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SACRAMENTO VALLEY
WATER QUALITY COALITION

Monitoring and Reporting Program Plan

Semi-Annual Storm Season Monitoring Report 2007

prepared by

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Introduction

The primary purpose of this report is to document the monitoring efforts and results of the Sacramento Valley Water Quality Coalition (Coalition) Monitoring and Reporting Program Plan (MRPP). This Storm Season Semi-Annual Monitoring Report also serves to document the Coalition's progress toward fulfilling the requirements of the *Conditional Waiver for Irrigated Lands* (hereinafter abbreviated as *ILP* for *Irrigated Lands Program*) and subsequent amendments to the *ILP* requirements (WQO-2004-0003, SWRCB 2004, RB 2005-0833).

The Storm Season Semi-Annual Monitoring Report includes the following elements, as specified in the *ILP*:

- A description of the watershed
- A summary of monitoring objectives
- Descriptions of sampling site locations and characteristics
- A summary of the sampling and analytical methods used
- All monitoring results, including field logs, laboratory reports, and chains-of-custody,
- An evaluation of pesticide use information
- Interpretation of the monitoring results reported
- Evaluation of management practices in the Coalition watershed
- Actions taken to address exceedances observed in monitoring
- Conclusions and recommendations of the Storm Season Semi-Annual Monitoring Report

All report elements required by the *ILP* or subsequently requested by the California Regional Water Quality Control Board, Central Valley Region (Water Board) are included in this report.

Description of the Watershed

The Sacramento River watershed drains over 27,000 square miles of land in the northern part of California's Central Valley into the Sacramento River. The upper watersheds of the Sacramento River region include the Pit River watershed above Lake Shasta and the Feather River above Lake Oroville. The Sacramento Valley drainages include the Colusa, Cache Creek, and Yolo Bypass watersheds on the west side of the valley, and the Feather, and American River watersheds on the east side of the valley. Additionally, the Coalition monitors in the Cosumnes River watershed, which isn't part of the Sacramento river watershed. Beginning near the town of Red Bluff at its northern terminus, the Sacramento Valley stretches about 150 miles to the southeast where it merges into the Sacramento-San Joaquin River Delta south of the Sacramento metropolitan area. The valley is 30 to 45 miles wide in the southern to central parts, but narrows to about 5 miles near Red Bluff. Its elevation decreases from 300 feet at its northern end to near sea level in the delta.

The Sacramento River Basin is a unique mosaic of farm lands, refuges, and managed wetlands for waterfowl habitat; spawning grounds for numerous salmon and steelhead trout; and the cities and rural communities that make up this region. This natural and working landscape between the crests of the Sierra Nevada and the Coast Range includes the following:

- More than a million acres of family farms that provide the economic engine for the region; provide a working landscape and pastoral setting; and serve as valuable habitat for waterfowl along the Pacific Flyway. The predominant crops include: rice, general grain and hay, improved pasture, corn, tomatoes, alfalfa, almonds, walnuts, prunes, safflower, and vineyards.
- Habitat for 50% of the threatened and endangered species in California, including the winter-run and spring-run salmon, steelhead, and many other fish species.
- Six National Wildlife Refuges, more than fifty state Wildlife Areas, and other privately managed wetlands that support the annual migration of waterfowl, geese, and water birds in the Pacific Flyway. These seasonal and permanent wetlands provide for 65% of the North American Waterfowl Management Plan objectives.
- The small towns and rural communities that form the backbone of the region, as well as the State Capital that serves as the center of government for the State of California.
- The forests and meadows in the numerous watersheds of the Sierra Nevada and Coast Range.

Monitoring Objectives

The Coalition MRPP will achieve the following objectives as a condition of the *ILP*:

1. Assess the impacts of waste discharges from irrigated lands to surface waters;
2. Determine the degree of implementation of management practices to reduce discharge of specific wastes that impact water quality;
3. Determine the effectiveness of management practices and strategies to reduce discharge of wastes that impact water quality;
4. Determine concentration and load of wastes in these discharges to surface waters; and
5. Evaluate compliance with existing narrative and/or numeric water quality objectives to determine if additional implementation of management practices is necessary to improve and/or protect water quality.

The Coalition is achieving these objectives by implementing a phased Monitoring And Reporting Program Plan that initially evaluates samples for the presence of statistically significant toxicity of sufficient magnitude in the initial sample to trigger follow-up actions designed to identify constituents causing toxicity. Also, the Coalition is evaluating samples for violations of applicable numeric water quality objectives to trigger follow-up actions. Additionally, the Coalition is evaluating the degree of implementation of current management practices in priority watersheds and recommending specific practices as water quality results indicate a need to do so. The Coalition is committed to the principle of adaptive management to control specific discharges of waste that are having an impact on water quality. This iterative approach allows for the most effective use of scarce human and fiscal resources.

The parameters monitored by the Coalition to achieve these objectives are as specified in the *ILP* and in subsequent amendments to the *ILP* requirements (WQO-2004-0003, SWRCB 2004, RB 2005-0833). The following environmental monitoring elements are included in Phases 1-3 of the Coalition MRPP:

- Water column and sediment toxicity
- Physical and conventional parameters in water and sediment
- Organic carbon and ultraviolet light absorbance in water
- Pathogen indicator organisms in water
- Trace metals in water and sediment
- Pesticides in water and sediment
- Nitrogen and phosphorus compounds in water

Note that not all parameters are monitored during every phase of monitoring. Specific individual parameters measured and the relevant Phases of the Coalition monitoring effort are listed in **Table 1**. Note that this list is consistent with the *ILP* in effect when the Coalition 2007 monitoring program was implemented in January 2007. It is expected that this list will be modified at least annually as the Water Board continues to revise requirements of the *ILP*.

Table 1. Constituents to be Monitored for Phases 1–3 of Monitoring

	Quantitation Limit (in Water)	Reporting Unit	Monitoring Phases
Physical Parameters			
Flow	NA	CFS (Ft^3/Sec)	Phase 1, 2 & 3
pH	0.1 [(a)]	-log[H^+]	Phase 1, 2 & 3
Conductivity	0.1 [(a)]	μmhos/cm	Phase 1, 2 & 3
Dissolved Oxygen	0.1 [(a)]	mg/L	Phase 1, 2 & 3
Temperature	0.1 [(a)]	˚C	Phase 1, 2 & 3
Color	NA	Chloroplatinate Units (CU)	Phase 1, 2 & 3
Hardness, total as $CaCO_3$	10	mg/L	Phase 2
Turbidity	1.0	NTU	Phase 1, 2 & 3
Total Dissolved Solids	3.0	mg/L	Phase 1, 2 & 3
Total Suspended Solids	3.0	mg/L	Phase 1, 2 & 3
Total Organic Carbon	0.5	mg/L	Phase 1, 2 & 3
Pathogen Indicators			
E. Coli bacteria	2	MPN/100 mL	Phase 1
Water Column and Sediment Toxicity			
Ceriodaphnia, 96-h acute	NA	% Mortality	Phase 1
Pimephales, 96-h acute	NA	% Mortality	Phase 1 [(d)]
Selenastrum, 96-h short-term chronic	NA	Cell Growth	Phase 1
Hyalella, 10-day short-term chronic	NA	% Mortality	Phase 1
Pesticides			
Carbamates	(b)	ug/L	Phase 2 [(c)]
Organochlorines	(b)	ug/L	Phase 2 [(c)]
Organophosphorus	(b)	ug/L	Phase 2 [(c)]
Pyrethroids	(b)	ug/L	Phase 2 [(c)]
Herbicides	(b)	ug/L	Phase 2 [(c)]
Trace Elements			
Arsenic	0.5	ug/L	Phase 2 [(c)]
Boron	10	ug/L	Phase 2 [(c)]
Cadmium	0.1	ug/L	Phase 2 [(c)]
Copper	0.5	ug/L	Phase 2 [(c)]
Lead	0.25	ug/L	Phase 2 [(c)]
Nickel	0.5	ug/L	Phase 2 [(c)]
Selenium	1.0	ug/L	Phase 2 [(c)]
Zinc	1.0	ug/L	Phase 2 [(c)]
Nutrients			
Total Kjeldahl Nitrogen	0.1	mg/L	Phase 2 [(c)]
Phosphorus, total	0.1	mg/L	Phase 2 [(c)]
Soluble Orthophosphate	0.01	mg/L	Phase 2 [(c)]
Nitrate as N	0.1	mg/L	Phase 2 [(c)]
Nitrite as N	0.03	mg/L	Phase 2 [(c)]
Ammonia as N	0.1	mg/L	Phase 2 [(c)]

(a) Detection and reporting limits are not strictly defined. Tabled value indicates required reporting precision.
(b) Limits are different for individual pesticides.
(c) Phase 2 monitoring may be conducted concurrently with Phase 1. Pesticides, trace elements, or nutrients suspected of causing toxicity or of causing exceedances of relevant water quality objectives may continue to be monitored in Phase 3.
(d) Pimephales toxicity testing was discontinued in 2007 due to the lack of observed toxicity at any site in 2005 and 2006.

Sampling Site Descriptions

To successfully implement the monitoring and reporting program requirements contained in the *ILP* adopted by the Water Board in June 2003, the Coalition worked directly with landowners in the twenty-one county watershed to identify and develop ten subwatershed groups. Representatives from each subwatershed group utilized agronomic and hydrologic data generated by the Coalition in an attempt to prioritize watershed areas for initial evaluation to ultimately select monitoring sites in their respective areas based upon existing infrastructure, historical monitoring data, land-use patterns, historical pesticide use, and the presence of 303(d)-listed water bodies.

Coalition members selected sampling sites in priority watersheds based upon the following fundamental assumptions regarding management of non-point source discharges to surface water bodies: 1) Landscape scale sampling at the bottom of drainage areas allows for determinations regarding the presence of a water quality problems using a variety of analytical methods including water column and sediment toxicity testing as well water chemistry analyses and bioassessment; 2) Strategic source investigations utilizing Geographic Information Systems can be used to identify upstream parcels with attributes that may be related to the analytical results, including crops, pesticide applications, and soil type; and 3) Though recognizably complex, management practice effectiveness can best be assessed by coalitions at the watershed scale to determine compliance with water quality objectives in designated water bodies. Farm-level management practices evaluations can complement Coalition efforts on the watershed scale by providing crop-specific research results that then can support management practice recommendations.

In January 2007, the Coalition adopted a more aggressive monitoring approach that involved, in part, replacing previously monitored sites with high priority sites in intermediate size drainages. Thirteen new monitoring locations in unmonitored drainages replaced sites monitored in 2006 with completed Phase 2 monitoring. Candidate drainages for new monitoring locations were selected based on overall monitoring priorities and an increased focus on maximizing the number of intermediate size drainages in 2007 to meet the requirements of the R5-2005-0833 MRP. The bases for making these monitoring recommendations for sites monitored in 2006 were provided in the Coalition's 2007 Monitoring Plan.

SAMPLING SITE LOCATIONS AND LAND USES

The sites monitored by the Coalition in 2007 are listed in **Table 2**. All sites monitored before 2007 have been approved by the Water Board as *ILP* compliance sites. The Coalition Monitoring Plan in place for 2007 has not yet been approved by the Water Board, including sites newly implemented in 2007. An overall map of Coalition and subwatershed sites is presented in **Figure 1**. Site-specific drainage maps with land use patterns for all monitoring locations are also provided in **Appendix F**.

Table 2. Coalition Monitoring Sites, 2007

Map Index[1]	Site ID[1]	Status[3]	Subwatershed	Site Name	Latitude	Longitude	Implementing Agency
14	PNCGR	Approved	ButteYubaSutter	Pine Creek at Nord Gianella Road	39.7811	-121.9877	SVWQC
15	SACSL	Approved		Sacramento Slough	38.7833	-121.6338	SRWP
33	GILSL	Approved		Gilsizer Slough at George Washington Road	39.0090	-121.6716	SVWQC
39	GRHPR	Pending		Grasshopper Slough at Forty Mile Road [4]	38.9938	-121.4898	SVWQC
40	LSNKR	Pending		Lower Snake R. at Nuestro Rd [4]	39.1853	-121.7036	SVWQC
13	WADCN	Approved		Wadsworth Canal at South Butte Rd [5]	39.1534	-121.7344	SVWQC
5	STYHY	Approved	ColusaBasin	Stony Creek on Hwy 45 near Rd 24	39.7101	-122.0040	SVWQC
9	COLDR	Approved		Colusa Basin Drain above KL	38.8121	-121.7741	SRWP
41	FRSHC	Pending		Freshwater Creek at Gibson Rd [4]	39.1766	-122.1892	SVWQC
42	LGNCR	Pending		Logan Creek at 4 Mile-Excelsior Rd [4]	39.3653	-122.1161	SVWQC
43	LRLNC	Pending		Lurline Creek at 99W [4]	39.2122	-122.1833	SVWQC
44	WLKRC	Pending		Walker Creek at Co Rd 48 [4]	39.5388	-122.1762	SVWQC
6	CODMR	Approved		Colusa Drain near Maxwell Rd [5]	39.2756	-122.0862	SVWQC
25	NRTCN	Approved	ElDorado	North Canyon Creek	38.7604	-120.7102	SVWQC
45	COONH	Pending		Coon Hollow Creek [4]	38.7534	-120.7240	SVWQC
23	PCULB	Approved	LakeNapa	Pope Creek upstream from Lake Berryessa	38.6464	-122.3642	PCWG
24	CCULB	Approved		Capell Creek u/s from Lake Berryessa	38.4825	-122.2411	PCWG
38	MDLCR	Pending		Middle Creek u/s from Highway 20 [4]	39.1635	-122.9161	SVWQC
22	MGSLU	Approved		McGaugh Slough at Finley Road East [5]	39.0042	-122.8623	SVWQC
1	PRPIT	Approved	PitRiver	Pit River at Pittville	41.0454	-121.3317	NECWA
2	FRRRB	Approved		Fall River at Fall River Ranch Bridge	41.0351	-121.4864	NECWA
3	PRCAN	Approved		Pit River at Canby Bridge	41.4017	-120.9310	NECWA
46	CCBRW	Pending	Placer-Nevada-SSutter-NSac.	Coon Creek at Brewer Road [4]	38.9340	-121.4518	SVWQC
11	CCSTR	Approved		Coon Creek at Striplin Rd [5]	38.8661	-121.5803	SVWQC
27	DCGLT	Approved	SacramentoAmador	Dry Creek at Alta Mesa Road	38.2480	-121.2260	SVWQC
47	LAGAM	Pending		Laguna Creek at Alta Mesa Road [4]	38.3110	-121.2263	SVWQC
30	ACACR	Approved	ShastaTehama	Anderson Creek at Ash Creek Road	40.4180	-122.2136	SVWQC
48	COYTR	Pending		Coyote Creek at Tyler Road [4]	40.0926	-122.1590	SVWQC
49	WLSBP	Pending	SolanoYolo	Willow Slough Bypass at SP [4]	38.5994	-121.7528	SVWQC
50	CCCPY	Pending		Cache Cr. at Diversion Dam [4]	38.7137	-122.0851	SVWQC
29	SSLIB	Approved		Shag Slough at Liberty Island Bridge	38.3068	-121.6934	SVWQC
32	UCBRD	Approved		Ulatis Creek at Brown Road	38.3070	-121.7940	SVWQC
18	TCHWY	Approved		Tule Canal @ I-80 [5]	38.5700	-121.5800	SVWQC
16	ZDDIX	Approved		Z-drain – Dixon RCD [5]	38.4157	-121.6752	SVWQC
20	MFFRA	Approved	UpperFeatherRiver	Middle Fork Feather River at County Rd A-23	39.8189	-120.3918	UFRW
53	MFFGR	Pending		Middle Fork Feather River above Grizzly Cr.	39.8160	-120.4260	UFRW
36	INDAB	Approved		Indian Creek at Arlington Bridge	40.0846	-120.9161	UFRW
37	SPGRN	Approved		Spanish Creek below Greenhorn Creek	39.9735	-120.9103	UFRW

(1) Numbered indices for the SVWQC site-specific drainage maps in Appendix F

(2) Site Identification codes for the SVWQC monitoring site map (**Figure 1**)

(3) "Approved" indicates site was approved as an *ILP* compliance site by the Water Board.
"Pending" indicates site approval as an *ILP* compliance site is pending Water Board review of the Coalitions 2007 Monitoring Plan.

(4) New sites implemented in 2007.

(5) Sites will only be monitored twice in 2007 for an *E. coli* source study (February and May).

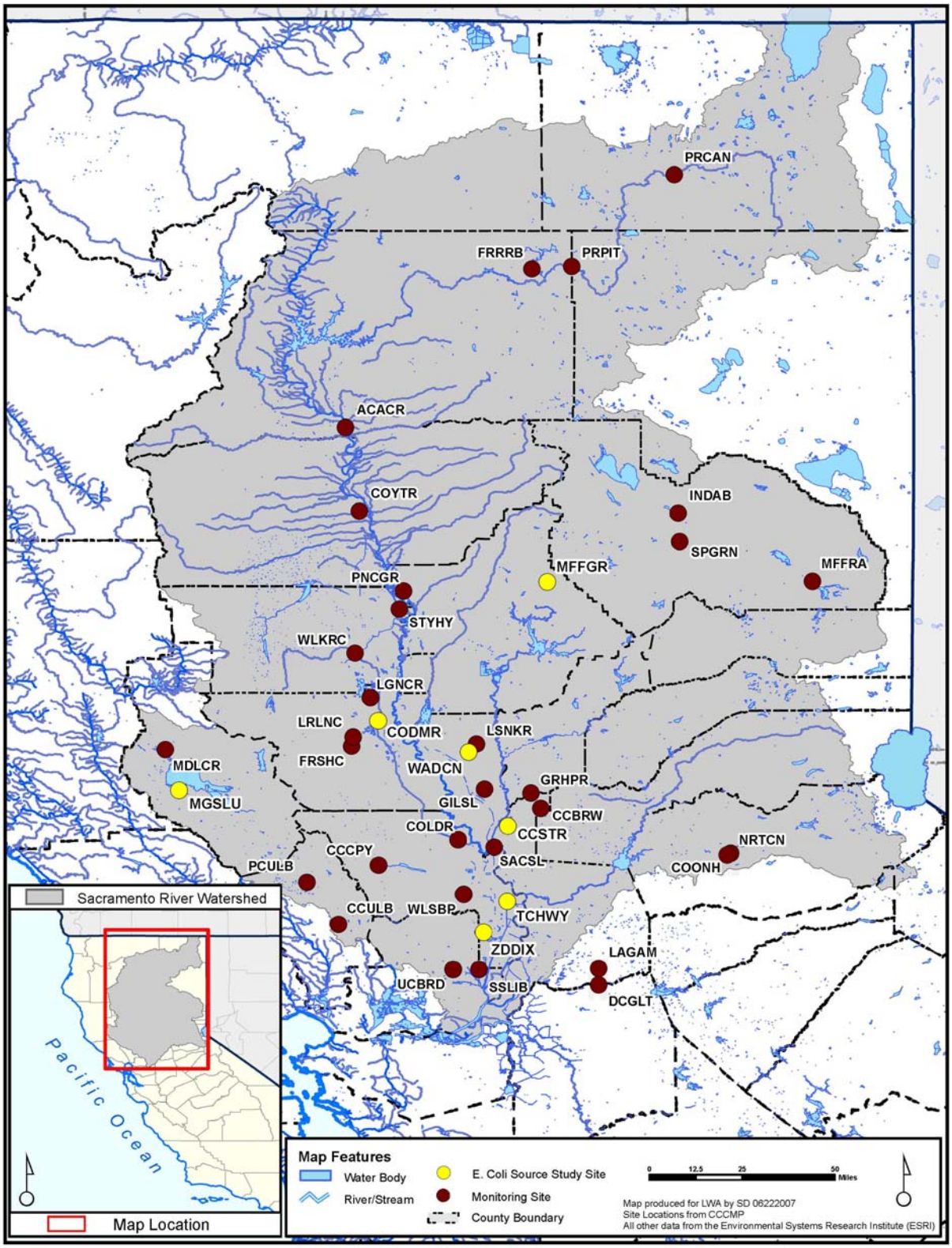

Figure 1. Coalition Monitoring Sites

SITE DESCRIPTIONS

Butte/Yuba/Sutter Subwatershed

Pine Creek at Nord-Gianella Road

The watershed sampled upstream from the monitoring site represents approximately 13,440 acres of varied farmland, riparian habitat and farmsteads. The predominant crops in this area are walnuts, almonds, prunes, wheat, oats, barley, beans, squash, cucumbers, alfalfa, pasture, and safflower.

Sacramento Slough

This site aggregates water from all areas in the subwatershed between the Feather and Sacramento Rivers. The major contributing areas include the areas downstream of the Butte Slough and Wadsworth monitoring sites. These areas include Sutter Bypass and its major inputs from Gilsizer Slough, RD 1660, RD 1500, and the Lower Snake River. Monitoring at this site is administered by the Sacramento River Watershed Program. No sampling was conducted in 2005.

Gilsizer Slough at George Washington Road

Gilsizer Slough is an unlined storm drainage outfall canal that runs from the Gilsizer County Drainage District's north pump station approximately 15 miles to the Sutter Bypass, draining 6,005 total acres. The actual monitoring location is located roughly 1.5 drainage miles from its confluence with the Sutter bypass and is a natural drainage channel that historically has drained Yuba City and the area south of town. Principal crops grown in this area include prunes, walnuts, peaches, and almonds.

Grasshopper Slough at Forty Mile Road

Grasshopper Slough is a small drainage about 4 miles west of Wheatland. It drains about 47,000 total acres. Predominant crops in this drainage include walnuts, rice, pasture, almonds, and prunes.

Lower Snake River at Nuestro Road

The Lower Snake River is an unlined irrigation supply and runoff canal that serves approximately 25,000 total acres and includes a relatively high percentage of rice acreage. The other predominant crops include prunes, peaches, idle acreage, and operations producing flowers, nursery stock, and Christmas trees.

*Wadsworth Canal at South Butte Road (Weir #4) (*E. coli *study only)*

This site will test water downstream of approximately 22,000 irrigated acres in the Wadsworth drainage as shown in the Butte-Sutter-Yuba subwatershed map. This area includes primarily prunes with some acreage of peaches, walnuts, pasture, wheat, and almonds.

Colusa Basin Subwatershed

Stony Creek at Hwy 45 (near Rd. 24)

This site characterizes water from the contributing area downstream of Black Butte Reservoir just north of the town of Orland and includes approximately 20,000 acres of irrigated lands. The major irrigated crops in the Lower Stony Creek drainage are pasture, almonds, prunes, and wheat.

Colusa Basin Drain above Knights Landing

This site is near the outfall gates of the Colusa Basin Drain before its confluence with the Sacramento River. This site is downstream of all of the other monitoring sites within the basin. The upstream acreage

consists of almonds, tomatoes, wetlands, pasture, corn, and walnuts. Monitoring at this site is administered by the Sacramento River Watershed Program.

Freshwater Creek at Gibson Road

The Freshwater Creek drainage includes approximately 83,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 19,000 acres. Predominant crops in the drainage are rice, tomatoes, idle, squash, grain, pasture, and safflower.

Logan Creek at 4 Mile-Excelsior Road

The Logan Creek drainage includes approximately 98,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 28,000 acres. Predominant crops in the drainage are rice, grain, corn, pasture, and managed marshland.

Lurline Creek at 99W

The Lurline Creek drainage includes approximately 55,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 19,000 acres. Predominant crops in the drainage are rice, idle acreage, pasture, managed wetland, grain, melons, and squash.

Walker Creek at County Road 48

The Walker Creek drainage is located east of Wilson Creek in Glenn County, and the Walker Creek monitoring site is located 1.3 miles north of the Town of Willows. The Walker Creek drainage includes approximately 27,000 total irrigated acres. Predominant crops in this drainage are almonds, rice, corn, and alfalfa.

*Colusa Drain at Maxwell Road (*E. coli *study only)*

This site is just downstream from the original site, Upper Colusa Drain. It captures additional drainage from the federal wildlife refuge. The site receives water from central Glenn County and northeast Colusa County. The contributing drainage areas include Willow Creek, Upper Colusa Drain, and the Provident Area as indicated on the Colusa Basin subwatershed map. This area has considerable acreages of almonds, walnuts, wheat, pasture, and corn.

El Dorado County Subwatershed

North Canyon Creek

This site captures representative agricultural drainage from the Camino-"Apple Hill" drainage in El Dorado County. Crops grown in this region include apples, pears, wine grapes, stone fruit, and Christmas trees. This site is approximately one (1) mile upstream from the confluence with the South Fork American River and is a perennial stream.

Coon Hollow Creek

This site is located in the Apple Hill area of Camino, approximately 1 mile north of the intersection of North Canyon Road and Carson Road and 1/2 mile south of the confluence with South Canyon Creek. Agricultural operations within the drainage include silviculture, apples, wine grapes, cherries, and blueberries. Coon Hollow Creek is considered a low-flow perennial stream.

Lake/Napa Subwatershed

Pope Creek and Capell Creek

The sites on Pope Creek and Capell Creek in Napa County are downstream of major storm runoff but are above the level of the receiving waters of Lake Berryessa. Collectively, these sites capture drainage from approximately 3,400 acres of irrigated lands. Primary crops include vineyards and olive orchards. Based upon the ephemeral nature of these two Napa County creeks, samples are planned to be collected three times per year: in January, March, and May.

Middle Creek Upstream from Highway 20

The Middle Creek drainage contains approximately 60,732 acres. Over 55,000 acres are listed as Native Vegetation with the US Forest Service controlling the majority of the land. Irrigated agriculture constitutes approx 1,112 acres participating in the Lake County Watershed group. This includes 374 acres of walnuts, 308 acres of grapes, 186 acres of pears 159 acres of hay/pasture, 10 acres of specialty crops/nursery crops and about 70 acres of wild rice.

The sampling location was chosen to avoid influence for the town of Upper Lake, and captures approximately 60% of irrigated agricultural operations within this drainage. Due to the ephemeral nature of the creek, sampling at this site is planned to be conducted three times per year: twice during the storm season, and once after commencement of the irrigation season.

*McGaugh Slough at Finley Road East (*E. coli *study only)*

McGaugh Slough captures irrigated agricultural drainage from about 10,300 acres of orchard and vineyard crops in Lake County. This site is in the most prevalent drain for the Big Valley, which is the most intensive area for agricultural operations in Lake County. Given the ephemeral nature of the creek, sampling at this site is planned to be conducted three times per year: twice during the storm season, and once after commencement of the irrigation season.

Pit River Subwatershed

Pit River at Pittville Bridge

This site captures a portion of the Big Lake drainage. This site captures drainage from the primary land-use, native pasture, as well as alfalfa, oat hay, grain and duck marsh, ultimately incorporating approximately 9,000 acres in the Fall River Valley.

Fall River at Fall River Ranch Bridge

This site is located at the lower end of Fall River before the river is partially diverted for hydroelectric uses at the Pit 1 Power House. The majority of Fall River water is spring-fed water that emerges in the northern portions of the valley (e.g., Lava Creek Springs, Spring Creek Springs, Crystal Springs, Mallard Springs, Big Lake Springs, Thousand Springs, Hideaway Spring, Rainbow Spring). These springs form the Little Tule River, Tule River, Spring Creek, Lava Creek, Mallard Creek, and Ja She Creek. One major tributary to Fall River, Bear Creek, captures flow mostly from private timberland comprising approximately 27 square miles of watershed. Bear Creek joins the Fall River near Thousand Springs. Finally, small amounts of water enter the Fall River from overland flow during winter and from irrigated lands during the growing season. Pasture, wild rice, and alfalfa are the primary agriculture crops in the northern portion of the valley. Total irrigated acreage draining to this site is approximately 12,000 acres.

Pit River at Canby

This site captures drainage from the Alturas and Canby drainage areas. Land-uses are primarily pasture and grain and hay crops. Approximate irrigated acreage is 50,000.

Placer/Nevada/South Sutter/North Sacramento Subwatershed

Coon Creek at Brewer Road

This site captures drainage from the Middle Coon Creek drainage areas as identified in the Placer-Northern Sacramento Drainage Prioritization Table in the Coalition's Watershed Evaluation Report (WER). This site is on Coon Creek about six mile northwest of the town of Lincoln and includes predominantly agricultural acreage. The drainage includes approximately 65,000 irrigated acres of rice, rice, pasture, grains, and sudan grass, with a high percentage of rice acreage.

*Coon Creek at Striplin Road (*E. coli *study only)*

This site captures drainage from the Middle and Lower Coon Creek drainage areas as identified in the Placer-Northern Sacramento Drainage Prioritization Table in the Coalition's Watershed Evaluation Report (WER) . This site is on Coon Creek about one mile downstream of the confluence with Ping Slough. The site drains approximately 25,000 irrigated acres of orchards, pasture, and wheat. It is recognized that there may be urban contributions at this site, but many of the growing cities in Western Placer County are conducting monitoring to identify potential urban impacts and are prepared to work closely with the Coalition in analyzing results and determining sources.

Sacramento/Amador Subwatershed

Dry Creek at Alta Mesa Road

Dry Creek originates in the eastern foothills and flows through considerable agricultural acreage. The drainage includes the southern portion of Amador County, the southeast corner of Sacramento County and the northeast corner of San Joaquin County. Amador County agriculture includes grain and irrigated pasture in the Dry Creek Valley and row crops, irrigated pasture, grain, vineyard, and orchard in the Jackson Valley. Sacramento County agriculture includes vineyard, irrigated pasture, grain, and scattered dairies. Dry Creek drains approximately 329 square miles (n.b. the number of irrigated acres is still being determined).

Laguna Creek at Alta Mesa Road

Laguna Creek is a tributary to the Cosumnes River. Laguna Creek originates in Amador County and flows south-west into Sacramento County, draining Willow, Hadselville, Brown and Griffith Creeks, among others. The primary agricultural uses are vineyards, field crops, grain and hay crops and pasture.

Shasta/Tehama Subwatershed

Anderson Creek at Ash Creek Road

Anderson Creek was identified as the highest priority drainage in the Shasta county portion of the Shasta/Tehama subwatershed. This ranking was based on total irrigated acreage, crop types by acreage, and amount and type of pesticide use. Anderson Creek originates about three miles west of the city of Anderson and then flows into the Sacramento River. Crops are predominantly pasture, followed by walnuts and alfalfa/hay and then smaller amounts of other field and orchard crops. Total irrigated land is 8,989 acres.

Coyote Creek at Tyler Road

The Coyote Creek drainage includes approximately 37,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 6,700 acres. Predominant crops in the drainage are pasture, walnuts, prunes, almonds, and olives.

Solano/Yolo Subwatershed

Willow Slough Bypass at SP

The Willow Slough is a large drainage including approximately 102,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 66,000 acres. Predominant crops in the drainage are grain, pasture, corn, tomatoes, rice, and walnuts.

Cache Creek at Diversion Dam

The diversion dam on Cache Creek near Capay is the main diversion point for irrigation water in the 190,000 acre Yolo County Flood Control and Water Conservation District. The Diversion Dam is located 1.9 miles west of the town of Capay. During the summer irrigation season, the water at this site is released from storage approximately 50-60 miles upstream, from the Clear Lake and Indian Valley Reservoirs. There is no snow pack in this coastal watershed, therefore winter flows are very flashy (rising and falling quickly). Major crops in this drainage include tomatoes, alfalfa, corn, wheat, grapes, and orchards.

Shag Slough at Liberty Island Bridge

The Liberty Island Bridge site is approximately 2.5 to 3 miles southwest of the Toe Drain in Shag slough and is within the South Yolo Bypass drainage area. Like the Toe Drain, it is a tidally influenced site and is likely to contain a mixture of Toe Drain water along with water from other sub-drainages within the South Yolo Bypass and the Southwest Yolo Bypass.

Ulatis Creek at Brown Road

Ulatis Creek is a flood control project (FCP) that drains the majority of the central portion of Solano County. The Ulatis Creek FCP monitoring site is approximately 8.5 miles south of Dixon and 1.5 miles east of State Highway 113 on Brown Road. This site drains the Cache Slough area, as designated in the Yolo/Solano subwatershed map, and empties into Cache Slough. The major crops in this area include wheat, corn, pasture, tomatoes, alfalfa, Sudan grass, walnuts and almonds.

*Tule Canal at North East corner of I-80 (*E. coli *study only)*

This site is near the USGS Gauging Station in the Upper Yolo Bypass and is located just South of Interstate 80. This site characterizes the East Side Canal in the bypass and serves as a major drain for croplands in the North Yolo Bypass drainage as indicated on the Yolo/Solano subwatershed map. This drainage area includes corn, wheat, tomatoes, safflower and pasture.

*Z-Drain (Dixon RCD) (*E. coli *study only)*

The Z-Drain is a major input into the Yolo Bypass south of Interstate 80. This site drains the SW Yolo Bypass drainage area as designated in the Yolo/Solano subwatershed map. The major crops in this area include pasture, wheat, corn, tomatoes, and alfalfa.

Upper Feather River Watershed

Agriculture in this subwatershed is localized in mountain valleys that are suitable for grazing and growing alfalfa, hay and grain crops. Monitoring in this subwatershed is therefore focused on characterizing drainage from three valleys with considerable agricultural acreage.

Middle Fork Feather River at County Rd. A-23

This site drains Sierra Valley, the largest irrigated agricultural region in this subwatershed. The three major creeks that drain into the Sierra Valley (Smithneck Creek, Cold Stream Creek, and Last Chance Creek) ultimately drain to the north towards this monitoring point and the headwaters of the Middle Fork Feather River. Monitoring conducted at this site in the first year provides a solid baseline for potential upstream monitoring on these other streams. This site captures approximately 30,000-35,000 irrigated acres, which is almost exclusively native pasture.

Middle Fork Feather River above Grizzly Creek

The Middle Fork above Grizzly Creek is below the last irrigated site in the Sierra Valley sub-watershed and has year-round flow in most years. This site replaces Middle Fork Feather River at County Rd A-23, which lacks year-round flow (often dry by mid-July) and has numerous non-agricultural uses, including recreation and water trucks.

Indian Creek downstream from Indian Valley

This site drains the second largest irrigated agricultural region in this subwatershed, the Indian Valley. There are approximately 12,500 acres of native pasture, hay, and alfalfa. Drainage flows through the Indian Valley via Wolf Creek, Cooks Creek, Lights Creek and Indian Creek. The first three creeks ultimately flow to the southwest and join Indian Creek on the west side of the valley upstream from the monitoring site. This site provides a baseline for potential upstream monitoring on these tributary streams if necessary.

Spanish Creek above confluence with Greenhorn Creek

This site captures drainage from the American Valley, which encompasses approximately 1,800 irrigated acres of pasture. Spanish Creek and Greenhorn Creek are the two primary streams draining the valley. A third stream, Mill Creek, connects with Spanish Creek upstream of the monitoring point. These creeks generally flow in a northerly direction, and ultimately, Spanish Creek connects with the North Fork Feather River.

Sampling and Analytical Methods

The objective of data collection for this monitoring program is to produce data that represent, as closely as possible, *in situ* conditions of agricultural discharges and water bodies in the Central Valley. This objective will be achieved by using standard accepted methods to collect and analyze surface water and sediment samples. Assessing the monitoring program's ability to meet this objective will be accomplished by evaluating the resulting laboratory measurements in terms of detection limits, precision, accuracy, representativeness, comparability, and completeness, as described in the Coalition's QAPP (SVWQC 2006) and approved by the Water Board.

Surface water samples were collected for analysis of the constituents listed in **Table 1** as specified in the Coalition's 2007 Monitoring Plan. Surface water and sediment samples were collected for chemical analyses and toxicity testing. All samples were collected and analyzed using the methods specified in the QAPP; any deviations from these methods were explained.

SAMPLE COLLECTION METHODS

All samples were collected in a manner appropriate for the specific analytical methods used and to ensure that water column samples are representative of the flow in the channel cross-section. Water quality samples were collected using clean techniques that minimize sample contamination. Samples were cross-sectional composite samples or mid-stream, mid-depth grab samples, depending on sampling site and event characteristics. Where appropriate, water samples were collected using a standard multi-vertical depth integrating method. Abbreviated sampling methods (i.e., weighted-bottle or dip sample) may be used for collecting representative water samples. If grab sample collection methods were used, samples were taken at approximately mid-stream and mid-depth at the location of greatest flow (where feasible).

Sediment sampling was conducted on an approximately 50 meter reach of the waterbody near the same location as water quality sampling stations. The specific reach definitions vary based on conditions at each sampling station. Sediment sub-samples were collected from five to ten wadeable depositional zones. Depositional zones include areas on the inside bend of a stream or areas downstream from obstacles such as boulders, islands, sand bars, or simply shallow waters near the shore. In low-energy waterbodies, composite samples may be collected from the bottom of the channel using appropriate equipment, as specified in the Coalition QAPP. Sediment samples for toxicity analyses were collected in such a manner to minimize air above sediment and to prevent exposure to air.

Details of the standard operating procedures (SOPs) for collection of surface water and sediment samples are provided in Appendix C of the Coalition's QAPP.

The SVWQC monitoring program was initially implemented using the three-phased approach specified in the *ILP* MRP and the Coalition's MRPP. Phase 1 monitoring includes analyses of physical parameters, drinking water constituents, and toxicity testing. Phase 2 monitoring includes chemical analyses of pesticides, metals, inorganic constituents and nutrients as well as continued monitoring of some required Phase 1 parameters, plus specific constituents that are identified as causes of toxicity testing in Phase 1. Phase 3 monitoring will include management practice effectiveness and implementation tracking and may include monitoring of additional water quality sites in the upper portions of the watershed. The initiation, scope, and schedule of Phase 2 and Phase 3 monitoring are intended to be dependent on the results of Phase 1 monitoring, as described in the MRPP. Some elements of Phase 2 monitoring have been conducted concurrently with Phase 1 monitoring. The sites and annual frequency of samples planned to be collected for the Coalition's 2007 monitoring are summarized in **Table 3**.

The Coalition's long term monitoring strategy was designed to achieve overall characterization of high and medium priority drainages in 5 years. The Coalition's monitoring plan for 2007 also anticipated some changes in monitoring requirements in the revised MRP that was expected to be released by the Regional

Board in 2006, and was delayed until 2007. These changes in the *ILP* MRP were expected to include an end to the phased monitoring approach of the current MRP, and replacement of the poorly defined requirement for 20% additional intermediate drainages per year with a more general requirement for a long term monitoring strategy to characterize agricultural drainages. Revisions to the Regional Board MRP are also expected to include numerous technical changes in monitoring requirements, and may implement significant additional changes in the overall monitoring strategy.

The elements that are key to achieving the Coalition's goals and satisfying the intent of the requirements of the R5-2005-0833 MRP currently in effect are (1) the Coalition's prioritization process for selecting drainages and monitoring sites, and (2) an efficient strategy for implementing monitoring in intermediate drainages. The overall strategy for efficiently completing the required monitoring has been to focus selectively on unmonitored intermediate drainages that are rated high or medium priority based on their irrigated acreage, cropping patterns, pesticide use, and their potential for contributing to cumulative impacts on receiving waters. Generally, this will be achieved by replacing sites with completed monitoring with new sites in intermediate drainages, as was done in 2007. Additionally, the Coalition continued to monitor several integrator sites that characterize multiple smaller drainages and provide an assessment of the overall or cumulative quality of irrigated agriculture runoff. Examples of these integrator sites are Colusa Basin Drain near Knights Landing, and Shag Slough at Liberty Island Bridge.

The other aspect of efficiently completing the required monitoring is to concurrently analyze all parameters required for Phase 1 and Phase 2 of the current R5-2005-0833 MRP. This allows drainages to be characterized in a single year instead in the two years required under the phased approach. All new sites implemented for 2007 were monitored for the full suite of parameters required for the MRP, as appropriate for the cropping and pesticide use patterns in each drainage. For continuing sites, a reduced set of parameters may be monitored based on previous monitoring results, with the goal of completing the Phase 2 monitoring for these sites in 2007. In cases where continued monitoring is required to evaluate effectiveness of management plans, the frequency and locations of monitoring will be established in the specific management plan and will be focused on the parameters of concern.

Table 3. Coalition 2007 Monitoring: Planned Annual Sampling Frequency

				Physical, Chemical, and Microbiological											Toxicity				
Subwatershed	Location	Water Column Sample Events	Sediment Sample Events	pH, conductivity, DO, temperature, Q	Color, Turbidity, TDS, TSS, TOC	Nutrients	Trace metals	Organophosphate pesticides	Triazines	Organonochlorines	Pyrethroids in toxic sediments	Glyphosate, Paraquat	Carbamate and Urea Pesticides	Pathogen Indicators: *E. Coli*	Ceriodaphnia, 96-h acute	Pimephales, 96-h acute	Selenastrum, 96-h short-term chronic	Hyalella, 10-day short-term chronic	Implementation
Butte-Sutter-Yuba	Grasshopper Sl. at Forty Mile Rd	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Lower Snake R. at Nuestro Rd	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Pine Creek at Nord Gianelli Rd	8	2	8	8	8	ns	8	ns	ns	2	ns	ns	ns	8	ns	ns	2	SVWQC
	Gilsizer Sl. at G. Washington Rd	8	ns	8	8	8	8	8	8	8	ns	8	8	8	ns	ns	ns	ns	SVWQC
	Sacramento Slough	7	ns	7	7	7	ns	7	7	ns	ns	ns	5	7	7	7	7	ns	SRWP
Colusa Basin	Freshwater Creek at Gibson Rd	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Logan Cr. at 4 Mile-Excelsior Rd	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Lurline Creek at 99W	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Walker Creek at Co Rd 48	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Stony Cr. on Hwy 45 near Rd 24	2	ns	2	ns	ns	ns	2	2	ns	ns	ns	ns	ns	2	ns	2	ns	SVWQC
	Colusa Drain above KL	7	ns	7	7	7	ns	7	5	ns	ns	ns	5	7	7	7	7	ns	SRWP
El Dorado	North Canyon Creek	4	ns	4	4	ns	ns	4	ns	4	ns	ns	ns	4	ns	ns	ns	ns	SVWQC
	Coon Hollow Creek	8	2	8	8	8	8	8	ns	8	2	ns	ns	8	8	ns	8	2	SVWQC
Lake-Napa	Middle Creek u/s Hwy 20	3	2	3	3	3	3	3	3	3	2	ns	ns	3	3	ns	3	2	SVWQC
	Pope Cr u/s from L. Berryessa	3	ns	3	3	ns	ns	ns	ns	ns	ns	ns	ns	3	ns	ns	ns	ns	PCWG
	Capell Cr u/s from L. Berryessa	3	ns	3	3	ns	ns	ns	ns	ns	ns	ns	ns	3	ns	ns	ns	ns	PCWG
Pit River	Pit River at Pittville	8	ns	8	8	8	ns	ns	ns	ns	ns	ns	ns	8	ns	ns	ns	ns	NECWA
	Fall R. at Fall R. Ranch Bridge	8	ns	8	8	8	ns	ns	ns	ns	ns	ns	ns	8	ns	ns	ns	ns	NECWA
	Pit River at Canby Bridge	8	ns	8	8	8	ns	ns	ns	ns	ns	ns	ns	8	ns	ns	ns	ns	NECWA
Placer-NSac-Nev-SSutter	Coon Creek at Brewer Rd	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
Sac-Amador	Laguna Creek at Alta Mesa Rd	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Dry Creek at Alta Mesa Road	8	ns	8	8	8	8	8	8	8	ns	8	8	8	2	ns	ns	ns	SVWQC
Shasta-Tehama	Coyote Creek at Tyler Rd	8	2	8	8	8	8	8	ns	ns	2	ns	8	8	8	ns	8	2	SVWQC
	Anderson Cr. at Ash Creek Rd	8	ns	8	8	ns	8	ns	ns	ns	ns	ns	ns	2	ns	ns	ns	ns	SVWQC
Solano-Yolo	Willow Sl. Bypass at SP	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Cache Cr. at Diversion Dam	8	2	8	8	8	8	8	8	8	2	8	8	8	8	ns	8	2	SVWQC
	Ulatis Creek at Brown Road	8	ns	8	8	8	8	8	8	8	ns	8	8	8	2	ns	2	ns	SVWQC
	Shag Sl. at Liberty Island Bridge	8	2	8	8	8	8	8	8	2	2	8	8	8	8	ns	8	2	SVWQC
Upper Feather	Spanish Cr. below Greenhorn Cr	7	2	7	7	7	ns	ns	ns	ns	ns	ns	ns	7	3	3	3	2	UFRW
	Indian Creek at Arlington Bridge	7	2	7	7	7	ns	ns	ns	ns	ns	ns	ns	7	3	3	3	2	UFRW
	Mid. Fk Feather at Co. Rd A-23	4	ns	4	4	4	ns	ns	ns	ns	ns	ns	ns	4	3	3	3	ns	UFRW
	Mid. Fk Feather above Grizzly Cr	3	2	3	3	3	ns	ns	ns	ns	ns	ns	ns	3	ns	ns	ns	2	UFRW

Notes: Tabled values indicate number of regular samples planned for 2007. "ns" indicates parameters are not sampled. Implementation indicates whether monitoring is conducted by the Coalition (SVWQC), Northeastern California Water Association (NECWA), Lake County, Putah Creek Watershed Group (PCWG), Upper Feather River Watershed Prop 50 Project Team (UFRW) or Sacramento River Watershed Program (SRWP).

ANALYTICAL METHODS

Water chemistry samples were analyzed for filtered (dissolved) and unfiltered/whole (total) fractions of the samples. Pesticide analyses were conducted only on unfiltered (whole) samples. Laboratories analyzing samples for this program have demonstrated the ability to meet the minimum performance requirements for each analytical method, including the ability to meet the project-specified quantitation limits (QL), the ability to generate acceptable precision and recoveries, and other analytical and quality control parameters documented in the Coalition QAPP. Analytical methods used for chemical analyses follow accepted standard methods or approved modifications of these methods, and all procedures for analyses are documented in the QAPP or available for review and approval at each laboratory.

Toxicity Testing and Toxicity Identification Evaluations

Water quality samples were analyzed for toxicity to *Ceriodaphnia dubia* and *Selenastrum capricornutum*. Sediment samples were analyzed for toxicity to *Hyalella azteca*. Toxicity tests were conducted using standard USEPA methods for these species.

- Determination of acute toxicity to *Ceriodaphnia* was performed as described in Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition (USEPA 2002a). Toxicity tests with *Ceriodaphnia* were conducted as 96-hour static renewal tests, with sample renewal 48 hours after test initiation.
- Determination of toxicity to *Selenastrum* was performed using the non-EDTA procedure described in Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition (USEPA 2002b). Toxicity tests with *Selenastrum* are conducted as a 96-hour static non-renewal test.
- Determination of sediment toxicity to *Hyalella* was performed as described in Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates–Second Edition (USEPA 2000). Toxicity tests with *Hyalella* were conducted as a 10-day whole-sediment toxicity test with renewal of overlying water at 12 hour intervals.

For all initial screening toxicity tests at each site, 100% ambient water and a control will be used for the acute water column tests. If 100% mortality to a test species is observed any time after the initiation of the initial screening toxicity test, a multiple dilution test using a minimum of five sample dilutions will be conducted with the initial water sample to estimate the magnitude of toxicity.

Procedures in the currently effective QAPP state that if any measurement endpoint from any of the three aquatic toxicity tests exhibits a significantly significant difference from the control of greater than 50%, Toxicity Identification Evaluation (TIE) procedures will be initiated using the most sensitive species to investigate the cause of toxicity. The 50% mortality threshold is consistent with the approach recommended in guidance published by U.S. EPA for conducting TIEs (USEPA 1996b), which recommends a minimum threshold of 50% mortality because the probability of completing a successful TIE decreases rapidly for samples with less than this level of toxicity. For samples that met these trigger criteria, Phase 1 TIEs to determine the general class of constituent (*e.g.*, metal, non-polar organics) causing toxicity or pesticide-focused TIEs were conducted. TIE methods generally adhere to the documented EPA procedures referenced in the QAPP. TIE procedures were initiated as soon as possible after toxicity is observed to reduce the potential for loss of toxicity due to extended sample storage. Procedures for initiating and conducting TIEs are documented in the QAPP (SVWQC 2006).

Detection and Quantitation Limits

The Method Detection Limit (MDL) is the minimum analyte concentration that can be measured and reported with a 99% confidence that the concentration is greater than zero. The Quantitation Limit (QL) represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and confidence in both identification and quantitation. For this program, QLs were established based on the verifiable levels and general measurement capabilities demonstrated by labs for each method. These QLs are considered to be maximum allowable limits to be used for laboratory data reporting. Note that samples required to be diluted for analysis (or corrected for percent moisture for sediment samples) may have sample-specific QLs that exceed the established QLs. This is unavoidable in some cases.

Project Quantitation Limits

Laboratories generally establish QLs that are reported with the analytical results – these may be called *reporting limits*, *detection limits*, *reporting detection limits*, or several other terms by different laboratories. In most cases, these laboratory limits are less than or equal to the project QLs listed in **Table 4**. Wherever possible, project QLs are lower than the proposed or existing relevant numeric water quality objectives or toxicity thresholds, as required by the *ILP*.

All analytical results between the MDL and QL are reported as numerical values and qualified as estimates ("J-values").

Table 4. Laboratory Method Detection Limit (MDL) and Quantitation Limit (QL) Requirements for Analyses of Surface Water for SVWQC Monitoring and Reporting Program Plan

Method	Analyte	Fraction	Units	MDL	QL	LAB
Physical and conventional Parameters						
EPA 110.2	Color	Filtered	ACU	2	5	CALTEST
EPA 130.2	Hardness, total as $CaCO_3$	Unfiltered	mg/L	3	5	CALTEST
EPA 180.1	Turbidity	Unfiltered	NTU	0.1	1	CALTEST
EPA 160.1	Total Dissolved Solids (TDS)	Filtered	mg/L	6	10	CALTEST
EPA 160.2	Total Suspended Solids (TSS)	Particulate	mg/L	2	3	CALTEST
EPA 415.1	Organic Carbon	Unfiltered	mg/L	0.3	0.5	CALTEST
Pathogen Indicators						
SM 9223B	E. Coli bacteria	NA	MPN/100 mL	2	2	CALTEST
Organophosphorus Pesticides						
EPA 625(m)	Azinphos-methyl	Unfiltered	µg/L	0.05	0.1	CRG
EPA 625(m)	Chlorpyrifos	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Diazinon	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Dimethoate	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Disulfoton	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Malathion	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Methamidophos	Unfiltered	µg/L	0.05	0.1	CRG
EPA 625(m)	Methidathion	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Parathion, Methyl	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Parathion, Ethyl	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Phorate	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Phosmet	Unfiltered	µg/L	0.05	0.1	CRG
Carbamate and Urea Pesticides						
EPA 8321	Aldicarb	Unfiltered	µg/L	0.2	0.4	APPL
EPA 8321	Carbaryl	Unfiltered	µg/L	0.05	0.07	APPL
EPA 8321	Carbofuran	Unfiltered	µg/L	0.05	0.07	APPL
EPA 8321	Diuron	Unfiltered	µg/L	0.2	0.4	APPL
EPA 8321	Linuron	Unfiltered	µg/L	0.2	0.4	APPL
EPA 8321	Methiocarb	Unfiltered	µg/L	0.2	0.4	APPL
EPA 8321	Methomyl	Unfiltered	µg/L	0.05	0.07	APPL
EPA 8321	Oxamyl	Unfiltered	µg/L	0.2	0.4	APPL
Organochlorine pesticides						
EPA 625(m)	4,4'-DDT (o,p' and p,p')	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	4,4'-DDE (o,p' and p,p')	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	4,4'-DDD (o,p' and p,p')	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	Dicofol	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	Dieldrin	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	Endrin	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	Methoxychlor	Unfiltered	µg/L	0.001	0.005	CRG

Table 4 (cont.). Laboratory Method Detection Limit and Quantitation Limit (QL) Requirements for Analyses of Surface Water for SVWQC Monitoring and Reporting Program Plan

Method	Analyte	Fraction	Units	MDL	QL	LAB
Pyrethroid Pesticides						
EPA 625(m)	Biphenthrin	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Cyfluthrin	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Cypermethrin	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Esfenvalerate/Fenvalerate	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Lambda-Cyhalothrin	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Permethrin	Unfiltered	µg/L	0.005	0.025	CRG
Herbicides						
EPA 625(m)	Atrazine	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Simazine	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Molinate	Unfiltered	µg/L	0.05	0.1	CRG
EPA 625(m)	Thiobencarb	Unfiltered	µg/L	0.05	0.1	CRG
EPA 625(m)	Cyanazine	Unfiltered	µg/L	0.005	0.01	CRG
EPA 549.2	Paraquat	Unfiltered	µg/L	0.2	0.5	APPL
EPA 547	Glyphosate	Unfiltered	µg/L	2	10(1)	APPL
Trace Elements						
EPA 200.8	Arsenic	Filtered, Unfiltered	µg/L	0.08	0.5	CALTEST
EPA 200.8	Cadmium	Filtered, Unfiltered	µg/L	0.04	0.1	CALTEST
EPA 200.8	Copper	Filtered, Unfiltered	µg/L	0.2	0.5	CALTEST
EPA 200.8	Lead	Filtered, Unfiltered	µg/L	0.02	0.25	CALTEST
EPA 200.8	Nickel	Filtered, Unfiltered	µg/L	0.2	0.5	CALTEST
EPA 200.8	Selenium	Unfiltered	µg/L	0.5	2	CALTEST
EPA 200.8	Zinc	Filtered, Unfiltered	µg/L	0.3	10	CALTEST
EPA 2008/200.7	Boron	Filtered, Unfiltered	µg/L	2	10	CALTEST
Nutrients						
EPA 350.2	Ammonia as N	Unfiltered	mg/L	0.02	0.1	CALTEST
EPA 300	Nitrate as N	Unfiltered	mg/L	0.02	0.1	CALTEST
EPA 354.1	Nitrite as N	Unfiltered	mg/L	0.002	0.03	CALTEST
EPA 351.3	Total Kjeldahl Nitrogen	Unfiltered	mg/L	0.07	0.1	CALTEST
EPA 365.2	Soluble Orthophosphate	Unfiltered	mg/L	0.01	0.05	CALTEST
EPA 365.2	Phosphorus, Total	Unfiltered	mg/L	0.01	0.1(1)	CALTEST

(1) These QLs are higher than those specified in the R5-2005-0833 MRP document but are adequate to assess compliance with water quality objectives and potential impacts on beneficial uses.

Monitoring Results

The following sections summarize the monitoring conducted by the Coalition and its subwatershed partners for the 2007 storm season (December 2006 through March 2007).

SUMMARY OF SAMPLE EVENTS CONDUCTED

This report presents storm season monitoring results from one Coalition Storm Season sampling event, and data for events conducted by coordinating monitoring programs between December 2006 and March 2007. Samples collected for these events are listed in **Table 5**. Monitoring conducted by Subwatershed monitoring programs coordinating with the Coalition monitoring effort is included in this document and also summarized in **Table 5**.

The monitoring included one major storm season Coalition event in February, and five storm season events (one each in December, January, and February, and two in March) conducted by coordinating monitoring programs. The single event monitored in December 2006 was conducted by the SRWP monitoring effort before the Coalition 2007 Monitoring Plan was completed and storm season monitoring had begun. Storm event monitoring analyses included water chemistry and aquatic toxicity. The decision to sample specific storm events is based on the timing of pesticide applications, the potential for runoff to occur during the event, and the ability to successfully characterize the event. The sites and parameters for all events were monitored in accordance with the Coalition's MRPP and QAPP.

The field logs for all Coalition and Subwatershed samples collected for the December 2006 through March 2007 events are provided in **Appendix A**.

Table 5. Sampling for the Coalition Storm Season Monitoring: December 2006 – March 2007

Agency	Subwatershed	Site Name	Sample Count		Storm Season Events[1]			
			Planned	Collected	December	January	February	March
Sacramento Valley Water Quality Coalition (SVWQC)								
	Butte-Sutter-Yuba	Grasshopper Sl. at Forty Mile Rd	2	1	–	–	2/10 (dry)	–
		Lower Snake R. at Nuestro Rd	2	1	–	–	2/10	–
		Pine Creek at Nord Gianelli Rd	2	1	–	–	2/8	–
		Gilsizer Sl. at G. Washington Rd	2	1	–	–	2/11	–
		Wadsworth Canal at S. Butte Rd [2]	2	1	–	–	2/11	–
	Colusa Basin	Freshwater Creek at Gibson Rd	2	1	–	–	2/9	–
		Logan Cr. at 4 Mile-Excelsior Rd	2	1	–	–	2/8	–
		Lurline Creek at 99W	2	1	–	–	2/9	–
		Walker Creek at Co Rd 48	2	1	–	–	2/8	–
		Stony Cr. on Hwy 45 near Rd 24	2	1	–	–	2/8	–
		Colusa Drain near Maxwell Rd. [2]	2	1	–	–	2/9	–
	El Dorado	North Canyon Creek	2	1	–	–	2/11	–
		Coon Hollow Creek [3]	2	0	–	–	–	–
	Lake-Napa	Middle Creek u/s Hwy 20	2	1	–	–	2/9	–
		McGaugh Slough at Finley Rd East [2]	2	1	–	–	2/9	–
	Placer-NSac-Nev-SSutter	Coon Creek at Brewer Rd	2	1	–	–	2/10	–
		Coon Creek at Striplin Rd [2]	2	1	–	–	2/10	–
	Sac-Amador	Laguna Creek at Alta Mesa Rd	2	1	–	–	2/11	–
		Dry Creek at Alta Mesa Road	2	1	–	–	2/11	–
	Shasta-Tehama	Coyote Creek at Tyler Rd	2	1	–	–	2/8	–
		Anderson Cr. at Ash Creek Rd	2	1	–	–	2/8	–
	Solano-Yolo	Willow Sl. Bypass at SP	2	1	–	–	2/10	–
		Cache Cr. at Diversion Dam	2	1	–	–	2/10	–
		Ulatis Creek at Brown Road	2	1	–	–	2/12	–
		Shag Sl. at Liberty Island Bridge	2	1	–	–	2/12	–
		Tule Canal @ I-80 [2]	2	1	–	–	2/10	–
		Z-drain – Dixon RCD [2]	2	1	–	–	2/11	–
Northeastern California Water Association (NECWA)								
	Pit River	Pit River at Pittville	2	2	–	–	2/13	3/21
		Fall R. at Fall R. Ranch Bridge	2	2	–	–	2/13	3/21
		Pit River at Canby Bridge	2	2	–	–	2/13	3/21
Putah Creek Watershed Group (PCWG)								
	Lake-Napa	Pope Cr u/s from L. Berryessa	2	2	–	1/8	2/27	–
		Capell Cr u/s from L. Berryessa	2	2	–	1/8	2/27	–
Sacramento River Watershed Program (SRWP)								
	Butte-Sutter-Yuba	Sacramento Slough	4	5	12/13, **19**	–	2/10	3/15, 29
	Colusa Basin	Colusa Drain above KL	4	5	12/12, **19**	–	2/9	3/14, 28
Upper Feather River Watershed Group (UFRW)								
	Upper Feather	Spanish Cr. below Greenhorn Cr	1	1	–	–	2/9	–
		Indian Creek at Arlington Bridge	1	1	–	–	2/9	–
		Middle Fk Feather R. at Rd A-23	1	1	–	–	2/9	–
		Totals	**75**	**49**				

(1) "—" indicates no samples planned. **Bold** indicates follow-up sampling.
(2) Monitored planned twice in 2007 for an E. coli source study (February and May).
(3) The Coon Hollow Creek site was not approved until after Storm Season monitoring was completed

Sample Custody

All samples that were collected for the Coalition monitoring effort met the requirements for sample custody. Sample custody must be traceable from the time of sample collection until results are reported. A sample is considered under custody if:

- it is in actual possession;
- it is in view after in physical possession; and
- it is placed in a secure area (i.e., accessible by or under the scrutiny of authorized personnel only after in possession).

The chain-of-custody forms (COCs) for all samples collected by Coalition contractors for the monitoring events conducted from December 2006 to March 2007 are included with the related lab reports and are provided in Appendix B. All COCs for *ILP* monitoring conducted by Coalition partners during this same period are also provided in Appendix B with their associated lab reports.

QUALITY ASSURANCE RESULTS

The Data Quality Objectives (DQOs) used to evaluate the results of the Coalition monitoring effort are detailed in the Coalition's QAPP (SVWQC 2006). These DQOs are the detailed quality control specifications for precision, accuracy, representativeness, comparability, and completeness. These DQOs are used as comparison criteria during data quality review to determine if the minimum requirements have been met and the data may be used as planned.

Results of Field and Laboratory QC Analyses

Quality Control (QC) data are summarized in **Table 6** through **Table 13** and discussed below. All QC results programs are included with the lab reports in Appendix B of this document, and any qualifications of the data provided were retained and are presented with the tabulated monitoring data. Monitoring results for all programs discussed are tabulated in Appendix C.

Hold Times

Results were evaluated for compliance with required preparation and analytical hold times. With the exceptions discussed below, all analyses met the target data quality objectives for hold times:

- No analyses exceeded hold times.

Method Detection Limits and Quantitation Limits

Target Method Detection Limits (MDL) and Quantitation Limits (QL) were assessed for all parameters. With the exceptions discussed below, all analyses met the target data quality objectives:

- The analytical MDL and QL for 16 color analyses were elevated above the DQOs because the samples required dilution for analysis. All sample results were greater than the elevated QL and were not adversely affected or qualified.
- The analytical MDL and QL for 10 total dissolved solids analysis were elevated above the DQOs because the samples required dilution for analysis. All sample results were greater than the elevated QL and were not adversely affected or qualified.
- The analytical MDL and QL for 10 total suspended solids analyses were elevated above the DQOs because the samples required dilution for analysis. All sample results were greater than the elevated QL and were not adversely affected or qualified.

- The analytical QL for 2 analyses for turbidity was elevated above the DQO because the samples required dilution for analysis. All sample results were greater than the elevated QL and were not adversely affected or qualified.
- The analytical QLs for 9 analyses for trace metals was elevated above the DQO because the samples required dilution for analysis. All sample results were greater than the elevated QL and were not adversely affected or qualified.
- The analytical QL for 2 analyses for nitrate was elevated above the DQO because the samples required dilution for analysis. All sample results were greater than the elevated QL and were not adversely affected or qualified.
- The analytical MDL and QLs for paraquat analyses were elevated above the DQOs of 0.2 and 0.5 ug/L for all analyses due to requirements to dilute the samples for analysis. All results for paraquat were below detection. The problem has been determine to be due to the physical characteristics of paraquat and can not be resolved without significantly modifying the *ILP*-recommended analytical method. The same physical characteristics make this pesticide very unlikely to be a cause of toxicity to aquatic life. It is recommended that this parameter be dropped from the *ILP* list of required parameters.

Field Blanks

Field blanks were collected and analyzed for analyses of coliform bacteria, total organic carbon, ultraviolet absorbance, trace metals, and pesticides. With the exceptions discussed below, analytes of interest were generally not detected in field blanks:

- Copper and zinc were detected above the QL in 1 field blank analysis. Lead and nickel were detected below the QL in 1 field blank analysis. This resulted in 2 analytical results being qualified as an upper limit due to potential contamination.
- Phosphorus was detected below the QL in 1 field blank analyses. No analytical results required qualification as a result of the potential contamination.

Field Duplicates

Field duplicate samples were collected and analyzed for all parameters. The data quality objective for field duplicates is a Relative Percent difference (RPD) not exceeding 25%. With the exceptions discussed below, all field replicates met this data quality objective:

- Field duplicate results exceeded the DQO for one analysis of ammonia. One environmental result was qualified as estimated on this basis.

Method Blanks

Method blanks were analyzed for TDS, TSS, TOC, turbidity, trace metals, nutrients, and pesticides. The data quality objective for method blanks is no detectible concentrations of the analyte of interest. With the exceptions discussed below, all analyses met this data quality objective:

- Arsenic, boron, and zinc were detected above the MDL in 9 total method blanks analyses. All method blank results were below the reporting limit. Five analytical results were qualified as a result of potential analytical contamination.
- Contamination was suspected to affect the results of two samples analyzed for trace metals, due to high dissolved concentrations and detections in the associated method blank. These samples were re-analyzed in triplicate and two copper data were revised based on the results of these analyses. The revised copper data were retained in the data set and reported to the

Water Board staff. The results for other analytes were confirmed and were not revised. The original and revised laboratory reports are on file and provided with this report.

Laboratory Control Spikes and Surrogates

Laboratory Control Spike (LCS) recoveries were analyzed for TDS, TSS, TOC, trace metals, nutrients, and pesticides. Surrogate recoveries were analyzed for organophosphorus and carbamate pesticides. The data quality objective for Laboratory Control Spikes (LCS) is 80-120% recovery of the analytes of interest for most analytes. The data quality objectives for Laboratory Control Sample recoveries and surrogate recoveries of pesticides varies for each analyte and surrogate and are based on the standard deviation of actual recoveries for the method.

The results of all LCS analyses met DQOs and no results were qualified based on LCS results. With the exceptions discussed below, all surrogate recovery analyses met data quality objectives:

- One carbamate surrogate recovery was greater than the maximum acceptable recovery DQO. Because all associated environmental sample results were below detection, no data were qualified.

Laboratory Duplicates

Laboratory Duplicates were analyzed for TDS, TSS, turbidity, and pesticides (**Table 11**). The data quality objective for laboratory duplicates is a Relative Percent difference (RPD) not exceeding 20%. With the exceptions discussed below, all laboratory duplicate analyses met this data quality objective:

- No laboratory duplicates exceeded the DQO.

Matrix Spikes and Matrix Spike Duplicates

Matrix Spikes and Matrix Spike Duplicates were analyzed for trace metals, nutrients, and pesticides (**Tables 12** and **13**). The data quality objective for matrix spikes is 80-120% recovery of most analytes of interest. The data quality objective for matrix spike recoveries of pesticides varies for each analyte or surrogate and is based on the standard deviation of actual recoveries for the method. The data quality objective for matrix spike duplicates is a Relative Percent difference (RPD) not exceeding 20%. With the exceptions discussed below, all analyses met these data quality objectives:

- Matrix Spike recoveries for 4 organophosphate pesticide analyses were below the DQO. This resulted in qualification of 2 environmental result as low biased.
- One Matrix Spike recovery for carbamate analyses was below the DQO for diuron. This resulted in qualification of 1 environmental result as low biased.
- The RPD for one pair of Matrix Spike Duplicate analyses for mexacarbate were higher than the DQO. The associated environmental sample result for this analyte was below detection and no results were qualified.

Summary of Precision and Accuracy

Based on the QC data for the monitoring discussed above, the precision and accuracy of the majority of monitoring results meet the DQOs and there were no systematic sampling or analytical problems. These data are adequate for the purposes of the Coalition's monitoring program and very few results required qualification. Of the 15 total qualified data, 1 result was qualified as *estimated* due to high variability in lab or field replicate analyses, 4 pH result were qualified as *estimated* due meter failure and use of alternate measurement methods, 3 results were qualified as *high biased* or *low biased*, and 7 results were potentially affected by contamination and qualified as *upper limits*. Of the 2,879 analytical results

generated from December 2006 – March 2007, 15 results required qualification or rejection, resulting in 99.5% valid and unqualified data with no restrictions on use.

Completeness

The objectives for completeness are intended to apply to the monitoring program as a whole. As summarized in **Table 5**, 49 of 75 initial water column samples planned by the Coalition and coordinating programs were collected and all collected samples were analyzed, for an overall sampling success rate of 65%. All of the uncollected samples planned for the 2007 storm season (26) were due to the lack of an appropriate 2nd storm event to monitor in the Sacramento Valley. Conditions were unusually dry during January through March of 2007, and only a single storm event was collected for most sites. Planned sampling that was not completed successfully is summarized below:

- A second Storm Season sample event planned for 27 sites was not collected because of unusually dry conditions.
- Samples planned for a new site in the El Dorado subwatershed were not collected because the sampling site had not been approved before Storm Season.
- Samples planned to be analyzed for total organic carbon were inadvertently omitted from one storm season sample event and were not collected or analyzed.

Table 6. Summary of Field Blank Quality Control Sample Evaluations for SVWQC Monitoring: December 2006 – March 2007

Method	Analyte	Data Quality Objective	Number of Analyses	Number Passing	% Success
EPA 200.8	Trace Metals	< MDL	7	3	43%
EPA 300	Nitrate, as N	< MDL	1	1	100%
EPA 350.2	Ammonia, as N	< MDL	1	1	100%
EPA 351.3	Total Kjeldahl Nitrogen	< MDL	1	1	100%
EPA 354.1	Nitrite, as N	< MDL	1	1	100%
EPA 365.2	Total Phosphorus, as P	< MDL	1	0	0%
EPA 365.2 (filtered)	Dissolved Orthophosphate, as P	< MDL	1	1	100%
EPA 415.1	Total Organic Carbon (TOC)	< MDL	0	0	0%
EPA 547	Glyphosate	< MDL	1	1	100%
EPA 549.2	Paraquat	< MDL	1	1	100%
EPA 625m	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	< MDL	72	72	100%
EPA 8321A	Carbamate Pesticides		25	25	100%
SM20-9223	E. coli	< MDL	1	1	100%
Totals			***113***	***108***	***96%***

Table 7. Summary of Field Duplicate Quality Control Sample Results for SVWQC Monitoring: December 2006 – March 2007

Method		Data Quality Objective	Number Analyses	Number Passing	% Success
EPA 110.2	Color	RPD ≤ 25%	1	1	100.0%
EPA 130.2	Hardness	RPD ≤ 25%	1	1	100.0%
EPA 160.1	Total Dissolved Solids (TDS)	RPD ≤ 25%	1	1	100.0%
EPA 160.2	Total Suspended Solids (TSS)	RPD ≤ 25%	1	1	100.0%
EPA 180.1	Turbidity	RPD ≤ 25%	1	1	100.0%
EPA 200.8	Trace Metals	RPD ≤ 25%	15	15	100%
EPA 300	Nitrate, as N	RPD ≤ 25%	1	1	100.0%
EPA 350.2	Ammonia as N	RPD ≤ 25%	1	0	100.0%
EPA 351.3	Total Kjeldahl Nitrogen	RPD ≤ 25%	1	1	100.0%
EPA 354.1	Nitrite, as N	RPD ≤ 25%	1	1	100.0%
EPA 365.2	Phosphate as P, Total	RPD ≤ 25%	1	1	100.0%
EPA 365.2 (filtered)	Dissolved Orthophosphate, as P	RPD ≤ 25%	1	1	100.0%
EPA 415.1	Total Organic Carbon (TOC)	RPD ≤ 25%	0	0	0%
EPA 625m	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	RPD ≤ 25%	72	72	100.0%
EPA 8321	Carbamate Pesticides	RPD ≤ 25%	25	25	100.0%
EPA 547	Glyphosate	RPD ≤ 25%	1	1	100.0%
Toxicity tests	Ceriodaphnia survival, Selenastrum growth	RPD ≤ 25%	2	2	100.0%
Totals			***126***	***125***	***99.2%***

Table 8. Summary of Method Blank Results for SVWQC Monitoring: December 2006 – March 2007

Method	Analyte	Data Quality Objective	Number of Analyses	Number Passing	% Success
EPA 110.2	Color	< MDL	7	7	100%
EPA 130.2	Hardness	< MDL	2	2	100%
EPA 160.1	Total Dissolved Solids	< MDL	6	6	100%
EPA 160.2	Total Suspended Solids	< MDL	7	7	100%
EPA 180.2	Turbidity	< MDL	6	6	100%
EPA 200.8	Trace Metals	< MDL	50	41	82%
EPA 300	Nitrate as N	< MDL	6	6	100%
EPA 350.2	Ammonia as N	< MDL	4	4	100%
EPA 351.3	Total Kjeldahl Nitrogen	< MDL	5	5	100%
EPA 354.1	Nitrite, as N	< MDL	4	4	100%
EPA 365.2	Phosphate/Orthophosphate, as P	< MDL	8	8	100%
EPA 415.1	Total Organic Carbon	< MDL	2	2	100%
SM20-9223	E. coli	< MDL	7	7	100%
EPA 547	Glyphosate	< MDL	2	2	100%
EPA 549.2	Paraquat	< MDL	1	1	100%
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	< MDL	103	103	100%
EPA 8321	Carbamate Pesticides	< MDL	50	50	100%
Totals			**263**	**254**	**96.6%**

Table 9. Summary of Lab Control Spike Results for SVWQC Monitoring: December 2006 – March 2007

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 130.2	Hardness	80-120%	2	2	100%
EPA 160.1	Total Dissolved Solids	80-120%	6	6	100%
EPA 160.2	Total Suspended Solids	80-120%	7	7	100%
EPA 200.8	Trace Metals	80-120%	56	56	100%
EPA 300	Nitrate as N	80-120%	6	6	100%
EPA 350.2	Ammonia as N	80-120%	4	4	100%
EPA 351.3	Total Kjeldahl Nitrogen	80-120%	5	5	100%
EPA 354.1	Nitrite, as N	80-120%	4	4	100%
EPA 365.2	Phosphate/Orthophosphate, as P	80-120%	8	8	100%
EPA 415.1	Total Organic Carbon	80-120%	2	2	100%
EPA 547	Glyphosate	78-128%	4	4	100%
EPA 549.2	Paraquat	42-104%	3	3	100%
EPA 8321	Carbamate Pesticides	(1)	50	50	100%
Totals			**229**	**229**	**100%**

(1) Data Quality Objectives for pesticide LCS recoveries vary by parameter and are based on 3 x the standard deviation of the lab's actual recoveries for each parameter.

Table 10. Summary of Surrogate Recovery Results for SVWQC Monitoring: December 2006 – March 2007

Method	Analyte	Data Quality Objective	Number of Analyses	Number Passing	% Success
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	(1)	108	108	100%
EPA 8321	Carbamate Pesticides	(1)	72	71	99%
Totals			**265**	**263**	**99.4%**

(1) Data Quality Objectives for pesticide Surrogate recoveries vary by parameter and are based on 3 x the standard deviation of the lab's actual recoveries for each parameter.

Table 11. Summary of Lab Duplicate Results for SVWQC Monitoring: December 2006 – March 2007

Method	Analyte	Data Quality Objective	Number of Pairs Analysed	Number Passing	% Success
EPA 110.2	Color	≤20% RPD	7	7	100%
EPA 160.1	Total Dissolved Solids	≤20% RPD	6	6	100%
EPA 160.2	Total Suspended Solids	≤20% RPD	7	7	100%
EPA 180.1	Turbidity	≤20% RPD	6	6	100%
EPA 547	Glyphosate	78-128%	3	3	100%
EPA 549.2	Paraquat	42-104%	1	1	100%
Totals			***23***	***23***	***100%***

Table 12. Summary of Matrix Spike Recovery Results for SVWQC Monitoring: December 2006 – March 2007

Method	Analyte	Data Quality Objective	Number of Analyses	Number Passing	% Success
EPA 130.2	Hardness	80-120%	4	4	100%
EPA 200.8	Trace Metals	80-120%	100	100	100%
EPA 300	Nitrate as N	80-120%	12	12	100%
EPA 350.2	Ammonia as N	80-120%	8	8	100%
EPA 351.3	Total Kjeldahl Nitrogen	80-120%	10	10	100%
EPA 354.1	Nitrite, as N	80-120%	8	8	100%
EPA 365.2	Phosphate/Orthophosphate, as P	80-120%	16	16	100%
EPA 415.1	Total Organic Carbon	80-120%	4	4	100%
EPA 547	Glyphosate	78-128%	2	2	100%
EPA 549.2	Paraquat	50-126%	2	2	100%
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	(1)	192	188	98%
EPA 8321	Carbamate Pesticides	(1)	50	49	98%
Totals			***408***	***403***	***98.8%***

(1) Data Quality Objectives for pesticide matrix spike recoveries vary by parameter and are based on 3 x the standard deviation of the lab's actual recoveries for each parameter.

Table 13. Summary of Matrix Spike Duplicate Precision Results for SVWQC Monitoring: December 2006 – March 2007

Method	Analyte	Data Quality Objective	Number of Pairs Analyzed	Number Passing	% Success
EPA 130.2	Hardness	80-120%	1	1	100%
EPA 200.8/200.7	Trace Metals	≤20% RPD	50	50	100%
EPA 300	Nitrate as N	≤20% RPD	6	6	100%
EPA 350.2	Ammonia as N	≤20% RPD	4	4	100%
EPA 351.3	Total Kjeldahl Nitrogen	≤20% RPD	5	5	100%
EPA 354.1	Nitrite, as N	≤20% RPD	4	4	100%
EPA 365.2	Phosphate/Orthophosphate, as P	≤20% RPD	8	8	100%
EPA 415.1	Total Organic Carbon	≤20% RPD	2	2	100%
EPA 547	Glyphosate	≤25% RPD	1	1	100%
EPA 549.2	Paraquat	≤25% RPD	1	1	100%
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	≤25% RPD	96	96	100.0%
EPA 8321	Carbamate Pesticides	≤25% RPD	25	24	96%
Totals			***203***	***202***	***99.5%***

TABULATED RESULTS OF LABORATORY ANALYSES

The tabulated results for all validated and QA-evaluated data are provided in Appendix C. This appendix includes results for non-target pesticide analytes reported along with the pesticides of primary interest for the Coalition's monitoring program. Copies of final laboratory reports, including chromatographs for pesticide analyses, and all reported Quality Assurance data for Coalition monitoring results are provided in Appendix B.

Pesticide Use Information

Resolution R5-003-0826 requires sampling for 303(d)-listed constituents identified in waterbodies downstream from Coalition sampling locations. Additionally, the *ILP* requires pesticide use reporting in the annual monitoring report. Previous reports focused upon sampling results and use reports for the six priority pesticides that met these criteria. The six pesticides specifically analyzed for the Phase 1 Coalition monitoring were azinphos-methyl, carbofuran, chlorpyrifos, diazinon, malathion, and, methyl parathion.

Fourteen sites were monitored for these constituents during Coalition sampling events in 2005, and diazinon and chlorpyrifos were detected in 9 samples. Azinphos-methyl, carbofuran, malathion, and, methyl parathion were not detected in any samples. Monitoring for organochlorine pesticides was conducted at 9 sites and monitoring for pyrethroid pesticides was conducted at 7 sites, respectively. No organochlorine or pyrethroid pesticides were detected in any samples during that period.

Pesticide use information for the pesticides of primary concern in the Sacramento Valley watershed was acquired from the California Department of Pesticide Regulations' Pesticide Use Reporting (PUR) Database and compiled for the subwatersheds. The information for 2000-2003, including usage trends, was summarized in the 2005 AMR. Pesticide use data were also characterized for specific monitored drainages within each subwatershed. These additional detailed tables were also provided in the 2005 AMR. Based on available data (2000-2003), these pesticides have been widely used throughout the Coalition's subwatersheds and exhibited relatively small annual variations in use overall. Total pesticide applications in the Coalition watersheds are summarized by county in Table 14. Within this overall pattern, there were some spatial and temporal trends evident. The usage trends for 2000 to 2003, with available updates for 2005, are summarized below.

Azinphos-methyl has been used throughout the Coalition area, with the exception of the Upper Feather subwatershed. The major agricultural uses for azinphos-methyl in the Coalition watershed have been almonds, walnuts, and pears. Generally, the use of azinphosmethyl is on the decline, except for the Colusa Drain subwatershed, where there have been increased applications reported in the Willow Creek and Lower Stony Creek drainages.

Carbofuran use in the Coalition watershed has decreased dramatically (approximately 70-80%) since the 1990s. Consequently, the reported percentage of carbofuran detections in the Sacramento River watershed in CDPR's Surface Water Database has also decreased from approximately 66% of analyses in 1994, to 2.5% in 2000, with no detected carbofuran reported in 2001-2003 monitoring. 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. Although carbofuran was historically used primarily on rice acreage, the majority of use in recent years has been on alfalfa and cotton. Based on data reported in the PUR database, the use of carbofuran in the Coalition subwatersheds has remained fairly stable at this lower level since 2001. Carbofuran is still used in the Colusa basin, Yolo/Solano, Butte/Sutter/Yuba, and Sacramento/Amador subwatersheds. Within the Yolo/Solano subwatershed, there has been an apparent change in the geographic pattern of use, with increased use in the Willow Slough and Cache Creek drainages and decreased use in the South Yolo Bypass.

Overall use of cholinesterase-inhibiting organophosphate insecticides has declined over the last ten years (CDPR 2003, CDPR 2006, Spurlock 2002). DPR reported that this trend has continued through 2005. 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 (CDPR 2003). This suggests that there may be a general shift from organophosphate insecticides to other categories of pesticides, possibly in response to economic pressures, patterns of pest pressures, and pesticide resistance, as well as to significant regulatory pressures and increased label restrictions. Within this category, chlorpyrifos

continues to be used in most Coalition subwatersheds at stable reduced rates. The primary agricultural uses of chlorpyrifos in recent years have been for walnuts, with smaller but significant application reported for alfalfa and almonds. However, as shown in Appendix E of the 2005 AMR, there were significant percentage increases in total applications of chlorpyrifos in 2002 and 2003 within the Pit River, Colusa Basin, and Placer/North Sacramento subwatersheds. Between 2004 and 2005, the total acreage treated with organophosphates increased statewide, mostly because of increased use of the insecticide chlorpyrifos. Within the entire Sacramento River watershed, the use of chlorpyrifos, based on total pounds applied, increased only slightly (2.7%) within the same time period.

The overall use of *diazinon* has also declined substantially over the past 10 years (CDPR 2003, Spurlock 2002), particularly for dormant spray applications. The predominant agricultural uses in the Sacramento Valley watersheds in recent years have been for stonefruit, almonds, tomatoes, pears, and walnuts. Diazinon continues to be used throughout the Coalition watershed, although with substantially higher rates of use per irrigated acre in the Butte/Yuba/Sutter and El Dorado subwatersheds. There was no overall trend apparent in total applications between 2000 and 2003, but there was a notable percent increase in applications in the Shasta/Tehama subwatershed and a decrease in the reported applications in the Napa/Lake subwatershed (see Appendix E of the 2005 AMR). Between 2004 and 2005, a 26% decrease in the total diazinon applications was observed within the Sacramento River watershed.

Malathion has exhibited a trend similar to the overall pattern observed in carbofuran use and detections. The major agricultural uses for malathion in the Coalition watershed have been walnuts and alfalfa in recent years. Malathion has been widely used throughout the Coalition subwatersheds, with the exception of the Upper Feather subwatershed. From 2000 to 2003, malathion applications increased in the Colusa Basin subwatershed and decreased substantially in the Pit River subwatershed, while overall applications in the Coalition watersheds remained relatively consistent (see Appendix E of the 2005 AMR).

Methyl parathion use also declined throughout the Coalition area as a whole from 2000 and 2003. The majority of the decrease and the total pounds applied were reported in the Butte/Sutter/Yuba subwatershed (approximately 80%), with much smaller total applications occurring in the Yolo/Solano, Placer/North Sacramento, and Colusa Basin subwatersheds. The majority of recent methyl parathion use in the Coalition watershed has been for walnut orchards.

TRENDS FOR PESTICIDES DETECTED 2003-2005

As previously reported in the 2006 Semi-Annual Irrigation Season Monitoring Report, only two of the six priority pesticides discussed above – chlorpyrifos and diazinon – were detected during the 2006 irrigation season. In addition, five other pesticides – atrazine, diuron, molinate, simazine, and thiobencarb – were detected in more than one sample and at multiple sites. None of these pesticides were detected at concentrations expected to cause toxicity to sensitive test species and none exceeded applicable water quality objectives in Irrigation Season 2006 samples.

Usage information from the PUR Database was compiled for these seven pesticides for 2003, 2004, and 2005 to evaluate recent trends in their use within the Coalition watershed. This information is currently limited to historical data reported through 2005 and is not yet available for the Irrigation Season 2006 or Storm Season 2007 monitoring periods. Based on these data, an overall decrease (i.e., greater than 10%) in total use of five of these seven pesticides was evident for the 16 counties within the Coalition watershed. Of these, four pesticides had greater than 25% decreases in total use. The recent usage trends and primary agricultural uses for these seven pesticides are summarized below. A similar analysis, including 2006 pesticide usage data, will be conducted for the 2007 Semi-Annual Irrigation Season Monitoring Report.

Table 14. Total Pesticide Applications in Sacramento Valley Water Quality Coalition Counties

County	Pounds Applied, 2003	Pounds Applied, 2004	Pounds Applied, 2005	Pounds Applied, 2006[1]
Amador	101,889	117,736	150,022	
Butte	3,062,292	2,962,210	3,142,996	
Colusa	2,088,248	1,809,678	1,908,137	
El Dorado	103,487	105,982	129,673	
Glenn	2,284,461	2,399,082	2,207,066	
Lake	786,874	704,033	757,574	
Napa	1,934,856	2,236,410	2,338,185	
Placer	267,931	374,618	318,128	
Plumas	14,447	11,931	7,352	
Sacramento	3,583,177	3,283,459	3,887,613	
Shasta	293,445	294,416	217,830	
Solano	1,089,607	1,025,269	1,013,223	
Sutter	3,305,776	3,624,764	3,307,058	
Tehama	659,978	596,303	858,989	
Yolo	2,644,303	2,665,655	2,823,694	
Yuba	1,427,355	1,398,577	1,499,642	
Totals	**23,648,126**	**23,610,123**	**24,567,182**	

Note:

1. This information is not yet available and will be included in the 2007 Semi-Annual Irrigation Season Monitoring Report.
2. The tabled values provided are total pesticide use for each county and include acreage outside of the Coalition boundary. Total pesticide use in the specific drainages monitored for the *ILP* is a fraction of the totals cited in this table. for example, Napa County includes acreage in the Western portion of the county that is outside of the Sacramento Valley watershed and under the Jurisdiction of Region 3 (San Francisco Bay Regional Water Quality Control Board). The Putah Creek drainage monitored for the ILP in this subwatershed contain approximately 8% of the total irrigated acreage in County, and uses an even lower percentage of the total pesticides applied in the County.

Data Interpretation

SUMMARY OF SAMPLING CONDITIONS

Sample collection for the December 2006 – March 2007 Coalition storm season was characterized by slightly below-average precipitation in December, record-breaking dry weather throughout the month of January, above-average precipitation in February, and above-average temperatures accompanying below-average precipitation in March.[1] This atypical weather pattern resulted in only one storm season sample event being collected for most Sacramento Valley watershed sites for the Coalition.

Significant rainfall events occurred throughout the watershed during the months of December and February. These events were characterized by one Coalition storm season sample event (Event 017, collected February 8-12), as well as several subwatershed group sample events, including that of the Sacramento River Watershed Program (SRWP) in December and those of all four subwatershed groups in February (see **Table 5**). In addition, both the Northeastern California Water Association (NECWA) and SRWP collected samples in March.

Precipitation was generally greater in the northern part of the watershed and at higher elevations. Regional precipitation patterns are illustrated in Figures 2-a through 2-e. Stream flows throughout the watershed exhibited typical wet season variability in the months of December, February, and March (Figures 3 a-f). All stream flows decreased during the month of January.

[1] Climate data for Sacramento-Delta region available at: http://www.wrcc.dri.edu/monitor/cal-mon/frames_version.html

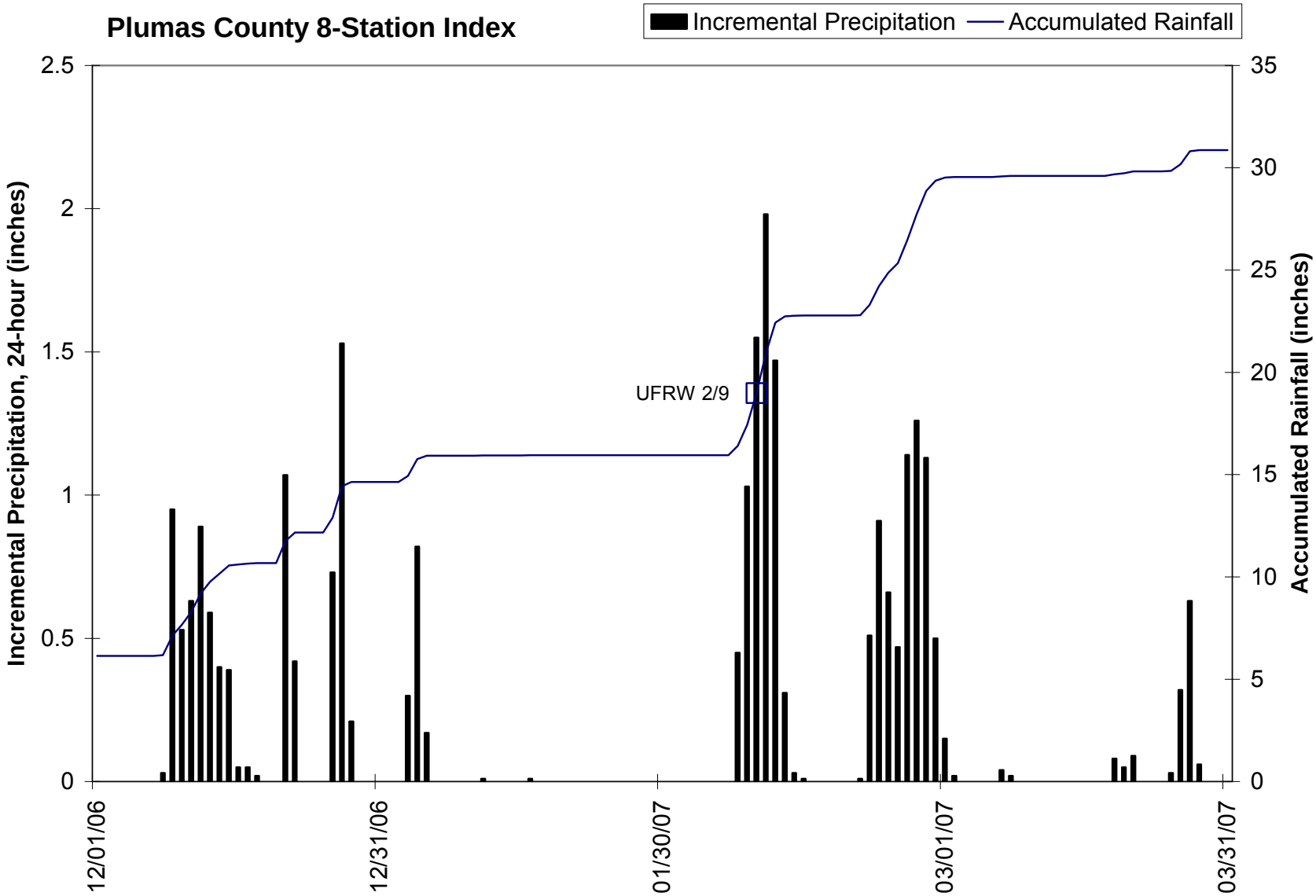

Figure 2-a. Precipitation during December 2006 – March 2007 Coalition Monitoring: Plumas County

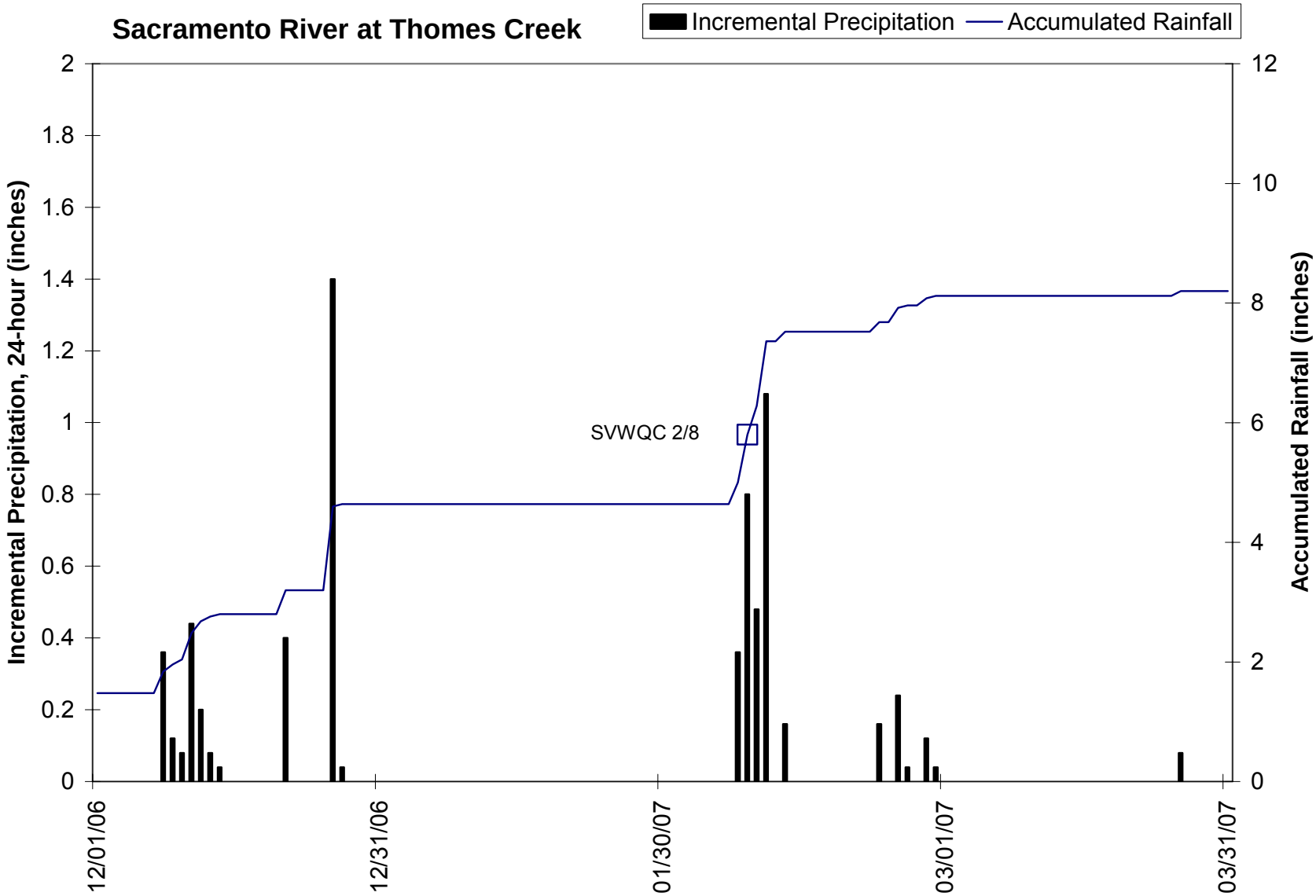

Figure 2-b. Precipitation during December 2006 – March 2007 Coalition Monitoring: Upper Sacramento Valley

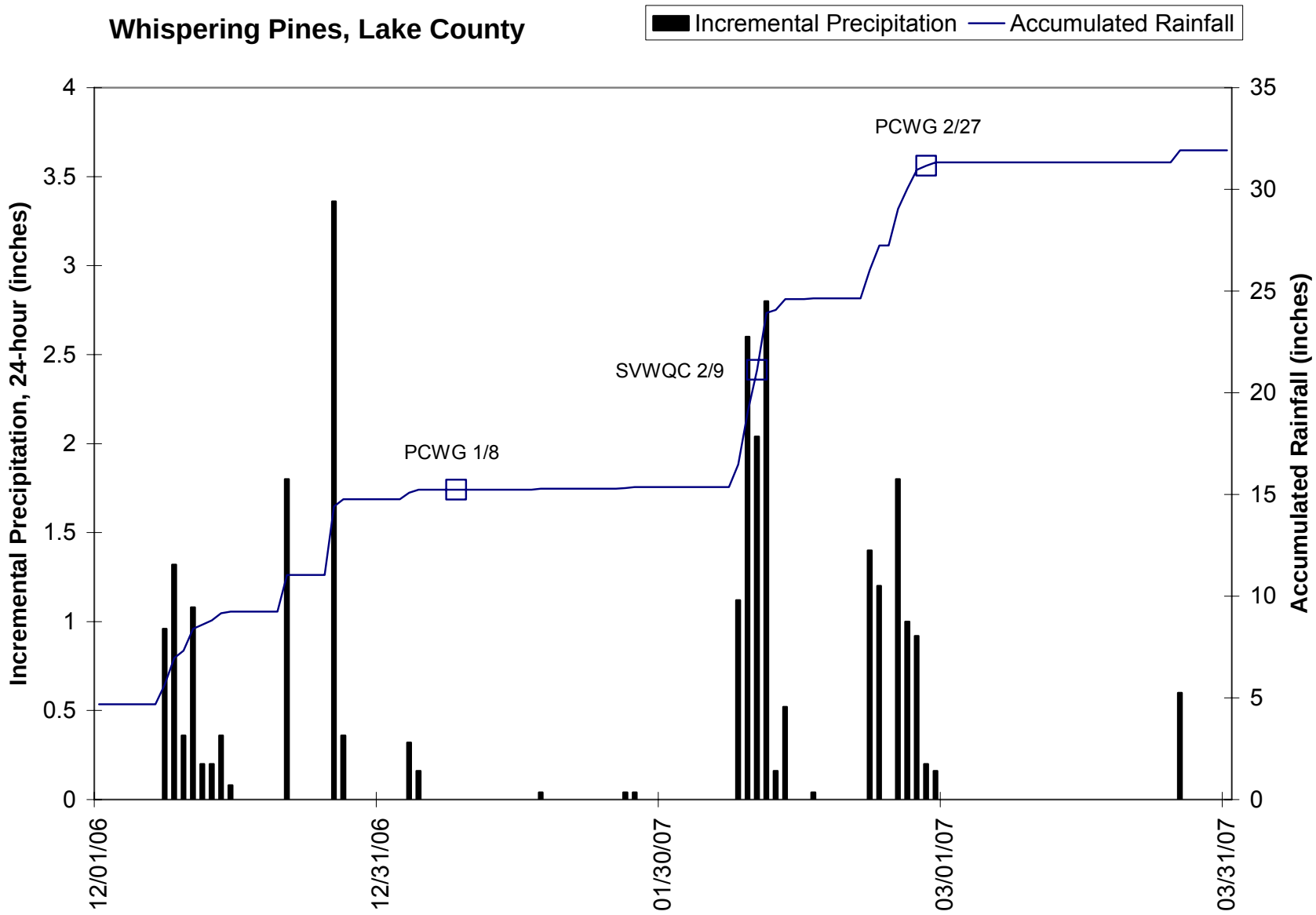

Figure 2-c. Precipitation during December 2006 – March 2007 Coalition Monitoring: Lake County

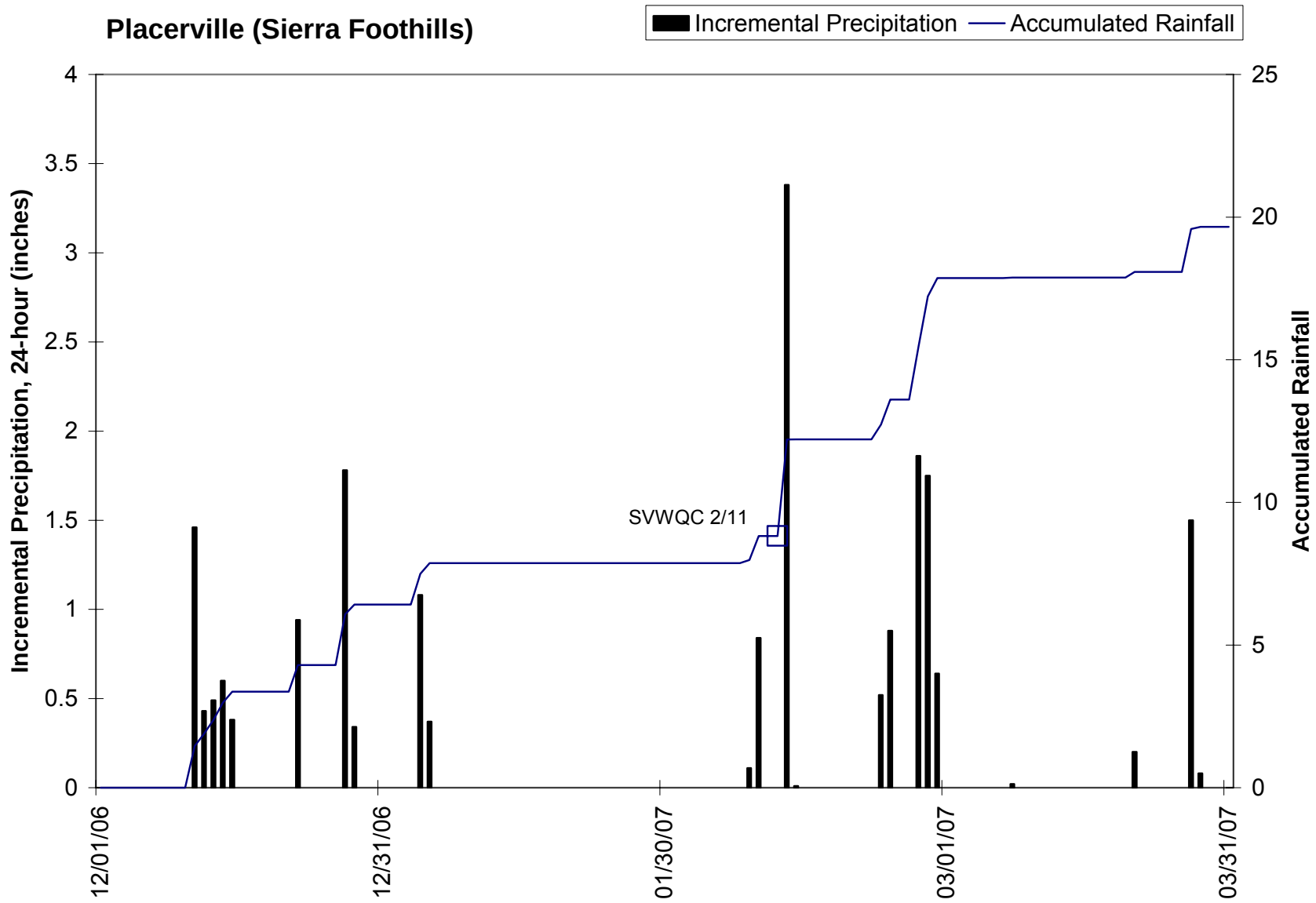

Figure 2-d. Precipitation during December 2006 – March 2007 Coalition Monitoring: Sierra Foothills

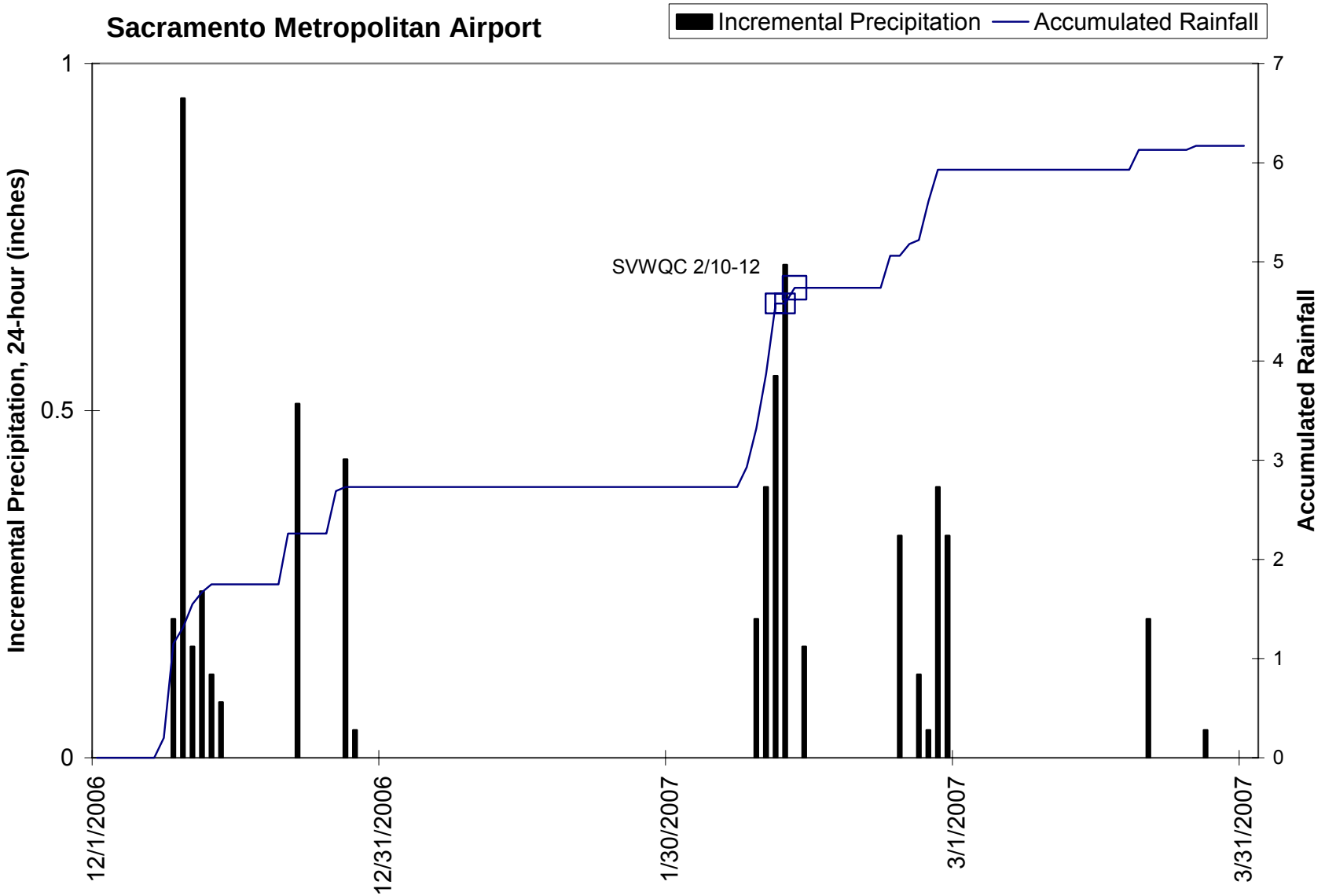

Figure 2-e. Precipitation during December 2006 – March 2007 Coalition Monitoring: Lower Sacramento Valley

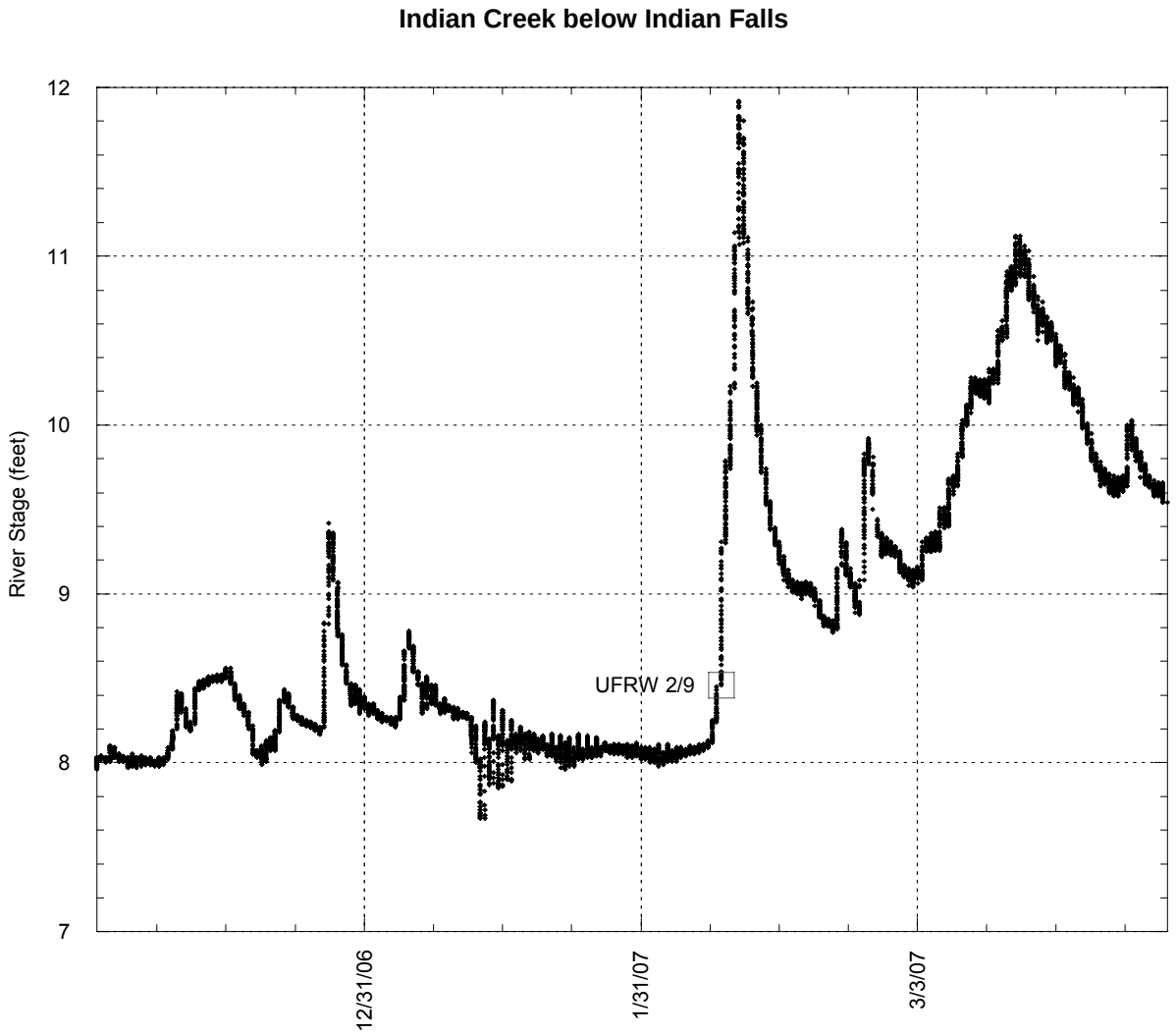

Figure 3-a. Flows during December 2006 – March 2007 Coalition Monitoring: Plumas County

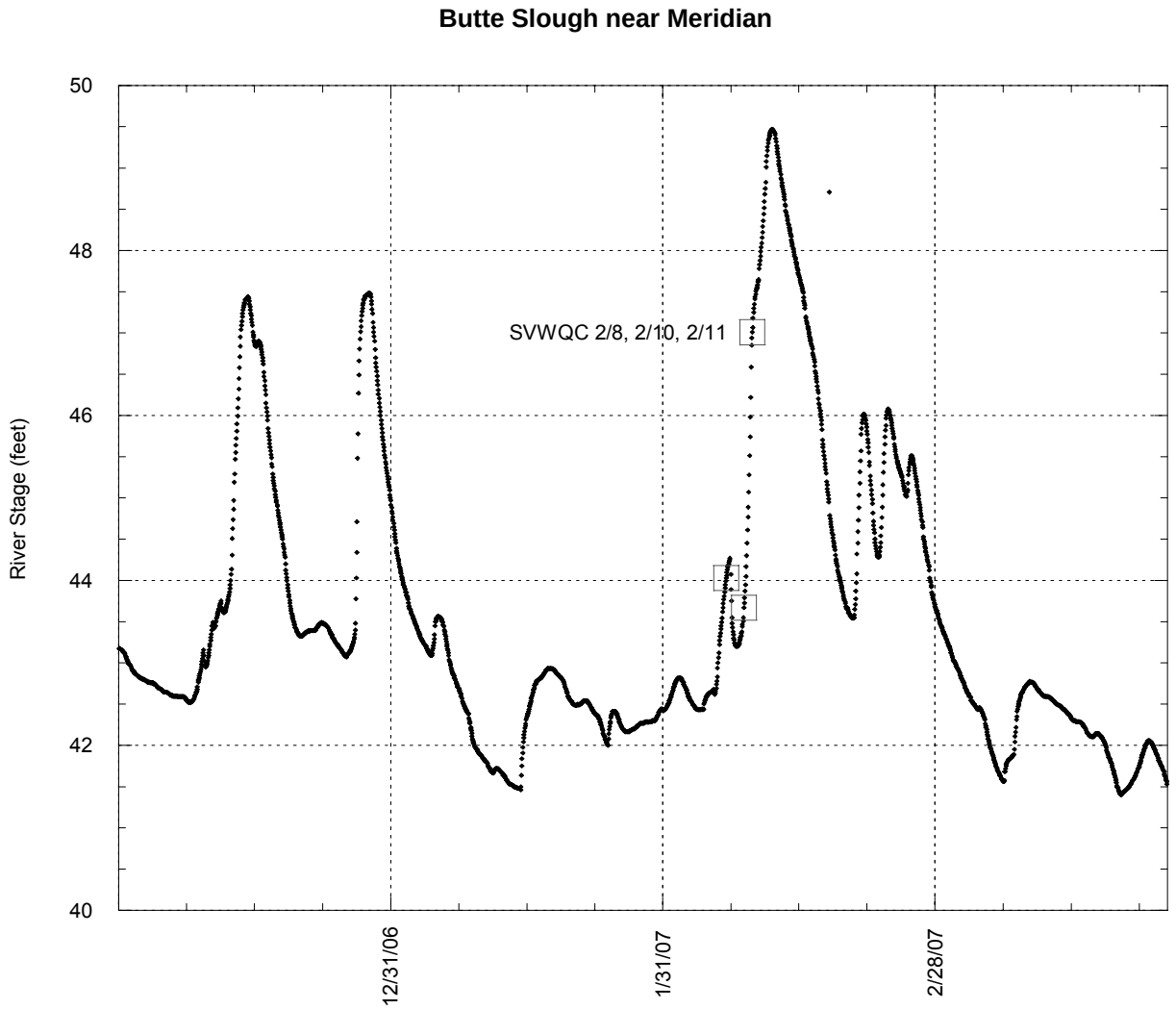

Figure 3-b. Flows during December 2006 – March 2007 Coalition Monitoring: East Sacramento Valley

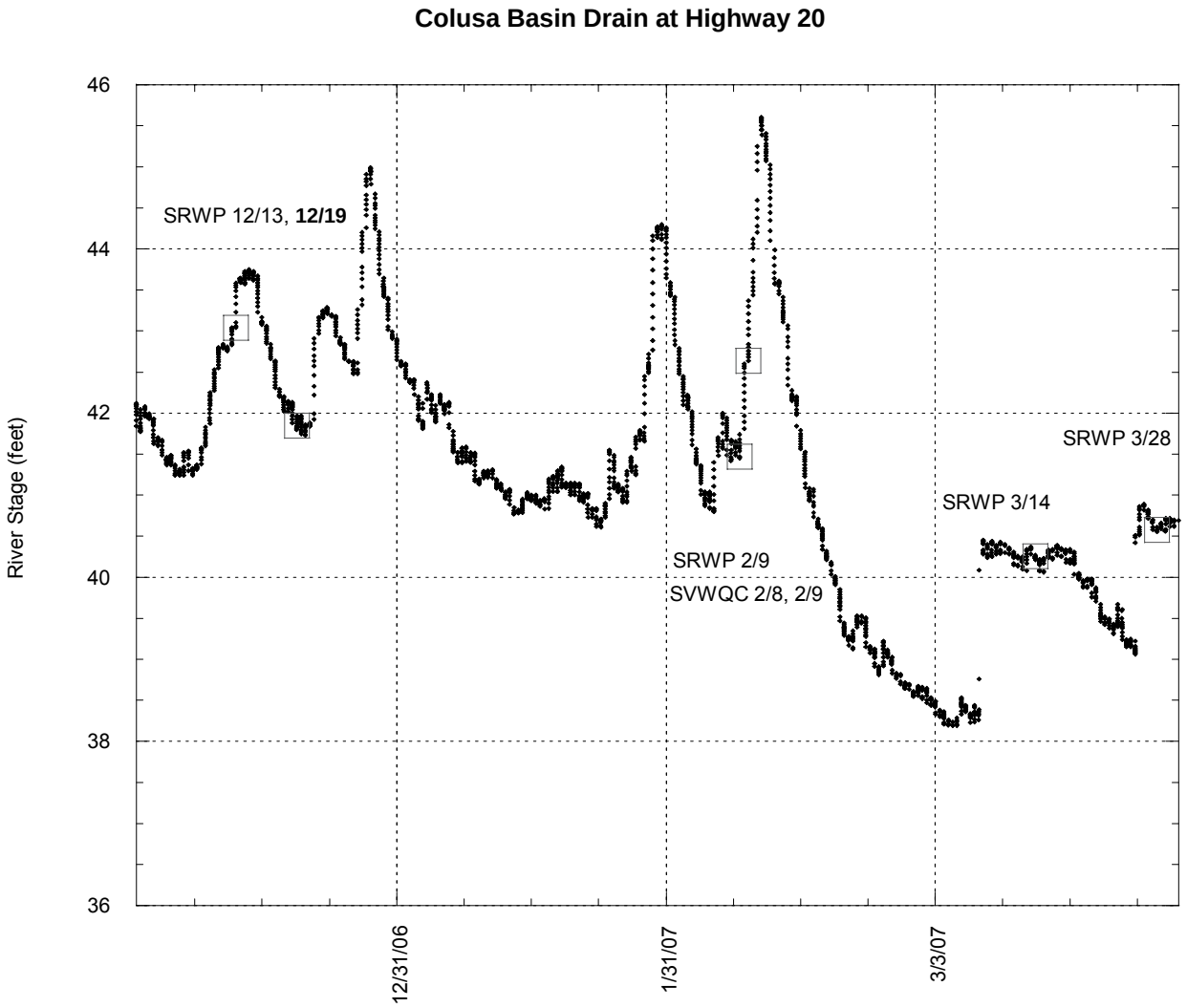

Figure 3-c. Flows during December 2006 – March 2007 Coalition Monitoring: West Sacramento Valley

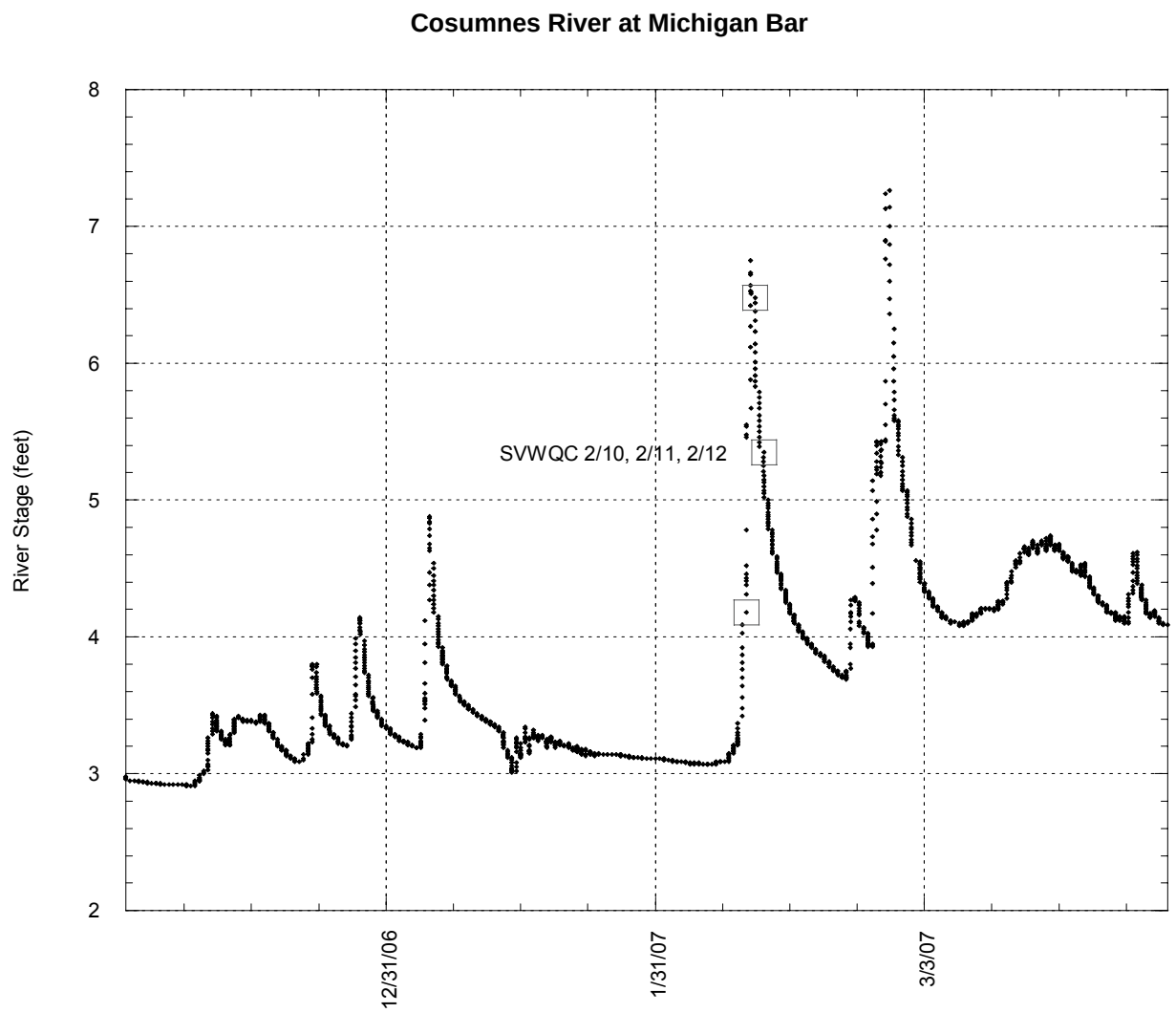

Figure 3-d. Flows during December 2006 – March 2007 Coalition Monitoring: Lower Sacramento Valley

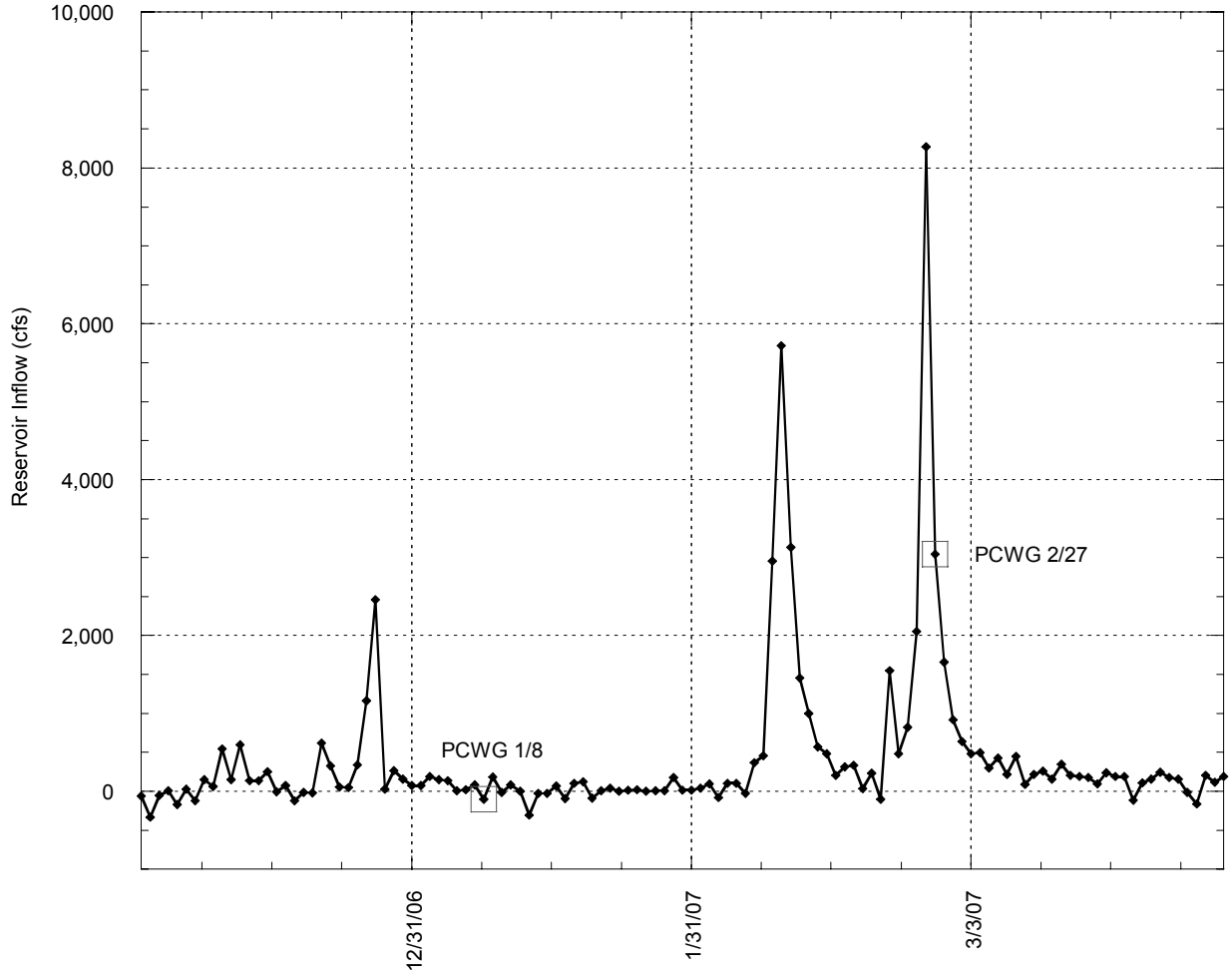

Figure 3-e. Flows during December 2006 – March 2007 Coalition Monitoring: Lake Berryessa (Reservoir Inflow)[2]

[2] These data are provisional data obtained from the California Data Exchange Center (CDEC, available at: http://cdec.water.ca.gov/), and they have not been reviewed for quality assurance. The 2/27/2007 data point was originally -3403 cfs. Based on preceding and subsequent values, this data point was changed to 3403 cfs. Other negative values in the data set have not been changed.

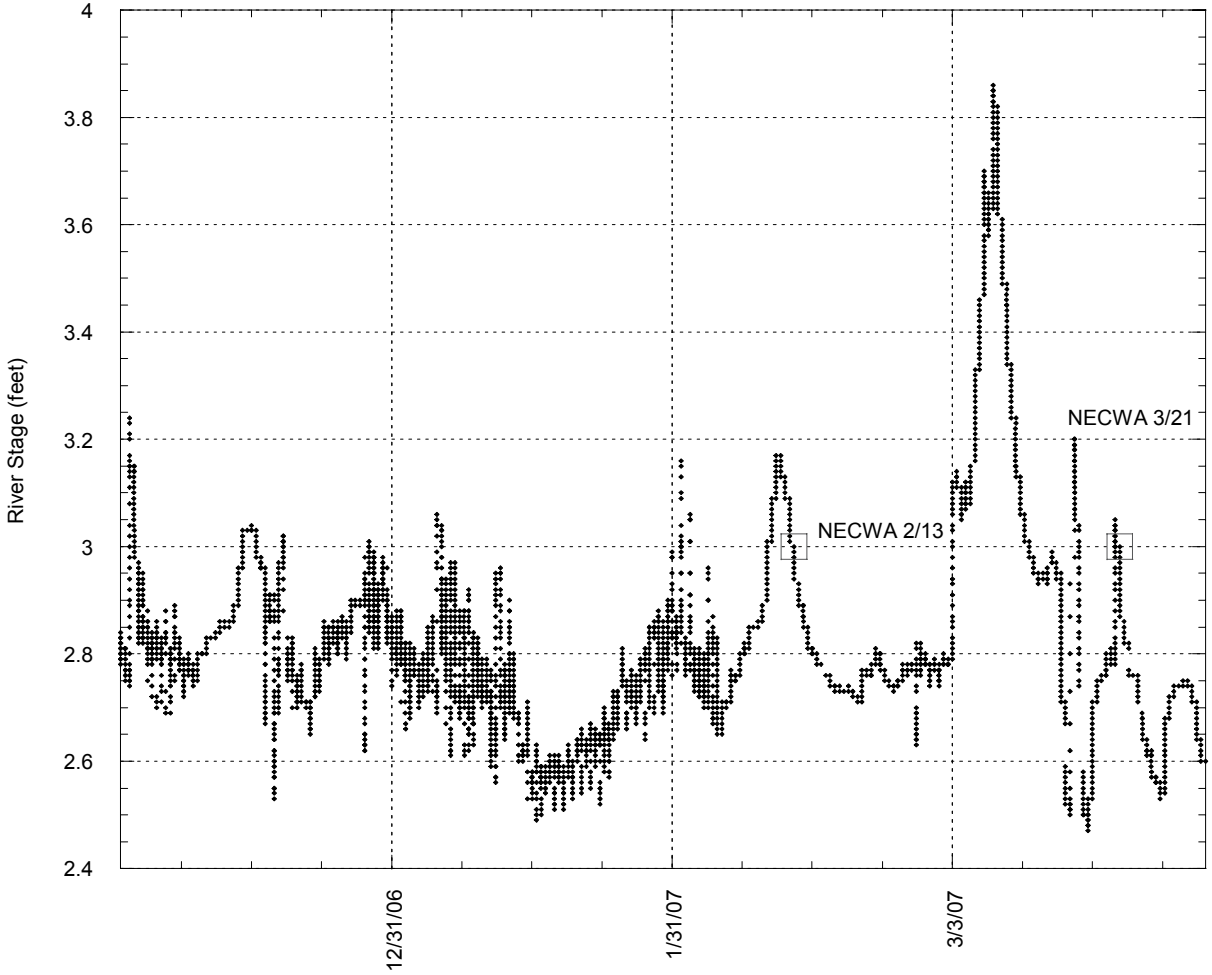

Figure 3-f. Flows during December 2006 – March 2007 Coalition Monitoring: Pit River near Canby

ASSESSMENT OF DATA QUALITY OBJECTIVES

The QC data for the Coalition's monitoring program have been evaluated and discussed previously in this document (Quality Assurance Results, beginning page 27). Based on these evaluations, the program data quality objectives of completeness, representativeness, precision, and accuracy of monitoring data have largely been achieved. These results indicate that the data collected are valid and adequate to support the objectives of the monitoring program, and demonstrate compliance with the requirements of the *ILP*.

The results of these evaluations were summarized previously in **Table 6** through **Table 13**.

EXCEEDANCES OF RELEVANT WATER QUALITY OBJECTIVES

Coalition and subwatershed monitoring data were compared to applicable narrative and numeric water quality objectives in the Central Valley Basin Plan (CVRWQCB 1995) and subsequent adopted amendments and the California Toxics Rule (USEPA 2000). Observed exceedances of these recognized regulatory thresholds are the focus of this discussion. Other relevant water quality thresholds (e.g., recommended toxicity-based criteria or non-regulatory toxicity thresholds) were considered for the purpose of identifying potential causes of observed toxicity. It should be noted that these unadopted limits are not appropriate criteria for determining exceedances for the purpose of the Coalition's monitoring program and evaluating compliance with the *ILP*. The additional thresholds considered include USEPA aquatic life criteria (USEPA 1999) that were not included in the California Toxics Rule, USEPA Maximum Contaminant Levels (MCL) for drinking water, and minimum toxic thresholds from USEPA's Office of Pesticide Programs (OPP) Ecotoxicity database (USEPA 2002). Also considered are the recommended aquatic life criteria developed by the California Department of Fish and Game for diazinon and chlorpyrifos (Siepmann and Finlayson 2000), and the recently finalized National Water Criteria for diazinon (USEPA 2006). Water quality objectives and other relevant water quality thresholds discussed in this section are summarized in **Tables 15 and 16**. Monitored analytes without relevant water quality objectives are listed in **Table 17**.

The data evaluated for exceedances in this document include all Coalition collected results, as well as the compiled results from the Subwatershed monitoring programs presented in this report. The results of these evaluations are discussed below.

Table 15. Adopted Basin Plan and California Toxics Rule Objectives for Analytes Monitored for the 2007 Storm Season

Analyte	Most Stringent Objective[1]	Units	Objective Source[2]
Ammonia, Total as N	narrative	mg/L	Basin Plan
Arsenic, dissolved	150	ug/L	CTR
Arsenic, total	50	ug/L	CA 1˚ MCL
Atrazine	1	ug/L	CA 1˚ MCL
Cadmium, dissolved	hardness dependent[4]	ug/L	CTR
Carbofuran	0.4	ug/L	Basin Plan
Color	15[3]	CU	CA 1˚ MCL
Copper, dissolved	hardness dependent[4]	ug/L	CTR
DDD (o,p' and p,p')	0.00083	ug/L	CTR
DDE (o,p' and p,p')	0.00059	ug/L	CTR
DDT (o,p' and p,p')	0.00059	ug/L	CTR
Dieldrin	0.00014	ug/L	CTR
Dissolved Oxygen	5	mg/L	Basin Plan
Endrin	0.036	ug/L	CTR
Fecal coliform	400	MPN/100mL	Basin Plan
Glyphosate	700	ug/L	CA 1˚ MCL
Lead, dissolved	hardness dependent[4]	ug/L	CTR
Malathion	0.1	ug/L	Basin Plan
Molinate	10	ug/L	Basin Plan
Nickel, dissolved	hardness dependent[4]	ug/L	CTR
Nitrate, as N	10	mg/L	CA 1˚ MCL
Nitrite, as N	1	mg/L	CA 1˚ MCL
Oxamyl	200	ug/L	CA 1˚ MCL
Parathion, Methyl	0.13	ug/L	Basin Plan
pH	6.5-8.5	-log[H+]	Basin Plan
Selenium, total	5	ug/L	Basin Plan
Simazine	4	ug/L	CA 1˚ MCL
Temperature	narrative	ug/L	Basin Plan
Thiobencarb	1	ug/L	Basin Plan
Total Suspended Solids	narrative	mg/L	Basin Plan
Toxicity, Algae Cell Density	narrative	ug/L	Basin Plan
Toxicity, Fathead Minnow Survival	narrative	ug/L	Basin Plan
Toxicity, Water Flea Survival	narrative	ug/L	Basin Plan
Turbidity	narrative	ug/L	Basin Plan
Zinc, dissolved	hardness dependent[4]	ug/L	CTR

(1) For analytes with more than one limit, the most limiting applicable adopted water quality objective is listed.

(2) *CA 1˚ MCLs* are the California's Maximum Contaminant Levels for treated drinking water; *CTR* indicates California Toxics Rule criteria.

(3) Applies only to treated drinking water.

(4) Objective varies with the hardness of the water.

Table 16. Unadopted Water Quality Limits for Analytes Monitored for the 2007 Storm Season

Analyte	Unadopted Limit[1]	Units	Limit Source
Boron, total	700	ug/L	UN Agricultural Supply Goal
Chlorpyrifos	0.015	ug/L	Proposed Basin Plan Amendment
Chlorpyrifos	0.014	ug/L	National Criterion
Conductivity	900	uS/cm	CA Recommended 2˚ MCL
Diazinon	0.10	ug/L	Proposed Basin Plan Amendment
Diazinon	0.17	ug/L	USEPA 2006
E. coli [1]	235	MPN/100mL	Basin Plan Amendment
Conductivity	700	uS/cm	UN Agricultural Supply Goal
Total Dissolved Solids	500	mg/L	CA Recommended 2˚ MCL
Total Dissolved Solids	450	mg/L	UN Agricultural Supply Goal

(1) Adopted by the Water Board but not approved by State Water Resources Control Board

Table 17. Analytes Monitored for the 2007 Storm Season Without Applicable Adopted or Unadopted Limits

Analytes	
Alkalinity	Orthophosphate, dissolved, as P
Bromacil	Oryzalin
Dimethoate	Paraquat
Discharge	Phosphorus as P, Total
Diuron	Total Kjeldahl Nitrogen
Hardness	Total Organic Carbon

Toxicity and Pesticide Results

Statistically significant toxicity was observed in two Coalition water quality samples collected from two different sites for one event conducted during the 2007 storm season. Significant toxicity to the algae *Selenastrum* was observed only at Ulatis Creek at Brown Road. Significant toxicity to *Ceriodaphnia* was observed at one site, Stony Creek on Highway 45 near Road 24.

Significant toxicity was also observed to *Ceriodaphnia* in two samples collected in December by SRWP at sites coordinated with the Coalition. These samples were collected before the beginning of the Coalition storm season monitoring and the results were reported to Water Board staff involved with the SRWP monitoring program, but have not previously been reported directly to Water Board *ILP* staff prior to this report. Follow-up testing and sampling consistent with *ILP* MRP requirements was conducted for both samples.

Samples exhibiting statistically significant toxicity are summarized in **Table 18**.

The observations of toxicity to *Ceriodaphnia* and *Selenastrum* were considered exceedances of the Basin Plan narrative objective for toxicity ("*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life*."), and the results for samples collected during the Coalition storm season monitoring were reported to the Water Board by the Coalition in "Exceedance Reports" and "Communication Reports" as required by the *ILP* and the Coalition's MRPP. The Exceedance and Communication Reports detailing these results and required follow-up testing and results are provided in **Appendix D**. The results of these reports and of the follow-up testing conducted on the two SRWP samples are summarized below.

Stony Creek on Hwy 45 near Rd 24 (STYHY)

In a toxicity test conducted on water samples with *Ceriodaphnia*, the Coalition observed a reduction in survival of 25% compared to the control. This result was statistically significant and was in exceedance of the Basin Plan narrative objective for toxicity. The reduction in *Ceriodaphnia* survival in the STYHY sample was not caused by organophosphate or triazine pesticides, since they were not detected in the sample. Because the observed reduction in mortality was less than 50%, it was not possible to investigate the cause of toxicity using TIE procedures. Other pesticides applied prior to the sample event in the STYHY drainage appeared unlikely to contribute significantly to the observed toxicity.

Ulatis Creek at Brown Road (UCBRD)

In a toxicity test conducted on water samples with *Selenastrum*, the Coalition observed a reduction in cell growth of 32% compared to the control. This result was statistically significant and was in exceedance of the Basin Plan narrative objective for toxicity. The reduction in *Selenastrum* cell growth in the UCBRD sample is best explained by the concentration of diuron, which was detected at a concentration higher than the 96-hour EC50 for *Selenastrum*[3] (2.4 µg/L). Because the observed reduction in cell growth was less than 50%, it was not possible to confirm the cause of toxicity using TIE procedures. Other detected pesticides were well below concentrations considered to represent "safe" or no effect concentrations and appear unlikely to have contributed to the toxicity. A number of unmonitored herbicides were also applied in the month prior to sampling but appear less likely to have contributed to toxicity than diuron, based on total numbers of applications or relatively low toxicity to *Selenastrum*.

[3] USEPA 2003f. Reregistration eligibility decision for diuron, list A, case 0046: U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Special Review and Reregistration Division.

Colusa Drain (COLDR) and Sacramento Slough (SACSL), December 2006

In toxicity tests conducted with *Ceriodaphnia* on samples collected in December 2006 at Colusa Basin Drain above Knight's Landing (COLDR) and at Sacramento Slough (SACSL), there were reductions in survival of 100% (0% survival) compared to the control. Toxicity Identification Evaluation (TIE) procedures and follow-up sampling were conducted for both samples. The TIE results indicated that a metabolically activated pesticide (which includes organophosphate pesticides such as diazinon and chlorpyrifos) was a significant cause of toxicity in the COLDR sample. The toxicity was not persistent in the SACSL sample and this TIE for Sacramento Slough was therefore inconclusive. Both samples were analyzed for pesticides (organophosphate, organochlorine, triazine, and pyrethroids) and COLDR was also analyzed for carbamate pesticides. No pesticides were detected that would explain the observed toxicity. No pesticides were detected in the SACSL sample at all, and only a low concentration of diuron (0.26 ug/l, below the quantitation limit) was detected in the COLDR sample. Follow-up samples collected at COLDR, SACSL, and at two location upstream from SACSL did not cause any *Ceriodaphnia* toxicity, indicating the toxicity was not persistent at these sites six days after the original samples were collected.

The toxicity observed at SACSL and COLDR was part of a larger widespread pattern of toxicity observed at a variety of sites with and without significant agricultural influence throughout the watershed. No specific cause of the widespread toxicity was determined.

Table 18. Summary of Water Column Samples Exceeding the Basin Plan Narrative Toxicity Objective, December 2006 – March 2007

Site	Date	Species	Units	Result
Stony Creek on Hwy 45 near Rd 24	02/08/2007	*Ceriodaphnia* survival	% of Control	75%
Ulatis Creek at Brown Road	02/12/2007	*Selenastrum* cell density	% of Control	68%
Colusa Basin Drain above KL	12/12/2006	*Ceriodaphnia* survival	% of Control	0%
Sacramento Slough	12/13/2006	*Ceriodaphnia* survival	% of Control	0%

Pesticides Detected in Coalition Monitoring

Pesticides were analyzed in 79 individual water column samples collected from December 2006 through March 2007. Analyses were conducted for organophosphates, carbamates, organochlorines, triazines, pyrethroids, glyphosate, and paraquat. Within these categories, 18 different pesticides were detected in 26 separate samples (out of 79 total samples) collected for Coalition monitoring conducted December 2006 through March 2007. It should be noted that detected pesticides are not equivalent to exceedances. There was only observed exceedance of pesticide water quality objectives during the 2007 Storm Season: a single marginal exceedance of the proposed Basin Plan diazinon objective of 0.1 ug/L. All detected pesticide concentrations for Coalition monitoring conducted between December 2006 and March 2007 are summarized in **Table 19**. Pesticides were compared to relevant numeric and narrative water quality objectives, and to concentrations in USEPA's *Ecological Risk Assessment Aquatic Life Benchmark Table*[4].

Detected pesticides (diuron) were determined to be the cause of toxicity to *Selenastrum* in one sample from Ulatis Creek. Pesticides detected in other samples did not appear to be the cause of toxicity, and no pesticides were detected in 67% of samples analyzed for pesticides.

- Benomyl (or its breakdown product carbendazim) was detected in one sample. Detected concentrations of this carbamate acaricide and fungicide were below levels expected to cause adverse effects to sensitive test species (EC50s for *Daphnia magna* reported in USEPA's Pesticide Ecotoxicity Database are greater than or equal to 68 ug/L). Benomyl/carbendazim was detected in one sample with toxicity to *Selenastrum* but was well below levels expected to have adverse effects on this species (EC50s for *Selenastrum* reported in USEPA's Pesticide Ecotoxicity Database are 1,100 ug/L to 3,000 ug/L). Detections in other samples were not associated with toxicity. There is no adopted objective for benomyl or carbendazim.
- DDT, a legacy organochlorine pesticide, and its breakdown products (DDE and DDD), were detected in four samples from four different sites. All detected concentrations exceeded the California Toxics Rule criteria (.00059 ug/L for DDT and DDE, .00083 ug/L for DDD). The detected concentrations of these legacy pesticides are well below concentrations expected to be acutely toxic to aquatic organisms.
- Diazinon was detected in six samples from five different sites. Detected concentrations exceeded the current site-specific Basin Plan objective of 0.05 ug/L in two samples, and was marginally exceeded the proposed Basin Plan objective of 0.10 ug/L in only one sample. Diazinon did not exceed the revised National criterion (0.17 ug/L, USEPA 2006) in any sample. No toxicity to *Ceriodaphnia* was observed in any of the samples with detected diazinon. In the three samples with observed *Ceriodaphnia* toxicity, diazinon concentrations were below the current and proposed Basin Plan objectives and below concentrations expected to cause *Ceriodaphnia* mortality (**Table 15**).
- Dimethoate was detected in four samples from four different sites. Detected concentrations of this organophosphate insecticide were below levels expected to have no adverse effects to sensitive test species (21.5 ug/L) and detections were not associated with any observed sample toxicity. There is no adopted objective for dimethoate.

[4] *Ecological Risk Assessment Aquatic Life Benchmark Table*, USEPA 2007. The table provides aquatic life benchmarks based on toxicity values derived from data in support of pesticide registrations. The aquatic life benchmarks are estimates of concentrations below which pesticides are *not* expected to have the potential for adverse effects on aquatic life. The benchmarks are not effect thresholds. The table can be found at http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm

- Diuron was detected in six samples. Detected concentrations exceeded the concentration expected to have no adverse effects to *Selanastrum* (2.4 ug/L) in one sample from Ulatis Creek and was associated with observed toxicity to *Selanastrum* in that sample. Diuron also exceeded 2.4 ug/L in one sample from Coon Creek at Brewer Road, but was not associated with *Selenastrum* toxicity in that sample. Other samples were below levels expected to cause toxic effects to test species and were not associated with toxicity. There is no adopted objective for diuron.
- Molinate was detected in three samples from three different sites. Detected concentrations of this carbamate herbicide were below concentrations expected to have no adverse effects to sensitive test species (105 ug/L) and detections were not associated with any observed sample toxicity. Molinate did not exceed the Basin Plan objective of 10 ug/L in any sample.
- Oryzalin was detected in four samples from four different sites. Detected concentrations of this herbicide were below levels expected to have no adverse effects to sensitive test species (42 ug/L) and detections were not associated with toxicity. There is no adopted objective for oryzalin.
- Oxyfluorfen was detected in three samples from three different sites. Detected concentrations were below levels expected to cause no adverse effects to sensitive test species (0.29 ug/L). Oxyfluorfen was detected in one sample with toxicity to *Selenastrum* but was well below levels expected to have no adverse effects on this species (0.29 ug/L). Detections in other samples were not associated with toxicity. There is no adopted objective for oxyfluorfen.
- Pendimethalin (Prowl) was detected in six samples from six different sites. Detected concentrations of this herbicide were below levels expected to cause no adverse effects to sensitive test species (5.4 ug/L) and detections were not associated with toxicity. There is no adopted objective for pendimethalin.
- Prometon was detected in two samples from two different sites. Detected concentrations were below levels expected to cause adverse effects to sensitive test species. Prometon was detected in one sample with toxicity to *Selenastrum* but was below levels expected to have no adverse effects on this species (the EC50 for *Selenastrum* in USEPA's Pesticide Ecotoxicity Database is 98 ug/L). Detections in other samples were not associated with toxicity. There is no adopted objective for prometon.
- Simazine, as reported previously, was again the most common of the pesticides detected (in 13 samples from 13 different sites). Detected simazine was below concentrations expected to cause toxic effects to test species. Simazine did not exceed the California 1˚ MCL of 4 ug/L in any samples.
- Tebuthiuron was detected in one sample. Detected concentrations of this herbicide were below levels expected to cause no adverse effects to sensitive test species. Trifluralin was detected in one sample with toxicity to *Selenastrum* but was well below levels expected to have no adverse effects on this species (50 ug/L). Detections in other samples were not associated with toxicity. There is no adopted objective for tebuthiuron.
- Tetrachlorvinphos was detected in one sample. Detected concentrations of this organophosphate insecticide were below levels expected to cause adverse effects to sensitive test species (the EC50 for *Daphnia magna* in USEPA's Pesticide Ecotoxicity Database is 1.9 ug/L) and detections were not associated with toxicity. There is no adopted objective for tetrachlorvinphos.
- Thiobencarb was detected in two samples from two different sites. Detected concentrations of this carbamate herbicide were below levels expected to have no adverse effects to sensitive

test species (1.0 ug/L) and detections were not associated with any observed sample toxicity. Thiobencarb did not exceed the Basin Plan objective of 1.0 ug/L in any sample.

- Trifluralin was detected in four samples from four different sites. Detected concentrations of this herbicide were below levels expected to cause no adverse effects to sensitive test species (1.14 ug/L). Trifluralin was detected in one sample with toxicity to *Selenastrum* but was well below levels expected to have no adverse effects on this species (7.5 ug/L). Detections in other samples were not associated with toxicity. There is no adopted objective for trifluralin.
- Paraquat and glyphosate were not detected in any samples.

Table 19. Pesticides Detected in Coalition Monitoring, December 2006 – March 2007

Site	Date Sampled	Analyte	Result[1] (ug/L)	Water Quality Limits[2]	
Gilsizer Sl. at G. Washington Rd	02/11/2007	Diazinon	.101	0.1 0.05	Basin Plan Amendment; Basin Plan
Gilsizer Sl. at G. Washington Rd	02/11/2007	Diuron	1.5	NA	NA
Gilsizer Sl. at G. Washington Rd	02/11/2007	Oryzalin	.58	NA	NA
Gilsizer Sl. at G. Washington Rd	02/11/2007	Oxyfluorfen	.0364	NA	NA
Gilsizer Sl. at G. Washington Rd	02/11/2007	Pendimethalin	.0266	NA	NA
Gilsizer Sl. at G. Washington Rd	02/11/2007	Prometon	.01	NA	NA
Gilsizer Sl. at G. Washington Rd	02/11/2007	Simazine	.232	4	CA Primary MCL
Gilsizer Sl. at G. Washington Rd	02/11/2007	Tetrachlorvinphos	.089	NA	NA
Lower Snake R. at Nuestro Rd	02/10/2007	Diazinon	.061	0.1 0.05	Basin Plan Amendment; Basin Plan
Lower Snake R. at Nuestro Rd	02/10/2007	Molinate	.0299	10	Basin Plan
Lower Snake R. at Nuestro Rd	02/10/2007	Oryzalin	1.4	NA	NA
Lower Snake R. at Nuestro Rd	02/10/2007	Oxyfluorfen	.2243	NA	NA
Lower Snake R. at Nuestro Rd	02/10/2007	Pendimethalin	.0097	NA	NA
Lower Snake R. at Nuestro Rd	02/10/2007	Simazine	.078	4	CA Primary MCL
Lower Snake R. at Nuestro Rd	02/10/2007	Thiobencarb	.0177	1	Basin Plan
Freshwater Creek at Gibson Rd	02/09/2007	DDE(p,p')	.0017	.00059	CTR
Freshwater Creek at Gibson Rd	02/09/2007	Pendimethalin	.0081	NA	NA
Freshwater Creek at Gibson Rd	02/09/2007	Trifluralin	.0067	NA	NA
Logan Cr at 4 Mile-Excelsior Rd	02/08/2007	Molinate	.0132	10	Basin Plan
Logan Cr at 4 Mile-Excelsior Rd	02/08/2007	Pendimethalin	.0233	NA	NA
Logan Cr at 4 Mile-Excelsior Rd	02/08/2007	Simazine	.028	4	CA Primary MCL
Lurline Creek at 99W	02/09/2007	DDD(o,p')	.0039	.00083	CTR
Lurline Creek at 99W	02/09/2007	DDD(p,p')	.0062	.00083	CTR
Lurline Creek at 99W	02/09/2007	DDE(p,p')	.0065	.00059	CTR
Lurline Creek at 99W	02/09/2007	Molinate	.0272	10	Basin Plan
Lurline Creek at 99W	02/09/2007	Pendimethalin	.0194	NA	NA
Lurline Creek at 99W	02/09/2007	Simazine	.023	4	CA Primary MCL
Lurline Creek at 99W	02/09/2007	Thiobencarb	.0516	1	Basin Plan
Walker Creek at Co Rd 48	02/08/2007	Simazine	.051	4	CA Primary MCL
Walker Creek at Co Rd 48	02/08/2007	Trifluralin	.0058	NA	NA

Site	Date Sampled	Analyte	Result[1] (ug/L)	Water Quality Limits[2]	
North Canyon Creek	02/11/2007	DDE(p,p')	.0107	.00059	CTR
North Canyon Creek	02/11/2007	Dimethoate	.0457	NA	NA
Middle Creek u/s from Hwy 20	02/09/2007	DDT(p,p')	.0095	.00059	CTR
Middle Creek u/s from Hwy 20	02/09/2007	Simazine	.026	4	CA Primary MCL
Coon Creek at Brewer Road	02/10/2007	Diuron	3.6	NA	NA
Coon Creek at Brewer Road	02/10/2007	Simazine	.273	4	CA Primary MCL
Dry Creek at Alta Mesa Road	02/11/2007	Diuron	J .39	NA	NA
Dry Creek at Alta Mesa Road	02/11/2007	Simazine	.255	4	CA Primary MCL
Laguna Creek at Alta Mesa Rd	02/11/2007	Oryzalin	J .39	NA	NA
Laguna Creek at Alta Mesa Rd	02/11/2007	Simazine	.229	4	CA Primary MCL
Shag Slough at Liberty Island Bridge	02/12/2007	Simazine	.011	4	CA Primary MCL
Ulatis Creek at Brown Road	02/12/2007	Benomyl/Carbendazim	.43	NA	NA
Ulatis Creek at Brown Road	02/12/2007	Diazinon	.0381	0.1 0.05	Basin Plan Amendment; Basin Plan
Ulatis Creek at Brown Road	02/12/2007	Diuron	E 15 [3]	NA	NA
Ulatis Creek at Brown Road	02/12/2007	Oryzalin	2.1	NA	NA
Ulatis Creek at Brown Road	02/12/2007	Oxyfluorfen	.0417	NA	NA
Ulatis Creek at Brown Road	02/12/2007	Pendimethalin	.0368	NA	NA
Ulatis Creek at Brown Road	02/12/2007	Prometon	.009	NA	NA
Ulatis Creek at Brown Road	02/12/2007	Simazine	3.4	4	CA Primary MCL
Ulatis Creek at Brown Road	02/12/2007	Tebuthiuron	.75	NA	NA
Ulatis Creek at Brown Road	02/12/2007	Trifluralin	.0469	NA	NA
Willow Slough Bypass at SP	02/10/2007	Diuron	J .2	NA	NA
Willow Slough Bypass at SP	02/10/2007	Simazine	.139	4	CA Primary MCL
Willow Slough Bypass at SP	02/10/2007	Trifluralin	.022	NA	NA
Colusa Basin Drain at KL	12/12/2006	Diuron	0.26J	NA	NA
Colusa Basin Drain at KL	02/09/2007	Diazinon	.0088	0.1 0.05	Basin Plan Amendment; Basin Plan
Colusa Basin Drain at KL	03/29/2007	Diazinon	.0475	0.1 0.05	Basin Plan Amendment; Basin Plan
Colusa Basin Drain at KL	03/29/2007	Simazine	.0595		
Colusa Basin Drain at KL	03/29/2007	Dimethoate	.0352	NA	NA
Sacramento Slough	03/09/2007	Diazinon	.0179	0.1 0.05	Basin Plan Amendment; Basin Plan
Sacramento Slough	03/29/2007	Dimethoate	.0193	NA	NA
Sacramento Slough (replicate)	03/29/2007	Dimethoate	.017	NA	NA

(1) "J" indicates pesticide was detected below the quantitation limit (QL); "E" indicates measured value exceeded the calibration range and was qualified as *estimated*.

(2) "Basin Plan" indicates limit is an adopted objective in the Central Valley Basin Plan; "CA 1˚MCL" indicates a California Primary Maximum Contaminant Limit for drinking water (adopted by reference in the Basin Plan);
"NA" indicates no applicable objective available

(3) Concentration is qualified as *estimated* based on quality assurance results.

Other Coalition-Monitored Water Quality Parameters

Exceedances of adopted Basin Plan objectives and advisory limits were observed for pH, dissolved oxygen, conductivity, total dissolved solids, boron, selenium, and *E. coli* bacteria (**Table 20**). There were no exceedances of water quality objectives for monitored nutrient compounds.

pH

During the 2007 storm season, pH was measured in 40 samples from 34 Coalition sites. In these samples, pH exceeded the Basin Plan maximum of 8.5 Standard Units (-log[H^+]) in two Coalition samples collected from two different sites (Cache Creek at Capay Diversion Dam and Willow Slough Bypass in the Solano-Yolo subwatershed) and was below the 6.5 minimum limit in two samples from two different sites (Pope Creek and Capell Creek in the Lake/Napa subwatershed). The Basin Plan limit for pH is intended to be assessed based on "*…an appropriate averaging period that will support beneficial uses*". This parameter typically exhibits significant natural diurnal variation over 24 hours in natural waters with daily fluctuations controlled principally by photosynthesis, rate of respiration, and buffering capacity of the water. These processes are controlled by light and nutrient availability, concentrations of organic matter, and temperature. The factors combine to cause increasing pH during daylight hours and decreasing pH at night. Diurnal variations in winter are typically smaller because less light is available and there are lower temperatures and higher flows. Irrigation return flows may influence this variation primarily by increasing or decreasing in-stream temperatures or by increasing available nutrients or organic matter. As described in the communication report dated April 18, 2007, it was determined that the normal range of Cache Creek pH is from 7.9 to 9.2, and that the pH of 9.0 recorded on February 10 was not unusual for Cache Creek. In addition, review of the field logs indicated that pH appeared to vary with depth and was lower near the surface, demonstrating some stratification at the site. The causes of elevated pH observed in the Willow Slough Bypass sample have not been determined. In part, the low pH observed in the Pope Creek and Capell Creek samples during the storm season can be attributed to measurements made with a less precise alternate system (due to a broken field meter).

Dissolved Oxygen

Dissolved oxygen was measured in 40 samples from 34 Coalition sites. Dissolved oxygen concentrations were above the Basin Plan minimum objective (5.0 mg/L) in all except one sample, and there was only one exceedance for this parameter at Coyote Creek at Tyler Road (Shasta-Tehama subwatershed). The initial exceedance was confirmed after recalibration and was associated with low water velocities, decaying aquatic vegetation and organic matter, and stagnant conditions at the site. The low velocities and biological oxygen demand associated with the decaying organic material are most likely the primary cause of the observed low DO. At follow-up sampling conducted on February 13, 2007, the aquatic vegetation observed previously remained and was still obstructing flows, although velocities were visibly increased compared to February 8, 2007 due to recent precipitation. At follow-up sampling, measured DO concentrations were 6.8 mg/L, above the Basin Plan lower limit for water bodies with WARM designated beneficial use.

E. coli bacteria

E. coli bacteria were monitored in 37 samples from 32 sites. Coliform bacteria numbers exceeded the single sample maximum objectives for *E. coli* (235 MPN/100mL) in 12 samples from 12 different Coalition locations. The Basin Plan objectives are intended to protect contact recreational uses where ingestion of water is probable (e.g., swimming). In general, agricultural lands commonly support a large variety (and sometimes very large numbers) of birds and other wildlife. These avian and wildlife resources are expected to be significant sources of *E. coli* and other bacteria in agricultural runoff and irrigation return flows. Other potential sources include cattle, horses, and septic systems. The Putah Creek drainage provides a specific example of the challenges that *E. coli* source identification presents in some

drainages. The Putah Creek drainage in the Lake/Napa subwatershed has no irrigated agricultural sources of *E. coli*. Manures are not applied as nutrients in this drainage, and the overwhelming majority of irrigated agricultural lands have no grazing as a primary agricultural use or as a management activity. In this drainage, sources of *E. coli* therefore appear to be from non-irrigated lands, which could include wildlife, septic systems, or dryland range grazing activities in close proximity to the monitored creeks.

E. coli exceedances are being investigated by a watershed-wide study of the biological sources of *E. coli* contamination.

Conductivity and Total Dissolved Solids

Conductivity was monitored in 38 samples from 33 Coalition sites. Conductivity exceeded the California recommended 2˚ MCL (900 uS/cm) for drinking water in one sample and the unadopted UN Agricultural Goal (700 uS/cm) in a total of three samples collected from three different sites. Total dissolved solids (TDS) were monitored in 32 samples from 27 sites. TDS exceeded the California recommended 2˚ MCL (450 mg/L) for drinking water in three samples collected from three sites, including two that also exceeded the conductivity objective (Walker Creek at County Road 48 in the Colusa Basin subwatershed and Willow Slough Bypass in the Solano-Yolo subwatershed). The conductivity and TDS objectives are intended to apply to treated drinking water and are based on aesthetic acceptance by consumers of the water.

Trace Metals

Total and dissolved trace metals required for *ILP* monitoring included arsenic, boron, cadmium, copper, lead, nickel, selenium, and zinc. Trace metals were monitored in samples collected from 16 Coalition sites. Selenium exceeded the Basin Plan objective of 5 ug/L in one sample from Willow Slough Bypass (Solano-Yolo subwatershed). Boron exceeded the unadopted UN Agricultural Supply Goal (700 ug/L) at Cache Creek at Capay Diversion Dam and Willow Slough Bypass (both in the Solano-Yolo subwatershed). Boron is naturally high in the soil and groundwater in this drainage. Boron exceedances are being evaluated and addressed by a regional management plan for Yolo County.

Nutrients

Nutrients monitored during the 2007 storm season included nitrate+nitrite nitrogen, total Kjeldahl nitrogen (TKN), ammonia, total phosphorus, and dissolved orthophosphate. Nutrients were monitored in at 22 different Coalition sites, and did not exceed water quality objectives at any sites in the 2007 storm season monitoring. Ammonia concentrations measured did not exceed the temperature- and pH-dependent national water quality criterion for this parameter in any sample. There are no water quality objectives (adopted or unadopted) for TKN, total phosphorus, or orthophosphate.

Table 20. Other Physical, Chemical, and Microbiological Parameters Observed to Exceed Numeric Objectives in Coalition Monitoring, 2007 Storm Season

Site ID	Sample Date	Analyte	Result	Units	WQO[1]	WQO Basis[2]	Mgt Plan[3]
CCCPY	2/10/2007	Boron, total	3100	ug/L	700	A&W	YES
WLSBP	2/10/2007	Boron, total	2600	ug/L	700	A&W	YES
CCCPY	2/10/2007	Conductivity	824	µS/cm	700, 900	A&W, BPN	YES
WLKRC	2/8/2007	Conductivity	755	uS/cm	700, 900	A&W, BPN	NO
WLSBP	2/10/2007	Conductivity	1181	uS/cm	700, 900	A&W, BPN	YES
COYTR	2/8/2007	DO	4.4	mg/L	7 (COLD[7]), 5 (WARM)	BP	NO
COYTR	2/13/2007	DO	6.8	mg/L	7 (COLD[7]), 5 (WARM)	BP	NO
CCBRW	2/10/2007	*E. coli*	>2400[(8)]	MPN/100mL	235	BPA	YES
CCSTR	2/10/2007	*E. coli*	980	MPN/100mL	235	BPA	YES
DCGLT	2/11/2007	*E. coli*	>2400[(8)]	MPN/100mL	235	BPA	YES
GILSL	2/11/2007	*E. coli*	>2400[(8)]	MPN/100mL	235	BPA	YES
LAGAM	2/11/2007	*E. coli*	>2400[(8)]	MPN/100mL	235	BPA	YES
LRLNC	2/9/2007	*E. coli*	610	MPN/100mL	235	BPA	YES
LSNKR	2/10/2007	*E. coli*	2400	MPN/100mL	235	BPA	YES
MGSLU	2/9/2007	*E. coli*	690	MPN/100mL	235	BPA	YES
NRTCN	2/11/2007	*E. coli*	370	MPN/100mL	235	BPA	YES
UCBRD	2/12/2007	*E. coli*	580	MPN/100mL	235	BPA	YES
WADCN	2/11/2007	*E. coli*	>2400[(8)]	MPN/100mL	235	BPA	YES
CCULB	2/27/2007	*E. coli*	820	MPN/100mL	235	BPA	NO
PCULB	2/27/2007	pH	6	-log[H+]	6.5-8.5	BP	NO
WLSBP	2/10/2007	pH	8.7	-log[H+]	6.5-8.5	BP	NO
CCCPY	2/10/2007	pH	9.04	-log[H+]	6.5-8.5	BP	NO
CCULB	2/27/2007	pH	6	-log[H+]	6.5-8.5	BP	NO
WLSBP	2/10/2007	Selenium, total	7	ug/L	5	BP	NO
LRLNC	2/9/2007	TDS	570	mg/L	450, 500	A&W, BPN	NO
WLKRC	2/8/2007	TDS	460	mg/L	450, 500	A&W, BPN	NO
WLSBP	2/10/2007	TDS	650	mg/L	450, 500	A&W, BPN	YES

Notes:

NA = Not applicable

1. Water Quality Objective or Narrative Interpretation Limit
2. WQO Basis: Sources of Adopted Objectives: BP = Central Valley Basin Plan; CTR = California Toxics Rule; Sources of unadopted limits used to interpret Basin Plan narrative objectives: BPA = Basin Plan Amendment (unapproved); A&W = UN Agricultural Supply Goal (Ayers and Westcott, 1986); BPN = other narrative interpretation limits, including recommended 2° MCLs and advisory limits;
3. Indicates whether site and parameter are currently being addressed by an ongoing management plan, study, or TMDL.
4. Dissolved copper results pending resolution of QA issues with the analytical laboratory.
5. Chlorinated pesticides are regulated under a narrative provision of the Basin Plan, which states that "…chlorinated hydrocarbon pesticides shall not be present in the water column at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer." The required accuracy limits approved specifically for the ILP MRP are 0.02 ug/l for DDD, and 0.01 ug/L for DDE and DDT. Concentrations at LRLNC and MDLCR did not exceed these MRP limits. The concentration of DDE did exceed the 0.01 ug/L limit at NRTCN.
6. The COLD freshwater habitat beneficial use is listed as a potential use in the Basin Plan.
7. The COLD use has not been specifically designated for this site.
8. The measured E. coli concentration exceeded the dilution range of the analysis.

Management Practices and Actions Taken

RESPONSE TO EXCEEDANCES

To address specific water quality exceedances, the Coalition and its partners developed two management plans, the *Diazinon Runoff Management Plan for Orchard Growers in the Sacramento Valley* and the *Yolo Technical Report*. In addition, the Coalition is currently conducting a *Bacterial Source Identification Study for* E. coli and has developed a *Landowner Outreach and Management Practices Implementation Communications Process for Monitoring Results (Management Practices Process)* to address exceedances that were not included as part of either of these management plans.

Diazinon Runoff Management Plan

The Coalition submitted the *Diazinon Runoff Management Plan for Orchard Growers in the Sacramento Valley* (Plan) to the Water Board on August 31, 2005, and it was subsequently approved in March 2006. The Plan was developed in response to the Sacramento and Feather Rivers Total Maximum Daily Load (TMDL) for diazinon and as part of the Coalition's commitment to address water quality issues caused by agriculture and managed wetlands in the watershed. The Coalition has submitted two Annual Monitoring Reports summarizing the 2005-2006 and 2006-2007 monitoring objectives, locations and results, outreach efforts, grower surveys, and effectiveness of management practices. Monitoring conducted under the Plan to date has shown no exceedances of diazinon or chlorpyrifos.

Diazinon monitoring conducted under the *ILP* in 2006 resulted in only one exceedance of the proposed Central Valley Region Basin Plan (Basin Plan) objective of 0.16 ug/L.[5] The exceedance was discovered at Stony Creek on Highway 45 near Road 24. Landowners in the area were notified of the exceedance and provided with options for best management practices (BMPs). No exceedances of the 0.16 ug/l acute objective were detected during Storm Season 2007, and only one marginal exceedance of the proposed 0.10 ug/L chronic objective (which is applied as a 4-day average) at Gilsizer Slough.

Yolo Technical Report

The *Yolo Technical Report* was developed in December 2005 and revised in June 2006 and March 2007 to address boron, specific conductivity (EC), algal toxicity, and *E. coli*. The Coalition and the Yolo-Solano Subwatershed are implementing a work plan to identify appropriate numeric criteria for boron and EC. To further understand algal toxicity, the Coalition is reviewing pesticides being used in both Solano and Yolo Counties that are not currently being monitored under the *ILP* but could potentially be contributing to algal toxicity.

Bacterial Source Identification Study

In September, the Coalition initiated a Bacterial Source Identification Study (Study). The primary objective of the study is to identify the categorical sources (i.e., which animal species) are contributing to fecal contamination resulting in observed exceedances of the Basin Plan *E. coli* water quality objective.[6] Exceedances of the *E. coli* objective were observed at nineteen locations throughout the Coalition area in 2006. Of the nineteen sites, nine sites throughout the Sacramento Valley were selected for the Study based on two main criteria: (1) a history of multiple exceedances of the Basin Plan *E. coli* objective (235

[5] 2007 Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos runoff into the Sacramento and Feather Rivers (Resolution No. R5-2007-0034).

[6] Although the *E. coli* objective has been adopted as an amendment to the Central Valley Basin Plan by the Water Board, the amendment has not been approved by the State Water Board, the Office of Administrative Law, and the United States Environmental Protection Agency; therefore, it is not yet in effect.

MPN/100 mL); and (2) broad representation of regional differences in hydrology, predominant crop types, and cultural practices.

Because the techniques used are research-level analyses, the study is also intended to serve as a model for investigation of bacterial contamination sources elsewhere in the Coalition's watersheds. The results will also support the second objective of the study, which is to evaluate whether contributing sources of bacterial contamination are agricultural. As part of the study, the Coalition collected samples in September 2006 and February and May 2007. A final report on the study will be completed in September 2007. If agricultural sources are judged to cause or significantly contribute to the *E. coli* exceedances, the Coalition will implement the procedures documented in the *Management Practices Process*.

Management Practices Process

To address water quality exceedances not specifically identified in existing management plans or studies, the Coalition and its partners have developed the *Management Practices Process*. On May 10, 2005, the Coalition sent a letter to the Chair of the State Water Resources Control Board (State Water Board) outlining a *Management Practices Action Plan* for the Sacramento Valley. On November 14, 2006, building on both the *Management Practices Action Plan* and the *Regional Plan for Action*, the Coalition submitted a detailed plan, the *Management Practices Process* (provided in Appendix G). This plan describes an aggressive approach for the Coalition and its subwatersheds to follow when there are exceedances of the water quality objectives formally adopted by the Regional Board. This approach is discussed further within the "Landowner Outreach Efforts" section.

LANDOWNER OUTREACH EFFORTS

The Coalition and its subwatersheds, working with the Coalition for Urban/Rural Environmental Stewardship (CURES), stand committed to working with the Regional Water Board and its staff to implement the *Management Practices Process* to address water quality problems identified in the Sacramento Valley. The strategic approach taken by the Coalition is to notify the subwatershed landowners, farm operators, and/or wetland managers about the cause(s) of toxicity and/or exceedance(s) of water quality standards. Notifications will be targeted to growers who operate directly adjacent to or within close proximity to the waterway. The broader outreach program, which includes both grower meetings and the notifications distributed through direct mailings, encourages the adoption of BMPs and modifying the uses of specific farm and wetland inputs to prevent movement of a constituent of concern into Sacramento Valley surface waters.

Targeted Outreach Efforts

The Coalition's targeted outreach approach is to focus on the growers with fields directly adjacent to or near the actual waterway of concern. To identify those landowners, which the Coalition describes as operating in high priority lands, the Coalition starts with a topographic map and overlays a parcel map to identify the assessor parcel numbers and, subsequently, the owner. From the list of assessor parcel numbers, the Coalition identifies its members and mails to them an advisory notice along with information on how to address the specific exceedances using BMPs. In targeted areas, management practice surveys are and will continue to be distributed. In 2006 and 2007, five subwatersheds with known pesticide exceedances and/or toxicity to *Hyallela* were targeted for outreach to growers. Information on exceedances of physical parameters in the targeted subwatersheds is in the process of being distributed. The information distributed to growers in the five targeted subwatersheds in 2006 and 2007 is summarized in **Table 21**.

Membership Outreach

Prior to the December 31, 2006 deadline for landowners to join a Coalition or file for individual permits, the Coalition's subwatersheds all made extensive efforts to encourage sign ups before the deadline. These efforts included mailing letters regarding the deadline, news items in organization newsletters, presentations at grower meetings and news releases sent to local media throughout the Coalition area. All subwatersheds experienced an overall increase in new members. However, several coalitions were in the process of membership renewals efforts or subsequently initiated member renewals. A common trend noted by the Subwatershed managers is that numerous previous members failed to pay their dues and renew their membership. The subwatershed managers believe much of the decline is due to the lack of follow through by the Regional Board in contacting those who did not join in prior years. Although the Regional Board is making great strides in enforcement efforts, the Coalition suspects many farmers believe they can "fly under the radar" and not participate in the Coalition.

General Outreach Efforts

Highlights of the additional outreach efforts conducted by the Coalition and its partners for specific subwatersheds between November 1, 2006 and May 31, 2007 are listed in Table 22.

Table 21. Summary of Targeted Outreach Efforts

Coalition Subwatershed	Sample Site	Exceedances in 2006	Action	BMP Literature Distributed
El Dorado	North Canyon Creek	DDE pH *E. coli*	Advisory notice/survey mailed in late June/July 2006 to growers in high priority lands	Sediment; manure
Glenn-Colusa	Rough & Ready Pumping Plant	DDE TDS *E. coli* DO	In June 2006, contacted sole grower using manure on lands regarding *E. coli* exceedance; all growers in high priority lands contacted regarding sediment management	Sediment; manure
Glenn-Colusa	Stony Creek on Hwy 45 near 24	Simazine Diazinon pH	Growers applying Simazine and Diazinon notified in July 2006 by County Agricultural Commissioner mailing to all growers in subwatershed	Simazine; Diazinon
Sacramento-Amador	Dry Creek	Sediment toxicity	Advisory notice/BMP survey to be mailed in June/July 2007 to growers in high priority lands	Pyrethroids; sediment
Shasta-Tehama	Anderson Creek	Sediment toxicity	Advisory notice/BMP survey to be mailed in June/July 2007 to growers in high priority lands	Pyrethroids; sediment
Yolo-Solano	Z-drain	Sediment toxicity	Advisory notice/BMP survey to be mailed in June/July 2007 to growers in high priority lands	Pyrethroids; sediment
Yolo-Solano	Ulatis Creek	Chlorpyrifos (Lorsban) TDS	Advisory notice/BMP survey to be mailed in June/July 2007 to almond/alfalfa growers (i.e., crops labeled for Lorsban use) in high priority lands	Chlorpyrifos (Lorsban); sediment

Table 22. Summary of Landowner Outreach Efforts, November 2006-May 2007

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
All	SVWQC & Subwatersheds	Calls/emails to growers to clarify program and sign up info	as needed	Throughout the Valley	
All	SVWQC & Subwatersheds	SVWQC Quarterly Meeting	2/16/2007	Westside Water District, Williams	>30
All	SVWQC & Subwatersheds	Subwatershed Coordinator/Water Quality Training	2/16/2007	Westside Water District, Williams	22
All	SVWQC & Subwatersheds	Subwatershed Coordinator/Water Quality Training	4/10/2007	Yuba-Sutter Farm Bureau	14
All	SVWQC & Subwatersheds	Subwatershed Coordinator Conference Call	1/31/2007	Conference Call	~10
All	SVWQC & Subwatersheds	4 page publication including 2006 water quality results	3/1/2007	Distributed to Subwatershed Coordinators, Agricultural Commissioners, Farm Bureaus, Water Districts, agency staff and Board Members and many others	Publication will be mailed to 8,600 irrigators in June 2007
All	Sacramento Valley Water Quality Coalition	Participated in Subwatershed Coordinator Conference Call	11/29/2006	Conference Call	~10
Butte-Yuba-Sutter	Sutter County Agricultural Commissioner	Growers' Meeting: New field workers safety info, Controlling weeds in your orchard, Why we care about pesticides in our rivers, Fall aphid treatments in prunes, Enforcement response policy, Water quality update, Orchard sprayer demo	11/2/2006	Sutter County Agricultural Department, Yuba City	~75
Butte-Yuba-Sutter	Primary: CSU Chico Others: Butte and Yuba Counties UCCE and Ag. Commissioners; Butte Co. RCD/NRCS, CURES	5th Annual Field Crop Seminar: Tentative agenda items: BMP review, Filter strip implementation, Smart Sprayer display, sprayer calibration display	11/8/2006	CSU Chico farm	5
Butte-Yuba-Sutter	Sutter County Agricultural Commissioner	Growers' Meeting: Controlling weeds in your orchard, Controlling squirrels and voles, Why we care about pesticides in our rivers, Water quality update, Orchard sprayer demo	11/16/2006	Sutter County Agricultural Department, Yuba City	~75
Butte-Yuba-Sutter	Primary CAPCA; Butte and Yuba Counties: RCD, NRCS, UCCE, Ag. Commissioner; CURES	PCA Meeting CAPCA Annual Meeting	11/16/2006	Glenn, CA	~30

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
Butte-Yuba-Sutter	Primary: Butte County Farm Bureau Others: Butte County Ag. Commissioner, Butte County RCD, BYS Subwatershed Group, CURES	Irrigated Lands Meeting: Water quality monitoring results, BMP implementation, Grass filter strip implementation program, Sprayer Calibrations, NRCS-EQIP funding, etc.	11/29/2006	Durham Memorial Hall	~115
Butte-Yuba-Sutter	Primary: BYS Subwatershed Group, Others: Butte County RCD, NRCS, Ag. Commissioner; CURES	Subwatershed Coalition Annual Meeting: Water quality monitoring results, BMP implementation, Grass filter strip implementation program, Sprayer Calibrations, NRCS-EQIP funding, etc.	12/5/2006	Gridley	3
Butte-Yuba-Sutter	Primary: BYS Subwatershed Group, Others: Sutter County RCD, NRCS, Ag. Commissioner; CURES	Subwatershed Coalition Annual Meeting: Water quality monitoring results, BMP implementation, Grass filter strip implementation program, Sprayer Calibrations, NRCS-EQIP funding, etc.	12/12/2006	Yuba City	~12
Butte-Yuba-Sutter	Sutter County Agricultural Commissioner	Pheromone use in walnuts & peaches, Prune research review	12/14/2006	Yuba City	
Butte-Yuba-Sutter	Primary: CSU Chico Others: Butte County UCCE, RCD, NRCS, Ag. Commissioner; CURES, B-Y-S Subwatershed Group	Growers' Meeting: BMP implementation, Grass filter strip implementation program, Smart Sprayer demonstration, sprayer calibration demonstration, etc.	12/15/2006	CSU Chico farm	~85
Butte-Yuba-Sutter	Primary Rick Gettys Butte and Yuba Counties: RCD, NRCS, UCCE, Ag. Commissioner; CURES, B-Y-S Subwatershed Group	PCA Meeting CAPCA Annual Meeting	11/16/2006	Ordbend Hall Ord Community Hall 3241 Hwy 45 Glenn, CA 95943	
Butte-Yuba-Sutter	Sutter County Agricultural Department	UC Growers' Meeting New field workers safety info, Controlling squirrels and voles, Dos and Don'ts of spray adjuvants, Fall aphid treatments in prunes, Closed mixing systems - why and how	11/30/2006	142 Garden Hwy. Yuba City, CA 95991	
Butte-Yuba-Sutter	Primary: B-Y-S Subwatershed Group Others: Butte County RCD, NRCS, Ag. Commissioner; CURES	Butte Yuba Sutter Subwatershed Coalition Annual Meeting: Water quality monitoring results, BMP implementation, Grass filter strip implementation program, Sprayer Calibrations, NRCS-EQIP funding, etc.	12/5/2006	Butte County Fairgrounds 1991 E Hazel Gridley, CA 95948	~ 2,000 on distribution list
Butte-Yuba-Sutter	Sacramento Valley Water Quality Coalition	E. Coli letters sent to landowners in area with high E.coli counts (counts provided by the City of Biggs Waste Water Treatment Plant)	12/6/2006	Biggs, CA	6

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
Butte-Yuba-Sutter	Primary: B-Y-S Subwatershed Group, Others: Sutter County RCD, NRCS, Ag. Commissioner; CURES	Butte Yuba Sutter Subwatershed Coalition Annual Meeting: Water quality monitoring results, BMP implementation, Grass filter strip implementation program, Sprayer Calibrations, NRCS-EQIP funding, etc.	12/12/2006	Yuba-Sutter Fairgrounds 442 Franklin Ave. Yuba City, CA 95991	Approximately 2000 on distribution list
Butte-Yuba-Sutter	Sutter County Agricultural Department	UC Growers' Meeting Dos and Don'ts of spray adjuvants, Review of phermone use in walnuts & peaches, Prune research review - building a better berm for long-term tree health, Closed mixing systems - why and how	12/14/2006	142 Garden Hwy. Yuba City, CA 95991	
Colusa-Glenn	Ag Commissioner	Colusa County Ag Dept growers meeting - results and BMPs for Chlorpyrifos, Diazinon, pyrethroids	12/4/2006	Colusa	34
Colusa-Glenn	Ag Commissioner	Glenn County Ag Dept growers meeting - results and BMPs for Chlorpyrifos, Diazinon, pyrethroids	12/5/2006	Ordbend	123
El Dorado County	El Dorado County RCD	Ag Watershed Group Meeting: membership list updates; APN updates; monitoring results and follow-up; development of website as outreach tol;	4/16/2007	Placerville	6
El Dorado County	El Dorado County RCD	Ag Watershed Group Meeting: membership irrigated acres vs. total acres; additonal monitoring site; discussion of further outreach efforts;	3/12/2007	Placerville	12
El Dorado County	El Dorado & Amador County Growers/UCCE	Winter Tree Fruit Meeting	3/7/2007	Camino	34
El Dorado County	UC/ANR	"Causes and Management of Runoff from Surface Irrigation"	1/1/2007	Fact Sheet	N/A
El Dorado County	UC/ANR	"Understanding Soil Erosion in Iriigated Agriculture"	1/1/2007	Fact Sheet	N/A
El Dorado County	EDC Farm Bureau	Ag Advocate, "Ag Watershed Group update"	Winter 2006	Placerville	~500
El Dorado County	El Dorado County RCD	Ag Watershed Group Meeting: membership: media release for membership cutoff date; membership list preparation for Coalition; Outreach: update to Ag brochure; discussion of possible monitoring sites w/ LWA	12/11/2006	Placerville	10
El Dorado County	Georgetown Gazette	Article: "Irrigators must meet water quality standards or face fines."	11/1/2006	Georgetown	N/A

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
El Dorado County	El Dorado County RCD	Ag Watershed Group Meeting: update/development of "Agricultural Land Use in El Dorado County" brochure including section on Conditional Waiver.	11/1/2006	Placerville	N/A
El Dorado County	CA Dept. Of Pesticide Regulation	"Complying with rules on dormant sprays" fact sheet.	11/1/2006	Dept. fact sheet	400 recipients
Lake-Napa	Napa County Putah Creek Watershed Group	Letter to PCWG members, invite to Jan 18,2007 General Membership meeting, invoice for 2006/07 program	Nov. 2006		79
Lake-Napa	LCFB Board of Directors	Update on Ag Waiver	11/8/2006	LCFB Office	18
Lake-Napa	Napa County Putah Creek Watershed Group	Steering Committee meeting	11/8/2006	Napa County Farm Bureau	9
Lake-Napa	Mendocino College	Pest Management Seminar	11/16/2006	Adventist Hall - Lakeport	90
Lake-Napa	Regional Board	Nutrient TMDL Clear Lake	11/19/2006	Board of Supervisors Chambers	20
Lake-Napa	Resource Management Committee/ County of Lake	Irrigated Lands Program Report	12/8/2006	Board of Supervisors Chambers	30
Lake-Napa	Common Ground Workshop - organic ag.	Water Quality Regs.	12/9/2006	Big Valley Grange	70
Lake-Napa	Ag. Grower Rules & Regs. Workshop	Kelly Briggs - Speaker	12/13/2006	Board of Supervisors Chambers	60
Lake-Napa	LCFB	Board of Directors meeting - Program Update	1/17/2007	Lakeport	19
Lake-Napa	Lake County Farm Bureau	Newsletter (Article entitled Ag fares well in Sac River monitoring study	1/18/2007	Countywide	Printed and distributed 1000
Lake-Napa	Nutrient TMDL for Clearlake Stakeholders Meeting	Ag Lands within the TMDL, local monitoring program & membership lists	2/21/2007	Lakeport	~15
Lake-Napa	Lake County Farm Bureau	Board of Directors meeting - Program Update	3/14/2007	Lakeport	17
Lake-Napa	Lake County Farm Bureau	Board of Directors meeting - Program Update	4/11/2007	Lakeport	9
Lake-Napa	Lake County Farm Bureau	Board of Directors meeting - Program Update	5/9/2007	Lakeport	18
Lake-Napa	Nutrient TMDL for Clearlake Stakeholders Meeting	Ag Lands within the TMDL, local monitoring program data collection on BMPs	5/16/2007	Lakeport	~15
Lake-Napa	Lake County Farm Bureau	Newsletter (Article on Nutrient TMDL)	Feb. 2007	Countywide	Printed and distributed 1000

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
Lake-Napa	Napa Putah Creek Watershed Group	General Meeting: discussion of monitoring program and review of monitoring results; discussion of BMPs (with info from NRCS); review and discussion of program funding and budget	1/18/2007	Pope Valley Farm Center, Pope Valley CA	45
Lake-Napa	Lake County Farm Bureau	SVWQC newsletter (four pages) included in FB newsletter	March 2007	Countywide	Printed and distributed 1000
Lake-Napa	Lake County Farm Bureau	SVWQC newsletter (two pages) included in FB newsletter	May 2007	Countywide	Printed and distributed 1000
NECWA (Pit River)	NECWA	Distributed to NECWA Members and Local Newspapers- SVWQC Fall Newsletter	Nov. 2006		167
NECWA (Pit River)	NECWA	Distributed Crop Information Sheet	1/7/2007	Throughout Membership	167
NECWA (Pit River)	NECWA	Farm Practices, Surface Water Storage, Water Monitoring	3/8/2007	Bieber, CA	55
Placer-Nevada-S.Sutter-N.Sac.	Placer-Nevada-S.Sutter-N.Sac.	Annual Meeting - overview of organization, results of water monitoring in 2006, BMP for large growers and smaller growers including BMP for dormant orchard and in season pesticide applications	2/7/2007	Western Placer Waste Mgmt Authority in Placer Co.	~40
Placer-Nevada-S.Sutter-N.Sac.	Placer-Nevada-S.Sutter-N.Sac.	Annual Meeting - overview of organization, water quality monitoring results 2006, BMP for smaller growers including BMP for dormant orchard and in season pesticide applications	2/8/2007	Grass Valley	~25
Placer-Nevada-S.Sutter-N.Sac.	Placer-Nevada-S.Sutter-N.Sac.	Membership drive - distributed first newsletter, informational letter from President of the Board, flyer re: Dec. 31st deadline from Reg. Water Bd.	11/1/2006 - 12/31/2006	mailed	~900
Sacramento-Amador	Grape Growers	Erosion Control	11/9/2006	Plymouth	30
Sacramento-Amador	Amador Irrigators Advisory Comm	06 testing results, '07 monitoring plan,	11/8/2006	Amador County	6
Sacramento-Amador	Sacramento Amador Water Quality Alliance	Amador RCD, '06 testing results and '07 monitoring plan, Sign up deadline and requirements	11/16/2006	Amador County	6
Sacramento-Amador	Sacramento Amador Water Quality Alliance	Amador RCD, '06 testing results and '07 monitoring plan, Sign up deadline and requirements	12/21/2006	Amador County	15
Sacramento-Amador	Sacramento Amador Water Quality Alliance	06 testing results, '07 monitoring plan, sign up deadline and policies.	1/18/2007	Amador County	7

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
Sacramento-Amador	Sacramento Amador Water Quality Alliance	Lower Cosumnes RCD, '06 testing results and '07 monitoring plan, Sign up deadline and requirements	2/15/2007	Elk Grove	7
Sacramento-Amador	Sacramento Amador Water Quality Alliance	Amador RCD, '06 testing results and '07 monitoring plan, Sign up deadline and requirements	2/15/2007	Amador County	7
Sacramento-Amador	Sac Co. Farm Bureau	06 testing results and '07 monitoring plan, Sign up deadline and requirements	3/9/2007	Galt	20
Sacramento-Amador	Sacramento Amador Water Quality Alliance	Amador RCD, '06 testing results and '07 monitoring plan, Sign up deadline and requirements	3/15/2007	Amador County	6
Sacramento-Amador	Sacramento Ag Commissioner	Sacramento Cnty grower meeting, '06 testing results and '07 monitoring plan, Sign up deadline and requirements	3/28/2007	Wilton Fire Dept.	35
Sacramento-Amador	Amador Wine Grape Growers	Sacramento Cnty grower meeting, '06 testing results and '07 monitoring plan, Sign up deadline and requirements, organization background	4/12/2007	Amador County	8
Sacramento-Amador	Sacramento Amador Water Quality Alliance	Amador RCD, '06 testing results and '07 monitoring plan, Sign up deadline and requirements, Newsletter and handouts	4/19/2007	Amador County	6
Sacramento-Amador	Sacramento Amador Water Quality Alliance	Amador RCD, '06 testing results and '07 monitoring plan, Sign up deadline and requirements, Newsletter and handouts	5/17/2007	Amador County	7
Sacramento-Amador	Florin RCD	Florin RCD, Lower Cosumnes RCD, Sloughhouse RCD and Elk Grove Water Service, '06 testing results, '07 monitoring plan, outreach efforts, News Letter and handouts.	5/17/2007	Elk Grove Water Service, Elk Grove	15
Shasta-Tehama	STWEC	Radio Interview	12/4/2006	Redding	15,000
Shasta-Tehama	UCCE	UCCE Workshop	12/14/2006	Corning	100
Shasta-Tehama	UCCE	Irrigated Lands Program	12/14/2006	Cottonwood	60
Shasta-Tehama	Shasta-Tehama Watershed Education Coalition	Status of Organization @ Annual Meeting	4/21/2007	Palo Cedro	15
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Seminar for Realtors, Lenders, and Title Companies	11/1/2006	Woodland	95 invited, 35 attended
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Large Grower Meeting: Irrigated Ag Lands	11/8/2006	Woodland	151 invited, 28 attended

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Grower Meeting: Irrigated Lands Program Information	11/15/2006	Woodland	700 invitations listed all 3 grower meetings, 43 attended
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Irrigated Ag Lands Landowners Meeting	11/17/2006	Woodland	3129 to all landowners participating in program, 68 people attended
Solano-Yolo	Dixon RCD	Presentation on Conditional Ag Waiver Program and the D/SRCD Water Quality Coalition	11/27/2006	Landowners Association Meeting, Elmira	20 attendees
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Grower Meeting: Irrigated Lands Program Information	11/29/2006	Clarksburg	17 people attended
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Water Quality Brochure	12/1/2006	Yolo County	4000 printed. Will be mailed in 2007
Solano-Yolo	Dixon RCD	Article on the D/SRCD Water Quality Coalition	Dec. 2006	Dixon RCD Newsletter	200 recipients
Solano-Yolo	Solano Irrigation District	Article on water quality BMPs and available cost-share programs	Dec. 2006	Solano Irrigation District's "The Irrigator" newsletter	450 recipients
Solano-Yolo	Dixon RCD	Article on the D/SRCD Water Quality Coalition	Dec. 2006	Dixon RCD newsletter	200 recipients
Solano-Yolo	Solano Irrigation District	Article on water quality BMPs and available cost-share programs	Dec. 2006	Solano Irrigation District's "The Irrigator" newsletter	450 recipients
Solano-Yolo	Dixon RCD	Presentation on Conditional Ag Waiver Program and summary of water quality monitoring results	12/12/2006	Pesticide Applicators Meeting, Solano County Ag Commissioner's Offices	50 attendees
Solano-Yolo	Dixon RCD	Presentation on Conditional Ag Waiver Program and summary of water quality monitoring results	12/12/2006	Pesticide Applicators Meeting, Solano County Ag Commissioner's Offices	50 attendees
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Grower Meeting: Irrigated Lands Program Information	12/14/2006	Woodland	Held AM and PM meetings, 20 people in AM and 25 in PM attended
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Realtor's Seminar - invited all Yolo County realtors, banks, Title Companies and agents to program	11/1/2006	Farm Bureau office, Woodland	~80 businesses invited,~35 attended
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Large Grower Meeting - Irrigated Lands Program Recap for Year	11/8/2006	Farm Bureau office, Woodland	150 flyers mailed to growers - 28 signed up and 10 attended

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Grower Meeting - Irrigated Lands Program Recap for Year	11/15/2006	Farm Bureau office, Woodland	700 flyers mailed to grower - 56 signed up, 19 attended
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Landowner Meeting - Irrigated Lands Program Recap for Year	11/17/2006	Heidrick Ag History Center, Woodland	4214 flyers mailed to landowners, 99 signed up, 42 attended
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Grower Meeting - Irrigated Lands Program Recap for Year	11/29/2006	Clarksburg	28 signed up, 12 attended
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Grower Meeting - Irrigated Lands Program Recap for Year	12/14/2006	Farm Bureau office, Woodland	4214 postcards sent to landowners for evening meeting
Solano-Yolo	Tomato Growers	Irrigated Lands Program Update	1/12/2007	Heidrick Ag History Center, Woodland	150
Solano-Yolo	Cattleman & Woolgrowers	Irrigated Lands Program Update	1/22/2007	Esparto Fire Dept	10
Solano-Yolo	UC Davis	Irrigated Lands Program Update	1/25/2007	UC Davis	30
Solano-Yolo	RCD Workshop	Irrigated Lands Program Update	2/21/2007	Lum Ranch	30
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Irrigated Lands Waiver Newsletter, Volume 2, Issue 1	4/1/2007	Yolo County	2800* duplicate names and addresses were removed
Solano-Yolo	Yolo County Farm Bureau Education Corporation - Subwatershed Program	Invoices for 2007 ILP fees	4/1/2007	Yolo County	2800* duplicate names and addresses were removed
Solano-Yolo	Livestock/Foodborne Illness Workshop	Irrigated Lands Program Update	4/18/2007	Norton Hall	30
Solano-Yolo	Dixon RCD	Summary of 2006 Monitoring Results	April 2007	Yolo-Solano RCD Water Quality Coaltion Newsletter	675 coalition members
Solano-Yolo	Dixon RCD	Coalition members survey to assess preferences for receiving communications and information	4/20/2007	Mailing	675 coalition members
UFRW	UFRW Group	Phase II Prop 50 Monitoring/ E. coli study & forage study	4/12/2007	Blairsden	18
UFRW	UFRW Group	Site Change MFFR/ E. coli exceedance	3/1/2007	Blairsden	22
UFRW	Prop 50 Team	Phase II Prop 50 ranch field visit	4/9/2007 & 4/10/2007	Sierra Valley, American Valley	8
UFRW	Prop 50 Team	Phase II Prop 50 ranch field visit	4/9/2007 & 4/10/2007	Sierra Valley, American Valley	5
UFRW	Prop 50 Team	Monitoring Team Training	5/5/2007	Quincy	7

Subwatersheds	Organization	Topics/Exceedances Discussed	Date	Location	No. Attending or No. on Distribution List
UFRW	UFRW Group	Directors Report/Newsletter	5/30/2007	mailed	105

Conclusions and Recommendations

The Coalition submits this 2007 Storm Season Semi-Annual Monitoring Report under the Water Board's Irrigated Lands Program (*ILP*). The 2007 Storm Season SAMR provides a detailed description of our monitoring results as part of our ongoing efforts to characterize irrigated agricultural and wetlands related water quality in the Sacramento River Basin.

To summarize, the results from the storm season monitoring in 2007 continue to indicate that there are not major water quality problems with agricultural and managed wetlands discharges in the Sacramento River Basin. Toxicity was observed in only than 2 of the toxicity tests performed in 2007 storm season. For the sites with observed toxicity, the Coalition and its subwatersheds took the appropriate actions to address these issues. By its nature, the SAMR focuses in detail on the small number of sites and samples that exhibited toxicity and exceedances of conventional and microbiological parameters, as well as the actions that were taken and are planned by the Coalition and its members to address these issues.

This SAMR characterizes potential water quality impacts of agricultural drainage from a broad geographic area in the Sacramento Valley from December 2006 through March 2007. To date, a total of six Coalition storm season sampling events and 11 irrigation events have been completed, with additional events collected by coordinating programs. For the period of record in this Semi-Annual Report (December 2006 – March 2007), samples were collected during three events at 27 locations.

From December 2006 through March 2007, 81 water column toxicity tests were conducted with three aquatic species on 35 samples from 25 different sites. There were two statistically significant water column toxicity exceedances (one *Ceriodaphnia* and one *Selenastrum* test) with reductions greater than 20% compared to control in Coalition Storm Season samples. In addition, two samples collected in December by the SRWP prior to the initiation of Coalition Storm Season effort exhibited significant toxicity to *Ceriodaphnia*. In total, 5% of all tests and 11% of samples exhibited a statistically significant reduction in *Ceriodaphnia* of *Pimephales* survival or *Selenastrum* cell density greater than 20% compared to the control. No samples caused toxicity to the fathead minnow (*Pimephales promelas*). The frequency of significant toxicity observed during this storm season was less than reported for the previous storm season annual report. Chemical results were evaluated for all of the cases of observed toxicity, and in one of these cases, the toxicity to *Selenastrum* was explained by concentrations of the herbicide diuron. For the two samples that triggered TIE procedures to investigate the cause of toxicity, toxicity was not persistent in one of the samples (i.e., there was no significant toxicity in the untreated baseline TIE sample), indicating a rapid breakdown of the source of toxicity, and therefore probably a short duration of toxicity in ambient waters. The second TIE indicated a metabolically activated pesticide (e.g., some organophosphate and carbamate pesticides), but no such pesticides were detected in the sample.

When detected, pesticides rarely exceeded applicable objectives, and were typically not associated with toxicity. Specifically, in Storm season 2007, there was only one observed exceedance of the proposed Basin Plan diazinon objective. Several of the pesticides specifically required to be monitored by the *ILP* have not been detected in any water sample, including glyphosate, paraquat, and all of the pyrethroid pesticides. This indicates that monitoring of these pesticides in water is unlikely to provide meaningful results regarding sources or needs for changes in management practices. Based on these results, the Coalition again requests that the Water Board consider dropping these pesticides from water column monitoring, and monitoring them only in sediment or not at all.

The majority of exceedances of adopted numeric objectives consisted of pH, conductivity, dissolved solids, and *E. coli*. Although agricultural runoff and irrigation return flows may contribute to exceedances of these objectives, all of these parameters are significantly affected by natural processes and sources that are not controllable by agricultural management practices. Causes of the observed exceedances of water quality objectives for pH and coliform bacteria were not investigated by the Coalition because effective methods had not yet been identified. However, follow-up strategies to evaluate causes of pH and

dissolved oxygen exceedances were implemented by the Coalition in the 2006 irrigation season. Causes of *E. coli* exceedances are also being investigated through a pilot study conducted as part of a Management Plan being implemented in the Yolo/Solano subwatershed. The Coalition also participates in the *ILP* Technical Issues Committee (TIC) workgroups to develop procedures and guidelines for evaluation of exceedances. The TIC has worked with Water Board *ILP* staff to develop recommendations for amendments to the current *ILP* Monitoring and Reporting Program requirements and procedures. Many of these recommendations are expected to be incorporated into the revised MRP expected to be released in 2007.

The Coalition initiated some Phase 2 monitoring elements during the 2005 irrigation season, concurrent with the Phase 1 irrigation season monitoring, and has added and continued these elements for many of the current monitoring sites. The Phase 2 elements monitored include additional pesticide analyses, trace elements, and nutrients. The Coalition implemented a strategy of monitoring Phase 1 and Phase 2 constituents concurrently for new monitoring sites implemented in 2007.

The Coalition has implemented the required elements of the ILP since 2004. The Coalition developed a Watershed Evaluation Report (WER) which set the priorities for development and implementation of the Monitoring and Reporting Program Plan (MRPP). The Coalition successfully developed the MRPP and QAPP required by the *ILP*, and these documents have been approved by the Water Board. Subsequent revisions requested by the Water Board have been incorporated into these documents and were implemented during the 2006 irrigation season monitoring, and continued for 2007 Coalition monitoring. The Coalition continues to adapt and improve elements of the monitoring program based on the knowledge gained through *ILP* monitoring efforts.

The Coalition implemented the approved monitoring program in coordination with its subwatershed partners, and has initiated follow-up activities to address observed exceedances. The Coalition has also completed a Management Practice Action Plan (provided in Appendix G) designed to communicate information and monitoring results within the Coalition, to track implementation of management practices in the watershed, and to evaluate effectiveness of management practices. Throughout this process, the Coalition has kept an open line of communication with the Water Board and has made every effort to fulfill the requirements of the *ILP* in a cost-effective and scientifically defensible manner. This semi-annual monitoring report is documentation of the success and continued progress of the Coalition in achieving these objectives.

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Appendices

Appendix A: Field Log Copies

Appendix B: Lab Reports and Chains-of-Custody

Appendix C: Tabulated Monitoring Results

Appendix D: Exceedance and Communication Reports

Appendix E: Pesticide Use Trends for Monitored Drainages

Appendix F: Site-Specific Drainage Maps

Appendix G: SVWQC Management Practices

- Implementation Communications Process
- Adoption Of Orchard Best Management Practices (BMPs) In The Sacramento Valley (Fulton and Lubell, 2006)