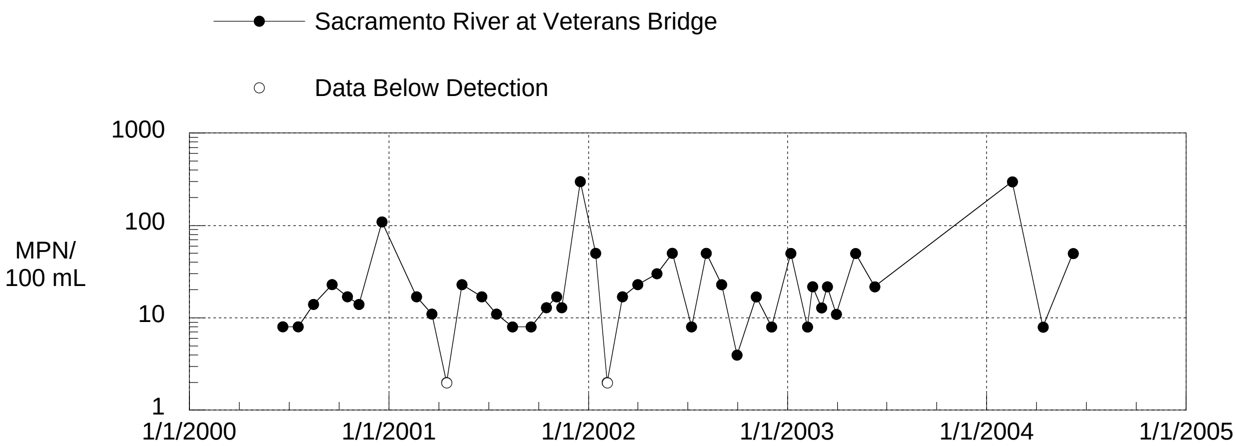

Sacramento Slough
Data Below Detection
MPN/
100 mL
1000
100
10
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

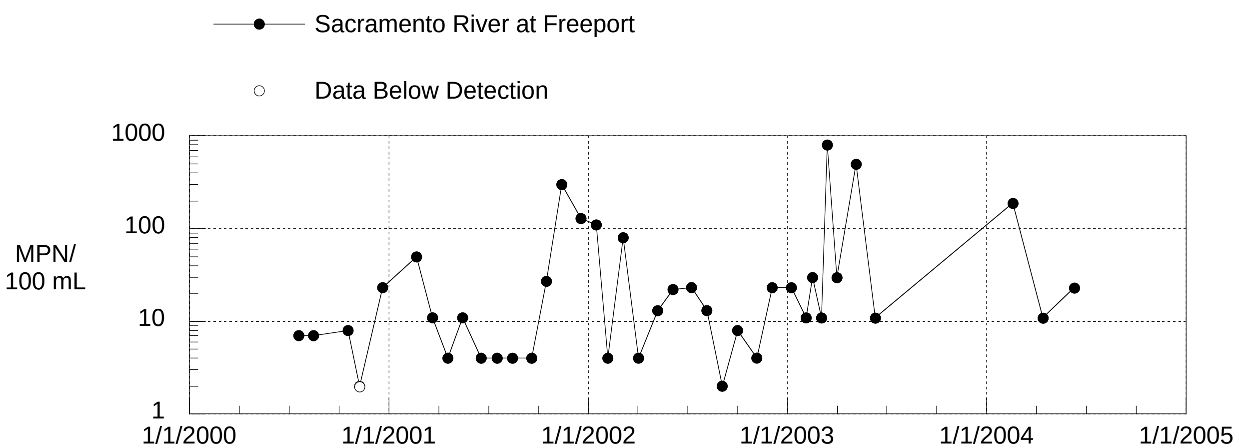

Natomas East Main Drain
Data Below Detection
MPN/
100 mL
10^4
1000
100
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

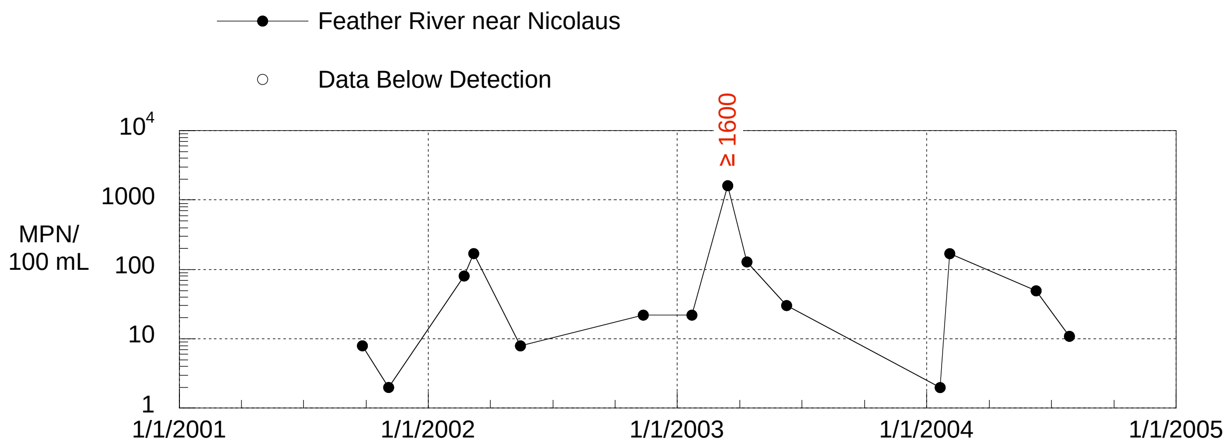

Sacramento River above Bend Bridge
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
≥1600
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

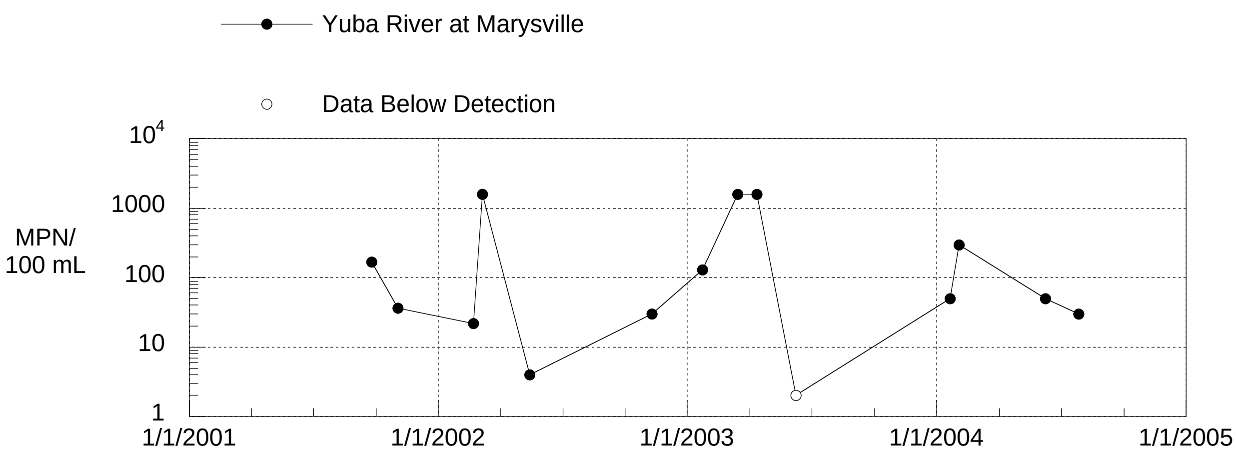

Sacramento River near Hamilton City
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
≥1600
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

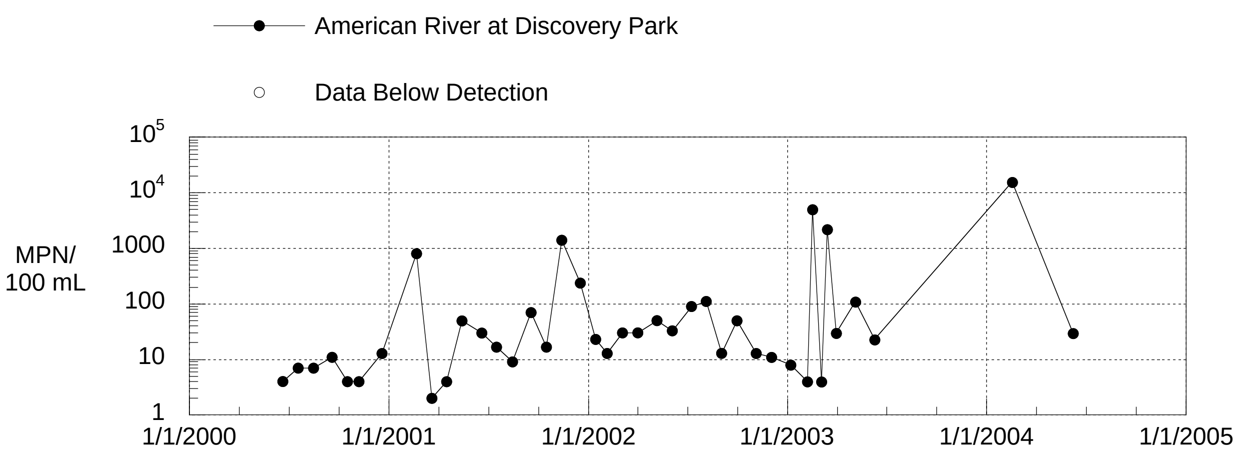

Sacramento River at Colusa
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
≥1600
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

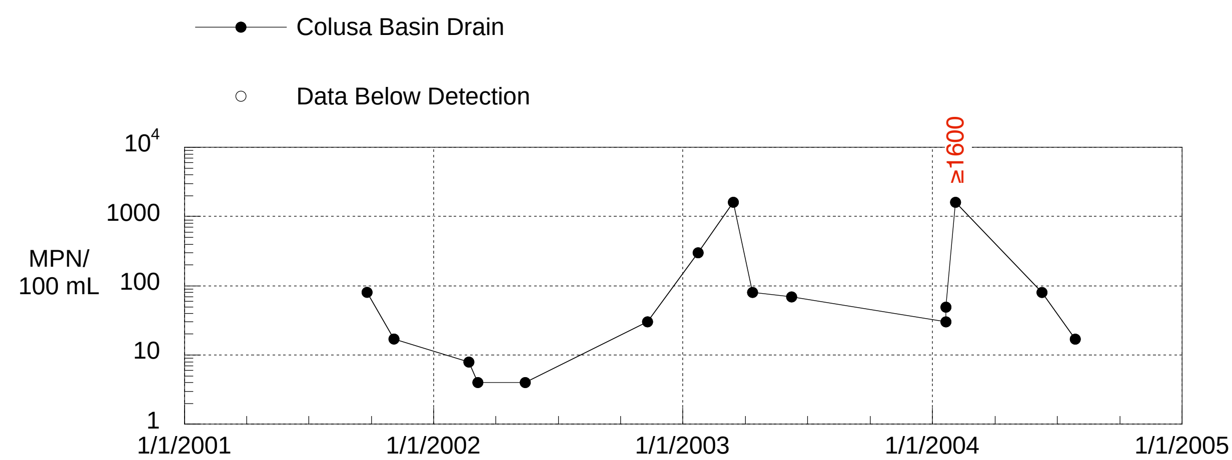

Sacramento River at Veterans Bridge
Data Below Detection
1000
100
10
1
MPN/
100 mL
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Sacramento River at Freeport
Data Below Detection
1000
100
10
1
MPN/
100 mL
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

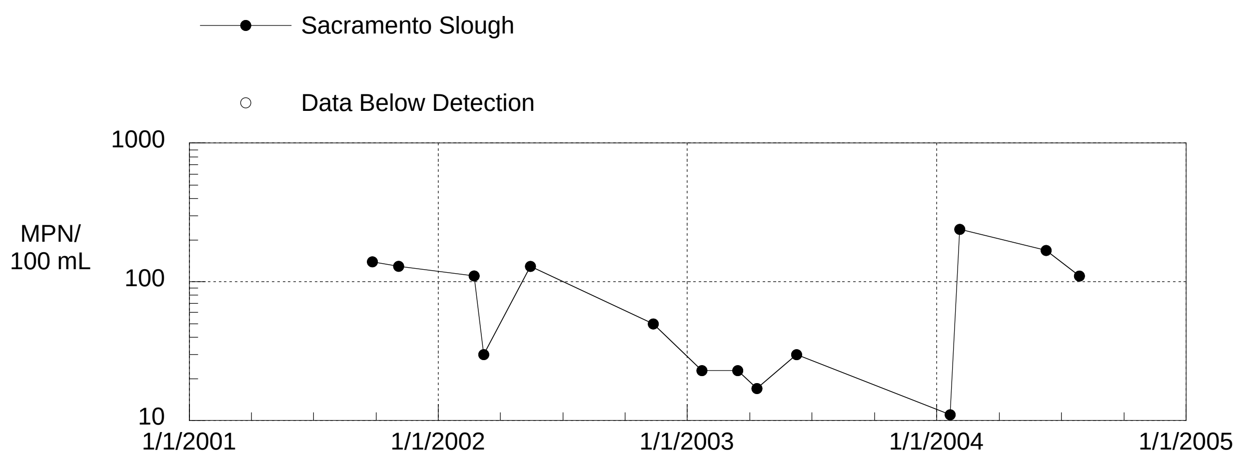

Feather River near Nicolaus
Data Below Detection
≥ 1600
MPN/
100 mL
10^4
1000
100
10
1
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005


Yuba River at Marysville
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

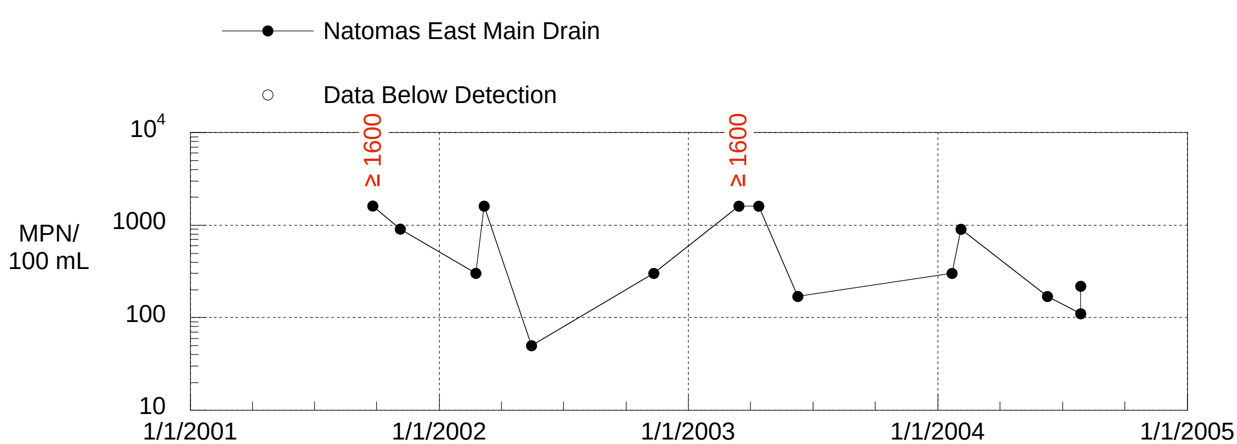

American River at Discovery Park
Data Below Detection
MPN/
100 mL
10^5
10^4
1000
100
10
1
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005



Colusa Basin Drain
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
1
≥1600
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005



Sacramento Slough
Data Below Detection
MPN/
100 mL
1000
100
10
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005



Natomas East Main Drain
Data Below Detection
MPN/
100 mL
10^4
1000
100
10
≥ 1600
≥ 1600
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005

APPENDIX C:

FISH TISSUE DATA, 1997-2003

YEAR	STATION LOCATION	Site Category	Species	Tissue	Sample Type	Number of fish	Length (mm)	% Moisture	% Lipid	Mercury, mg/kg, wet weight	Sum of PCB Congeners, µg/kg	Sum of Aroclors, µg/kg	Sum of Chlordanes, µg/kg	Sum of DDTs, µg/kg	Dieldrin, µg/kg
1997	Colusa Basin Drain	Ag Drain	White Catfish	fillet	Composite	5	288	78.8		0.304					
1997	Sacramento Slough	Ag Drain	White Catfish	fillet	Composite	5	274	77.6		0.438					
1997	Cache Slough	Delta	White Catfish	fillet	Composite	5	279	78.7		0.552					
1997	Cache Slough	Delta	White Catfish	fillet	Composite	5	271	79.1		0.415					
1997	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Composite	5	258	79.9	0.92	0.285	9.4	12.9	2.83	32.7	0.96
1997	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Composite	5	256	80.3	1.55	0.390	33.4	46.7	8.78	67.8	2.43
1997	Sacramento R. above Bend Bridge	Lower Sac. R. Mainstem	Rainbow Trout	fillet	Composite	5	313	75.3	2.54	0.032	7.3	ND	1.51	3.3	ND
1997	Sacramento R. below Keswick	Lower Sac. R. Mainstem	Rainbow Trout	fillet	Composite	5	366	72.4	3.99	0.032	23.8	27.0	2.88	26.4	0.62
1997	Sacramento R. at Veterans Br	Lower Sac. R. Mainstem	White Catfish	fillet	Composite	5	249	79.0	0.84	0.553	10.7	14.7	3.25	42.9	1.11
1997	American R. at Discovery Park	Major Tributary	White Catfish	fillet	Composite	4	274	80.4	0.49	0.524	58.8	80.6	7.97	62.0	0.72
1997	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Composite	5	264	81.1	0.49	0.391	10.5	ND	4.29	36.4	1.01
1997	McCloud R. above Shasta	Tributary	Rainbow Trout	fillet	Composite	5	274	76.9		0.053					
1997	Pit R. above Shasta	Tributary	Rainbow Trout	fillet	Individual	1	332	86.0		0.047					
1997	Sacramento R. above Shasta	Tributary	Rainbow Trout	fillet	Composite	5	321	78.8		0.064					
1998	Colusa Basin Drain	Ag Drain	Carp	fillet	Composite	5	386	76.8	1.78	0.106	6.6	1.9	1.89	684.0	20.07
1998	Natomas East Main Drain	Urban Creek/Runoff	Largemouth Bass	fillet	Composite	5	367	79.1	0.51	0.599	15.3	2.6	2.57	8.1	UJ
1998	Sacramento Slough	Ag Drain	Largemouth Bass	fillet	Composite	5	381	78.1	1.23	0.506	5.5	1.0	ND	41.3	2.79
1998	Cache Slough	Delta	Largemouth Bass	fillet	Composite	5	367	80.5	0.50	0.723	5.0	1.0	ND	32.7	2.53
1998	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Composite	5	345	77.0	0.86	0.748	6.2	1.0	ND	12.4	<2
1998	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Composite	5	334	76.6	0.90	0.895	116.9	1.0	1.01	25.0	2.01
1998	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Composite	5	286	80.5	1.67	0.518	46.5	3.8	3.78	75.9	2.28 J
1998	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Composite	5	250	80.0	1.94	0.258	57.1	10.0	16.40	129.5	<2
1998	Sacramento R. above Bend Bridge	Lower Sac. R. Mainstem	Pike Minnow	fillet	Composite	5	254	79.8	1.06	0.119	8.7	1.0	ND	8.4	<2
1998	Sacramento R. below Keswick	Lower Sac. R. Mainstem	Rainbow Trout	fillet	Composite	5	399	74.0	4.40	0.036	26.1	1.6	1.55	36.5	<2
1998	Sacramento R. at Colusa	Lower Sac. R. Mainstem	Carp	fillet	Composite	5	398	80.3	1.00	0.186	5.6	1.0	ND	62.7	<2
1998	Sacramento R. at Colusa	Lower Sac. R. Mainstem	Pike Minnow	fillet	Composite	5	278	80.6	0.76	0.301	7.0	1.0	ND	17.3	<2
1998	Sacramento R. near Hamilton City	Lower Sac. R. Mainstem	Pike Minnow	fillet	Composite	5	286	79.1	1.30	0.216	10.0	1.0	1.14	20.9	<2
1998	Sacramento R. near Hamilton City	Lower Sac. R. Mainstem	Sacramento Sucker	fillet	Composite	5	322	79.1	1.24	0.030	1.4	1.1	ND	2.1	<2
1998	Sacramento R. at Veterans Br	Lower Sac. R. Mainstem	Largemouth Bass	fillet	Composite	5	335	78.8	0.74	0.818	7.3	1.0	ND	22.5	<2
1998	American R. at Discovery Park	Major Tributary	Pike Minnow	fillet	Composite	5	283	75.0	4.02	0.418	35.7	11.0	21.78	58.2	3.67
1998	American R. at J Street	Major Tributary	Largemouth Bass	fillet	Composite	4	375	78.5	0.67	0.659	5.3	2.0	2.01	4.8	<2
1998	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Composite	5	382	79.1	0.72	1.154	8.2	1.0	ND	14.1	<2
1999	Natomas East Main Drain	Urban Creek/Runoff	Largemouth Bass	fillet	Composite	5	332	79.2	0.7	0.680	35.1	26.0	4.08	16.1	<2
1999	Natomas East Main Drain	Urban Creek/Runoff	White Catfish	fillet	Composite	5	258	80.7		0.286					
1999	Sacramento Slough	Ag Drain	White Catfish	fillet	Composite	5	263	79.1	0.4	0.639	1.2	ND	ND	17.9	<2
1999	Sacramento Slough	Ag Drain	Largemouth Bass	fillet	Composite	5	381	80.6	1.0	0.442	11.0	ND	1.27	45.9	2.00
1999	Cache Slough	Delta	White Catfish	fillet	Composite	5		81.8	0.6		15.5	16.0	1.40	56.4	<2
1999	Cache Slough	Delta	Largemouth Bass	fillet	Composite	5		79.6	0.4		6.5	ND	ND	17.0	<2
1999	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	385	76.6		0.877					
1999	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	340	78.3		0.747					
1999	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	340	78.6		0.872					
1999	Cache Slough	Delta	Carp	fillet	Composite	5	352	78.9		0.107					
1999	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	429	79.0		0.898					
1999	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	380	79.2		1.180					
1999	Cache Slough	Delta	White Catfish	fillet	Individual	1	270	79.3		0.602					
1999	Cache Slough	Delta	White Catfish	fillet	Individual	1	285	79.7		0.513					
1999	Cache Slough	Delta	White Catfish	fillet	Individual	1	280	81.2		0.497					
1999	Cache Slough	Delta	White Catfish	fillet	Individual	1	330	82.0		0.833					

YEAR	STATION LOCATION	Site Category	Species	Tissue	Sample Type	Number of fish	Length (mm)	% Moisture	% Lipid	Mercury, mg/kg, wet weight	Sum of PCB Congeners, µg/kg	Sum of Aroclors, µg/kg	Sum of Chlordanes, µg/kg	Sum of DDTs, µg/kg	Dieldrin, µg/kg
1999	Cache Slough	Delta	White Catfish	fillet	Individual	1	274	83.3		0.680					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Composite	5		80.4	1.2		18.1	21.0	1.99	31.5	<2
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Composite	5		79.8	2.0		24.8	24.0	2.67	58.8	<2
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Composite	5		79.8	1.0		26.0	26.0	2.58	44.3	<2
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Composite	5		72.2	3.9		36.6	29.0	5.50	88.6	<2
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Composite	5		77.7	1.1		11.0	ND	1.58	26.4	<2
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	250	58.9		0.197					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	283	69.3		0.448					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	379	76.7		1.010					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	385	76.7		1.340					
1999	Sacramento R. at Mile 44	Delta	Bluegill	fillet	Composite	5	185	76.9		0.103					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	341	76.9		1.050					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	355	77.1		0.750					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	315	77.2		0.775					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	341	77.2		0.524					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	317	77.6		0.867					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	358	78.1		0.883					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	350	78.4		1.350					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	259	78.5		0.327					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	265	78.9		0.536					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	277	78.9		0.563					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	309	78.9		0.426					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	286	78.9		0.673					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	295	78.9		0.375					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	261	80.3		0.238					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	305	80.4		0.271					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	290	80.5		0.256					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	265	81.1		1.140					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	275	81.3		0.237					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	281	82.3		0.515					
1999	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	233	82.6		0.204					
1999	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	381	82.8		1.370					
1999	Sacramento R. at Veterans Br	Lower Sac. R. Mainstem	Sacramento Sucker	fillet	Composite	5	318	79.6	1.37	0.098	19.0	15.0	2.44	18.2	<2
1999	American R. at Discovery Park	Major Tributary	Largemouth Bass	fillet	Composite	5	340	78.5	0.7	0.850	22.7	23.0	2.86	18.3	<2
1999	American R. at Discovery Park	Major Tributary	Sacramento Sucker	fillet	Composite	5	314	79.6	1.0	0.247	9.7	ND	1.10	7.6	<2
1999	American R. at J Street	Major Tributary	Pike Minnow	fillet	Composite	5	248	78.4	1.0	0.426	16.2	18.0	2.48	16.3	<2
1999	American R. at J Street	Major Tributary	Sacramento Sucker	fillet	Composite	5	266	77.5	1.1	0.099	2.5	ND	ND	2.9	<2
1999	Feather R. near Nicolaus	Major Tributary	Pike Minnow	fillet	Composite	5	287	80.5	0.7	1.200	19.0	20.0	ND	33.3	<2
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Composite	5		76.7	0.9		7.4	ND	ND	13.3	<2
1999	Feather R. near Nicolaus	Major Tributary	Striped Bass	fillet	Individual	1	626	76.3		1.280					
1999	Feather R. near Nicolaus	Major Tributary	Striped Bass	fillet	Individual	1	645	76.5		0.320					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	339	76.7		2.080					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	361	77.7		1.520					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	321	77.8		0.667					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	495	77.8		2.350					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	305	77.9		0.649					
1999	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	497	77.9		0.745					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	314	77.9		0.633					

YEAR	STATION LOCATION	Site Category	Species	Tissue	Sample Type	Number of fish	Length (mm)	% Moisture	% Lipid	Mercury, mg/kg, wet weight	Sum of PCB Congeners, µg/kg	Sum of Aroclors, µg/kg	Sum of Chlordanes, µg/kg	Sum of DDTs, µg/kg	Dieldrin, µg/kg
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	310	78.0		0.555					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	310	78.0		0.667					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	322	78.1		0.787					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	456	78.1		1.510					
1999	Feather R. near Nicolaus	Major Tributary	Striped Bass	fillet	Individual	1	817	78.5		3.500					
1999	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	350	78.9		1.030					
1999	Feather R. near Nicolaus	Major Tributary	Bluegill	fillet	Composite	5	184	79.7		0.121					
1999	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	491	79.8		0.620					
1999	Clear Ck @ Hwy 273	Tributary	Riffle sculpin	fillet	Composite			79.3	1.13	0.241	2.7	ND	<RL	2.2	<2
1999	Clear Ck @ Reading Bar	Tributary	Riffle sculpin	fillet	Composite			80.0	0.83	0.160	<RL	ND	ND	<RL	<2
1999	Clear Ck @ Reading Bar	Tributary	Rainbow Trout	fillet	Composite			80.5	1.13	0.046	<RL	ND	ND	<RL	<2
1999	Clear Ck @ Reading Bar	Tributary	Riffle sculpin	liver	Composite			80.0	0.83	0.088					
1999	Clear Ck @ Reading Bar	Tributary	Rainbow Trout	liver	Composite			80.5	1.13	<.020					
1999	Clear Ck above Whiskeytown	Tributary	Rainbow Trout	fillet	Composite			78.1	1.96	0.050	0.9	ND	ND	<RL	<2
1999	Clear Ck above Whiskeytown	Tributary	Riffle sculpin	fillet	Composite			79.1	1.12	**0.107**	<RL	ND	ND	<RL	<2
1999	Clear Ck above Whiskeytown	Tributary	Rainbow Trout	liver	Composite			78.1	1.96	0.050					
1999	Clear Ck above Whiskeytown	Tributary	Riffle sculpin	fillet	Composite			79.1	1.12	**0.096**					
1999	Clear Ck above Whiskeytown	Tributary	Riffle sculpin	liver	Composite			79.1	1.12	0.213					
1999	Big Chico Ck @ Hwy 32	Tributary	Rainbow Trout	fillet	Composite			76.8	3.17	**0.041**	0.8	ND	ND	2.5	<2
1999	Big Chico Ck @ Hwy 32	Tributary	Rainbow Trout	fillet	Composite			76.8	3.17	**0.044**	0.8	ND	ND	2.5	<2
1999	Big Chico Ck @ Hwy 32	Tributary	Rainbow Trout	liver	Composite			76.8	3.17	0.037					
1999	Big Chico Ck @ Hwy 99	Tributary	Smallmouth bass	fillet	Composite			77.8	0.99	0.231	<RL	ND	<RL	<RL	<2
1999	Big Chico Ck @ Hwy 99	Tributary	Smallmouth bass	fillet	Composite			77.8	0.98		0.4	ND	ND	<RL	<2
1999	Big Chico Ck @ Hwy 99	Tributary	Riffle sculpin	fillet	Composite			79.6	0.61	0.146	<RL	ND	<RL	<RL	<2
1999	Big Chico Ck @ Hwy 99	Tributary	Smallmouth bass	liver	Composite			77.8	0.99	0.124					
1999	Big Chico Ck @ Hwy 99	Tributary	Riffle sculpin	liver	Composite			79.6	0.61	0.182					
1999	Deer Ck @ Hwy 99	Tributary	Riffle sculpin	fillet	Composite			77.2	2.84	0.082	0.4	ND	<RL	<RL	<2
1999	Deer Ck @ Hwy 99	Tributary	Smallmouth bass	fillet	Composite			79.2	0.93	0.075	<RL	ND	ND	<RL	<2
1999	Deer Ck @ Hwy 99	Tributary	Riffle sculpin	liver	Composite			77.2	2.84	0.043					
1999	Deer Ck @ Hwy 99	Tributary	Smallmouth bass	liver	Composite			79.2	0.93	0.044					
1999	Deer Ck below Childs Meadow	Tributary	Rainbow Trout	fillet	Composite			76.8	3.28	<.020	8.8	ND	<RL	4.9	<2
1999	Deer Ck below Childs Meadow	Tributary	Rainbow Trout	fillet	Composite			76.9	2.42		7.2	ND	<RL	4.0	<2
1999	Deer Ck below Childs Meadow	Tributary	Riffle sculpin	fillet	Composite			77.9	2.11	0.034	0.2	ND	ND	<RL	<2
1999	Deer Ck below Childs Meadow	Tributary	Rainbow Trout	liver	Composite			76.8	3.28	<.020					
1999	Deer Ck below Childs Meadow	Tributary	Riffle sculpin	liver	Composite			77.9	2.11	<.020					
1999	Mill Ck at Black Rock	Tributary	Riffle sculpin	fillet	Composite			79.1	0.73	0.327	<RL	ND	ND	<RL	<2
1999	Mill Ck at Black Rock	Tributary	Riffle sculpin	liver	Composite			79.1	0.73	0.353					
1999	Mill Ck at Hwy 99	Tributary	Riffle sculpin	fillet	Composite			79.7	1.01	0.279	0.2	ND	ND	<RL	<2
1999	Mill Ck at Hwy 99	Tributary	Riffle sculpin	liver	Composite			79.7	1.01	0.288					
1999	Putah Creek	Tributary	Sacramento Sucker	fillet	Composite	4	383	76.3	3.3	0.185	20.7	19.0	1.68	95.7	<2
1999	Putah Creek	Tributary	Largemouth Bass	fillet	Composite	5		77.9	0.6		3.9	ND	ND	13.2	<2
1999	Putah Creek	Tributary	White Catfish	fillet	Individual	1	470	73.3		0.146					
1999	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	425	76.0		0.592					
1999	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	354	76.7		0.396					
1999	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	410	77.0		0.540					
1999	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	345	77.1		0.231					
1999	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	402	78.6		0.630					
1999	Putah Creek	Tributary	Bluegill	fillet	Composite	5	112	78.9		0.097					
1999	Putah Creek	Tributary	Bluegill	fillet	Composite	5	135	79.5		0.123					
2000	Colusa Basin Drain	Ag Drain	White Catfish	fillet	Composite	5	259.4	81.0	0.80	0.21	1.5	ND	ND	40.2	<RL

YEAR	STATION LOCATION	Site Category	Species	Tissue	Sample Type	Number of fish	Length (mm)	% Moisture	% Lipid	Mercury, mg/kg, wet weight	Sum of PCB Congeners, µg/kg	Sum of Aroclors, µg/kg	Sum of Chlordanes, µg/kg	Sum of DDTs, µg/kg	Dieldrin, µg/kg
2000	Colusa Basin Drain	Ag Drain	Carp	fillet	Composite	5	371.6	78.3	1.25	0.18	3.6	ND	ND	284.8	3.88
2000	Natomas East Main Drain	Urban Creek/Runoff	Largemouth Bass	fillet	Composite	5	350.4	76.8	0.74	0.65	23.4	32.0	1.82	17.2	<RL
2000	Natomas East Main Drain	Urban Creek/Runoff	White Catfish	fillet	Composite	4	275.75	78.8	2.00	0.21	37.0	45.0	2.66	37.9	<RL
2000	Natomas East Main Drain	Urban Creek/Runoff	Striped Bass	fillet	Individual	1	494	72.0		0.81					
2000	Sacramento Slough	Ag Drain	White Catfish	fillet	Composite	5	261.6	80.7	1.89	0.44	26.6	28.0	1.77	64.5	2.55
2000	Sacramento Slough	Ag Drain	Largemouth Bass	fillet	Composite	5	355	78.6	0.60	0.49	4.3	ND	ND	30.8	<RL
2000	Cache Slough	Delta	White Catfish	fillet	Composite	10	288.2	79.7	1.06	0.443096	9.7	13.0	1.21	54.7	<RL
2000	Cache Slough	Delta	Largemouth Bass	fillet	Composite	6	361.8	78.7	0.76	0.50	5.5	ND	ND	31.2	<RL
2000	Cache Slough	Delta	Sacramento Sucker	fillet	Composite	5	393.6	78.5		0.11					
2000	Cache Slough	Delta	Crappie	fillet	Composite	5	231.2	77.0		0.32					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	400	78.6		1.14					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	276	82.6		0.21					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	319	78.6		0.82					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	254	81.3		0.14					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	258	80.5		0.43					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	259	80.7		0.53					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	275	78.3		0.52					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	290	82.3		0.49					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	323	79.3		0.48					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	325	78.6		0.62					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	328	79.5		0.37					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	305	79.9		0.45					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	265	80.1		0.40					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	228	80.1		0.25					
2000	Cache Slough	Delta	White Catfish	fillet	Individual	1	385	83.8		1.00					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	560	76.2		1.27					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	348	77.3		0.31					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	340	77.5		0.53					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	382	77.8		0.48					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	348	78.3		0.49					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	365	76.2		0.59					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	388	77.5		0.60					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	270	79.5		0.39					
2000	Cache Slough	Delta	Largemouth Bass	fillet	Individual	1	290	80.1		0.31					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Composite	6	368.7	77.5	1.12	0.99	13.2	15.0	ND	16.8	<RL
2000	Sacramento R. at Mile 44	Delta	Sacramento Sucker	fillet	Composite	5	452.2	76.1	3.83	0.22	24.3	43.0	2.00	57.4	<RL
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Composite	7	287.86	79.6	1.46	0.386827	37.8	61.0	1.97	39.2	<RL
2000	Sacramento R. at Mile 44	Delta	Pike Minnow	fillet	Composite	5	252.2	81.7	0.96	0.11	5.0	ND	ND	9.7	<RL
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	327	75.9		0.92					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	345	75.9		0.89					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	350	74.1		0.86					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	359	75.1		0.86					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Composite										
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	343	74.4		0.70					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	392	74.8		1.08					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	386	74.2		1.26					

YEAR	STATION LOCATION	Site Category	Species	Tissue	Sample Type	Number of fish	Length (mm)	% Moisture	% Lipid	Mercury, mg/kg, wet weight	Sum of PCB Congeners, µg/kg	Sum of Aroclors, µg/kg	Sum of Chlordanes, µg/kg	Sum of DDTs, µg/kg	Dieldrin, µg/kg
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	376	73.5		1.06					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	359	76.0		1.11					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	356	74.0		0.74					
2000	Sacramento R. at Mile 44	Delta	Striped Bass	fillet	Individual	1	450	74.8		0.34					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	286	75.9		0.45					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	281	78.1		0.44					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	227	77.7		0.18					
2000	Sacramento R. at Mile 44	Delta	Largemouth Bass	fillet	Individual	1	247	76.6		0.34					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	317	80.6		0.56					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	314	81.3		1.04					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	259	77.3		0.18					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	296	72.0		0.29					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	294	79.2		0.25					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	270	79.0		0.16					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	265	77.1		0.24					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	227	76.2		0.22					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	207	75.9		0.24					
2000	Sacramento R. at Mile 44	Delta	White Catfish	fillet	Individual	1	345	79.4		0.72					
2000	Sacramento R. above Bend Bridge	Lower Sac. R. Mainstem	Sacramento Sucker	fillet	Composite	5	457	75.3	7.04	0.10	10.6	10.0	ND	5.9	<RL
2000	Sacramento R. above Bend Bridge	Lower Sac. R. Mainstem	Rainbow Trout	fillet	Composite	5	350	77.3	1.79	0.04	6.1	ND	ND	3.6	ND
2000	Sacramento R. below Keswick	Lower Sac. R. Mainstem	Rainbow Trout	fillet	Composite	4	422	73.9	5.32	0.04	11.3	11.0	ND	7.4	<RL
2000	Sacramento R. at Colusa	Lower Sac. R. Mainstem	Pike Minnow	fillet	Composite	5	275.2	78.7	1.36	0.15	10.8	14.0	ND	19.0	<RL
2000	Sacramento R. at Colusa	Lower Sac. R. Mainstem	Striped Bass	fillet	Individual	1	451	76.9	0.80	0.30	23.8	34.0	1.48	45.4	<RL
2000	Sacramento R. at Colusa	Lower Sac. R. Mainstem	Sacramento Sucker	fillet	Composite	5	290.4	79.7	0.86	0.06	3.8	ND	ND	7.5	ND
2000	Sacramento R. near Hamilton City	Lower Sac. R. Mainstem	Pike Minnow	fillet	Composite	5	298.2	79.0	1.05	0.29	9.1	12.0	ND	12.1	ND
2000	Sacramento R. near Hamilton City	Lower Sac. R. Mainstem	Sacramento Sucker	fillet	Composite	5	316.2	79.2	1.61	<.0314	0.6	ND	ND	ND	ND
2000	Sacramento R. at Veterans Br	Lower Sac. R. Mainstem	Pike Minnow	fillet	Composite	4	266	80.3	0.63	0.25	25.5	22.0	1.07	34.2	<RL
2000	Sacramento R. at Veterans Br	Lower Sac. R. Mainstem	White Catfish	fillet	Composite	5	263.6	78.4	3.04	0.21	40.5	49.0	2.40	77.0	<RL
2000	Sacramento R. at Veterans Br	Lower Sac. R. Mainstem	Largemouth Bass	fillet	Composite	5	371.2	77.9	0.78	0.96	4.2	ND	ND	11.9	<RL
2000	American R. at Discovery Park	Major Tributary	Pike Minnow	fillet	Composite	5	277.8	78.1	1.94	0.42	27.4	27.0	6.38	35.0	<RL
2000	American R. at Discovery Park	Major Tributary	White Catfish	fillet	Composite	5	261.8	78.7	1.96	0.26	41.4	44.0	3.00	54.0	<RL
2000	American R. at Discovery Park	Major Tributary	Largemouth Bass	fillet	Composite	5	393.4	78.3	0.86	1.37	29.8	47.0	2.71	17.1	<RL
2000	American R. at Discovery Park	Major Tributary	Largemouth Bass	fillet	Individual	1	471	77.1		1.38					
2000	American R. at Discovery Park	Major Tributary	Redear Sunfish	fillet	Composite	5	192.8	77.0		0.30					
2000	American R. at J Street	Major Tributary	Sacramento Sucker	fillet	Composite	5	249	79.6	1.32	0.08	7.6	10.0	ND	6.4	<RL
2000	American R. at J Street	Major Tributary	Pike Minnow	fillet	Composite	5	264.6	77.6	2.85	0.54	32.3	33.0	7.71	36.6	<RL
2000	Feather R. near Nicolaus	Major Tributary	Pike Minnow	fillet	Composite	5	300.8	79.8	0.74	0.57	9.1	12.0	ND	16.9	<RL
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Composite	6	312.83	78.3	0.54	0.606581	5.7	ND	ND	6.5	ND
2000	Feather R. near Nicolaus	Major Tributary	Striped Bass	fillet	Individual	1	441	72.8		1.65					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	305	78.2		0.63					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	305	76.7		0.40					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	311	77.8		0.70					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	306	76.5		0.54					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	311	77.3		0.82					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	339	77.4		0.56					
2000	Feather R. near Nicolaus	Major Tributary	Redear Sunfish	fillet	Composite	5	153.6	76.8		0.22					

YEAR	STATION LOCATION	Site Category	Species	Tissue	Sample Type	Number of fish	Length (mm)	% Moisture	% Lipid	Mercury, mg/kg, wet weight	Sum of PCB Congeners, µg/kg	Sum of Aroclors, µg/kg	Sum of Chlordanes, µg/kg	Sum of DDTs, µg/kg	Dieldrin, µg/kg
2000	Feather R. near Nicolaus	Major Tributary	Channel Catfish	fillet	Composite	5	478.6	72.2		0.73					
2000	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	272	80.5		0.39					
2000	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	269	79.4		0.85					
2000	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	545	69.2		0.55					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	305	75.6		0.47					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	334	75.8		0.79					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	362	76.9		1.00					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	236	77.7		0.21					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	233	78.6		0.27					
2000	Feather R. near Nicolaus	Major Tributary	Striped Bass	fillet	Individual	1	556	75.2		1.22					
2000	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	492	69.6		0.55					
2000	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	670	73.2		1.25					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	334	74.9		0.55					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	321	75.8		0.42					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	302	78.2		0.67					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	355	75.9		0.86					
2000	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Individual	1	255	76.2		0.46					
2000	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	205	85.8		0.45					
2000	Feather R. near Nicolaus	Major Tributary	White Catfish	fillet	Individual	1	278	79.9		1.21					
2000	Clear Creek at Mouth	Tributary	Rainbow Trout	fillet	Composite	5	358.8	77.8	1.34	0.05	8.4	11.0	ND	5.3	ND
2000	Clear Creek at Mouth	Tributary	Largemouth Bass	fillet	Composite	5	376.4	80.0	0.50	0.45	4.0	ND	ND	ND	ND
2000	Big Chico Ck near mouth	Tributary	Pike Minnow	fillet	Composite	5	288.2	79.9	0.74	0.48	5.1	ND	1.11	10.4	ND
2000	Big Chico Ck near mouth	Tributary	Largemouth Bass	fillet	Composite	5	358.8	76.0	1.19	0.33	2.5	ND	ND	11.0	<RL
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Composite	8	348	77.8	0.50	0.45	6.2	ND	ND	13.6	<RL
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	324	77.8		0.26					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	376	78.2		0.45					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	384	77.7		0.57					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	409	77.3		0.82					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	390	77.4		0.64					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	306	77.8		0.28					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	210	77.3		0.10					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	385	74.3		0.50					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	319	78.9		0.34					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	342	78.5		0.34					
2000	Putah Creek	Tributary	Largemouth Bass	fillet	Individual	1	326	78.7		0.22					
2000	Putah Creek	Tributary	Bluegill	fillet	Composite	5	157a	79.8		0.16					
2000	Putah Creek	Tributary	Bluegill	fillet	Composite	5	147a	80.1		0.07					
2000	Putah Creek	Tributary	Bluegill	fillet	Composite	5	150a	78.2		0.16					
2000	Putah Creek	Tributary	Bluegill	fillet	Composite	5	148a	79.1		0.10					
2000	Upper Putah Creek	Tributary	Brown Trout	fillet	Composite	5	300.8	77.9	1.59	0.06	4.6	ND	ND	4.6	<RL
2000	Sacramento R. above Shasta	Tributary	Rainbow Trout	fillet	Composite	5	318	81.1	0.47	0.06	3.5	ND	ND	ND	ND
2001	Sacramento R. at Mile 44	Delta	Splittail	fillet	Composite	4	387.5	78		0.37					
2001	Sacramento R. at Mile 44	Delta	Pike Minnow	fillet	Composite	5	270.8	79	2.12	0.18	13.4	12.0	ND	24.7	<RL
2001	Sacramento R. at Mile 44	Delta	Smallmouth Bass	fillet	Composite	5	338.2	78	0.67	0.57	6.6	ND	ND	7.0	2.82
2001	Colusa Basin Drain	Ag Drain	Carp	fillet	Composite	5	398	79	0.87	0.17	5.8	ND	1.09	149.3	2.14
2001	Colusa Basin Drain	Ag Drain	Channel Catfish	fillet	Composite				1.49		9.7	25.0	1.30	81.0	2.33

YEAR	STATION LOCATION	Site Category	Species	Tissue	Sample Type	Number of fish	Length (mm)	% Moisture	% Lipid	Mercury, mg/kg, wet weight	Sum of PCB Congeners, µg/kg	Sum of Aroclors, µg/kg	Sum of Chlordanes, µg/kg	Sum of DDTs, µg/kg	Dieldrin, µg/kg
2001	Colusa Basin Drain	Ag Drain	Crappie	fillet	Composite	5	240.8	79		0.08					
2001	American River at Sunrise	Major Tributary	Sacramento Sucker	fillet	Composite	5	462	76	6.20	0.20	63.1	92.0	3.62	68.1	<RL
2001	American R. at Discovery Park	Major Tributary	Redear Sunfish	fillet	Composite	5	169.4	78		0.08					
2001	American R. at Discovery Park	Major Tributary	Sacramento Sucker	fillet	Composite	5	489.4	78	3.28	0.35	62.7	102.0	17.89	43.3	<RL
2001	Sacramento R. below Keswick	Lower Sac. R. Mainstem	Rainbow Trout	fillet	Composite	5	321.2	76	3.03	<.007	9.8	ND	ND	3.3	<RL
2001	Feather River above Bear River	Major Tributary	Redear Sunfish	fillet	Composite	5	159.2	77		0.10					
2001	Feather River above Bear River	Major Tributary	Sacramento Sucker	fillet	Composite	5	496.6	77	3.50	0.27	25.3	31.0	ND	29.4	<RL
2001	Feather R. near Nicolaus	Major Tributary	Sacramento Sucker	fillet	Composite	5	469	79	2.22	0.28	12.3	12.0	ND	18.4	<RL
2001	Feather R. near Nicolaus	Major Tributary	Pike Minnow	fillet	Individual	1	500	71		0.64					
2002	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Composite	5	327	76.8		0.45					
2002	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Composite	5	337.8	76.9		0.41					
2002	Feather R. near Nicolaus	Major Tributary	Pike Minnow	fillet	Composite	5	334.8	79.0		0.88					
2002	Feather R. near Nicolaus	Major Tributary	Pike Minnow	fillet	Composite	5	357.2	78.0		1.38					
2002	American R. at Discovery Park	Major Tributary	Pike Minnow	fillet	Composite	5	327.8	77.9		0.45					
2002	American R. at Discovery Park	Major Tributary	Pike Minnow	fillet	Composite	5	305.4	77.1		0.40					
2002	American R. at Discovery Park	Major Tributary	Largemouth Bass	fillet	Composite	5	329.2	76.7		0.45					
2002	American R. at Discovery Park	Major Tributary	Largemouth Bass	fillet	Composite	5	377.4	76.3		0.89					
2002	American R. at Discovery Park	Major Tributary	Largemouth Bass	fillet	Individual	1	448	76.0		1.43					
2002	American R. at Discovery Park	Major Tributary	Sacramento Sucker	fillet	Composite	5	488.8	72.89	7.88	0.28	291.7	414.0	9.05	57.5	1.79
2002	American R. at Discovery Park	Major Tributary	Sacramento Sucker	fillet	Composite	5	439	74.1	5.12	0.13	44.2	55.0	5.62	30.3	1.38
2002	American R. at Discovery Park	Major Tributary	Striped Bass	fillet	Individual	1	559	77.0		0.28					
2002	Sacramento R. at Mile 44	Lower Sac. R. Mainstem	Largemouth Bass	fillet	Composite	5	392.4	76.5		0.89					
2002	Sacramento R. at Mile 44	Lower Sac. R. Mainstem	Largemouth Bass	fillet	Composite	5	392.6	74.9		0.93					
2002	Sacramento R. at Mile 44	Lower Sac. R. Mainstem	Sacramento Sucker	fillet	Composite	5	492.6	69.3	10.4	0.21	62.838	108	12.737	181.3	3.04
2002	Colusa Basin Drain	Ag Drain	Carp	fillet	Composite	3	504.33	78.2		0.41					
2003	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Composite	5	307	79.4		0.59					
2003	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Composite	5	307	79.4		0.38					
2003	Feather R. near Nicolaus	Major Tributary	Largemouth Bass	fillet	Composite	5	327	78.7		0.35					
2003	Feather R. near Nicolaus	Major Tributary	Pike Minnow	fillet	Composite	5	255	79.3		0.19					
2003	Feather R. near Nicolaus	Major Tributary	Pike Minnow	fillet	Composite	5	362	79.5		0.52					
2003	American R. at Discovery Park	Major Tributary	Largemouth Bass	fillet	Composite	5	395	77.9		0.65					
2003	American R. at Discovery Park	Major Tributary	Largemouth Bass	fillet	Composite	5	324	77.4		0.43					
2003	American R. at Discovery Park	Major Tributary	Pike Minnow	fillet	Composite	5	285	78.2		0.17					
2003	American R. at Discovery Park	Major Tributary	Pike Minnow	fillet	Composite	5	339	78.4		0.23					
2003	American R. at Discovery Park	Major Tributary	Sacramento Sucker	fillet	Composite	5	403	78.0		0.09					
2003	American R. at Discovery Park	Major Tributary	Sacramento Sucker	fillet	Composite	5	475	76.4		0.29					
2003	Sacramento R. at Mile 44	Lower Sac. R. Mainstem	Largemouth Bass	fillet	Composite	5	347	78.7		0.68					
2003	Sacramento R. at Mile 44	Lower Sac. R. Mainstem	Largemouth Bass	fillet	Composite	5	408	77.6		1.37					
2003	Sacramento R. at Mile 44	Lower Sac. R. Mainstem	Sacramento Sucker	fillet	Composite	5	443	78.5		0.12					
2003	Sacramento R. at Mile 44	Lower Sac. R. Mainstem	Sacramento Sucker	fillet	Composite	5	490	70.1		0.23					

"<" indicates concentration not detected above specific reporting limit (for mercury and dieldrin)
"J" indicates the analyte was positively identified and the associated value is an estimated concentration
"ND" indicates "Not Detected"
"UJ" indicates that the analyte was not detected above the reported quantitation limit

YEAR	STATION LOCATION	Site Category	Species	Tissue	Sample Type	Number of fish	Length (mm)	% Moisture	% Lipid	Mercury, mg/kg, wet weight	Sum of PCB Congeners, µg/kg	Sum of Aroclors, µg/kg	Sum of Chlordanes, µg/kg	Sum of DDTs, µg/kg	Dieldrin, µg/kg

<RL indicates not detected above reporting limits for individual compounds or congeners (for PCBs, aroclors, chlordanes, DDTs)
All tissue concentration data are provided on a "Wet Weight" basis
Blanks indicate data not reported or analyzed

APPENDIX D:

REVIEW OF QUALITY ASSURANCE DATA

REVIEW OF QUALITY CONTROL DATA

The Quality Assurance procedures for the 2003-2004 SRWP monitoring program are documented in the Quality Assurance Project Plan (QAPP) (SRWP 2003). This appendix summarizes the types of quality assurance assessments used in the SRWP monitoring program and presents the results of those evaluations. Detailed procedures for preparation and analysis of quality control samples are provided in the analytical method documents referenced in the QAPP.

QUALITY ASSURANCE PROCEDURES AND OBJECTIVES

Qualitative Objectives

Comparability— Comparability of the data can be defined as the similarity of data generated by different monitoring programs. For the purpose of the SRWP Monitoring Program, this objective is addressed primarily by using standard sampling and analytical procedures where possible. Additionally, comparability of analytical data is addressed by analysis of standard reference materials (discussed subsequently in this document).

Representativeness—Representativeness can be defined as the degree to which the environmental data generated by the monitoring program accurately and precisely represent actual environmental conditions. For the SRWP, this objective is addressed by the overall design of the monitoring program. Specifically, assuring the representativeness of the data is addressed primarily by selecting appropriate locations, methods, times, and frequencies of sampling for each environmental parameter, and by maintaining the integrity of the sample after collection. Each of these elements of the quality assurance program are addressed elsewhere in this document.

Completeness

Data completeness is a measure of the amount of successfully collected and validated data relative to the amount of data planned to be collected for the project. Completeness is usually expressed as a percentage value. A project objective for percent completeness is typically based on the percentage of the data needed for the program or study to reach valid conclusions. Because the SRWP is intended to be a long term monitoring program, data that are not successfully collected for a specific sample event or site can typically be recollected at a later sampling event. For this reason, most of the data planned for collection can not be considered absolutely critical, and it is difficult to set an meaningful objective for data completeness. However, some reasonable objectives for data are desirable, if only to measure the effectiveness of the Monitoring Program. The following program goals for data completeness are based on the planned sampling frequency and a subjective determination of the relative importance of the monitoring element within the Monitoring Program:

Table 1. SRWP Goals For Data Completeness

Monitoring Element	Completeness Objective
Mercury	90%
Pesticides	90%
General Water Quality Constituents	90%
Pathogens	90%
Aquatic Toxicity	90%
Benthic Invertebrates	95%
Fish Tissue	85%

Field Procedures

For basic water quality analyses, quality control samples to be prepared in the field consisted of field blanks and field duplicates.

Field Blanks

The purpose of analyzing field blanks is to demonstrate that sampling procedures and equipment do not result in contamination of the environmental samples. Field blanks were generally prepared and analyzed for all analytes of interest at the rate of one per sample event, along with the associated environmental samples. Field blanks consisted of laboratory-prepared blank water processed through the sampling equipment using the same procedures used for environmental samples. If the concentration in the associated environmental samples was less than five times the value detected in the field blank, the results for the environmental samples may be affected by contamination and were qualified as an *upper limit* of the reported sample result.

Field Duplicates

The purpose of analyzing field duplicates is to demonstrate the precision of sampling and analytical processes. Field duplicates were prepared and analyzed at a rate of 1 per event for most analytes. Field duplicates consisted of two aliquots from the same composite sample, or of two grab samples collected in rapid succession. If the relative Percent Difference (RPD) of field duplicate results was greater than 25% and the absolute difference is greater than the RL, environmental results were qualified as *estimated*.

Laboratory Analyses

For basic water quality analyses, quality control samples prepared in the contract laboratory(s) will typically consist of equipment blanks, method blanks, standard reference materials, laboratory duplicates, matrix spikes, and matrix spike duplicates. Laboratory analyses for coliform bacteria will include negative and positive quality control samples, as specified in the method documents.

Equipment Blanks

The purpose of analyzing equipment blanks is to demonstrate that sampling equipment is free from contamination. Prior to using sampling equipment for the collection of environmental samples, the laboratory responsible for cleaning and preparation of the equipment will prepare bottle blanks and sampler blanks. These were prepared and analyzed by the lab at the rate of one each per batch of bottles or sampling equipment. The blanks were analyzed using the same analytical methods specified for environmental samples.

Method Blanks

The purpose of analyzing method blanks is to demonstrate that the analytical procedures do not result in sample contamination. Method blanks were prepared and analyzed by the contract laboratory at a rate of at least one for each analytical batch. Method blanks consisted of laboratory-prepared blank water processed along with the batch of environmental samples. If the result for a single method blank was greater than the MDL, the source(s) of contamination should be corrected, and the associated samples should be reanalyzed. If reanalysis was not possible, the associated sample results were qualified as an *upper limit* of the actual sample result.

Laboratory Control Samples

The purpose of analyzing laboratory control samples is to demonstrate the accuracy of the analytical method. Laboratory control samples were analyzed at the rate of one per sample batch for most analytes. Laboratory control samples consisted of laboratory fortified method blanks. If recovery of any analyte is outside the acceptable range for accuracy, the analytical process is not being performed adequately for that analyte. In this case, the sample batch should be prepared again, and the laboratory control sample should be reanalyzed. If reanalysis was not possible, the associated sample results were qualified as *low or high biased*.

Laboratory Duplicates

The purpose of analyzing laboratory duplicates is to demonstrate the precision of the analytical method. Laboratory duplicates were analyzed at the rate of one pair per sample batch. Laboratory duplicates will consist of duplicate laboratory fortified method blanks. If the Relative Percent Difference (RPD) for any analyte is greater than the precision criterion *and* the absolute difference between duplicates is greater than the RL, the analytical process is not being performed adequately for that analyte. In this case, the sample batch should be prepared again, and laboratory duplicates should be reanalyzed. If reanalysis was not possible, the associated sample results were qualified as *not reproducible* due to analytical variability.

Matrix Spikes and Matrix Spike Duplicates

The purpose of analyzing matrix spikes and matrix spike duplicates is to demonstrate the performance of the analytical method in a particular sample matrix. Matrix spikes and matrix spike duplicates were typically analyzed at the rate of one pair per sample batch for most analytes. Each matrix spike and matrix spike duplicate consisted of an aliquot of laboratory-fortified environmental sample.

If matrix spike recovery of any analyte is outside the acceptable range, the results for that analyte have failed the acceptance criteria for that specific matrix. If recovery of laboratory control samples is acceptable, the analytical process is being performed adequately for that analyte, and the problem is attributable to the sample matrix. If the matrix problem can't be corrected, the results for that analyte were qualified as appropriate (*low or high biased*) due to matrix interference.

If matrix spike duplicate RPD for any analyte is greater than the precision criterion, the results for that analyte have failed the acceptance criteria for that specific matrix. If the RPD for laboratory duplicates is acceptable, the analytical process is being performed adequately for that analyte, and the problem is attributable to the sample matrix. If the matrix problem can't be corrected, the results for that analyte were qualified as *not reproducible*, due to matrix interference.

Aquatic Toxicity Quality Control

For aquatic toxicity tests, the acceptability of test results was determined primarily by performance-based criteria for test organisms, culture and test conditions, and the results of control bioassays. Control bioassays included testing with reference toxicants, reference sediments, and negative and solvent controls. Test acceptability requirements are documented in the method documents for each bioassay method and in the QAPP.

In addition to the QA requirements for the toxicity testing methods, samples collected for aquatic toxicity testing were reserved for other QC analyses. An additional ten percent of analyses consisted of laboratory splits, spikes, and blanks. The results of duplicate analyses are considered acceptable if the results are not significantly different at the 95% confidence level *or* the RPD for the results is less than 30%. Acceptable results for tests with blanks are no significant toxicity. Although the laboratory has no formal limit of acceptability for analysis of spiked samples, the pattern and progress of toxic responses are evaluated subjectively for consistency with expected responses for the level of the spiked compound.

Benthic Invertebrates Processing and Analysis

Accuracy of identifications and precision of enumeration of benthic invertebrate collections was assessed by re-analysis of samples at the rate of one for every ten samples analyzed. This consisted of complete re-examination of the organisms in the archived original sample, including remnants from the sorting process. If any additional organisms are identified in the "remnant" fraction of the archived sample, the numbers of taxa and organisms was recorded. The total number of organisms and enumeration of individual taxa for the re-examined sample should be within 5% of the original total. Discrepancies in taxonomic identification or enumeration were resolved by consultation between taxonomic analysts.

Fish Tissue

Quality assurance and assessment procedures for analysis of contaminants in fish tissue were generally similar to those for water quality samples (documented above).

SUMMARY OF QUALITY CONTROL DATA

Aquatic Toxicity

For SRWP samples collected and analyzed in 2003-2004, aquatic toxicity tests met all performance criteria and 95% reported data were unqualified. The results of 8 tests were qualified because tests were initiated slightly after the 36-hour hold time objective. The results for quality control analyses for aquatic toxicity testing are presented in monitoring data summaries produced by Pacific EcoRisk.

The overall completion rate exceeded the 90% objective for the program, and this monitoring element provided data that were adequate for the purposes of the SRWP.

Fish Tissue Monitoring

The results of quality control analyses performed for 2003 fish tissue monitoring are reported in “Quality Assurance/Quality Control Document for the Sacramento River Toxic Pollutant Control Program” prepared by the California Department of Fish and Game. All of the 2003-2004 quality assurance results met data quality objectives, with the exception of one laboratory duplicate analysis. Overall, this monitoring element provided data that were of adequate quality for the purposes of the SRWP and met the completeness target of 85%.

Bioassessment

No bioassessment monitoring was conducted in 2003-2004.

Water Column Chemical and Microbiology Monitoring

Quality control data for SRWP monitoring data collected from July 2003 through June 2004 are summarized below. Quality control data were evaluated using methods documented in the Quality Assurance Project Plan (QAPP) for the SRWP (SRWP 2003). Sample results were reviewed for conformance with recommended allowable holding times for specific analyses and for compliance with SRWP Monitoring Program data quality objectives for laboratory and external QC results. Internal laboratory QC data reviewed include results for method blanks, laboratory control samples (standard reference materials), laboratory duplicates, matrix spikes, and matrix spike duplicates. Field and external laboratory QC data reviewed include results for field blanks and field duplicates.

Holding Times

Data quality objectives for holding times generally conform to EPA recommendations specified for the analytical methods used for individual parameters. Allowable holding times for the project range from 24 hours for microbiological analyses to 6 months for metals and hardness (after preservation). Of the total analyses performed, greater than 99% were within acceptable holding times. Analyses performed outside of acceptable limits resulted in qualification of some analytical results for aquatic toxicity, coliform bacteria, and UVA_{254}. Most of the qualified data were for aquatic toxicity analyses, due to the short 36-hour holding times and the logistics of getting samples to the lab from distant sampling locations. Toxicity tests for all of these samples were initiated as soon as possible after receipt by the laboratory. These results are presented in Table 2.

Laboratory Method and Filter Blanks

Laboratory method blanks and filter blanks were analyzed to evaluate the potential for contamination attributable to analytical reagents and sample processing. The project data quality objective for laboratory method and filter blanks was defined as below the method detection limit. If detectable levels of an analyte were determined to be present in method or filter blanks, sample results were accepted without qualification if the associated environmental sample results were greater than five times the concentration detected in the blank. If detectable levels of an analyte were determined to be present in method or filter blanks and associated environmental sample results were less than five (5) times the concentration detected in the blank, the reported analytical results were qualified as an upper limit of the actual sample result.

For SRWP 2003-2004 monitoring results, no analytes were detected in laboratory method blank analyses. The overall success rate for analyses of laboratory method and filter blanks was 100%. These results indicate that laboratory contamination of water quality samples is not a significant problem. Results for laboratory method blanks are summarized in Table 3.

Laboratory Control Sample Recoveries

Laboratory control samples were analyzed to evaluate analytical accuracy. If recoveries were outside the acceptable range for the analysis, associated samples results were qualified as "*low*- or *high-biased*" as indicated by the control sample recovery.

For SRWP 2003-2004 monitoring results, 8 of 251 laboratory control sample recoveries were outside project specifications, all for pesticide analyses by EPA Method 8141. The overall success rate for analysis of laboratory control samples was 97%. These results indicate that analytical accuracy was adequate for analysis of water quality samples for the project. Results for laboratory control sample recoveries are summarized in Table 4 and Table 5.

Laboratory Duplicates

Analyses of duplicate samples were conducted to evaluate analytical precision. If laboratory duplicate results were outside the project data quality objective, associated samples results were qualified as "estimated" (not reproducible) due to analytical variability. An RPD greater than the project data quality objective was not considered cause for qualification of analytical results if measured differences between replicates were less than the reporting limit, or if matrix spike duplicate results were acceptable.

For SRWP 2003-2004 monitoring results, none of the 155 laboratory duplicate results were outside program specifications. The overall success rate for analyses of laboratory duplicate samples was 100%. These results indicate that analytical precision was adequate to produce reliable data for the SRWP. Results for laboratory duplicate analyses are summarized in Table 6.

Matrix Spike Recoveries

Analyses of matrix spike samples (spiked environmental samples) were performed to evaluate the effect of water quality sample matrix on analytical accuracy. When a matrix spike recovery does not meet the project data quality objective, associated sample results are considered "*low*- or *high-biased*" due to matrix interference, as indicated by the recovery.

For SRWP 2003-2004 monitoring results, reported matrix spike recoveries exceeded program specifications for 37 of 328 total analyses. The success rate for analyses of matrix spike recoveries was 85% for pesticide analyses by EPA Method 8141, and 100% for all other analyses. Matrix spike recoveries and lab control sample recoveries that were outside DQOs were almost universally high, indicating an overall tendency for *high bias* for the analysis for some specific pesticides. No detected results were qualified as *high biased* on the basis of these matrix spike recoveries. In combination with the results for laboratory control samples, these results indicate that with the exception of a few triazine pesticides, matrix interference did not represent a significant problem and that analytical accuracy was adequate to produce reliable data for water quality samples for the SRWP. Results for matrix spike recoveries are summarized in Table 7 – Table 8.

Matrix Spike Duplicates

Analyses of matrix spike duplicate samples were performed to evaluate the effect of water quality sample matrix on analytical precision. If matrix spike duplicate results were outside this range, associated samples results were qualified as "*estimated*" due to matrix variability.

For SRWP 2003-2004 monitoring results, matrix spike duplicate RPDs exceeded project objectives in a total of 33 of 120 analyses. The overall success rate for analyses of matrix spike duplicates was 73%. All but one of the results exceeding the project DQO (25%) were for pesticide analyses in two samples with high recoveries of matrix spikes. Although analytical precision was generally adequate to produce reliable water quality data for the SRWP, problems due to matrix effects on precision were more frequently observed for pesticide analyses than is desirable. However, only one detected pesticide result was qualified on the basis of matrix duplicate variability. Results for matrix spike duplicate RPDs are summarized in Table 9.

Field Blanks

Field blanks were submitted and analyzed to evaluate the potential for sampling equipment and procedures to contaminate water quality samples. The project data quality objective for field and equipment blanks was defined as below the program reporting limit. If detectable levels of an analyte were determined to be present in field blanks, sample results were accepted without qualification if the environmental results were greater than five (5) times the concentrations detected in the blank. If detectable levels of an analyte were determined to be present in field or equipment blanks and sample results were less than five (5) times the concentrations detected in the blank, the reported results were qualified as an upper limit of the true sample concentration.

For SRWP 2003-2004 monitoring results, SRWP analytes were detected above reporting limits in 2 of 145 field blank analyses: 1 total mercury blank and 1 dissolved organic carbon blank. The overall success rate for analysis of field blanks was 99%. Results of analyses of field blanks indicate that sampling procedures and equipment were generally adequate to prevent detectable or significant levels of contamination of samples collected for the SRWP. Results for field blank analyses are summarized in Table 11.

Field Duplicates

The purpose of analyzing duplicate field samples is to measure the reproducibility (i.e. precision) of analyte concentrations in field samples from replicate composite or grab samples. The results provide a measure of the variability attributable to sampling and sample handling procedures after sample collection. The project data quality objective for duplicates field samples was defined as a relative percent difference (RPD) of less than or equal to 25%. Duplicate RPDs outside this range resulted in the qualification of sample result data as “estimated” (not reproducible) due to sample variability. An RPD greater than 25% was not considered cause for qualification of data if measured differences between replicates were less than the reporting limit.

For SRWP 2003-2004 monitoring results, field duplicate RPDs exceeded program specifications for 2 of 154 pairs of analyses. The overall success rate for analysis of field duplicates was 99%. These results indicate that sampling and sample handling-generated variability was not excessive, and that sampling procedures were performed in a manner to provide adequate data for the SRWP. Results for field duplicates are summarized in Table 12.

Summary

From June 2003 through July 2004, the SRWP monitoring program successfully completed 1974 of 1974 planned water chemistry and aquatic toxicity analyses for a completion rate of 100%. These results excluded planned analyses for percent sand in suspended solids because an appropriate method and laboratory for this analysis in water was not found. Of the 1974 completed analyses, data qualifications were required for 72 analytical results, leaving 1902 unqualified results for an overall analytical success rate of 96% for water chemistry, microbiology, and aquatic toxicity monitoring for 2003-2004. These results are summarized in Table 13.

The quality control results for 2003-2004 indicate that sampling and analytical methods for water column monitoring were generally adequate to produce reliable data for the SRWP.

Table 2. Summary of Compliance with Holding Times for SRWP Analyses, 2002-2003 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
alkalinity, total	14 days	38	0	100
coliform, fecal	24 hours	43	1	98
coliform, total	24 hours	43	1	98
E. coli	24 hours	43	1	98
hardness	6 months	38	0	100
mercury, dissolved	90 days	35	0	100
mercury, total	90 days	36	0	100
methylmercury, dissolved	6 months	37	0	100
methylmercury, total	6 months	45	0	100
organic carbon, dissolved	28 days(5)	40	0	100
organic carbon, total	28 days(5)	40	0	100
pesticides, EPA 507	40 days	14	0	100
pesticides, EPA 8141A	40 days	1588	0	100
total dissolved solids	7 days	40	0	100
total suspended solids	7 days	36	0	100
UVA_{254}	7 days(6)	38	2	95
Aquatic Toxicity (*Ceriodaphnia, Pimephales, Selenastrum*)	36 hours	146	10	93
total for all parameters		2300	15	99.4%

(1) Data quality objectives (DQO) are as specified in the Quality Assurance Project Plan (SRWP 2003)

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

(5) The QAPP (SRWP 2003) specifies a holding time of 7 days. However, standard laboratory practice for this parameter is analysis within 28 days for properly preserved and stored samples, and no data were qualified based on exceedance of the 7 day holding time.

(6) The QAPP (SRWP 2003) specifies a holding time of 48 hours. However, the methods specify analysis within 7 days for UVA samples filtered within 48 hours, and no data were qualified based on exceedance of the 48 hour holding time.

Table 3. Summary of Compliance with Laboratory Method Blank Results for SRWP Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
mercury, total	<MDL or <S/5	15	0	100
methylmercury, total	< MDL or <S/5	10	0	100
organic carbon, dissolved	< MDL or <S/5	26	0	100
organic carbon, total	< MDL or <S/5	30	0	100
pesticides, EPA 507	< MDL or <S/5	2	0	100
pesticides, EPA 8141A	< MDL or <S/5	171	0	100
total dissolved solids	< MDL or <S/5	8	0	100
total suspended solids	< MDL or <S/5	8	0	100
UVA_{254}	< MDL or <S/5	4	0	100
total for all analyses		274	0	100%

(1) Data quality objectives (DQO) are as specified in the Quality Assurance Project Plan (SRWP 2003)

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 4. Summary of Laboratory Control Sample and SRM Recoveries for SRWP Non-Organophosphate Pesticide Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
mercury, total	80% - 120%	5	0	100
methylmercury, total	80% - 120%	30	0	100
organic carbon, dissolved	80% - 120%	28	0	100
organic carbon, total	80% - 120%	29	0	100
total dissolved solids	80% - 120%	4	0	100
total suspended solids	80% - 120%	4	0	100
Molinate by EPA 507	69% - 127%	1	0	100
Thiobencarb by EPA 507	60% - 111%	1	0	100
total for all analyses		101	0	100%

(1) Data quality Objectives (DQO) for EPA 619 LCS Recoveries were revised by the laboratory during the 2003-2004 monitoring period.

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 5. Summary of Laboratory Control Sample Recoveries for SRWP Organophosphate Pesticide Analyses by EPA Method 8141, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
azinphosmethyl	27-151%, 36-189%	5	1	80
bolstar	40-117%, 43-119%	5	0	100
chlorpyrifos	37-120%, 61-125%	5	0	100
coumaphos	46-134%, 60-124%	5	0	100
def/merphos	34-140%, 60-118%	5	1	80
demeton (total)	12-85%, 21-80%	5	1	80
diazinon	36-113%, 64-122%	5	0	100
dichlorvos	41-126%, 46-141%	5	1	100
dimethoate	51-161%, 68-202%	5	0	100
disulfoton	29-90%, 39-109%	5	1	100
EPN	37-159%, 57-133%	5	0	100
EPTC	43-130%, 39-133%	5	0	100
ethion	54-115%, 59-118%	5	0	100
ethoprop	38-118%, 65-125%	5	0	100
fensulfothion	36-161%, 54-161%	5	0	100
fenthion	52-113%, 50-118%	5	0	100
malathion	54-121%, 47-125%	5	0	100
mevinphos	31-150%, 43-205%	5	0	100
naled	27-237%, 10-67%	5	2	60
parathion, ethyl	44-133%, 62-123%	5	0	100
parathion, methyl	28-132%, 53-137%	5	1	80
phorate	34-104%, 45-101%	5	0	100
prowl	32-128%, 63-129%	5	0	100
ronnel	47-112%, 53-114%	5	0	100
stirophos	25-180%, 28-158%	5	0	100
sulfotep	50-114%, 49-119%	5	0	100
tokuthion	36-126%, 56-123%	5	0	100
trichloronate	49-116%, 43-113%	5	0	100
trifluralin	33-105%, 44-117%	5	0	100
total for EPA method 8141A		150	8	94.6%

(1) Data Quality Objectives (DQO) for EPA 8141 MS Recoveries were revised (tightened) by the laboratory during the 2003-2004 monitoring period.

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 6. Summary of Laboratory Duplicate Results for SRWP Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
mercury, total	≤20% RPD	5	0	100
methylmercury	≤20% RPD	9	0	100
organic carbon, dissolved	≤20% RPD	47	0	100
organic carbon, total	≤20% RPD	41	0	100
total dissolved solids	≤20% RPD	3	0	100
total suspended solids	≤20% RPD	2	0	100
UVA_{254}	≤20% RPD	48	0	100
total for all analyses		155	0	100%

(1) Data quality objectives (DQO) are as specified in the Quality Assurance Project Plan (SRWP 2003)

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 7. Summary of Matrix Spike Recoveries for SRWP Non-Pesticide Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
mercury, total	80% - 120%	10	0	100
methylmercury	80% - 120%	18	0	100
organic carbon, dissolved	80% - 120%	22	0	100
organic carbon, total	80% - 120%	22	0	100
total dissolved solids (TDS)	80% - 120%	8	0	100
total suspended solids (TSS)	80% - 120%	8	0	100
total for all analyses		88	0	100%

(1) Data quality objectives (DQO) are as specified in the Quality Assurance Project Plan (SRWP 2003)

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 8. Summary of Matrix Spike Recoveries for SRWP Pesticide Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
azinphosmethyl	27-151%, 36-189%	8	2	75
bolstar	40-117%, 43-119%	8	0	100
chlorpyrifos	37-120%, 61-125%	8	1	87.5
coumaphos	46-134%, 60-124%	8	0	100
def/merphos	34-140%, 60-118%	16	1	100
demeton (total)	12-85%, 21-80%	8	3	62.5
diazinon	36-113%, 64-122%	8	2	75
dichlorvos	41-126%, 46-141%	8	0	100
dimethoate	51-161%, 68-202%	8	6	25
disulfoton	29-90%, 39-109%	8	1	87.5
EPN	37-159%, 57-133%	8	0	100
EPTC	43-130%, 39-133%	8	2	75
ethion	54-115%, 59-118%	8	1	87.5
ethoprop	38-118%, 65-125%	8	0	100
fensulfothion	36-161%, 54-161%	8	1	87.5
fenthion	52-113%, 50-118%	8	1	87.5
malathion	54-121%, 47-125%	8	1	87.5
mevinphos	31-150%, 43-205%	8	2	75
naled	27-237%, 10-67%	8	2	75
parathion, ethyl	44-133%, 62-123%	8	1	87.5
parathion, methyl	28-132%, 53-137%	8	2	75
phorate	34-104%, 45-101%	8	0	100
prowl	32-128%, 63-129%	8	0	100
ronnel	47-112%, 53-114%	8	3	62.5
stirophos	25-180%, 28-158%	8	0	100
sulfotep	50-114%, 49-119%	8	2	75
tokuthion	36-126%, 56-123%	8	0	100
trichloronate	49-116%, 43-113%	8	1	87.5
trifluralin	33-105%, 44-117%	8	0	100
total for all analyses		240	37	85%

(1) Data Quality Objectives (DQO) for EPA 8141 MS Recoveries were revised (tightened) by the laboratory during the 2003-2004 monitoring period.

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 9. Summary of Matrix Spike Duplicate Results for SRWP Non-Pesticide Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number tested (2)	Number outside DQO (3)	% success (4)
mercury, total	≤20% RPD	5	0	100
methylmercury	≤20% RPD	9	0	100
organic carbon, dissolved	≤20% RPD	11	0	100
organic carbon, total	≤20% RPD	11	0	100
total dissolved solids	≤20% RPD	4	0	100
total suspended solids	≤20% RPD	4	0	100
total for all analyses		44	0	100%

(1) Data quality objectives (DQO) are as specified in the Quality Assurance Project Plan (SRWP 2003)

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 10. Summary of Matrix Spike Duplicate Results for SRWP Pesticide Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
azinphosmethyl	≤25% RPD	4	0	100
bolstar	≤25% RPD	4	0	100
chlorpyrifos	≤25% RPD	4	1	75
coumaphos	≤25% RPD	4	2	50
def/merphos	≤25% RPD	8	2	75
demeton (total)	≤25% RPD	4	2	50
diazinon	≤25% RPD	4	0	100
dichlorvos	≤25% RPD	4	2	50
dimethoate	≤25% RPD	4	0	100
disulfoton	≤25% RPD	4	2	50
EPN	≤25% RPD	4	2	50
EPTC	≤25% RPD	4	2	50
ethion	≤25% RPD	4	2	50
ethoprop	≤25% RPD	4	0	100
fensulfothion	≤25% RPD	4	2	50
fenthion	≤25% RPD	4	2	50
malathion	≤25% RPD	4	2	50
mevinphos	≤25% RPD	4	0	100
naled	≤25% RPD	4	0	100
parathion, ethyl	≤25% RPD	4	2	50
parathion, methyl	≤25% RPD	4	0	100
phorate	≤25% RPD	4	0	100
prowl	≤25% RPD	4	0	100
ronnel	≤25% RPD	4	2	50
stirophos	≤25% RPD	4	2	50
sulfotep	≤25% RPD	4	0	100
tokuthion	≤25% RPD	4	0	100
trichloronate	≤25% RPD	4	2	50
trifluralin	≤25% RPD	4	0	100
total for all analyses		120	33	73%

(1) Data Quality Objectives (DQO) for EPA 8141 MS Recoveries were revised (tightened) by the laboratory during the 2003-2004 monitoring period.

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 11. Summary of Field Blank Results for SRWP Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
coliform, fecal	<RL or <S/5	4	0	100
coliform, total	<RL or <S/5	4	0	100
E. coli	<RL or <S/5	4	0	100
mercury, total (filtered)	<RL or <S/5	3	1	66
methylmercury, dissolved	<RL or <S/5	4	0	86
methylmercury, total	<RL or <S/5	1	0	100
organic carbon, dissolved	<RL or <S/5	3	1	75
pesticides, EPA 507	<RL or <S/5	2	0	100
pesticides, EPA 8141A	<RL or <S/5	120	0	100
total for all analyses		145	2	99%

(1) Data Quality Objectives (DQO) are as specified in the Quality Assurance Project Plan (SRWP 2003)

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 12. Summary of Field Duplicate Results for SRWP Analyses, 2003-2004 Monitoring

Parameters	DQO (1)	Number Tested (2)	Number Outside DQO (3)	% Success (4)
alkalinity	≤25% RPD	4	0	100
hardness	≤25% RPD	4	0	100
mercury, total	≤25% RPD	4	1	75
methylmercury	≤25% RPD	4	1	75
organic carbon, total	≤25% RPD	4	0	100
pesticides, EPA 507	≤25% RPD	2	0	100
pesticides, EPA 8141A	≤25% RPD	120	0	100
total dissolved solids	≤25% RPD	4	0	100
total suspended solids	≤25% RPD	4	0	100
UVA_{254}	≤25% RPD	4	0	100
total for all analyses		154	2	99%

(1) Data quality objectives (DQO) are as specified in the Quality Assurance Project Plan (SRWP 2003)

(2) Total number of results for parameter

(3) Number of results not achieving DQO

(4) Success rate, i.e. percent of results achieving DQO

Table 13. Summary of Planned and Completed Environmental Analyses for SRWP Monitoring, 2003-2004 Monitoring

Parameter	Total Environmental Analyses Planned	Environmental Analyses Completed	Total Percent Completeness
Mercury, total (filtered and unfiltered)	64	64	100
Methylmercury, total (filtered and unfiltered)	64	64	100
Total Suspended Solids (TSS)	32	32	100
Alkalinity	44	44	100
Hardness	44	44	100
Organic Carbon, total and dissolved	72	72	100
Total Dissolved Solids (TDS)	36	36	100
UVA254	36	36	100
Field Measurements (ph, Temp., D.O., EC)	208	208	100
Molinate and Thiobencarb (EPA 507)	10	10	100
Organophosphate Pesticides (EPA 8141A)	1080	1080	100
Coliform Bacteria (*E. coli*, total coliforms, fecal coliforms)	108	108	100
Aquatic Toxicity (*Ceriodaphnia, Pimephales, Selenastrum*)	176	176	100
Total for all analyses	1974	1974	100
Minus total qualified data		72	
Total unqualified data		1902	96%
% Success			**96%**

APPENDIX E:

COMMENTS AND RESPONSES

RESPONSES TO SPECIFIC COMMENTS ON THE PUBLIC DRAFT ANNUAL MONITORING REPORT, 2003-2004.

Comments were received from one Peer reviewer of the Annual Monitoring Report (Sarah Lowe, San Francisco Estuary Institute). Specific comments on the Public Draft Annual Monitoring Report (2003-2004) are paraphrased below and are followed by the responses addressing each comment. The full text of the peer reviewer's comments are provided following the responses to paraphrased comments below. General programmatic recommendations were also received from Jerry Troyan (Sacramento Regional County Sanitation District). These comments and reccomendations are intended to be considered by the SRWP Board of Trustees and Committees, as well as the broader stakeholder community, and are therefore not addressed in this document. The peer reviewers' responses to these additional programmatic questions are included with the full text of the Annual Monitoring Report comments submitted by reviewers.

Comments from Sarah Lowe, California Department of Water Resources (Received July 25, 2005)

SL-1. Suggests the addition of expanded discussions in the Executive Summary and Introduction providing context for the monitoring plan and for Monitoring Committee decisions over time.

(a) Why were OC pesticide analyses discontinued, *Hyalella* toxicity tests planned to be added, and analyses for new pesticides and trace organics (e.g., pyrethroids, PBDEs) added?

(b) …did the program initially monitor all CTR pesticides and drop parameters consistently below detection? Is there a plan to continue monitoring OC pesticides on a less frequent schedule?

(c) …I think the report needs to state the breadth of the program and that the annual reports focus on specific aspects of this broader context based on recommendation from the Monitoring Committee.

Response: Organochlorine pesticides have only been analyzed in fish tissue in the past. Analysis of these legacy pesticides in fish tissue continues to be a high priority and will be reinstated in future monitoring years when funds are available. PBDEs are a newly identified contaminant of concern and will also be analyzed in fish tissue when possible. (These monitoring goals were achieved in 2005-2006 through coordination with the CALFED-funded Fish Mercury Project conducted by SFEI, and the fish tissue monitoring conducted by SWRCB.) Sediment toxicity testing using Hyalella is cited as a specific element for agricultural coalitions for Conditional Waiver monitoring programs, and is not planned for SRWP.

The primary purpose of this report is to document and interpret the monitoring results, rather than focusing on the Monitorng Committee's decision making process. The process of developing and establishing the initial monitoring effort is documented in the Phase 1 Monitoring Plan (SRWP 1998a), and past decisions for program modifications have been documented in previous annual reports. The initial monitoring effort was designed to provide information to address known water quality issues determined by the Monitoring and Toxics Committees to be the highest priorities in the watershed (e.g., mercury, pesticides, toxicity, and drinking water), and parameters were generally selected as the best available indicators

> *for specific beneficial uses. Evaluation of beneficial uses necessarily relies on these indicator parameters, rather than on direct assessment of these uses.*
>
> *As the reviewer correctly points out, funding restrictions have been the primary reason for limiting the number of sampling sites and events, and for temporarily discontinuing some parameters. In the past, monitoring for some parameters have been discontinued for a variety of other reasons (e.g., determination that trace metals were no longer a significant problem; inadequate analytical methods for pathogens; non-informative results for sediment toxicity tests). Decisions regarding specific future monitoring plans (when known) are also summarized in the appropriate sections of this report.*

SL-2. “Summary tables … are informative and well-composed. [However,] the figures for toxicity time series are not very clear.” Addition of alternative presentation figures based on annual summaries of percent toxicity was suggested.

Response: Clear and concise summary and graphic presentation of the toxicity results has proven to be difficult. Your suggestion is a good one though, and it will be explored for future evaluations of these data.

SL-3. Rationale for consumption-weighted average evaluation is requested. Addition of size ranges to Table 8 is suggested.

Response: The main purpose of discussing the consumption-weighted averages is to make this evaluation consistent with the method that was used by USEPA to develop consumption-based mercury criteria. This method attempts to consider the different degree of biomagnification expected at different trophic levels in evaluating whether consumption based guidelines are exceeded. Size ranges were added to Table 8, as recommended.

From: Sarah Lowe
Environmental Scientist
San Francisco Estuary Institute
Oakland, CA 94621
Date: July 25, 2005

Dear Claus Suverkropp,

Thank you for inviting me to review the public draft of the *Sacramento River Watershed Program Annual Report: 2003-2004*. The Report is well written and organized. Below are some comments and I have also marked up a copy with some specific comments.

1) I suggest a *summary in the Executive Summary and a section in the introduction that provide more context for the programs overarching monitoring plan and the decisions the Monitoring Subcommittee has made (and plans) for adding/dropping sites and parameters over time* (the goals and objectives seem clear: evaluate beneficial uses and monitor for potential impairment of surface waters [condition, trends, sources, and relationship to management actions]).

A short discussion on what the Monitoring Subcommittee outlined for the initial monitoring effort (to characterize water quality in the Sacramento River watershed for informing managers on current condition) and the decisions made over time to adapt the program to changing land use, budget, and other pressures. Also include a summary of what they recommended for the near and long-term monitoring effort. The reports states what some of the decisions were but there is little explanation as to why they were made (e.g. to drop OC-Pesticides [are there plans to monitor them less frequently or not at all?], added toxicity testing with *Hyalella* in 2005-06 [will this be water or sediment toxicity testing (I'm used to seeing it as a sed. Tox. Test but found out that it is also used in water tox.)? Why are you adding an additional species if it is for water tox?], monitoring for new pesticides [pyrethroids, PBDEs – by incorporating data from other studies, mentioned in the report, into next years report?]).

The report clearly states that for funding reasons, the program had to downsize the number of sites and frequency of sampling and you provide clear rationale for keeping the final subset of locations, and your shift to event based monitoring… but I did not see much discussion of how the group made decisions on what parameters to monitor for initially and as the program evolved. For example, did the program initially monitor for all the CTR parameters in water and then drop parameters that were always below detection? I see on table 19 that a few water bodies are on the 303(d) list for DDT and chlordane. Is there a monitoring plan to continue to monitor organochlorine pesticides on a less frequent schedule? My sense from the document is that funding constraints were the main factor for the downsizing of number of sample locations, frequency, and parameters measured. For example, there is no clear rationale provided (other than $) for why the program decided to drop the OC-pesticide monitoring but I expect that some of it has to do with the fact that some of those legacy contaminants are very slow to degrade and therefore annual monitoring doesn't make a lot of sense.

The document does a nice job of documenting and reporting data from other studies that collect related and relevant information, and how those studies are addressing key contaminants of concern and/or emerging contaminants, etc. More discussion on how the SRWP is planning to incorporate the results of those additional efforts into their program design and the their reporting process would be helpful. (i.e. Don Weston's pyrethroid study (UCB) and the fish mercury study (SFEI)). By putting the SRWP and these other study efforts into a coherent framework, the program shows readers that the program has long and short-term vision. The report does this quite well already with land use and DPR pesticide usage summaries. (More is always helpful.)

As mentioned before, a short sentence on page viii, indicates that the program in planning to add toxicity testing in 2005-06 using *Hyalella* but the document did not clearly state why this was suggested and how the program is adapting to new monitoring needs as a result of changing use patterns towards compounds that tend to be more hydrophobic (pyrethroids). Will the *Hyalella* be used in water or new sediment toxicity tests (I know it as a sediment tox. test organism)? I think this is important to state clearly as the added measure is possibly demonstrating another way the program in changing in ways that better address the changing pesticide use patterns.

Finally, I understand this program to be more comprehensive that the report seems to imply. Don't you monitoring for beneficial uses (wildlife (toxicity in water and sediments), recreational (sportfish, water quality for swimability, etc.), drinking water standards….. I think the report needs to state the breadth of the program and that the annual reports focus on specific aspects of this broader context based on recommendations by the Monitoring Subcommittee. Being new to this program, it would have been nice to get a better overview of the program from the Program Description chapter.

2) The summary tables in the report include a variety of information from land use, pesticide applications, the various studies that are collecting data, and summary results. They are informative and well composed. The box plots are clear and easy to read as are the scatter plots over time with trend lines. I also like the land use summaries, diazinon detection histogram over the 12-month period, and DPR pesticide use figures for pyrethroids. They provide additional context for interpreting the contaminant results.

The toxicity summary tables (e.g. table 23) are clear, but the figures for time series (e.g. figures 14& 15) are not very clear. Maybe another way to evaluate toxicity over time would be % of tests that were toxic over time… (i.e. plotting the last column of table 23 over time for different regions or locations). Another suggestion would be a summary map graphic of the overall percent of time each site was toxic for the duration of monitoring. This would highlight the locations that are persistently toxic.

3) I am not so familiar with fish tissue evaluations…. I found that section fairly easy to follow with the exception of the discussion on the consumption-weighted averages on page 22 parag. 2. I'm not sure what the rationale for this additional evaluation is. Does it put the different species (with different trophic level feeding habits) on the same par? Another suggestion is to add a column of age/size class range to Table 8 (although you state in the text that you composited fish of similar age/size (pg. 22 p.1) one would see that the large mouth bass from one location were of similar age/size to another).

From: Jerry Troyan via email
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The three basic questions asked by Jerry Toyan were:

1. When money resources are limited what parameters and or sites would you recommend as deleting or reducing the frequency of sampling? Why?
    a. Reduce frequency of
        i. legacy pesticides (slow to recover, so infrequent "status and trends" monitoring is warranted)
        ii. parameters that are persistently below detection or effects thresholds (OK to screen for possible change at a reduced schedule).
        iii. Parameters monitored by other organizations (collaborate to ensure data are of useful quality and quantity for SRWP monitoring goals and objectives)
    b. Change strategy for monitoring persistent problem measures (e.g. Aq.Tox).
        i. may need to perform focused study to investigate possible causes of persistent problem (e.g. TIE work, dose-response study of likely causes, focused biological study of resident organisms at problem locations, etc.)

2. What water quality parameters would you recommend as being added such that it would be helpful for future considerations or enhance decision making? For example, adding DOC, specific ions that would be helpful for using in the Biotic Ligand Model for assessing metals within the watershed?
    a. Additional riparian habitat measures would be good to get a better handle on current condition of the water bodies as it seems that TOC and TSS are of great concern for water quality (drinking water needs). As stated in the report, changing land use in the Sierra (urbanization and other developments) may have a large impact on these parameters in the future. Having good "base-line" habitat characteristics data will be useful to the program in the long-term.
    b. Include parameters for which management actions have recently been put into motion such as PBDEs.
    c. Additional effects measures such as use of biomarkers

3. What emerging pollutants based on your experience in the watershed should we consider adding to our list?
    a. It seems that Pyrethroids and PBDEs were mentioned in the report and are being monitored by other programs. An effort should be made to incorporate and possible collaborate with others to investigate the status and trends of these new contaminant groups.
    b. Sediment toxicity evaluations. As new pesticides tend to be hydrophobic, it would be prudent to gather baseline data on sediment toxicity in the tributaries. UCB (Don Weston) is already doing some of this and it appears that the SRWP is already participating in this issue. (However, the report is weak on stating this and providing information on what the program plans for the future).

APPENDIX F:

METHODS FOR 2003-2004 MONITORING

(from 2003-2004 Quality Assurance Project Plan)

DECEMBER 8, 2003

Sacramento River Watershed Program

Quality Assurance Project Plan for Monitoring,

Amended for Monitoring Year 2003-2004

SACRAMENTO RIVER

WATERSHED

PROGRAM

A. PROJECT MANAGEMENT

A.1. Title Page and Approvals

QUALITY ASSURANCE PROJECT PLAN FOR MONITORING FOR THE SACRAMENTO RIVER WATERSHED PROGRAM, MONITORING YEAR 2003-2004

QA Office Chief	______________________________ Vance Fong, Chief, Quality Assurance Program, EPA Region IX	Date
Project Officer	______________________________ Debra Denton, EPA Region IX	Date
Project Manager	______________________________ Jerry Troyan, Sacramento Regional County Sanitation District	Date
QA Manager	______________________________ Claus Suverkropp, Larry Walker Associates	Date
QA Officer	______________________________ Scott Ogle, Pacific EcoRisk Laboratory, Martinez, CA	Date
QA Officer	______________________________ Jay Davis, San Francisco Estuary Institute	Date
QA Officer	______________________________ Mark Stephenson, CDFG, Marine Pollution Studies Lab, Moss Landing	Date

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APPENDIX B: CALCULATIONS FOR DATA QUALITY ASSESSMENTS

APPENDIX C: SUPPORTING DOCUMENTS FOR CHEMICAL WATER QUALITY MONITORING

- Field Sampling Procedures (CDFG 1993)
- Methylmercury Field Sampling Procedures (CDFG 2000)
- Methyl Mercury in Water by Distillation, Aqueous Ethylation, Purge and Trap, and CVAFS by USEPA Method 1630 (DRAFT) (USEPA 2001)
- Evapo-Concentration Procedure (CDFG 1993)
- Total Hardness (Pacific EcoRisk 1995)
- Total Alkalinity (Pacific EcoRisk 1995)
- Total Dissolved Solids by EPA Method 160.1
- Total Suspended Solids by EPA Method 160.2
- Total and Dissolved Organic Carbon by UV-Promoted Persulfate Oxidation (Sierra Foothill Laboratory SOP, 5-19-2000)
- SOP: Organophosphorus Compounds by Gas chromatography: Capillary Column Technique by Gas Chromatography by EPA Method 8141A (APPL 1997) *This proprietary SOP is on file with the U.S. EPA Quality Assurance Division and is not available for public review*.
- Forms: Labels, Log Sheets, Data Reports

APPENDIX D: SUPPORTING DOCUMENTS FOR AQUATIC TOXICITY MONITORING

- Quality Assurance/Quality Control Manual, May 2000 (Pacific EcoRisk 2000).
- *Ceriodaphnia dubia* 7-Day Survival and Reproduction Bioassay Standard Operating Procedures (Pacific EcoRisk 1997)
- *Pimephales promelas* (Fathead Minnow) 7 Day Survival, and Growth Bioassay Standard Operating Procedures (Pacific EcoRisk 1997)
- *Selenastrum capricornutum* Algal Growth Bioassay Standard Operating Procedures (Pacific EcoRisk 2002)
- Flow Charts of TIE Procedures (Deanovic *et al* 1998; Norberg-King et al 1991)
- The Use of Ion Exchange Resins to Determine the Biotoxicity and Concentration of Dissolved Trace Metals in Natural Waters (Connor 1991)
- Forms: Labels, Log Sheets, Data Reports

APPENDIX E: SUPPORTING DOCUMENTS FOR PATHOGEN MONITORING (*RESERVED, NOT USED 2003-2004)*

APPENDIX F: SUPPORTING DOCUMENTS FOR BENTHIC INVERTEBRATE MONITORING (*RESERVED, NOT USED 2003-2004)*

APPENDIX G: SUPPORTING DOCUMENTS FOR FISH TISSUE MONITORING

- CDFG Fish Sampling and Sample Handling Protocols: DFG Method 102 (CDFG 2001)
- Analytical Protocols: Mercury in Fish Tissue
- Forms: Labels, Log Sheets, Data Reports

APPENDIX H: EXAMPLE LABEL AND CHAIN OF CUSTODY FORM

A.3. Distribution List

Table A-1 Primary Distribution List for SRWP Quality Assurance Project Plan

Name	Agency or Company
Debra Denton	EPA, Region IX
Vance Fong	EPA, Region IX
Mark Kutnink	EPA, Region IX
Steven Nebozuk	Sacramento Regional County Sanitation District (Coordinated Monitoring Program)
Scott Ogle	Pacific EcoRisk, Martinez, CA
Stephen Clark	Pacific EcoRisk, Martinez, CA
Gary Ichikawa	California Department of Fish and Game (Moss landing Marine Lab)
Brenda Lasorsa	Battelle Marine Science Laboratories, Squim, WA
David Crane	California Department of Fish and Game (Water Pollution Control Lab)
Jim Harrington	California Department of Fish and Game (Water Pollution Control Laboratory)
Mark Stephenson	California Department of Fish and Game (Moss Landing Marine Lab)
Rick Danielsen	BioVir Laboratories Inc., Benicia, CA
Sharon Dehmlow	APPL Labs, Fresno, CA
Sandy Nurse	Sierra Foothill Laboratory, Jackson, CA
Rich Gresham	Placer County Resource Conservation District
Fraser Sime	Department Of Water Resources, Northern District
Lori Webber	Central Valley Regional Water Quality Control Board, Sacramento, CA
Val Connor	State Water Resources Control Board, Sacramento, CA

A.4. Project Organization and Responsibility

The Sacramento River Watershed Program (SRWP) is an association of stakeholders in the Sacramento River watershed. These stakeholders include representatives of local municipalities and districts, state and federal agencies, agriculture, industry, landowners, environmental organizations, universities, technical consultants, and watershed conservancies. The SRWP was formed in 1996 through a series of stakeholder meetings.

Formation of the SRWP was facilitated by the Sacramento River Toxic Pollutant Control Program (SRTPCP), a locally initiated effort led by Sacramento County and the Sacramento Regional County Sanitation District. The SRTPCP is a watershed-based approach to the management of toxic pollutants in surface waters of the Sacramento Valley.

Funding for the SRTPCP is provided primarily by the federal government and is administered by EPA Region IX. A portion of the SRTPCP funding was specifically designated to assist in the formation of the broader watershed program. This project is the SRWP monitoring program.

The SRWP monitoring program is managed by Larry Walker Associates (LWA). The monitoring program manager is Tom Grovhoug of LWA. The project quality assurance manager is Claus Suverkropp, Senior Scientist with LWA.

Sample collection and analysis will be performed by the following agencies and subcontractors:

- Pacific EcoRisk
- California Department of Fish and Game (Moss Landing Marine Lab, and Water Pollution Control Lab)
- Battelle Marine Science Laboratories
- APPL Laboratories
- BioVir Laboratory
- Sierra Foothill Laboratory
- Sacramento Regional County Sanitation District

For the parameters measured by the monitoring program of the Sacramento River Watershed Program, the agencies selected to perform sampling and laboratory analyses provide the precision, accuracy, detection and reporting limits, and meet the quality control criteria necessary to satisfy the data quality objectives described in this document.

Sampling and analytical responsibilities and primary contacts are listed in Appendix A.

The organizational structure of the SRWP monitoring program is illustrated in Figure A–1.

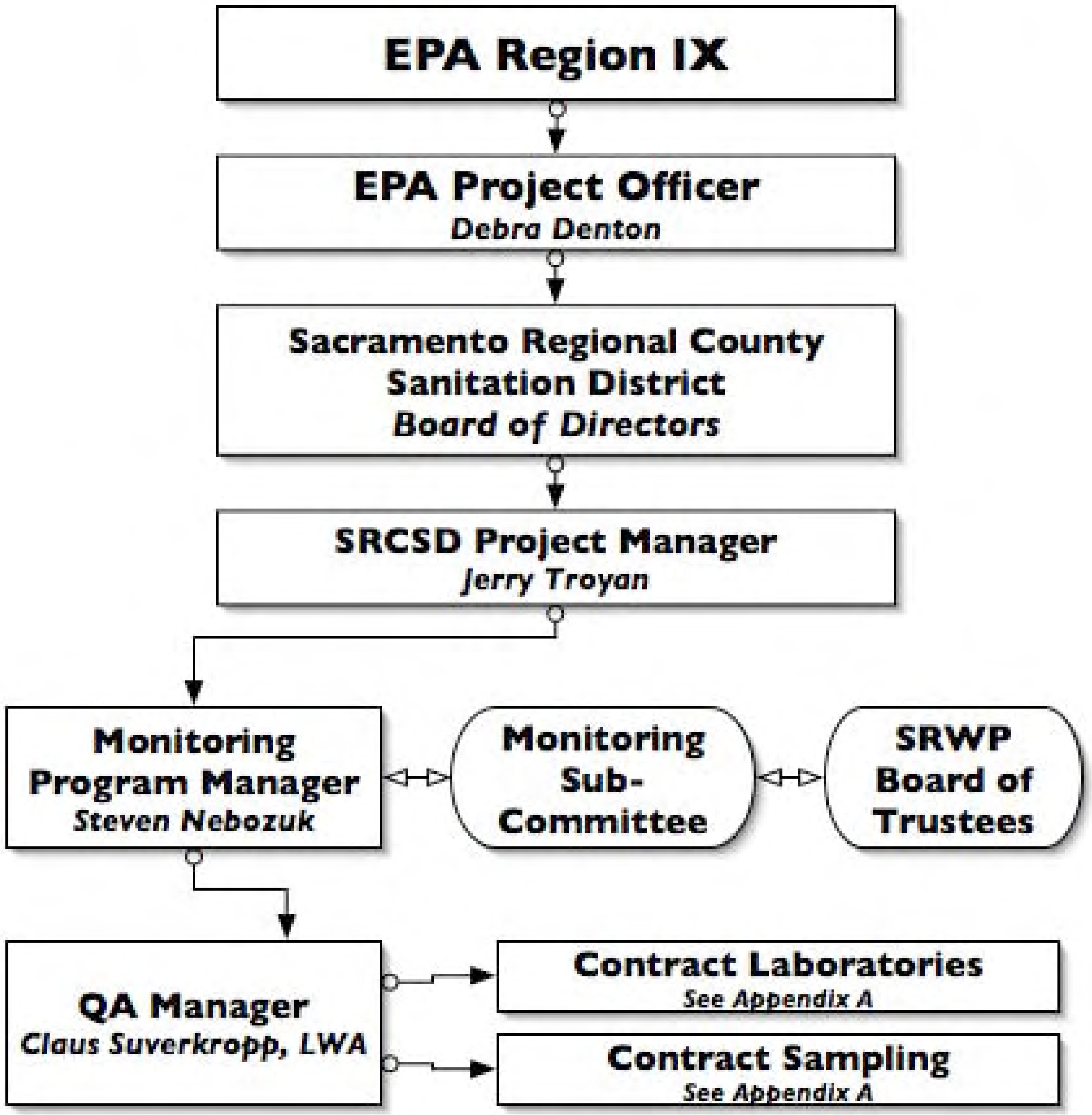

Figure A–1 SRWP Monitoring Program Management Structure

A.5. Problem Definition

The goal statement for the SRWP developed by the participating stakeholders is as follows:

> ***SRWP Goal Statement:***
> *"To ensure that current and potential uses of the watershed's resources are sustained, restored, and where possible, enhanced while promoting the long-term social and economic vitality of the region."*

One of the primary tasks of the SRTPCP and the SRWP is the design and implementation of a monitoring program for the watershed. In early stakeholder meetings, a Monitoring Subcommittee was formed to lead the development of the monitoring program.

A.6. Project Description

A.6.1. Project Objectives and Approach

The Monitoring Subcommittee has established the following long-term goal for the SRWP monitoring program:

> ***SRWP Monitoring Program Long-Term Goal:***
> *"In coordination with other subcommittees and the larger stakeholder group, develop a cost-efficient and well-coordinated long term monitoring program within the watershed to identify the causes, effects and extent of constituents of concern that affect the beneficial uses of water and to measure progress as control strategies are implemented."*

The SRWP monitoring program is envisioned by the subcommittee to be a long-term (e.g. 20 year) effort that will provide information to promote the understanding of conditions in the watershed and to assess the relative health of the watershed. The monitoring program will be a dynamic activity that will change over time as information is accumulated and new information needs are identified.

The Monitoring Subcommittee set the following initial goal for the monitoring program:

> ***SRWP Monitoring Program Short-Term Goal:***
> *"To assess conditions in the main stem of the Sacramento River through the collection of baseline information, with an emphasis on examining the degree to which beneficial uses are attained."*

The monitoring program will augment and coordinate with a number of other monitoring efforts that are ongoing in the watershed, including the USGS National Water Quality Assessment Program, the Sacramento Coordinated Water Quality Monitoring Program, and monitoring efforts by the Department of Water Resources, Department of Pesticide Regulation, US Bureau of Reclamation, City of Sacramento, and City of Redding. The SRWP monitoring program includes chemical, physical, biological and toxicological monitoring elements.

A.6.2. Measurements

The following environmental monitoring elements are included in the 2003-2004 SRWP monitoring program:

- Mercury in fish tissue
- Mercury, methylmercury, and pesticides in water
- Toxicity in water
- Pathogen indicator organisms in water
- Organic carbon and ultraviolet absorbance in water
- General constituents in water (solids, alkalinity, hardness) in water

Specific individual parameters measured by the SRWP monitoring effort are listed in Table A-2. The purpose for monitoring these parameters is discussed below.

Fish Tissue Monitoring. Mercury and certain organic contaminants (including DDT and PCBs) readily accumulate in the food web, resulting in concentrations in fish tissue which may be of concern to humans and wildlife. Monitoring levels of these pollutants in fish provides an effective way to assess the degree of contamination of the Sacramento River system. Because fish accumulate contaminants throughout their life span and their habitat, measurements of contaminant concentrations in fish tissue provide an indication of average conditions over space and time. Fish tissue data can be useful in the determination of long term trends of bioaccumulative contaminants in the watershed. This long-term data set is intended to be used to measure the effectiveness of activities to control these pollutants. The three locations selected for 2003–2004 monitoring were chosen to maintain the long-term data set for mercury in fish tissue in the lower Sacramento River watershed. Organic bioaccumulative contaminants will not be monitored in 2003–2004.

Mercury in water. As stated above, low levels of mercury and methylmercury in water are of potential concern to human health. Several programs are currently planned or under way in the Sacramento River watershed to monitor mercury levels at various locations, including the Sacramento Coordinated Water Quality Program and CALFED. SRWP mercury monitoring will supplement existing data and ongoing monitoring efforts with information for eight locations. Data obtained will be used to quantify ambient levels of mercury and methylmercury in the Sacramento River watershed and to assess whether these levels are causing or contributing to potential human health risks or otherwise adversely affecting beneficial uses. Locations for mercury monitoring were selected to continue the data sets for long-term SRWP monitoring locations and to augment and coordinate with ongoing monitoring efforts in the watershed.

Pesticides in water. Low levels of pesticides in water can affect the growth, reproduction and/or survival of sensitive aquatic species. Pesticides of concern to aquatic life in the Sacramento River system include organophosphate (OP), carbamate, and triazine pesticides. Specific pesticides in these categories are responsible for the presence of several Sacramento River watershed waterbodies on the 303(d) list of impaired waterbodies. Several programs are currently under way in the Sacramento River watershed to monitor pesticides at various locations in the Sacramento River watershed, including programs administered by the California Department of Pesticide Regulation (DPR), the California Regional Water Quality Control Board, the Department of Water Resources, and the USGS National Water Quality Assessment for the Sacramento River. SRWP pesticide monitoring of organophosphate will supplement the existing data with information for nine additional locations. Locations for pesticide monitoring were selected on the basis of documented use of these pesticides upstream from the locations monitored, on pesticide-caused toxicity detected at these streams/rivers, and on inclusion for pesticides on the 303(d) list of impaired water bodies. Data obtained will be used to quantify ambient levels of pesticides in the Sacramento River watershed and to assess whether these levels are adversely affecting uses.

Toxicity in water. Ambient samples of water can be tested in the laboratory for toxicity to provide an indication of the conditions that exist in the natural environment. Standard test species and test procedures are used to provide reliable and comparable results. Toxicity is considered to occur when test species are adversely affected by exposure to ambient water. Adverse effects may include impaired growth or reproduction, abnormalities, or mortality of test species. Effects may occur rapidly (acute toxicity) or may occur over a longer period (chronic toxicity). For the SRWP monitoring program, the results of toxicity testing with *Ceriodaphnia dubia, Pimephales pimephales* (fathead minnow), and *Selenastrum capricornutum* (a single-cell green algae) will be used to trigger further investigations to determine the cause of observed toxicity. These investigations include the consideration of a number of factors, including contributing watershed characteristics, chemistry, biology, and additional toxicity testing. Results from these weight-of-evidence investigations are useful in identifying potential water quality problems in the watershed. Toxicity testing in water will be performed at eleven locations in the watershed. Sites for aquatic toxicity monitoring were selected to provide an overall survey of the distribution of toxicity in the watershed, to coordinate with existing monitoring programs, and to characterize causes of observed toxicity.

Pathogens in water. Pathogens are disease-producing organisms (protozoa, bacteria, viruses) which adversely affect the quality of drinking water and may pose health risks for water contact recreation. Coliform bacteria are commonly used as an indicator for potential contamination by viruses and the protozoan species of greatest concern (Giardia lamblia and Cryptosporidium) because these more dangerous pathogens are difficult to monitor effectively. SRWP pathogen monitoring will continue to monitor for pathogen indicator organisms (total and fecal coliforms, and *E. coli*) at nine additional locations in the Sacramento River watershed. Data will be used to determine the magnitude and extent of levels of these organisms in the main stem of the Sacramento River and selected tributaries.

Organic carbon in water. The organic content of water (measured as organic carbon) is a parameter important to drinking water suppliers. High levels of organic compounds in source waters leads to the production of disinfection by-products as a result of conventional water treatment. These by-products pose human health problems at relatively low concentrations. For these reasons, baseline data on typical organic carbon levels and seasonal variability of those levels in the Sacramento River system are important to the assessment of drinking water uses. SRWP monitoring for organic carbon at nine sites will augment or continue fairly extensive monitoring conducted by the USGS NAWQA program, the City of Sacramento, and the Department of Water Resources.

General constituents (suspended and dissolved solids, hardness, and alkalinity) in water. These conventional water quality parameters are important to the evaluation of the attainment of a variety of uses, including drinking water supply, recreation, aesthetics, aquatic habitat, and agricultural supply. Data on these parameters are available from a number of other programs, including USGS NAWQA, the Sacramento Coordinating Monitoring Program and the Department of Water Resources. SRWP monitoring will augment these ongoing data collection efforts for some of these constituents at eleven sites.

Table A-2 Parameters Measured for the SRWP 2003–2004 Monitoring Program

Chemical and Physical Water Quality Characteristics	
Mercury	*Pesticides*
Mercury, filtered and unfiltered	Organophosphate Pesticides
Methylmercury, filtered and unfiltered	
General Constituents	
Alkalinity	UVA_{254}
Hardness	Temperature
Total Suspended Solids	pH
Total Dissolved Solids	Dissolved Oxygen
Dissolved Organic Carbon	Conductivity
Total Organic Carbon	
Microbiological Water Quality Characteristics	
Escherischia coli	Total coliform bacteria
	Fecal coliform bacteria
Aquatic Toxicity	
Ceriodaphnia reproduction	*Ceriodaphnia* mortality
Pimephales growth	*Pimephales* mortality
Selenastrum cell growth	
Fish Tissue	
Mercury	

Assessment Tools

The QAPP and any amendments to QAPP elements will be reviewed and approved by project Quality Assurance Officers, and by the U.S. EPA Quality Assurance Manager prior to the initiation of monitoring.

Project Schedule

The proposed schedule for SRWP monitoring is summarized in Table A-3.

Table A-3 Project Implementation Schedule for 2002-2003 Monitoring

Finalize and Execute Contracts for 2002-2003 Monitoring	July 2003
Submit QAPP to EPA for Review	December 2003
Receive Comments on QAPP	December 2003
Respond to EPA Comments on Revised QAPP	December 2003
Conditional Approval for QAPP for 2003-2004 Monitoring	December 2003
Initiate 2003-2004 Monitoring	December 2003
Final Approval for QAPP	January 2004

A.6.3. Sampling Schedule

Water column monitoring for mercury, pesticides, pathogens, organic carbon, general constituents in water, and for aquatic toxicity sampling will be “event-based”, for a total of four sampling events. These four sample events are planned to coincide with a range of hydrological conditions and other events expected to significantly affect water quality (e.g. during seasonal pesticide applications, expected periods of agricultural or urban runoff, high and low flows). The four sample events will typically be conducted over a period of three or four days. A summary of sampling sites, samples per year, and parameters to be analyzed is provided in Table A-4. The list of sampling sites in Table A-4 supersedes all lists of sampling sites included in previous versions of QAPPs or monitoring plans, approved or unapproved, relating to the monitoring described in this document.

Fish tissue sampling will be conducted once annually (in the fall season) for all sites to be monitored.

Table A-4 Summary of Sampling Sites, Frequency, and Parameters.

Monitoring Locations [c]	Chemical Characteristics: total Hg and MeHg (filtered and unfiltered)	TSS	% sand	TOC, DOC, UVA_{254}, TDS	OP Pesticides	Pathogen Indicators: E. coli, Total & Fecal Coliforms	Aquatic Toxicity: Ceriodaphnia, Pimephales, Selenastrum	Hardness, Alkalinity	WC Tox Followup (a)	Fish Tissue: Mercury in fish
Sac. R. below Keswick							4	4	E	(b)
Sac. R. at Bend Br	4	4	4	4		4	4	4	E	
Sac. R. near Hamilton City	4	4	4	4	4	4	4	4	E	
Sac. R. @ Colusa	4	4	4	4	4	4	4	4	E	
Sac. Slough	4	4	4	4	4	4	4	4	E	
Colusa Basin Dr	4	4	4	4	4	4	4	4	E	
Yuba R. at Marysville	4	4	4	4	4	4	4	4	E	
Feather R. near Nicolaus	4	4	4	4	4	4	4	4	E	2
Sac. R. at Veterans Br.	CMP	CMP	4	CMP	4	CMP				
Arcade Creek	4	4	4	4	4	4	4	4	E	
Natomas East Main Drain				4	4	4				
American R. at Discovery Pk	CMP	CMP	4	CMP	CMP	CMP	4	4	E	2
Sac. R. at Freeport	CMP	CMP	4	CMP	CMP	CMP	4	4	E	
Sac. R. at RM44	CMP	CMP	4	CMP	CMP	CMP				4
Number of Sites	8	8	12	9	9	9	11	11	(a)	3
Number of Regular Analyses	32	32	48	36	36	36	44	44	(a)	8
Additional QC Analyses	8	4	4	4	8	4	4	4	(a)	0

Table Notes: Values indicate number of environmental samples collected annually. Additional samples are collected for Quality Assurance. Text entries indicate data or samples collected by primary coordinating programs: CMP = Sacramento River Coordinated Monitoring Program.
(a) A fixed budget of $40,000 is allocated for Toxicity follow-up consisting of chemistry, TIE testing, and additional sampling that has no fixed frequency.
(b) Two rainbow trout samples will be collected and analyzed by CDFG at no cost to the SRWP.

A.7. Quality Objectives and Criteria for Measurement Data

The objective of data collection for this program is to produce data that represent as closely as possible, *in situ* conditions of the Sacramento River watershed. This objective will be achieved by using accepted methods to collect and analyze water and biota. Assessing the program's ability to meet this objective will be accomplished by evaluating the resulting laboratory measurements in terms of detection limits, precision, accuracy, comparability, representativeness, and completeness, as presented in Section B of this document.

A.8. Documentation and Records

A.8.1. Data To Be Included In Data Reports

For each sample event, the field crew or monitoring agency shall provide the Quality Assurance Manager with copies of relevant pages of the field logs and copies of the Chain of Custody forms for all samples submitted for analysis. At a minimum, the following sample-specific information will be provided for each sample collected:

- sample ID (unique for each sample and replicate)
- SRWP monitoring location
- sample depth
- sample type, e.g. grab or composite type (cross-sectional, flow-proportional, etc.)
- number of sub-samples in composite (if appropriate)
- QA sample type (if appropriate)
- date and time of collection
- requested analyses (specific parameters or method references).

For each sample analyzed, the analyzing laboratory shall provide the Quality Assurance Manager with the following information:

- sample ID
- date of sample receipt
- dates of analysis
- analytical method(s)
- method detection limit (if appropriate)
- reporting limit (if appropriate)
- measured value of the analyte or parameter
- laboratory qualifications of results.

In addition, the analyzing laboratory shall provide results from all laboratory quality control analyses (blanks, duplicates, spikes, reference materials, etc.) and the sample IDs associated with each analytical sample batch.

A.8.2. Reporting Format

In addition to the laboratory's standard reporting format, all results meeting data quality objectives, and results having satisfactory explanations for deviations from objectives, shall be reported in tabular format on electronic media.

B. DATA ACQUISITION

B.1. Sampling Design

The SRWP 2003–2004 monitoring program includes monitoring at fourteen locations in the Sacramento River watershed. Seven of these sites are located on the main stem of the Sacramento River, from the Sacramento River below Keswick Reservoir to the Sacramento River at Mile 44. Three sites are located on major tributaries to the Sacramento River, two sites are located on major agricultural drains, one site receives agricultural and urban runoff, and one site is located on an urban creek. These sites cover over 300 miles of the Sacramento River system. The SRWP monitoring sites are listed in Table B-1 and illustrated in Figure B–1.

All water quality monitoring samples will be collected as “event-based” grab samples. Four episodic events will be conducted at each of the above sites. Other monitoring will consist of one-time fish tissue monitoring events. Table A-3 in the previous section provides a summary of sampling frequency and parameters monitored at each site.

Table B-1 SRWP Monitoring Sites, 2003–2004

Site description	Site ID	Site Type
Sacramento River below Keswick	SRBKR	Mainstem
Sacramento River above Bend Bridge	SRABB	Mainstem
Sacramento River near Hamilton City	SRHAM	Mainstem
Sacramento River at Colusa	SRCOL	Mainstem
Colusa Basin Drain above KL	COLDR	Agricultural Drain
Sacramento Slough	SACSL	Agricultural Drain
Yuba River at Marysville	YRMRY	Major Tributary
Feather River near Nicolaus	FRNIC	Major Tributary
Sacramento River at Veterans Bridge	SRVET	Mainstem
Natomas East Main Drain	NEMDR	Agricultural Drain
American River at Discovery Park	ARDPK	Major Tributary
Arcade Creek at Norwood Ave.	ARCNW	Urban Creek
Sacramento River at Freeport	SRFPT	Mainstem
Sacramento River at River Mile 44	SRRMF	Mainstem

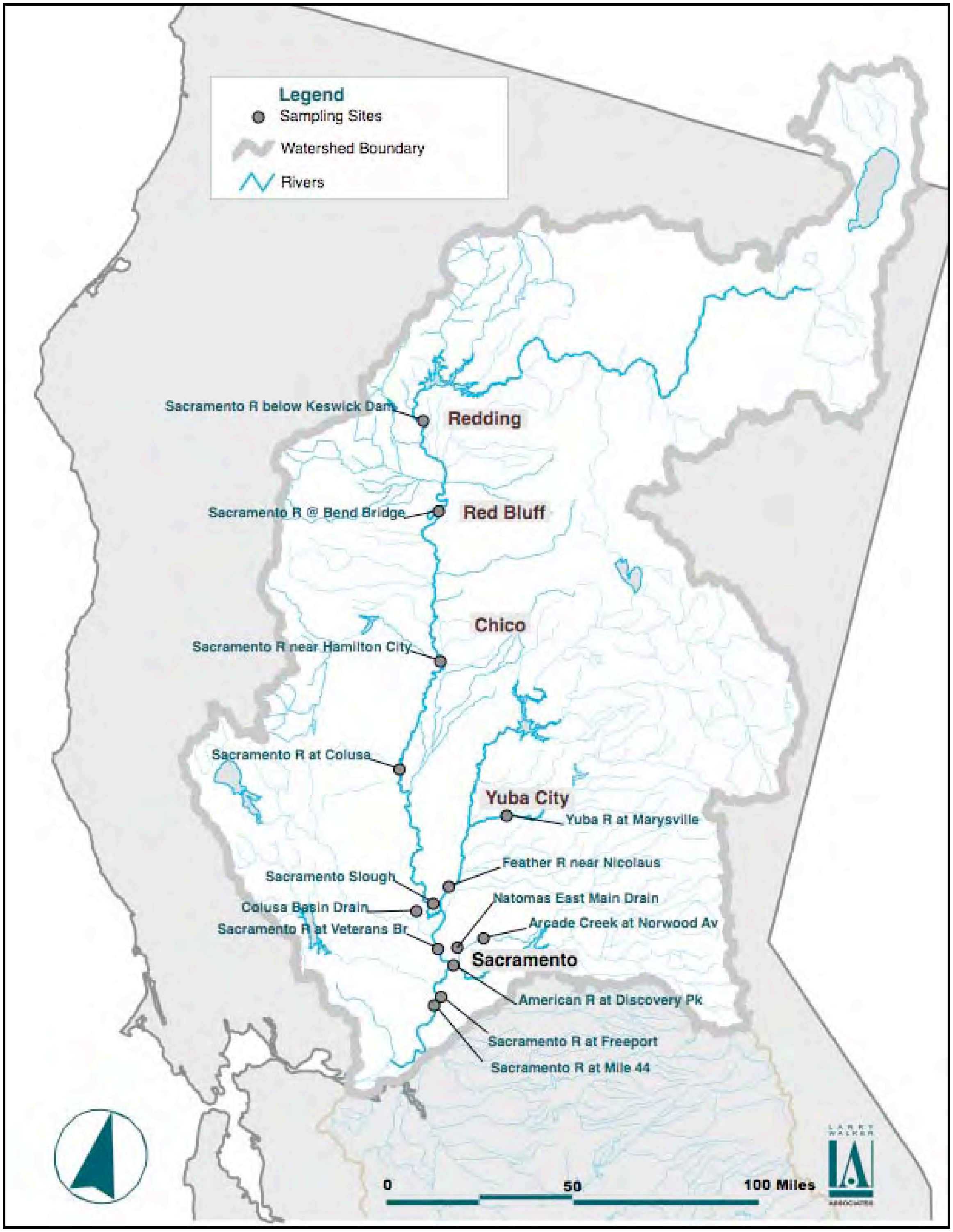

Figure B–1 SRWP 2003–2004 Monitoring Program Sampling Sites

B.2. Sampling Methods Requirements

Samples will be collected from two environmental media —water and fish tissue. Three different sample collection methods will be used for the monitoring elements in water: (1) basic water quality sampling, (2) pathogen sampling, and (3) toxicity sampling. Sampling of tissue will include methods specific for fish. For each of these methods described or referenced, it is the combined responsibility of all members of the sampling crew to determine if the performance requirements of the specific sampling method have been met, and to collect an additional sample if required. Sampling personnel should carry copies of the QAPP and any relevant SOPs with them in the field for reference during sampling. Descriptions of specific sampling methods and requirements are provided below.

B.2.1. Basic Water Quality Characteristics

Basic water quality monitoring will include sampling for mercury and methylmercury, pesticides, total suspended solids, hardness, total dissolved solids, alkalinity, total organic carbon, dissolved organic carbon, and ultraviolet absorbance. Field-measured parameters (temperature, dissolved oxygen, specific conductivity, and pH) will also be measured at each site where basic water quality characteristic samples are collected. Field parameters will be measured using a YSI Model 57 Oxygen Meter for dissolved oxygen, VWR Scientific Traceable Digital Thermometer (Cat. #61220416) for temperature, Orion Model 230A pH meter, and an Orion Model 130 conductivity meter, or comparable instrument(s).

All water quality samples will be collected using clean techniques that minimize sample contamination. Sampling methods will generally conform to EPA "clean" sampling methodology described in *Method 1669: Sampling Ambient Water for Trace Metals* (USEPA 1995a). Specific methods are also documented in Appendix C[1]. Samples will generally be mid-depth grab samples and will be collected by boat or from shore using a peristaltic pump and acid-cleaned polyethylene or Teflon™ tubing. Grab samples will be collected into acid-cleaned glass carboys and aliquoted into glass, polyethylene, or Teflon™ sample containers appropriate for the analyses to be performed, *or* will be collected directly into the sample containers, if appropriate. Samples to be analyzed for dissolved (filtered) analytes will be filtered to 0.45 μm in the field using Gelman in-line filtration capsules.

After collection, samples will be stored at 4°C until arrival at the contract laboratory. Samples to be analyzed for mercury will be preserved using ultrapure hydrochloric or bromochloric acid at the contract laboratory, immediately on arrival. Samples to be analyzed for other constituents will be preserved in the field, as appropriate (Table B-2).

This sample collection method requires that the sample collection tubing, and the sample bottle and lid come into contact only with surfaces known to be clean, or with the water sample. Additionally, mercury samples must have no air bubbles or head space present in

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[1] Water sampling for chemical parameters by Pacific EcoRisk will also generally adhere to their QA manual, which is included in Appendix D. Sections generally relevant to collecting samples for water chemistry include *Documentation*, *Collection and Handling of Samples*, Collection and Preparation of Receiving Water, *Instrument Calibration and Standardization*, and *Acquisition, Reduction, Validation and Reporting of Data*. General sample collection methods included in the PER QA Manual are superseded by any more specific collection methods for chemical analyses included or referenced in this Quality Assurance Project Plan.

the bottle immediately following sample collection. If air is present in the sample container for mercury analyses, additional sample will be aliquoted into the same sample bottle. If the performance requirements for specific samples are not met, the sample will be re-collected. If contamination of the sample container is suspected, a fresh sample container will be used.

B.2.2. Pathogens

Pathogen monitoring will include sampling for pathogen indicator organism (fecal and total coliform bacteria, and *E. coli* bacteria). *Note*: Samplers must wear gloves when collecting pathogen samples.

Bacteria

Samples analyzed for bacteria will be collected as near-surface grab samples. Sampling for bacteria will be performed according to the sampling procedures detailed for Standard Methods 9221B and 9221E (APHA *et al.* 1998). In brief, the sampling procedures are summarized as follows:

- Sample containers should be cleaned and sterilized using procedures described in Standard Methods 9030 and 9040.
- For waters suspected to contain a chlorine residual, sample bottles should contain a small amount of sodium thiosulfate ($Na_2S_2O_3$) sufficient to neutralize bactericidal activity. For water containing high concentrations of copper or zinc, sample bottles should contain sufficient EDTA solution to reduce metal toxicity. *Note: These conditions are rare in surface waters and are not expected to occur in samples collected for the 2003–2003 monitoring program.*
- Sample bottles may be glass or plastic (e.g. polypropylene) with a capacity of at least 120 mL. After sterilization, sample bottles should be kept closed until they are to be filled.
- When removing caps from sample bottles, be careful to avoid contaminating inner surface of caps or bottles.
- Using aseptic techniques, fill sample bottles leaving sufficient air space to facilitate mixing by shaking. Do not rinse bottles.
- Recap bottles tightly.

If at any time the sampling crew suspects that the sample or sampling container has been contaminated, the sample should be re-collected into a new sample container.

After collection, store samples at 4˚C until evaluation. Bacteriological tests must be set up within 24 hours of collection. The 20th edition of Standard Methods (APHA et al. 1998) recommends analysis of samples as soon as possible, but specifies that non-drinking water samples analyzed for non-compliance purposes may be held for up to 24 hours (below 10˚C) until time of analysis. For this reason, data from SRWP samples should not be used for assessment of regulatory compliance.

B.2.3. Aquatic Toxicity

Collection of water samples for analysis of ambient water column toxicity will be performed in accordance with guidance for sampling and sample handling documented in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (USEPA 1994a). In brief, the sampling requirements for toxicity testing are as follows:

- Water collected for toxicity tests will consist of grab samples.
- Samples will be collected directly into 5-gallon fluorocarbon-lined polyethylene (FLPE) jerry cans, using the same equipment and procedures as for basic water quality samples (previously described in section 2.1).
- Sufficient volume will be collected to conduct the characterization and identification phases (Phase I and II) of chronic toxicity identification evaluation (TIE) procedures.
- Samples will be filtered in the laboratory as required for specific toxicity tests.
- After collection, samples will be chilled and maintained at 4˚C until testing.
- Toxicity tests will be initiated within 36 hours of sampling, whenever possible.

In some cases where significant toxicity is observed during aquatic toxicity testing, samples may be analyzed for any of the chemical parameters included in this QAPP (or in previous SRWP QAPPs, if the parameter is not specifically included in 2003–2004 monitoring). The specific analyses to be performed will depend on the pattern of toxicity observed, including any decision to filter samples for chemical analysis. Every effort will be made to be consistent with the sample requirements documented for the specific analyte. Because requirements for sample and preservation holding times, filtration, and original sample containers may not be strictly met, the results of the analyses will be used primarily for determining or confirming causes of toxicity, and will be qualified for any other use. Laboratories selected to perform these analyses must meet the same QA performance criteria used to select laboratories for 2003–2004 and previous monitoring efforts.

B.2.4. Fish Tissue

Tissue monitoring will include sampling of fish for analysis of mercury and trace organic concentrations in tissue. Fish tissue samples will be collected by the California Department of Fish and Game Moss Landing Marine Lab , using protocols detailed in *Contaminant Levels in Fish Tissue from San Francisco Ba*y (SFRWQCB 1995). Details of the protocols are documented in Appendix G and summarized below.

Collection of fish for analysis of mercury, PCBs, and chlorinated pesticides in tissue may be accomplished by a variety of methods, including hook and line, seines, gill nets, and electroshocking. Species collected will be non-migratory species that are most representative of a given location. Efforts will be made to collect fish of a similar (medium) size for each composite. Fish will be wrapped in trace metal- and organic-free Teflon™ sheets and frozen for transportation to the laboratory. The tissue samples are prepared in the laboratory using non-contaminating techniques in a clean room environment. Equal-weight tissue samples will be removed from five fish of a similar size and combined into a single 200 g composite sample.

Largemouth bass and white catfish are the primary target species. Other species may be targeted at sites where largemouth and white catfish are less abundant. Primary target species (white catfish and largemouth) that are larger than the specified size ranges should be kept if they are caught, as long as they are of legal size. Total length (longest length from tip of tail fin to tip of nose/mouth) and fork length should be measured in the field. Size ranges to be targeted for each species are as follows:

- White catfish, 229–330 mm;
- Largemouth bass, 305–438 mm
- Sacramento sucker, 340–500 mm
- Sacramento pikeminnow, 195–400 mm
- Common carp, 400–600 mm
- Rainbow trout, 250–400 mm
- Channel catfish, 300–500 mm
- Striped bass, >457 mm (legal limit)

Species not listed above are considered “bycatch” and should not be collected unless requested by the SRWP Fish focus group.

Collection, handling and storage of tissue samples will be performed in a manner consistent with Regional Monitoring Program (RMP) protocols (SFEI 1999, SFRWQCB 1995) to assure the collection of representative, uncontaminated tissue chemistry samples. Briefly, the key aspects of quality control associated with chemistry sample collection are as follows:

- Field personnel will be thoroughly trained in the proper use of sample collection gear and will be able to distinguish acceptable versus unacceptable samples in accordance with pre-established criteria.
- Field personnel will be thoroughly trained to recognize and avoid potential sources of sample contamination (e.g., engine exhaust, winch wires, deck surfaces, ice used for cooling).
- Samplers and utensils which come in direct contact with the sample will be made of non-contaminating materials (e.g., glass, high-quality stainless steel and/or Teflon™) and will be thoroughly cleaned between sampling stations.
- Sample containers will be pre-cleaned and of the recommended type.

In general, sampling protocols are consistent with national guidance developed by USEPA (2000). The Program employs a composite sampling strategy, as recommended in the USEPA guidance document. The target number of fish to be collected for each composite is five for all current target species (but may be higher for alternate smaller species). In any single composite the total length of the smallest fish should be no less than 75% of the total length of the largest fish. If, after expending a reasonable amount of effort, the field crew is unable to catch the required number of fish of an appropriate size range at a location, the sampling contractor will contact the SFEI Program Manager to discuss whether sampling should continue at that location.

If the performance requirements documented in the sampling protocols and the QAPP are not met, the sample will be re-collected. Sample collection will be conducted between September 1 and October 15. Samples will be distributed to the analytical laboratories within 45 days (i.e., by November 30) after the completion of sampling.

Table B-2 Sampling Requirements

Parameter	Sample Container	Sample Volume[1]	Immediate Processing and Storage	Holding Time[2]
Mercury				
Total Mercury[3]	Teflon™, or glass w/ PTFE-lined cap	250 mL	Store at 4˚C; Field-filtered[3]; Preserve with HCl or BrCL within 48 hours	90 days
Methylmercury[3]	Teflon™, or glass w/ PTFE-lined cap	250 mL	Store at 4˚C; Field-filtered[3]; Preserve with HCl within 48 hours	6 months
Pesticides				
Organophosphates	Amber Glass	1 Liter	Store at 4˚C; Extract within 7 days	40 days
General Constituents				
Total Suspended Solids	Polyethylene	500 mL	Store at 4˚C	7 days
Hardness	Polyethylene	125 mL	Store at 4˚C; Preserve to ≤pH 2 with HNO_3	6 months
Total Dissolved Solids	Polyethylene	500 mL	Filtered; Store at 4˚C	7 days
Alkalinity	Polyethylene	500 mL	Store at 4˚C	14 days
Total Organic Carbon	Amber Glass, PTFE-lined cap	125 mL	Preserve w/ H_2SO_4; Store at 4˚C;	7 days
Dissolved Organic Carbon	Amber Glass, PTFE-lined cap	125 mL	Field-filtered[4]; Preserve w/ H_2SO_4; Store at 4˚C;	7 days
UVA_{254}	Amber Glass, PTFE-lined cap	125 mL	Store at 4˚C;	48 hours
Pathogens				
Total & fecal coliforms, *E. coli*, *Enterococcus*	Polyethylene	250 mL	Store at 4˚C	24 hours[5]
Tissue				
Fish Tissue	Teflon	200 g	Freeze until processing	6 months
Toxicity				
Aquatic bioassays and chemistry[7]	Fluorocarbon-lined polyethylene	15 Gal	Store at 4˚C	36 hours[6]

1. Additional volumes may be required for QC analyses; NA = Not Applicable
2. Holding time after initial preservation or extraction.
3. Applies only to filtered samples. Samples to be analyzed for filtered mercury or methylmercury may also be filtered and preserved in the laboratory within 48 hours. Note that both filtered and unfiltered mercury and methylmercury are collected.
4. Field-filtration and preservation is preferred, but DOC samples may be filtered and preserved in the laboratory within 48 hours, if field filtration is not practical.
5. Samples for bacteria analyses should be set up as soon as possible.
6. Results for tests initiated after 36 hours will be qualified, as appropriate.
7. For interpretation of toxicity results, samples may be split from aquatic toxicity samples in the laboratory and analyzed for specific chemical parameters. All other sampling requirements (sample containers, filtration, preservation, holding times) for these samples are as specified in this document for the specific analytical method. Results of these analyses are qualified for any other use (e.g. characterization of ambient conditions) because of potential holding time exceedances and variance from sampling requirements.

B.3. Sample Handling and Custody

All samples will be packed in wet ice or frozen ice packs during shipment, so that they will be kept at approximately 4˚C. Samples will be shipped in insulated containers. All caps and lids will be checked for tightness prior to shipping.

All samples will be handled, prepared, transported and stored in a manner so as to minimize bulk loss, analyte loss, contamination or biological degradation. Sample containers will be clearly labeled with an indelible marker. Where appropriate, tissue samples may be frozen to prevent biological degradation. Water samples will be kept in Teflon™, glass, or polyethylene bottles and kept cool at a temperature of 4˚C until analyzed. Maximum holding times for specific analyses are listed in Table B-2.

All samples remaining after successful completion of analyses will be disposed of properly. It is the responsibility of the personnel of each analytical laboratory to ensure that all applicable regulations are followed in the disposal of samples or related chemicals.

Chain-of-custody procedures require that possession of samples be traceable from the time the samples are collected until completion and submittal of analytical results. A complete chain-of-custody form is to accompany the transfer of samples to the analyzing laboratory. A sample is considered under custody if:

- it is in actual possession;
- it is in view after in physical possession;
- it is placed in a secure area (accessible by or under the scrutiny of authorized personnel only after in possession)

With the exception of aquatic toxicity samples, samples will be kept for a minimum of 28 days after collection. The QA officer for each laboratory will evaluate the analytical data before the end of the 28 day period. After this period, samples may be disposed of properly when all analyses have been completed, and data quality objectives have been met. Aquatic toxicity samples may be disposed of after initial testing is complete, if no further analyses are warranted.

B.3.1. Sample Holding Times

Data quality objectives for sample holding times conform to recommendations documented in the analytical methods for individual parameters. All samples will be analyzed by the contract laboratory before the maximum allowable holding time for any sample is exceeded. Holding times for specific parameters are presented in Table B-2.

B.3.2. Field Log

Field crews shall be required to keep a field log for each sampling event. The following items should be recorded in the field log for each sampling event:

- time of sample collection;
- sample ID numbers, including unique IDs for any replicate or blank samples;
- the results of field measurements (temperature, D.O., pH, conductivity) and the time that measurements were made;

- qualitative descriptions of relevant water conditions (e.g. color, flow level, clarity) or weather (e.g. wind, rain) at the time of sample collection;
- a description of any unusual occurrences associated with the sampling event, particularly those that may affect sample or data quality.

Appropriate pages from the sampling log will be photo-copied and transmitted to the Quality Assurance Manager at the conclusion of each sampling run.

The field crews shall have custody of samples during field sampling. Chain of custody forms will accompany all samples during shipment to contract laboratories. All water quality samples will be transported to the analytical laboratory by the field crew or by overnight courier.

B.3.3. Laboratory Custody Log

Laboratories shall maintain custody logs sufficient to track each sample submitted and to analyze or preserve each sample within specified holding times.

B.4. Analytical Methods Requirements

B.4.1. Chemical Analyses

Water quality samples may be analyzed for filtered and unfiltered fractions of mercury and methylmercury, trace metals, pesticides, and conventional water quality constituents. Analytical methods for these parameters are summarized in Table B-3 through Table B-5.

Mercury and Methylmercury

Prior to analysis of any environmental samples for mercury and methylmercury, the laboratory must have demonstrated the ability to meet the minimum performance requirements for each analytical method. Initial demonstration of laboratory capability includes the following:

- the ability to produce a detection limit equal to or less than the method detection limit (MDL) listed in Table B-3;
- the ability to generate acceptable precision and recovery, as defined by s and X in Table B-3;
- the ability to generate average recoveries within 15% of the stated concentration in a Standard Reference Material (SRM).

Procedures for demonstrating analytical performance requirements, extraction procedures, and waste disposal and pollution prevention requirements are detailed in the Standard Operating Protocols or EPA Method documents for each analytical method.

Pesticides

Prior to analysis of any environmental samples for pesticides, the laboratory must have demonstrated the ability to meet the minimum performance requirements for each analytical method. Initial demonstration of laboratory capability includes the following:

- the ability to produce a reporting limit equal to or less than the reporting limit (RL) listed in Table B-4;
- the ability to generate acceptable precision and recovery, as defined by the specified method;

Procedures for demonstrating analytical performance requirements, extraction procedures, and waste disposal and pollution prevention requirements are detailed in the EPA Method documents for each analytical method. EPA's recommended minimum performance requirements are summarized in the method documents.

Conventional Constituents

Analyzing laboratories must demonstrate the ability to produce reporting limits approximately equal to or below the estimated reporting limits listed in Table B-5. Precision and replicate measurements in ambient waters should be less than 20% Relative Percent Difference for all constituents. Average recovery of appropriate reference materials should be between 80% and 120% for all constituents.

B.4.2. Pathogen Analyses

Water quality samples will be analyzed for fecal and total coliform bacteria, and *E. coli*. Analysis for coliform bacteria must be performed in accordance with the methods referenced in

Table B-6. The laboratory must demonstrate the ability to meet the performance requirements described in this method.

B.4.3. Aquatic Toxicity Analyses

Water quality samples will be analyzed for toxicity to *Ceriodaphnia dubia*, *Pimephales pimephales*, and *Selenastrum capricornutum*. Determination of chronic toxicity shall be performed generally as described in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (USEPA 1994a). The only modification to these procedures is that test containers are grouped by treatment instead of being randomly arranged. This modification is not expected to have any impact on the toxicity test results.

If initial testing indicates the presence of significant and consistent toxicity, Toxicity Identification Evaluation (TIE) procedures may be initiated. Because factors responsible for chronic toxicity may not be stable for extended periods, TIE procedures may be initiated prior to completion of initial chronic toxicity testing if early responses of test organisms suggest that toxic conditions are probable, and if there is a history of toxicity at the site. The decision to initiate TIE procedures will be a consensus decision made by the Toxicity Testing Focus Group (comprised of members of the Toxics and Monitoring Sub-Committees of the Sacramento River Watershed Program). When deciding whether to initiate TIE procedures for a specific site and sample event, the Focus Group will consider a number of different factors including the history of toxicity at the site, the level of toxicity, and the species and endpoints exhibiting toxic effects. The rationale for initiating TIE procedures for a specific sample will be clearly documented in subsequent data reports. TIE methods will generally adhere to EPA procedures documented in conducting TIEs (USEPA 1991, 1992, 1993a-b). For samples exhibiting toxic effects consistent with carbofuran, diazinon, or chlorpyrifos, TIE procedures will follow those documented in Bailey *et al.* (1996). Laboratory Standard Operating Procedures for conducting TIEs are documented in Appendix D. Any project-specific modifications to these methods will be documented in future amendments to this QAPP.

B.4.4. Fish Tissue Analyses

Fish tissue samples will be analyzed for total mercury. Laboratories will use the protocols referenced in Table B-7 for analysis of mercury in fish tissue. These protocols are documented in Appendix G. Prior to analysis of any tissue samples, the laboratory must demonstrate the following:

- the ability to produce a detection limit equal to or less than the method detection limit (MDL) listed in Table B-7;
- the ability to generate acceptable precision and recovery, as defined in Table B-13;
- the ability to generate acceptable recoveries of a Standard Reference Material (SRM) within the limits cited in Table B-13.

Table B-3 Mercury and Methylmercury: Laboratory Performance Requirements for Analysis of Water

Analyte	Method [1]	MDL[2], µg/L	RL[3], µg/L	Accuracy[4], *X*	Precision[5], *s*	MS Rec[6]	MS/MSD RPD[7]
Mercury	EPA 1631	.00005	.0002	70-130	21	70-130	24
Methylmercury	EPA 1630	.00002	.00006	69-131	31	65-135	35

1. SOP or EPA Method number
2. Method Detection Limit: minimum concentration that can be reported with 99% confidence that the analyte is greater than zero.
3. Target Project Reporting Limit: MDL multiplied by 3.18 and rounded to the nearest multiple of 1, 2, 5, 10, 20, 50, etc.,
4. X = Average recovery for demonstration of initial performance
5. s = standard deviation of recovery for demonstration of initial performance
6. Percent recovery of matrix spike
7. Relative percent difference of matrix spike duplicates

Table B-4 Pesticides: Analytical Methods and Estimated Reporting Limits

Analyte	RL[1]	Analyte	RL[1]
Organophosphate and urea pesticides by EPA Method 8141a			
Azinphosmethyl	1.0	Fenthion	0.10
Bolstar	0.10	Malathion	0.10
Chlorpyrifos	0.05	Merphos	0.10
Coumaphos	0.20	Mevinphos	0.70
Def	0.10	Naled	0.50
Demeton-S	0.20	Parathion, ethyl	0.10
Diazinon	0.05	Parathion, methyl	0.10
Dichlorovos	0.20	Phorate	0.10
Dimethoate	0.10	Prowl	0.10
Disulfoton	0.10	Ronnel	0.10
EPN	0.10	Stirophos	0.10
EPTC	0.10	Tokuthion	0.10
Ethion	0.10	Trichloronate	0.10
Ethoprop	0.10	Trifluralin	0.10
Fensulfotion	0.50		

1. Reporting Limit for project, based on detection limits achievable by analyzing laboratory. Because detection limits are affected by differences in sample matrices, the RLs listed are estimates.

Table B-5 General Constituents: Analytical Methods and Project Reporting Limits

Constituent	Fractions	Method # (1)	RL, mg/L (2)
Alkalinity	Total	SM 403	10
Suspended Solids, Total	Total	EPA 160.2	5.0
Hardness	Total, as $CaCO_3$	EPA 130.2	5.0
Dissolved Solids, Total	Total	EPA 160.1	5.0
Organic Carbon	Total, Dissolved	SM 5310 C	0.2
UVA_{254}	Filtered	5910B	NA[(A)]

1. Standard Methods (SM), EPA Method number, or reference.
2. Reporting Limit for project, based on detection limits achievable by analyzing laboratory
3. Detection limit for UVA_{254} not be rigorously determined because it is a "non-specific" method (APHA *et al.* 1995)

Table B-6 Pathogens: Analytical Methods, and Estimated Project Reporting Limits

Constituent	Method [(1)]	RL[(2)]
Total Coliform	SM 9221B	2 MPN 100 mL
Fecal Coliform	SM 9221E	2 MPN 100 mL
E. coli	SM 9221B/E mod. MUG	2 MPN 100 mL

1. Standard Methods (SM) number or method reference.
2. Reporting Limit for project.

Table B-7 Fish Tissue: Analytical Methods, Method Detection Limits, and Estimated Project Reporting Limits

Constituent and Method [(1)]	MDL [(2)] ng/g w.w.	RL [(3)] ng/g w.w.
Mercury by CVAA (SFBRWQCB 1995; Appendix G)	10	20

1. CVAA = Cold Vapor Atomic Absorption
   ECD/GC = Electron Capture Detection/Gas Chromatography
2. Method Detection Limit: minimum concentration that can be reported with 99% confidence that the analyte is greater than zero; units are ng/g wet weight
3. Target Project Reporting Limit: MDL multiplied by 3.18 and rounded to the nearest multiple of 1, 2, 5, 10, 20, 50, etc.; units are ng/g wet weight.

B.5. Quality Control Requirements

The types of quality control assessments used in the SRWP monitoring program are discussed below. Quality control requirements and schedules are summarized in Table B-8 through **Error! Reference source not found.**. Detailed procedures for preparation and analysis of quality control samples are provided in the analytical method documents.

B.5.1. Qualitative Objectives

Comparability

Comparability of the data can be defined as the similarity of data generated by different monitoring programs. For the purpose of the SRWP Monitoring Program, this objective is addressed primarily by using standard sampling and analytical procedures where possible. Additionally, comparability of analytical data is addressed by analysis of standard reference materials (discussed subsequently in this document).

Representativeness

Representativeness can be defined as the degree to which the environmental data generated by the monitoring program accurately and precisely represent actual environmental conditions. For the SRWP, this objective is addressed by the overall design of the monitoring program. Specifically, assuring the representativeness of the data is addressed primarily by selecting appropriate locations, methods, times, and frequencies of sampling for each environmental parameter, and by maintaining the integrity of the sample after collection. Each of these elements of the quality assurance program are addressed elsewhere in this document.

B.5.2. Completeness

Data completeness is a measure of the amount of successfully collected and validated data relative to the amount of data planned to be collected for the project. Completeness is usually expressed as a percentage value. A project objective for percent completeness is typically based on the percentage of the data needed for the program or study to reach valid conclusions. Because the SRWP is intended to be a long term monitoring program, data that are not successfully collected for a specific sample event or site can typically be recollected at a later sampling event. For this reason, most of the data planned for collection can not be considered absolutely critical, and it is difficult to set an meaningful objective for data completeness. However, some reasonable objectives for data are desirable, if only to measure the effectiveness of the Monitoring Program. The following program goals for data completeness are based on the planned sampling frequency and a subjective determination of the relative importance of the monitoring element within the Monitoring Program:

Table B-8 SRWP Completeness Goals

Monitoring Element	Completeness Objective
Mercury and methylmercury	90%
Pesticides	90%
General Water Quality Constituents	90%
Pathogens	90%
Aquatic Toxicity	90%
Fish Tissue	85%

B.5.3. Field Procedures

For basic water quality analyses, quality control samples to be prepared in the field will consist of field blanks and field duplicates. The number of field duplicates and field blanks are set to achieve an overall rate of at least 10% of all analyses for a particular parameter. The external QA samples are rotated among sites and events to achieve the overall rate of 10% field duplicate samples and 10% field blanks (as appropriate for specific analyses).

Field Blanks

The purpose of analyzing field blanks is to demonstrate that sampling procedures do not result in contamination of the environmental samples. Field blanks will be prepared and analyzed for all analytes of interest at the rate of one per sample event, along with the associated environmental samples. Field blanks will consist of laboratory-prepared blank water processed through the sampling equipment using the same procedures used for environmental samples. If any analytes of interest are detected at levels greater than the Method Detection Limit (MDL) for the parameter, the sampling crew should be notified so that the source of contamination can be identified (if possible) and corrective measures taken prior to the next sampling event. If the concentration in the field blank is above the MDL and concentrations in associated samples are less than five times the value reported in the field blank, the results for the environmental samples should be qualified as an *upper limit* (UL) at the reported value.

Field Duplicates

The purpose of analyzing field duplicates is to demonstrate the precision of sampling and analytical processes. Field duplicates will be prepared at the rate of one per sampling event, and analyzed along with the associated environmental samples. Field duplicates will consist of two aliquots from the same composite sample, or of two grab samples collected in rapid succession. If the relative Percent Difference (RPD) of field duplicate results is greater than 25% and the absolute difference is greater than the RL, both samples should be reanalyzed. If an RPD greater than 25% is confirmed by reanalysis, environmental results will be qualified as *estimated*. The sampling crew should be notified so that the source of sampling variability can be identified (if possible) and corrective measures taken prior to the next sampling event.

B.5.4. Laboratory Analyses

For chemical analyses of water samples and fish tissue, quality control samples prepared in the contract laboratory(s) will typically consist of equipment blanks, method blanks, standard reference materials, laboratory duplicates, matrix spikes, and matrix spike duplicates. Laboratory analyses for bacteria will include negative and positive quality control samples, as specified in the method documents.

Equipment Blanks

The purpose of analyzing equipment blanks is to demonstrate that sampling equipment is free from contamination. Prior to using sampling equipment for the collection of environmental samples, the laboratory responsible for cleaning and preparation of the equipment will prepare bottle blanks and sampler blanks. These will be prepared and analyzed at the rate of one each per batch of bottles or sampling equipment. The blanks will be analyzed using the same analytical methods specified for environmental samples. If any analytes of interest are detected at levels greater than the MDL, the source(s) of contamination should be identified and corrected, the affected batch of bottles or equipment should be re-cleaned, and new equipment blanks should be prepared and analyzed.

Bottle blanks will consist of one of each type of sample container required for water quality analyses, selected randomly from the set of available bottles. The bottles will be filled with laboratory-prepared blank water (acidified to pH < 2 for metals samples) and allowed to stand for a minimum of 24 hours before analysis.

Sampler blanks will consist of laboratory-prepared blank water processed through the sampling equipment using the same procedures used for environmental samples.

Method Blanks

The purpose of analyzing method blanks is to demonstrate that the analytical procedures do not result in sample contamination. Method blanks will be prepared and analyzed by the contract laboratory at a rate of at least one for each analytical batch. Method blanks will consist of laboratory-prepared blank water processed along with the batch of environmental samples. The method blank should be prepared and analyzed before analysis of the associated environmental samples. If the result for a single method blank is greater than the MDL, or if the average blank concentration plus two standard deviations of three or more blanks is greater than the RL, the source(s) of contamination should be identified and corrected, and the associated samples should be reanalyzed. If reanalysis is not possible, the associated sample results should be qualified as an *upper limit* (UL) at the reported value.

Laboratory Control Samples

The purpose of analyzing laboratory control samples is to demonstrate the accuracy of the analytical method. Laboratory control samples will be analyzed at the rate of one per sample batch. Laboratory control samples will consist of laboratory fortified method blanks. If recovery of any analyte is outside the acceptable range for accuracy, the analytical process is not being performed adequately for that analyte. In this case, the sample batch should be prepared again, and the laboratory control sample should be reanalyzed. If reanalysis is not possible, the associated sample results should be qualified as *low or high biased.*

Laboratory Duplicates

The purpose of analyzing laboratory duplicates is to demonstrate the precision of the analytical method. Laboratory duplicates will be analyzed at the rate of one pair per sample batch. Laboratory duplicates will consist of duplicate laboratory fortified method blanks. If the Relative Percent Difference (RPD) for any analyte is greater than the precision criterion *and* the absolute difference between duplicates is greater than the RL, the analytical process is not being performed adequately for that analyte. In this case, the sample batch should be prepared again, and laboratory duplicates should be reanalyzed. If reanalysis is not possible, the associated sample results should be qualified as *not reproducible* due to analytical variability.

Matrix Spikes and Matrix Spike Duplicates

The purpose of analyzing matrix spikes and matrix spike duplicates is to demonstrate the performance of the analytical method in a particular sample matrix. Matrix spikes and matrix spike duplicates will be analyzed at the rate of one pair per sample batch. Each matrix spike and matrix spike duplicate will consist of an aliquot of laboratory-fortified environmental sample. Spike concentrations should be added at between 2 to 10 times the expected sample value.

If matrix spike recovery of any analyte is outside the acceptable range, the results for that analyte have failed the acceptance criteria. If recovery of laboratory control samples is acceptable, the analytical process is being performed adequately for that analyte, and the problem is attributable to the sample matrix. Attempt to correct the problem (by dilution, concentration, etc.) and re-analyze the samples and the matrix spikes. If the matrix problem can't be corrected, qualify the results for that analyte as appropriate (*low or high biased*) due to matrix interference.

If matrix spike duplicate RPD for any analyte is greater than the precision criterion, the results for that analyte have failed the acceptance criteria. If the RPD for laboratory duplicates is acceptable, the analytical process is being performed adequately for that analyte, and the problem is attributable to the sample matrix. Attempt to correct the problem (by dilution, concentration, etc.) and re-analyze the samples and the matrix spike duplicates. If the matrix problem can't be corrected, qualify the results for that analyte as *not reproducible*, due to matrix interference.

Aquatic Toxicity Quality Control

For aquatic toxicity tests, the acceptability of test results is determined primarily by performance-based criteria for test organisms, culture and test conditions, and the results of control bioassays. Control bioassays include testing with reference toxicants, and negative and solvent controls. Test acceptability requirements are documented in the method documents for each bioassay method and are included in Appendices D.

In addition to the QA requirements for the toxicity testing methods, a minimum of ten percent of the samples collected for aquatic toxicity testing will be reserved for other QC analyses. These analyses will consist of interlaboratory splits, field duplicates, or spiked samples. At least six interlaboratory split analyses will be performed during the monitoring year, *if possible*. If no appropriate laboratories are willing to perform these analyses at a reasonable cost, these QA samples will be analyzed as field duplicates by Pacific EcoRisk. Field duplicate samples analyzed for aquatic toxicity will also serve as field duplicates for alkalinity and hardness analyses. Although the laboratory has no formal limit of acceptability for analysis of spiked samples, the pattern and progress of toxic responses are evaluated subjectively for consistency with expected responses for the level of the spiked compound. Acceptable results for tests with blanks are no significant toxicity.

Fish Tissue

Quality control requirements and assessment procedures for analysis of contaminants in fish tissue are generally similar to those for water quality samples (documented above). However, for analysis of PCBs and chlorinated pesticides, surrogate compounds (internal standards) are added to each sample to assess analytical accuracy of classes of similar compounds. The acceptable range for recovery of surrogate compounds is set by the analyzing laboratory. If surrogate recoveries are outside the defined range, the sample batch should be prepared again and reanalyzed. If reanalysis is not possible, the associated environmental data for all analytes by the specific method should be qualified as *low or high biased*, consistent with the surrogate recovery bias. If surrogate recovery bias is inconsistent for different surrogate compounds, qualify the associated environmental data as *biased* due to indeterminate surrogate recovery bias.

Table B-9. Project Quality Control Requirements for Analysis of Water Quality Samples: Frequency[1] and Numbers of Field Quality Assurance Samples for Mercury, Organic Carbon, General Water Quality Constituents, and Pesticides.

Parameter(s)	Field Duplicates	Field Blanks	Total QA Samples
Mercury	4 (1 per event)	4 (1 per event)	8
Methylmercury	4 (1 per event)	4 (1 per event)	8
TSS	4 (1 per event)	0	4
Hardness [2]	No Additional Field QA Samples		0 [2]
Alkalinity [2]	No Additional Field QA Samples		0 [2]
TOC and DOC	4 (1 per event)	4 (1 per event)	8
UVA_{254}	4 (1 per event)	0	4
TDS	4 (1 per event)	0	4
OP Pesticides	4 (1 per event)	4 (1 per event)	8

1. External QA samples are rotated among sites to provide at least one field duplicate sample and one field blank per event for a particular parameter (as appropriate for specific analyses).
2. Evaluation of sampling precision for alkalinity and hardness will be assessed from analysis of field duplicate aquatic toxicity samples for these parameters.

Table B-10 Project Quality Control Requirements for Analysis of Water Quality Samples: Trace Metals, Organic Carbon, and General Water Quality Constituents.

QA Procedure	QA Parameter	Frequency[1]	Criterion	Corrective Action
Equipment Blanks: • bottle blanks • sampler blanks	Contamination	1 per bottle lot, reagent lot, or equipment lot	< MDL	Identify contamination source. Reclean equipment. Reanalyze blank(s).
Field Blanks	Contamination	Various, see Table B-9	< MDL *or* < sample ÷ 5	Examine field log. Identify contamination source. Qualify data as needed.
Field Duplicate	Precision	Various, see Table B-9	RPD ≤ 25% if |Difference| ≥ RL	Reanalyze both samples. Identify variability source. Qualify data as needed.
Method Blank	Contamination	≥1 per batch, (trace metals and OC)	< MDL *or*, if n≥3, avg ± 2 s.d. < RL	Identify contamination source. Reanalyze method blank and all samples in batch.
LCS or SRM	Accuracy	1 per batch	80-120% REC	Recalibrate and reanalyze LCS or SRM and samples
Lab Duplicate	Precision	1 per batch	RPD ≤ 20% if |Difference| ≥ RL	Recalibrate and reanalyze.
Matrix Spike	Accuracy	1 per batch	80-120% REC	Check SRM recovery. Attempt to correct matrix problem and reanalyze sample. Qualify data as needed.
Matrix Spike Duplicate	Precision	1 per batch	RPD ≤ 20%	Check lab dup RPD. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Assess percent of data successfully collected	Data Completeness	1 per event	90%	Reschedule sample events as necessary or appropriate.

Notes: MDL = Method Detection Limit; RL = Reporting Limit; RPD = Relative Percent Difference; RSD = Relative Standard Deviation; REC = Recovery; LCS = Laboratory Control Sample; SRM = Standard Reference Material (=Certified Reference Material)

1. The term “lot” refers to a set of bottles or reagents identifiable by a common production lot number, or to sampling equipment subjected to the same cleaning procedures as a set. The term “batch”, as used in this document, refers to an uninterrupted series of analyses.

Table B-11 Project Quality Control Requirements for Analysis of Water Quality Samples: Requirements for Organophosphorus Pesticide Analyses by EPA Method 8141A (USEPA 1994b)

QA Procedure	QA Parameter	Frequency[1]	Criterion	Corrective Action
Equipment Blanks: • bottle blanks • sampler blanks	Contamination	1 per bottle or reagent lot	< MDL	Identify contamination source. Reclean equipment. Reanalyze blank(s).
Field Blanks	Contamination	1 per event	< MDL *or* < sample ÷ 5	Examine field log. Identify contamination source. Qualify data as needed.
Field Duplicate	Precision	1 per event	RPD ≤ 25% if |Difference| ≥ RL	Reanalyze both samples. Identify variability source. Qualify data as needed.
Matrix Spike & LCS Phorate Diazinon Disulfoton Methyl Parathion Stirophos Ethion Tributylphosphate Triphenlyphosphate	Accuracy	1 per batch	 22-96% REC 57-130% REC 47-117% REC 55-164% REC 68-128% REC 65-134% REC 60-150% REC 76-140% REC	Check SRM recovery. Attempt to correct matrix problem and reanalyze sample. Qualify data as needed.
Matrix Spike & LCS Duplicates: Phorate Diazinon Disulfoton Methyl Parathion Stirophos Ethion	Precision	1 per batch	 24% RPD 21% RPD 22% RPD 24% RPD 25% RPD 20% RPD 25% RPD	Check lab dup RPD. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Assess percent of data successfully collected	Data Completeness	1 per event	90%	Reschedule sample events as necessary or appropriate.

Notes: MDL = Method Detection Limit; RL = Reporting Limit; RPD = Relative Percent Difference; RSD = Relative Standard Deviation; REC = Recovery; LCS = Laboratory Control Sample; SRM = Standard Reference Material (=Certified Reference Material)

1. The term “lot” refers to a set of bottles or reagents identifiable by a common production lot number, or to sampling equipment subjected to the same cleaning procedures as a set.
   The term “batch”, as used in this document, refers to an uninterrupted series of analyses.

Table B-12 Project Quality Control Requirements for Analysis of Water Quality Samples for Pathogen Indicators

QA Procedure	Parameter	Frequency[1]	Criterion	Corrective Action
Coliform Bacteria Analyses				
Field Blanks	Contamination	1 per event	< MDL *or* < (sample/5)	Examine field log. Identify contamination source. Qualify data as needed.
Method Blanks (Sterility Checks)	Contamination	1 per batch	< MDL	Identify contamination source. Clean equipment and slides. Check reagents. Re-analyze blank.
Lab Duplicate	Precision[2]	1 per 10 samples, and at least 1 per batch	$R_{log} \leq 3.27 \bullet \text{mean } R_{Log}$	Recalibrate and reanalyze.
Negative Control Samples	Contamination	1 per culture medium or reagent lot	< MDL	Identify source. Clean equipment and prepare new media. Re-examine negative control
Positive Control Samples	Assay function	1 per culture medium or reagent lot	≥ MDL	Identify and correct problem. Re-examine positive control.
Assess percent of data successfully collected	Data Completeness	1 per planned sample event	90%	Reschedule sample events as necessary or appropriate.

Notes: MDL = Method Detection Limit; RL = Reporting Limit; RPD = Relative Percent Difference;
RSD = Relative Standard Deviation; REC = Recovery; LCS = Laboratory Control Sample;
SRM = Standard Reference Material (=Certified Reference Material)

1. The method documentation defines an analytical batch as an "uninterrupted series of analyses".
2. R_{log} is the absolute difference between logarithms of coliform counts for duplicate analyses. The mean R_{log} is determined by performing duplicate analyses on the first 15 positive sample analyzed for each matrix type.

Table B-13 Project Quality Control Requirements for Analysis of Fish Tissue for Mercury.

QA Procedure	Parameter	Frequency	Criterion	Corrective Action
Method Blank (a.k.a. analytical blank or lab reagent blank)	Contamination	1 per batch	< MDL *or* < 10% of lowest sample	Identify contamination source. Reanalyze method blank and all samples in batch.
SRM (a.k.a. certified reference material)	Accuracy	1 per batch of 20 or fewer samples	Within 20% of the certified 95% confidence interval, *or* within 20% of the certified mean	Review raw data quantitation reports Check instrument response using calibration standard Recalibrate and reanalyze SRM and samples Repeat analysis until control limits are met
SRM (a.k.a. certified reference material)	Precision	1 per batch of 20 or fewer samples	RPD ≤ 35%, *or* RSD ≤ 30%	Recalibrate and reanalyze. If problem persists eliminate source of imprecision and reanalyze.
Field Duplicate (two aliquots from same composite sample: RMP calls this a lab duplicate)	Precision	1 per batch	RPD ≤ 35%	Recalibrate and reanalyze. If problem persists eliminate source of imprecision and reanalyze.
Matrix Spike	Accuracy	1 per batch	> 50% REC	Check SRM or LCS recovery. Review raw data quantitation reports Check instrument response using calibration standard Attempt to correct matrix problem and reanalyze sample. Qualify data as needed.
Matrix Spike Duplicate	Precision	1 per batch	RPD ≤ 35%	Check lab duplicate RPD. Review raw data quantitation reports Check instrument response using calibration standard Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Assess percent of data successfully collected	Data Completeness	1 per planned sampling event	85%	Reschedule sampling as necessary or appropriate.

1. MDL = Method Detection Limit; RL = Reporting Limit; RPD = Relative Percent Difference; RSD = Relative Standard Deviation; REC = Recovery; LCS = Laboratory Control Sample; SRM = Standard Reference Material (=Certified Reference Material)

B.6. Instrument and Equipment Preventive Maintenance

B.6.1. Sample Equipment Cleaning Procedures

Equipment used for sample collection (peristaltic pump tubing, carboys and carboy caps, and sample bottles) will be cleaned according to the specific procedures documented for each analytical method. Clean sample containers will be provided by the laboratories performing the analyses. Clean peristaltic pump tubing, carboys and carboy caps used for collecting mercury and methylmercury samples will be provided by the Department of Fish and Game Moss Landing Marine Lab. Note that the same pump tubing and carboys may also be used to collect samples for analysis of other parameters. The cleaning procedures for equipment used to collect water quality samples are documented in Appendices C and D, and E. The cleaning procedure for equipment used to collect fish tissue samples is documented in Appendix G.

At least one equipment blank will be generated and analyzed for mercury and methylmercury prior to initiating monitoring for the current program year, and additional equipment blanks will be analyzed for new lots of critical cleaning reagents. In addition, for all analytes where contamination is considered a significant concern, field blanks will be collected and analyzed as directed in Section B.5 of this document. If the results of these analyses indicate any contamination, the source will be identified and corrected, and the equipment will be re-cleaned and re-tested. The combined regimen of equipment blanks and field blanks is considered to provide adequate control against potential systematic equipment contamination problems.

B.6.2. Analytical Instrument and Equipment Testing Procedures and Corrective Actions

Testing, inspection, maintenance of analytical equipment used by the contract laboratory, and corrective actions are documented in the Quality Assurance manuals for each analyzing laboratory. Laboratory QA Manuals are made available for review at the analyzing laboratory.

B.7. Calibration Procedures and Frequency

B.7.1. Laboratory Analytical Equipment

Frequency and procedures for calibration of analytical equipment used by each contract laboratory is documented in the Quality Assurance Manual for each contract laboratory. Laboratory QA Manuals are made available for review at the analyzing laboratory.

B.7.2. Field Instruments

Calibration of all instruments used for measurement of field parameters (temperature, pH, dissolved oxygen, and electroconductivity) are performed as described in the owner's manuals for individual instruments. Instruments used to measure pH, dissolved oxygen, and electroconductivity should be calibrated prior to taking field measurements at each site for each event. Typical field instrument calibration procedures are as follows:

- Temperature calibration is factory-set and requires no subsequent calibration.
- Calibration for pH measurement is accomplished using standard buffer solutions.
- Calibration for dissolved oxygen measurements is accomplished using an oxygen-saturated water sample.

- Calibration for electroconductivity measurements is generally accomplished using potassium chloride standard solutions.

B.8. Inspection/Acceptance Requirements for Supplies and Consumables

Gloves, sample containers, and any other consumable equipment used for sampling will be inspected by the sampling crew on receipt and will be rejected/returned if any obvious signs of contamination (torn packages, etc.) are observed. Inspection protocols and acceptance criteria for laboratory analytical reagents and other consumables are documented in the Quality Assurance Manuals for individual laboratories. Laboratory QA Manuals are made available for review at the analyzing laboratory.

B.9. Quality Control Requirements for Indirect Measurements

Water quality data collected by this monitoring program is intended to complement data collected by several other programs: the National Water Quality Assessment program (NAWQA), the Sacramento Coordinated Water Quality Monitoring Program, and monitoring efforts by the Department of Water Resources, Department of Pesticide Regulation, U.S. Bureau of Reclamation, the City of Sacramento, and City of Redding. Each of these programs has stringent quality assurance and quality control elements comparable to those described in this document. It is anticipated that data reported by these programs can be used without limitation for the purposes of the SRWP monitoring program. Additionally, data from USGS flow monitoring gages located near SRWP monitoring sites will be collected to supplement sample event data for each location. It is the responsibility of the Quality Assurance Manager to acquire, validate, and compile the necessary data from these programs.

B.10. Data Management

Copies of field logs, copies of chain of custody forms, original preliminary and final lab reports, and electronic media reports will be sent to the Quality Assurance Manager. Each type of report will be stored separately and ordered chronologically. Original field logs will be retained by the field crew. Original chain of custody forms will be retained by the contract laboratory. Copies of the preliminary and final data reports will be retained by the contract laboratory(s).

Concentrations of chemicals and toxicity endpoints, and all numerical biological parameters will be calculated as described in the laboratory Standard Operating Procedures or referenced method document for each analyte or parameter.

The various data and information generated from the SRWP monitoring program will be stored and maintained at the Monitoring Program Manager's offices. The data generated from the monitoring program will be transmitted to the Quality Assurance Manager in various formats and converted to a standard database format maintained on personal computers in the Monitoring Program Manager's offices. After data entry or data transfer procedures are completed for each sample event, data will be inspected for data transcription errors, and corrected as appropriate. After the final QA checks for errors are completed, the data are added to the final database. The production of data tables are generated from this database.

In cases where environmental results are not detected above the method detection limit (MDL) for a parameter, the results will be reported as "less than" the MDL; e.g. a nondetect analytical result for an analyte with an MDL of 1 μg/L will be reported as <1 μg/L. When environmental results are greater than the MDL but less than the reporting limit (RL) for a parameter, the results will be reported as the measured value and qualified as *estimated,* i.e. “detected, but not quantifiable” (equivalent to a “J” or “DNQ” flag).

In cases where field blank results exceed the acceptance criteria, associated environmental sample data collected during the run will be qualified and reported as follows:

- Measured environmental sample concentrations greater than or equal to 5 times the field blank level will be reported with no qualification.
- If the field blank concentration is above the Method Detection Limit (MDL), measured environmental sample concentrations less than 5 times the reported field blank level will be qualified as an *upper limit* (UL) at the measured value.
- Any data qualifications resulting from QC analyses will be reported with the environmental data as appropriate.

C. ASSESSMENT AND OVERSIGHT

C.1. Assessments and Response Actions

Assessments of compliance with quality control procedures will be undertaken on a routine basis during the data collection phase of the project:

- Performance assessments of sampling procedures will be performed by the field sampling crews. Corrective actions shall be carried out by the field sampling crew and reported to the Quality Assurance Manager.
- Assessment of laboratory QC results and implementation of corrective actions will be the responsibility of the QA officer at each laboratory and shall be reported to the Quality Assurance Manager as part of any data reports.
- Assessment of field QC results and implementation of corrective actions shall be the responsibility of the Quality Assurance Manager.

Routine procedures to assess precision and accuracy, criteria for success, and corrective actions have been discussed previously (Section B) and are summarized in Table B-10 through Table B-13.

Quarterly status reports will be produced by the Monitoring Program Manager to document project status, results of performance evaluations, data quality assessments, and any significant QA problems and recommended solutions. Quarterly project status reports will be distributed to the SRCSD Project Manager and the EPA Project Officer.

C.2. Quality Assurance Reports to Management

A quality assurance report will be prepared by the Quality Assurance Manager following each year of monitoring, as part of the annual report produced for the SRWP. The quality assurance report will summarize the results of QA/QC assessments and evaluations, including precision, accuracy, comparability, representativeness, and completeness of the monitoring data. The annual report will be distributed to the project managers, as well as to all other program participants and interested parties.

D. DATA VALIDATION AND USABILITY

D.1. Data Review, Validation, and Verification

In addition to the data quality objectives presented in Table B-9 through Table B-13, the standard data validation procedures documented in the contract laboratory's Quality Assurance Manuals will be used to accept, reject, or qualify the data generated by the laboratory. Each laboratory's QA officer will be responsible for validating data generated by the laboratory. The Quality Assurance Manager will be responsible for initial verification of data submitted by analyzing labs (including electronic data reports), final data validation, and for qualifying data based on the evaluation of field and laboratory quality control samples.

D.2. Data Reporting

Laboratory personnel will verify that the measurement process was "in control" (i.e., all specified data quality objectives were met or acceptable deviations explained) for each batch of samples before proceeding with the analysis of a subsequent batch. In addition, each laboratory will establish a system for detecting and reducing transcription and/or calculation errors prior to reporting data.

Only data which have met data quality objectives, or data which have acceptable deviations explained, will be submitted by the laboratory. When QA requirements have not been met, the samples will be reanalyzed when possible and only the results of the reanalysis will be submitted, provided they are acceptable.

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