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SACRAMENTO VALLEY
WATER QUALITY COALITION

# Monitoring and Reporting Program Plan

# Semi-Annual Storm Season Monitoring Report 2006

*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 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 Annual 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 Annual 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 annual 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, American and Cosumnes River watersheds on the east side of the valley. 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 mi near Red Bluff. Its elevation decreases from 300 ft (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:

- More than a million acres of family farms that provide the economic engine for the region, provides a working landscape and pastoral setting and serves 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 waterbirds 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 original analysis 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 current management practices implementation 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). The following environmental monitoring elements are included in the Phases 1-3 of the Coalition MRPP:

- Water column and sediment toxicity
- Physical and conventional parameters in water and sediment
- Organic carbon and ultraviolet 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 to be 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 monitoring program was implemented in January 2005. 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 |
| *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) Some 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 also be monitored in Phase 3.

# 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.

### SAMPLING SITE LOCATIONS AND LAND USES

The sites monitored by the Coalition in 2005 are listed in Table 2. All of the sites have been approved by the Water Board as full *ILP* Compliance Sites. 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. Status of Coalition Monitoring Sites**

| Map[1] Index | Status[2] | Drainages | Site Name | Lat | Long |
|---|---|---|---|---|---|
| 1 | Approved | Big Lake, Fall River Valley | Pit River at Pittville | 41.0454 | 121.3317 |
| 2 | Approved | Fall River Valley | Fall River at Fall River Ranch Bridge | 41.0351 | 121.4864 |
| 3 | Approved | Big Lake, Fall River Valley | Pit River at Canby Bridge | 41.4017 | 120.9310 |
| 4 | Approved | Burch Creek | Burch Creek at Woodson Ave Bridge | 39.9053 | 122.1837 |
| 5 | Approved | Orland & Lower Stony Creek | Stony Creek on Hwy 45 near Rd 24 | 39.7101 | 122.0040 |
| 6 | Approved | Colusa Basin | Colusa Drain near Maxwell Road | 39.2756 | 122.0862 |
| 7 | Approved | Colusa Basin | Stone Corral Creek near Maxwell Road | 39.2751 | 122.1043 |
| 8 | Approved | Sycamore Area Drainage | Rough and Ready Pumping Plant | 38.8621 | 121.7927 |
| 9 | Approved | Colusa Basin | Colusa Basin Drain above Knight's Landing[3] | 38.8121 | 121.7741 |
| 10 | Approved | Butte Creek | Butte Creek at Gridley Rd Bridge | 39.3619 | 121.8927 |
| 11 | Approved | Lower Coon Creek, Upper Coon Creek | Coon Creek at Striplin Road | 38.8661 | 121.5803 |
| 12 | Approved | Butte Creek, Cherokee Canal | Butte Slough at Pass Road | 39.1873 | 121.9085 |
| 13 | Approved | Wadsworth | Wadsworth Canal at South Butte Rd | 39.1534 | 121.7344 |
| 14 | Approved | Pine Creek | Pine Creek at Nord-Gianella Road | 39.7811 | 121.9877 |
| 15 | Approved | Butte/Yuba/Sutter | Sacramento Slough[3] | 38.7833 | 121.6338 |
| 16 | Approved | Lower Yolo | Z Drain – Dixon RCD | 38.4157 | 121.6752 |
| 18 | Approved | Upper Yolo | Tule Canal at I-80 | 38.5700 | 121.5800 |
| 19 | Approved | N. Fk. Feather River (American Valley) | Spanish Cr. above confluence with Greenhorn Cr. | 39.9678 | 120.9164 |
| 20 | Approved | Middle Fork Feather Plumas | Middle Fork Feather River at County Road A-23 | 39.8189 | 120.3918 |
| 21 | Approved | North Fork Feather (Indian Valley) | Indian Creek downstream from Indian Valley | 40.0507 | 120.9741 |
| 22 | Approved | Big Valley | McGaugh Slough at Finley Road East | 39.0042 | 122.8623 |
| 23 | Approved | Putah Creek (Napa County) | Pope Creek upstream from Lake Berryessa | 38.6464 | 122.3642 |
| 24 | Approved | Putah Creek (Napa County) | Capell Creek upstream from Lake Berryessa | 38.4825 | 122.2411 |
| 25 | Approved | Coloma | North Canyon Creek | 38.7604 | 120.7102 |
| 26 | Approved | Lower Cosumnes | Cosumnes River at Twin Cities Rd | 38.2910 | 121.3804 |
| 27 | Approved | Lower Cosumnes | Dry Creek at Alta Mesa Road[4] | 38.248 | -121.226 |
| 28 | Approved | North Fork Cosumnes | Big Indian Creek at Bridge | 38.5498 | 120.8478 |
| 29 | Approved | Lower Yolo | Shag Slough at Liberty Island Bridge | 38.3068 | 121.6934 |
| 30 | Approved | Shasta County | Anderson Creek at Ash Creek Road[4] | 40.4180 | -122.2136 |
| 32 | Approved | Ulatis Creek | Ulatis Creek at Brown Road[4] | 38.3070 | 121.7940 |
| 33 | Approved | Gilsizer Slough | Gilsizer Slough at G. Washington Rd[4] | 39.0090 | -121.6716 |
| 34 | Approved | Burch Creek | Burch Creek west of Rawson Rd[4] | 39.9254 | -122.2182 |

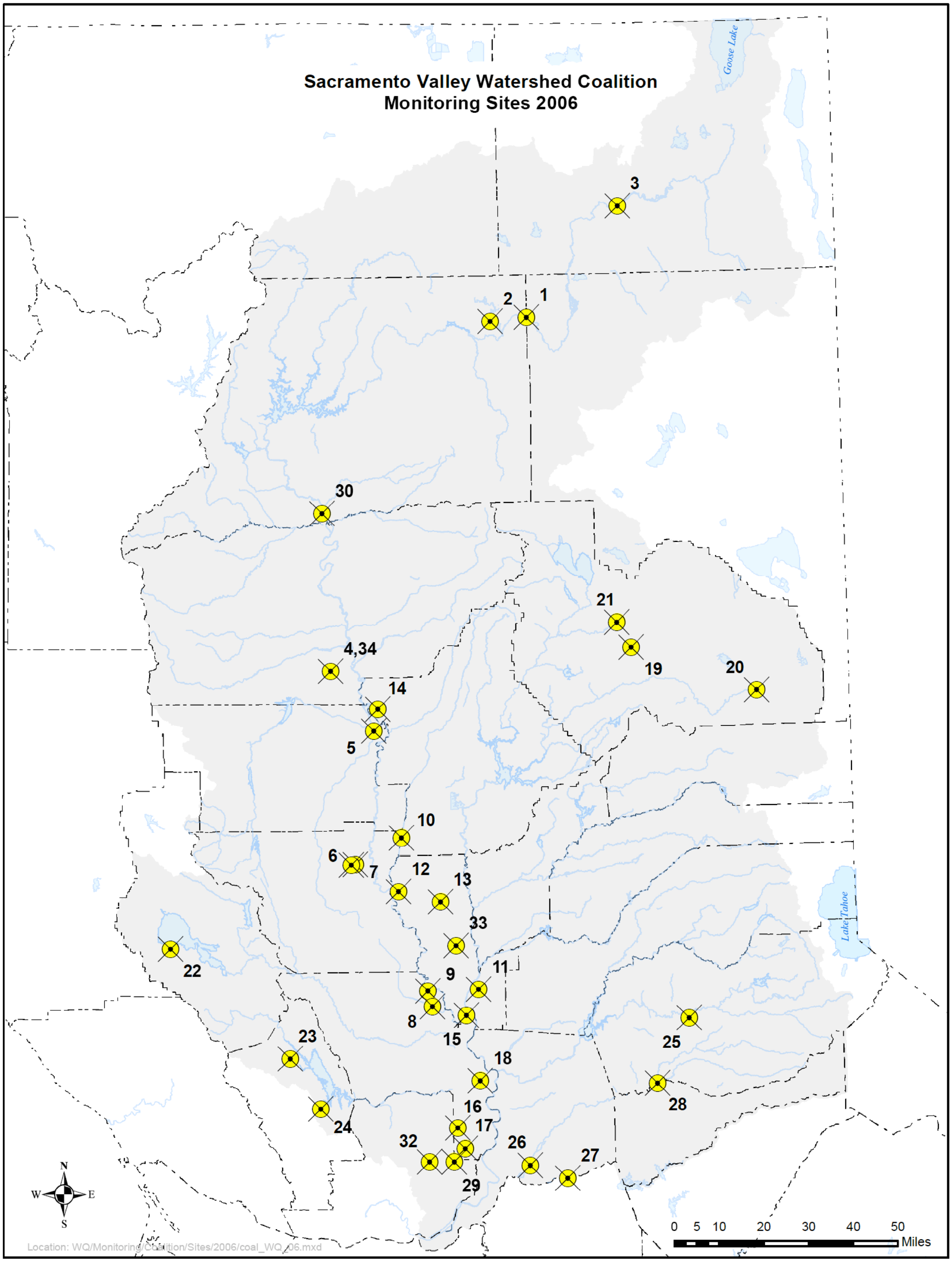
(1) Numbered indices for the SVWQC monitoring site map (Figure 1)

(2) "Approved" indicates site was approved as an *ILP* Compliance Site by Water Board.
"Pending" indicates site approval as an *ILP* Compliance Site is pending Water Board review of additional site-specific information, additional pesticide monitoring, or implementation of toxicity special studies.

(3) Coordinated with the Sacramento River Watershed Monitoring Program (SRWP). This site was not monitored in Winter 2006 by the SRWP.

(4) These are new sites implemented in 2006.

**Figure 1. Coalition Monitoring Sites**



## SITE DESCRIPTIONS

### 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.

### Shasta/Tehama Subwatershed

#### *Burch Creek at Woodson Avenue Bridge*

Burch Creek was identified as the highest priority drainage in this subwatershed based upon the relatively high amount of irrigated acreage and the high degree of pesticide use. Burch Creek flows in an easterly direction from the foothills in southwestern Tehama County and joins the Sacramento River southeast of the City of Corning. Due to the need to select an accessible site, the site chosen on Burch Creek will probably capture approximately about 12,500 of the acres listed for the entire drainage. Burch Creek has a balanced acreage of olives, almonds, pasture, and wheat and hay crops.

### *Burch Creek west of Rawson Road*

Burch Creek west of Rawson Road is a replacement site for Woodson Avenue Bridge. Burch Creek was identified as the highest priority drainage in this subwatershed based upon the relatively high amount of irrigated acreage and the high degree of pesticide use. Burch Creek flows in an easterly direction from the foothills in southwestern Tehama County and joins the Sacramento River southeast of the City of Corning. Due to the need to select an accessible site, the site chosen on Burch Creek will probably capture approximately about 12,500 of the acres listed for the entire drainage. Burch Creek has a balanced acreage of olives, almonds, pasture, and wheat and hay crops.

### *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.

## 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 Drain at Maxwell Road*

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.

### *Stone Corral Creek at Maxwell Road:*

This site captures drainage from approximately 10,000 irrigated acres in the Stone Corral Creek drainage area as indicated on the Colusa Basin subwatershed map. The primary crops include pasture, wheat, rice, and safflower.

### *Rough & Ready Pumping Plant*

The Rough & Ready Pumping Plant aggregates runoff and return flows for the Sycamore drainage as noted on the Colusa Basin subwatershed map. The pumps lift the water into the Sacramento River. This drainage area contains large amounts of tomatoes, safflower, wheat, melons, corn, and pasture. Smaller acreages of prunes and walnuts are located directly on the banks of the Sacramento River.

### *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. No sampling was conducted in 2005.

### *Butte Creek at Colusa Gridley Highway*

This station monitors water from upper Butte Creek and the southeast portion of Glenn County that is east of the Sacramento River. The upper drainage area consists of foothills and orchards, including walnuts, almonds, and prunes. The middle part of this drainage area is primarily rice. The lower part of the drainage area includes beans, melons, and pasture, with some walnuts and prunes.

## Placer/Nevada/South Sutter/North Sacramento Subwatershed

### *Coon Creek at Striplin Road*

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.

## Butte/Yuba/Sutter Subwatershed

### *Butte Slough at Pass Road*

This site is farther downstream from the other monitoring site on Butte Creek at the Gridley Colusa Highway. In addition to the Butte Creek water from the upstream site, this station includes water from the wetlands of Gray Lodge and Butte Sink, the fields surrounding Cherokee Canal and the orchards near Gridley.

### *Wadsworth Canal at South Butte Road (Weir #4)*

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.

### *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.

### Yolo/Solano Subwatershed

#### *Z-Drain (Dixon RCD)*

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.

#### *Toe Drain at North East corner of Little Holland Tract*

This site drains a large portion of the South Yolo Bypass. Crops grown in this drainage area include corn, safflower, grain, vineyards, tomatoes, and irrigated pasture. This is one of the highest priority drainages in this subwatershed area. Drainage flows to this site from both the north and the west from a variety of row crop sections. Due to access difficulties, this site was replaced with Shag Slough at Liberty Island Bridge in August 2005.

#### *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.

#### *Tule Canal at North East corner of I-80*

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.

#### *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.

## 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.

### *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.

### *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.

### *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.

## Lake/Napa Subwatershed

### *McGaugh Slough at Finley Road East*

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.

### *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.

### 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.

### Sacramento/Amador Subwatershed

#### *Cosumnes River at Twin Cities Road*

Water flows to this monitoring point from the east via the Cosumnes River and a handful of tributary creeks which originate in the foothills and flow through considerable agricultural acreage including pasture, vineyards, corn, and grains. This site captures drainage from the two largest drainages in the subwatershed: Lower Cosumnes and Middle Cosumnes, which drain a total of approximately 55,000 irrigated acres.

#### *Big Indian Creek at Bridge*

This site is located just above the confluence of Big Indian Creek with the Cosumnes River. The objective at this site is to assess stream water quality by monitoring the current contributions of vineyard and non-vineyard erosion to stream water quality. This site drains approximately 3,000 irrigated acres, almost all of which are vineyards.

#### *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).

# 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 appropriate for the monitoring Phase in effect. 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 5 to 10 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 implemented using a three-phased approach. 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 dependent on the results of Phase 1 monitoring, as described in the MRPP. Some elements of Phase 2 and Phase 3 monitoring may be conducted concurrently with Phase 1 monitoring. The sites and annual frequency of samples planned to be collected for the Coalition's 2006 monitoring are summarized in Table 3.

**Table 3. Coalition 2005-2006 Monitoring: Planned Annual Sampling Frequency**

| | Events | | Physical and Chemical Parameters | | | | | | | | | | Toxicity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Water Column Sample Events | Sediment Sample Events | Flow | pH, conductivity, DO, temperature | Color, Turbidity, TDS, TSS, TOC | Nutrients | Trace metals | Organophosphate pesticides | Organonochlorines, triazines, pyrethroids | Glyphosate, Paraquat | Carbamates, urea pesticides | Pathogen Indicators: *E. Coli* bacteria | Ceriodaphnia, 96-h acute Pimephales, 96-h acute Selenastrum, 96-h short-term chronic | Hyalella, 10-day short-term chronic | Implementation (1) |
| Butte Slough at Pass Road | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | ns | ns | ns | SVWQC |
| Colusa Drain near Maxwell Road | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 8 | 2 | SVWQC |
| Stone Corral Creek near Maxwell Road | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 8 | 2 | SVWQC |
| Butte Creek at Gridley Rd Bridge | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 8 | 2 | SVWQC |
| Wadsworth Canal at South Butte Rd | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | ns | ns | SVWQC |
| Pine Creek at Nord-Gianella Rd | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | ns | ns | SVWQC |
| Gilsizer Slough at G. Washington Rd | 8 | 2 | 8 | 8 | 8 | ns | ns | 8 | ns | ns | ns | 8 | 8 | 2 | SVWQC |
| Z-Drain (Dixon RCD) | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 8 | 2 | SVWQC |
| Shag Slough at Liberty Island | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 8 | 2 | SVWQC |
| Tule Canal at NE corner of I-80 | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | ns | ns | SVWQC |
| Ulatis Creek at Brown Road | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 (3) | ns | ns | 8 | 8 | 2 | SVWQC |
| Rough and Ready Pumping Plant | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | ns | ns | ns | SVWQC |
| Stony Creek on Hwy 45 near Rd 24 | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | ns | ns | 2 | SVWQC |
| North Canyon Creek | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | ns | ns | ns | ns | ns | SVWQC |
| McGaugh Slough at Finley Road East | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | ns | ns | 3 | 3 | 2 | SVWQC |
| Coon Creek at Striplin Road | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | ns | ns | SVWQC |
| Cosumnes River at Twin Cities Rd | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | ns | 8 | ns | ns | SVWQC |
| Big Indian Creek at Bridge | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | SVWQC |
| Dry Creek at Alta Mesa Road | 8 | 2 | 8 | 8 | 8 | ns | ns | ns | ns | ns | ns | 8 | 8 | 2 | SVWQC |
| Burch Creek at Woodson Ave Bridge | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ns | ns | 2 | 2 | 1 | SVWQC |
| Burch Creek west of Rawson Road | 6 | 1 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | ns | 6 | 6 | 6 | 1 | SVWQC |
| Anderson Creek at Ash Creek Road | 8 | 2 | 8 | 8 | 8 | 8 | 8 | 8 | ns | ns | ns | 8 | 8 | 2 | SVWQC |
| Spanish Creek above Greenhorn Creek | 7 | ns | 7 | 7 | 7 | 7 | 7 | ns | ns | ns | ns | 7 | (2) | (2) | SVWQC |
| Indian Creek d/s from Indian Valley | 7 | ns | 7 | 7 | 7 | 7 | 7 | ns | ns | ns | ns | 7 | (2) | (2) | SVWQC |
| Middle Fk Feather River at County Rd A-23 | 7 | ns | 7 | 7 | 7 | 7 | 7 | ns | ns | ns | ns | 7 | (2) | (2) | SVWQC |
| Pit River at Pittville | 8 | ns | 8 | 8 | 8 | 8 | ns | 3 | ns | ns | ns | 8 | 2 | ns | NECWA |
| Fall River at Fall River Ranch Bridge | 8 | ns | 8 | 8 | 8 | 8 | ns | 3 | ns | ns | ns | 8 | 2 | ns | NECWA |
| Pit River at Canby Bridge | 8 | ns | 8 | 8 | 8 | 8 | ns | 3 | ns | ns | ns | 8 | 2 | ns | NECWA |
| Pope Cr. upstream from Lake Berryessa | 8 | ns | 8 | 8 | 8 | ns | ns | ns | ns | ns | ns | 8 | ns | ns | PCWG |
| Capell Cr. upstream from Lake Berryessa | 8 | ns | 8 | 8 | 8 | ns | ns | ns | ns | ns | ns | 8 | ns | ns | PCWG |
| Colusa Drain above Knight's Landing | 9 | ns | 9 | 9 | 9 | 9 | ns | 6 | 6 | ns | 6 | 9 | 9 | ns | SRWP |
| Sacramento Slough | 9 | ns | 9 | 9 | 9 | 9 | ns | 6 | 6 | ns | 6 | 9 | 9 | ns | SRWP |

Tabled values indicate number of regular samples planned for 2006. "ns" indicates parameter is not sampled.

(1) Implementation indicates whether monitoring is implemented by the Coalition (SVWQC), Northeastern California Water Association (NECWA), Putah Creek Watershed Group (PCWG), or Sacramento River Watershed Program (SRWP).

(2) Toxicity testing will be implemented by the Feather River Coordinated Resource Management group.

(3) Organochlorine pesticides only.

## 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*, *Pimephales promelas*, 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* and *Pimephales* 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* and *Pimephales* were conducted as 96-hour static renewal tests, with sample renewal 48 hours after test initiation. Acute test procedures with *Pimephales* were modified to control pathogen-related mortality by using smaller test containers with two fish per container, and increasing the number of replicate containers to ten.
- Determination of toxicity to *Selenastrum* shall be 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).

During the continuing Phase 1 monitoring effort in 2006, sediment toxicity testing was conducted at the sites and frequencies indicated in Table 3. This includes one event in the storm season and once in the irrigation season. Coalition sediment monitoring was conducted during one event in the 2006 storm season.

## 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 these 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 | 1[(1)] | 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 (continued from previous page). 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 351.3 | Total Kjeldahl Nitrogen | Unfiltered | mg/L | 0.07 | 0.1 | CALTEST |
| EPA 353.2 | Nitrate plus Nitrite as N | Unfiltered | mg/L | 0.02 | 0.1(2) | CALTEST |
| EPA 350.2 | Ammonia as N | Unfiltered | mg/L | 0.02 | 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.

(2) Analyzed as nitrate + nitrite, as specified in the approved Coalition QAPP. The Water Board has since requested that they be analyzed separately.

# Monitoring Results

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

### SUMMARY OF SAMPLE EVENTS CONDUCTED

This report presents storm season monitoring results from three Coalition sampling events and three Subwatershed monitoring program events completed between January and March 2006. 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 Coalition monitoring included two major storm season events in late February and March 2006, and the Subwatershed monitoring included three major storm season events (two in January and one in March 2006). 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. Sediment toxicity testing was also conducted by the Coalition once during this storm season, as specified in the MRPP and QAPP. The sites and parameters for all events were monitored in accordance with the Coalition's MRPP and QAPP.

With one exception, the field logs for all Coalition and Subwatershed samples collected for January through March 2006 events are provided in Appendix A. The field log for the NECWA monitoring of Pit River and Fall River sites in January was not provided in time to include with this report. This field log has been requested and will be provided as an amendment as soon as it is available.

**Table 5. Sampling for the Coalition Storm Season Monitoring: January – March 2006**

| | Sample Count | | Dates Sampled (month/day) (1) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storm Season Events | | | | | |
| Site Name | Planned | Collected | 1/5 | 1/24 | 2/28-3/2 | 3/9 | 3/16-3/17 | 3/29-3/30 |
| ***Sacramento Valley Water Quality Coalition (SVWQC)*** | | | | | | | | |
| Anderson Creek at Ash Creek Road | 3 | 3 | – | – | 2/28 | – | 3/17 | 3/29 (2) |
| Big Indian Creek at Bridge | 1 | 1 | – | – | 3/1 | – | – | – |
| Burch Creek at Woodson Ave Bridge | 3 | 3 | – | – | 2/28 | – | 3/17 | 3/29 |
| Burch Creek west of Rawson Road | 1 | 1 | – | – | – | – | 3/17 | – |
| Butte Creek at Gridley Rd Bridge | 3 | 2 | – | – | flood | – | 3/17 | 3/29 |
| Butte Slough at Pass Road | 3 | 3 | – | – | 3/2 | – | 3/18 | – |
| Colusa Drain near Maxwell Road | 3 | 3 | – | – | 3/1 | – | 3/17 | 3/29 |
| Coon Creek at Striplin Road | 2 | 2 | – | – | 2/28 | – | 3/16 | – |
| Cosumnes River at Twin Cities Rd | 2 | 2 | – | – | 3/1 | – | 3/16 | – |
| Dry Creek at Alta Mesa Road | 3 | 3 | – | – | 3/1 | – | 3/16 | 3/30 |
| Gilsizer Slough at G. Washington Road | 3 | 3 | – | – | 2/28 | – | 3/16 | 3/30 |
| Indian Creek d/s from Indian Valley | 2 | 2 | – | – | 2/28 | – | 3/16 | – |
| McGaugh Slough at Finley Road East | 2 | 2 | – | – | 2/28 | – | – | 3/29 |
| Middle Fork Feather River at County Road A-23 | 2 | 2 | – | – | 2/28 | – | 3/16 | – |
| North Canyon Creek | 3 | 3 | – | – | 3/1 | – | 3/16 | 3/30 |
| Pine Creek at Nord-Gianella Road | 2 | 2 | – | – | 3/1 | – | 3/18 | – |
| Rough and Ready Pumping Plant (RD 108) | 2 | 2 | – | – | 2/28 | – | 3/16 | – |
| Shag Slough at Liberty Island Bridge | 3 | 3 | – | – | 3/1 | – | 3/16 | 3/30 |
| Spanish Creek above Greenhorn Cr. | 2 | 2 | – | – | 2/28 | – | 3/16 | – |
| Stone Corral Creek near Maxwell Road | 3 | 3 | – | – | 3/1 | – | 3/17 | 3/30 |
| Stony Creek on Hwy 45 near Rd 24 | 3 | 3 | – | – | 3/1 | – | 3/18 | 3/29 |
| Tule Canal at I-80 | 2 | 2 | – | – | 2/28 | – | 3/16 | – |
| Ulatis Creek at Brown Road | 3 | 3 | – | – | 2/28 | – | 3/16 | 3/30 |
| Wadsworth Canal at South Butte Rd | 2 | 2 | – | – | 3/2 | – | 3/18 | – |
| Z Drain – Dixon RCD | 3 | 3 | – | – | 3/1 | – | 3/16 | 3/30 |
| ***Sacramento River Watershed Program (SRWP)*** | | | | | | | | |
| Colusa Drain above Knight's Landing | 3 | 0 | – | – | – | – | – | – |
| Sacramento Slough | 3 | 0 | – | – | – | – | – | – |
| ***Putah Creek Watershed Group (PCWG)*** | | | | | | | | |
| Capell Creek upstream from Lake Berryessa | 2 | 2 | – | 1/24 | – | 3/9 | – | – |
| Pope Creek upstream from Lake Berryessa | 2 | 2 | – | 1/24 | – | 3/9 | – | – |
| ***Northeastern California Water Association (NECWA)*** | | | | | | | | |
| Fall River at Fall River Ranch Bridge | 1 | 1 | 1/5 | – | – | – | – | – |
| Pit River at Canby Bridge | 1 | 1 | 1/5 | – | – | – | – | – |
| Pit River at Pittville | 1 | 1 | 1/5 | – | – | – | – | – |
| ***totals*** | **74** | **67** | | | | | | |

(1) "—" indicates no samples planned. "flood" indicates site was flooded and inaccessible for sample collection.

(2) Samples collected on 3/29 and 3/30 were for sediment toxicity only.

## 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).

With one exception, the chain-of-custody forms (COCs) for all samples collected by Coalition contractors for the monitoring events conducted from January to March 2006 are included with the related lab reports and are provided in Appendix B. The COC for Caltest Report G030047 for samples collected during the first storm event (February 28-March 2, 2006) was not provided with the original lab report and appeared to have been misplaced by both the laboratory and the sampling personnel. We are continuing to track down the missing COC and it will be provided as an amendment as soon as it is available. 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:

- Six coliform samples exceeded the 24-hour hold time for analyses initiation by several hours. These results were accepted and qualified as *estimated*.
- One sample analyzed for dissolved orthophosphate exceeded hold times. The results were accepted and qualified as *estimated*.

#### *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 6 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 20 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 MDL and QL for 20 organic carbon analyses were elevated above the DQOs due to requirements to dilute the samples for analysis. All sample results were greater than the elevated QL and were not adversely affected or qualified.
- The analytical QL for all analyses of dissolved orthophosphate was elevated above the DQO of 0.05 mg/L. The target MDL (0.01 mg/L) was achieved, and results were reported to this level. This resulted in an additional 7 results qualified as "J-values".
- All paraquat results were reported by the analyzing laboratory to be affected by matrix interference, and 11 results were rejected outright. The analytical MDL and QLs paraquat analyses were elevated above the DQOs of 0.2 and 0.5 ug/L for the remaining 14 of 25 analyses due to requirements to dilute the samples for analysis. All results for paraquat were below detection. The Coalition is investigating the cause of this problem.
- The analytical QL for selenium achieved the Coalition DQO of 2 ug/L for all analyses, and achieved the QL specified in the MRP (1 ug/L) for 65 of 80 analyses. However, the achieved MDL of 0.7 ug/L and the QL of 2.0 ug/L were adequate to evaluate potential impacts on beneficial uses.
- The analytical QL for zinc achieved the Coalition DQO of 10 ug/L for all analyses. The achieved QL was above the QL specified in the MRP (1 ug/L) for 15 of 80 analyses. However, the achieved QL of 10 ug/L and MDL of 0.8 were adequate to evaluate potential impacts on beneficial uses.

#### *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:

- Nitrate + nitrite was detected at the QL in 1 of 2 field blank analyses. This resulted in 1 analytical result being qualified as an *upper limit* due to potential contamination.
- Phosphorus was detected below the QL in 1 of 2 field blank analyses. This resulted in 1 analytical result being qualified as an *upper limit* due to potential contamination.
- Organic carbon was detected below the QL in 1 field blank and above the QL in a second field blank. This resulted in 1 analytical result being qualified as an *upper limit* due to potential contamination. This continues a trend observed in previous monitoring and the cause is being investigated with the laboratory.

#### *Field Duplicates*

Field duplicate samples were collected and analyzed for all parameters except coliform bacteria. 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 each of total dissolved solids, zinc, and total organic carbon. Six environmental results were qualified as *estimated* on this basis.
- Field duplicate results exceeded the DQO for two pesticide analyses. Two environmental results were 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:

- Glyphosate was detected in one method analysis. A second method blank was prepared and analyzed and was below detection. No analytical results were qualified as a result and all glyphosate for environmental samples were below detection.

#### *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:

- Two carbamate surrogate recoveries were 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:

- One lab duplicate analysis for diazinon exceeded the DQO. One environmental result was qualified as *estimated* on this basis.

#### *Matrix Spikes and Matrix Spike Duplicates*

Matrix Spikes and Matrix Spike Duplicates were analyzed for trace metals, nutrients, and pesticides (Table 12 and Table 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 10 trace metal analyses were outside the DQO. This resulted in qualification of 7 results as *high biased*.
- Matrix Spike recoveries for 2 TKN and 6 nitrate+nitrite analyses in non-Coalition samples were outside the DQO. The analytical batches were accepted based on acceptable LCS recoveries and no Coalition data were qualified on this basis.
- Matrix Spike recoveries for three paraquat analyses were below the DQO. Eleven results were rejected as unacceptable and 14 additional results were qualified as *low biased* with elevated detection limits due to matrix effects.
- One Matrix Spike recovery for organochlorine pesticide analysis was below the DQO. This resulted in qualification of 1 environmental result as *low biased*.
- Two Matrix Spike recoveries for carbamate analyses were higher than the DQO for propoxur. All environmental results for this analyte were below detection and no results were qualified.
- The RPDs for two pairs of Matrix Spike Duplicate analyses (fluometron and oxamyl) were higher than the DQO. All environmental sample results for these analytes were 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 33 total qualified data, 19 results were qualified as *estimated* due to high variability in lab or field replicate analyses or holding time exceedances, 11 results were qualified as *high biased* or *low biased*, and 3 results were potentially affected by contamination and qualified as *upper limits*. There were 11 results rejected for unacceptable matrix interference and 23 pH results that were rejected due to unreliable field meter performance. Of the 5,101 analytical results generated from January – March 2006, 67 results required qualification or rejection, resulting in 98.7% 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, 67 of 74 initial water column and sediment samples planned by the Coalition and coordinating programs were collected and all collected samples were analyzed, for an overall sampling success rate of 91%. The majority of uncollected planned samples (6) were because sampling for the coordinating program had not yet been initiated for 2006. One additional set of uncollected samples was due to access problems caused by flooding. Planned sampling that was not completed successfully is summarized below:

- Three storm season sample events planned for Sacramento Slough and Colusa Drain were not collected because for the Sacramento River Watershed Program had not yet been initiated for 2006.
- One planned storm season sample event for Butte Creek at Gridley Road Bridge was not conducted because access was blocked by flooding.

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

| Method | Analyte | Data Quality Objective | Number of Analyses | Number Passing | % Success |
|---|---|---|---|---|---|
| EPA 200.8 | Trace Metals | < MDL | 19 | 15 | 79% |
| EPA 350.2 | Ammonia, as N | < MDL | 2 | 2 | 100% |
| EPA 351.3 | Total Kjeldahl Nitrogen | < MDL | 2 | 2 | 100% |
| EPA 353.2 | Nitrate+Nitrite, as N | < MDL | 2 | 1 | 50% |
| EPA 365.2 | Total Phosphorus, as P | < MDL | 2 | 1 | 50% |
| EPA 365.2 (filtered) | Dissolved Orthophosphate, as P | < MDL | 2 | 2 | 100% |
| EPA 415.1 | Total Organic Carbon (TOC) | < MDL | 2 | 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 | 144 | 144 | 100% |
| EPA 8321A | Carbamate Pesticides | | 25 | 25 | 100% |
| SM20-9223 | E. coli | < MDL | 1 | 1 | 100% |
| ***Totals*** | | | ***203*** | ***195*** | ***96%*** |

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

| Method | | Data Quality Objective | Number of Analyses | Number Passing | % Success |
|---|---|---|---|---|---|
| EPA 110.2 | Color | RPD ≤ 25% | 2 | 2 | 100.0% |
| EPA 160.1 | Total Dissolved Solids (TDS) | RPD ≤ 25% | 2 | 1 | 50.0% |
| EPA 160.2 | Total Suspended Solids (TSS) | RPD ≤ 25% | 2 | 2 | 100.0% |
| EPA 180.1 | Turbidity | RPD ≤ 25% | 2 | 2 | 100.0% |
| EPA 200.8 | Trace Metals | RPD ≤ 25% | 14 | 13 | 92.9% |
| EPA 350.2 | Ammonia as N | RPD ≤ 25% | 2 | 2 | 100.0% |
| EPA 351.3 | Total Kjeldahl Nitrogen | RPD ≤ 25% | 2 | 2 | 100.0% |
| EPA 353.2 | Nitrate+Nitrite, as N | RPD ≤ 25% | 2 | 2 | 100.0% |
| EPA 365.2 | Phosphate as P, Total | RPD ≤ 25% | 3 | 3 | 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% | 2 | 1 | 50.0% |
| EPA 625m | Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides | RPD ≤ 25% | 123 | 121 | 98.4% |
| SM18-2320B | Alkalinity | RPD ≤ 25% | 1 | 1 | 100.0% |
| SM18-2340C | Hardness | RPD ≤ 25% | 1 | 1 | 100.0% |
| SM18-4500 | Ammonia as N | RPD ≤ 25% | 1 | 1 | 100.0% |
| Toxicity tests | *Ceriodaphnia* survival, *Pimephales* survival, *Selenastrum* growth | RPD ≤ 25% | 7 | 7 | 100.0% |
| ***Totals*** | | | ***167*** | ***162*** | ***97%*** |

**Table 8. Summary of Method Blank Results for SVWQC Monitoring: January – March 2006**

| Method | Analyte | Data Quality Objective | Number of Analyses | Number Passing | % Success |
|---|---|---|---|---|---|
| EPA 160.1 | Total Dissolved Solids | < MDL | 9 | 9 | 100% |
| EPA 160.2 | Total Suspended Solids | < MDL | 8 | 8 | 100% |
| EPA 200.8 | Trace Metals | < MDL | 107 | 107 | 100% |
| EPA 350.2 | Ammonia as N | < MDL | 5 | 5 | 100% |
| EPA 351.3 | Total Kjeldahl Nitrogen | < MDL | 7 | 7 | 100% |
| EPA 353.2 | Nitrate+Nitrite, as N | < MDL | 6 | 6 | 100% |
| EPA 365.2 | Phosphate/Orthophosphate, as P | < MDL | 7 | 7 | 100% |
| EPA 415.1 | Total Organic Carbon | < MDL | 12 | 12 | 100% |
| EPA 547 | Glyphosate | < MDL | 3 | 2 | 67% |
| EPA 549.2 | Paraquat | < MDL | 2 | 2 | 100% |
| EPA 625(m) | Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides | < MDL | 213 | 213 | 100% |
| EPA 8321 | Carbamate Pesticides | < MDL | 50 | 50 | 100% |
| ***Totals*** | | | **420** | **419** | **99.8%** |

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

| Method | Analyte | DQO | Number of Analyses | Number Passing | % Success |
|---|---|---|---|---|---|
| EPA 160.1 | Total Dissolved Solids | 80-120% | 9 | 9 | 100% |
| EPA 160.2 | Total Suspended Solids | 80-120% | 8 | 8 | 100% |
| EPA 200.8/200.7 | Trace Metals | 80-120% | 107 | 107 | 100% |
| EPA 350.2 | Ammonia as N | 80-120% | 5 | 5 | 100% |
| EPA 351.3 | Total Kjeldahl Nitrogen | 80-120% | 7 | 7 | 100% |
| EPA 353.2 | Nitrate+Nitrite, as N | 80-120% | 6 | 6 | 100% |
| EPA 365.2 | Phosphate/Orthophosphate, as P | 80-120% | 7 | 7 | 100% |
| EPA 415.1 | Total Organic Carbon | 80-120% | 12 | 12 | 100% |
| EPA 547 | Glyphosate | 78-128% | 4 | 4 | 100% |
| EPA 549.2 | Paraquat | 42-104% | 4 | 4 | 100% |
| EPA 8321 | Carbamate Pesticides | (1) | 50 | 50 | 100% |
| ***Totals*** | | | **219** | **219** | **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: January – March 2006**

| Method | Analyte | Data Quality Objective | Number of Analyses | Number Passing | % Success |
|---|---|---|---|---|---|
| EPA 625(m) | Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides | (1) | 196 | 196 | 100% |
| EPA 8321 | Carbamate Pesticides | (1) | 69 | 67 | 97% |
| ***Totals*** | | | **265** | **263** | **99.3%** |

(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: January – March 2006**

| Method | Analyte | Data Quality Objective | Number of Pairs Analysed | Number Passing | % Success |
|---|---|---|---|---|---|
| EPA 160.1 | Total Dissolved Solids | ≤20% RPD | 8 | 8 | 100% |
| EPA 160.2 | Total Suspended Solids | ≤20% RPD | 9 | 9 | 100% |
| EPA 180.1 | Turbidity | ≤20% RPD | 8 | 8 | 100% |
| EPA 625(m) | Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides | ≤20% RPD | 143 | 142 | 99.3% |
| ***Totals*** | | | **168** | **167** | **99.4%** |

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

| Method | Analyte | Data Quality Objective | Number of Analyses | Number Passing | % Success |
|---|---|---|---|---|---|
| EPA 200.8/200.7 | Trace Metals | 80-120% | 202 | 192 | 95% |
| EPA 350.2 | Ammonia as N | 80-120% | 10 | 10 | 100% |
| EPA 351.3 | Total Kjeldahl Nitrogen | 80-120% | 16 | 14[(2)] | 87.5% |
| EPA 353.2 | Nitrate+Nitrite, as N | 80-120% | 12 | 6[(2)] | 50% |
| EPA 365.2 | Phosphate/Orthophosphate, as P | 80-120% | 12 | 12 | 100% |
| EPA 415.1 | Total Organic Carbon | 80-120% | 38 | 38 | 100% |
| EPA 547 | Glyphosate | 78-128% | 4 | 4 | 100% |
| EPA 549.2 | Paraquat | 50-126% | 3 | 0 | 0% |
| EPA 625(m) | Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides | (1) | 294 | 292 | 99.3% |
| EPA 8321 | Carbamate Pesticides | (1) | 100 | 98 | 98% |
| ***Totals*** | | | **691** | **666** | **96.4%** |

(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.

(2) All matrix spikes with recoveries outside DQO were non-SVWQC matrices.

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

| Method | Analyte | Data Quality Objective | Number of Pairs Analyzed | Number Passing | % Success |
|---|---|---|---|---|---|
| EPA 200.8/200.7 | Trace Metals | ≤20% RPD | 105 | 105 | 100% |
| EPA 350.2 | Ammonia as N | ≤20% RPD | 5 | 5 | 100% |
| EPA 351.3 | Total Kjeldahl Nitrogen | ≤20% RPD | 7 | 7 | 100% |
| EPA 353.2 | Nitrate+Nitrite, as N | ≤20% RPD | 5 | 5 | 100% |
| EPA 365.2 | Phosphate/Orthophosphate, as P | ≤20% RPD | 5 | 5 | 100% |
| EPA 415.1 | Total Organic Carbon | ≤20% RPD | 20 | 20 | 100% |
| EPA 547 | Glyphosate | ≤25% RPD | 2 | 2 | 100% |
| EPA 549.2 | Paraquat[1] | ≤25% RPD | — | — | — |
| EPA 365(m) | Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides | ≤25% RPD | 147 | 147 | 100% |
| EPA 8321 | Carbamate Pesticides | ≤25% RPD | 50 | 48 | 96% |
| ***Totals*** | | | **346** | **344** | **99.4%** |

(1) Paraquat MS Recoveries failed, RPD not calculable

## 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 annual reports. Previous annual reports presented the results and trends for pesticide data available through 2003 from the California Department of Pesticides' Pesticide Use Reporting (PUR) Database (2004). These analyses focused upon sampling results and use reports for six priority pesticides specifically analyzed for the Phase 1 Coalition monitoring. Because the 2004 PUR data were not released until 2006, detailed drainage level analysis of pesticide use provided in previous reports could not be completed for this Semi-Annual Report. These will be provided in the December 2006 Semi-annual Report covering the 2006 irrigation season.

With the 2006 release of pesticide use data, the California Department of Pesticide Regulation (DPR) reported several continuing broad trends in statewide pesticide use. Pesticide use varies from year to year based on many factors, including types of crops, economics, acreage planted, and other factors, with weather being one of the single most important factor. The wet winter in 2004 promoted weed growth, and a hot, dry summer increased infestations of mites and other pests. In addition, acreage increased for some major crops, and high-value crops often justify more intensive pest management. Due in part to these factors, a small increase was reported in the total pounds of pesticides applied statewide, from 175 million pounds in 2003 to 180 million pounds in 2004. However, the 2004 totals also included a dramatic rise in the use of lowered risk pesticides and chemicals. More than half of the five million pound increase in 2004 consisted of sulfur and mineral oils, pesticides that qualify for organic agriculture and that are considered to have low environmental risks. In the Sacramento Valley, there no significant change in overall pesticide use, with total pounds applied of 23.6 million pounds in 2003 and 2004 (Table 14).

The PUR data also document a dramatic increase in the use of some newer, reduced-risk pesticides, while uses of several classes of higher risk pesticides declined in both in pounds applied and acres treated. Statewide, the declining trend in the use of organophosphate and carbamate insecticides continued. Overall use of these chemicals declined by 130,000 pounds (1.6 percent) and by 360,000 acres treated (5.7 percent) in 2004. This declining trend is expected to continue in 2005 and 2006.

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

| County | Pounds Applied, 2003 | Pounds Applied, 2004 |
|---|---|---|
| Amador | 101,889 | 117,736 |
| Butte | 3,062,292 | 2,962,210 |
| Colusa | 2,088,248 | 1,809,678 |
| El Dorado | 103,487 | 105,982 |
| Glenn | 2,284,461 | 2,399,082 |
| Lake | 786,874 | 704,033 |
| Napa | 1,934,856 | 2,236,410 |
| Placer | 267,931 | 374,618 |
| Plumas | 14,447 | 11,931 |
| Sacramento | 3,583,177 | 3,283,459 |
| Shasta | 293,445 | 294,416 |
| Solano | 1,089,607 | 1,025,269 |
| Sutter | 3,305,776 | 3,624,764 |
| Tehama | 659,978 | 596,303 |
| Yolo | 2,644,303 | 2,665,655 |
| Yuba | 1,427,355 | 1,398,577 |
| **Totals** | **23,648,126** | **23,610,123** |

# Data Interpretation

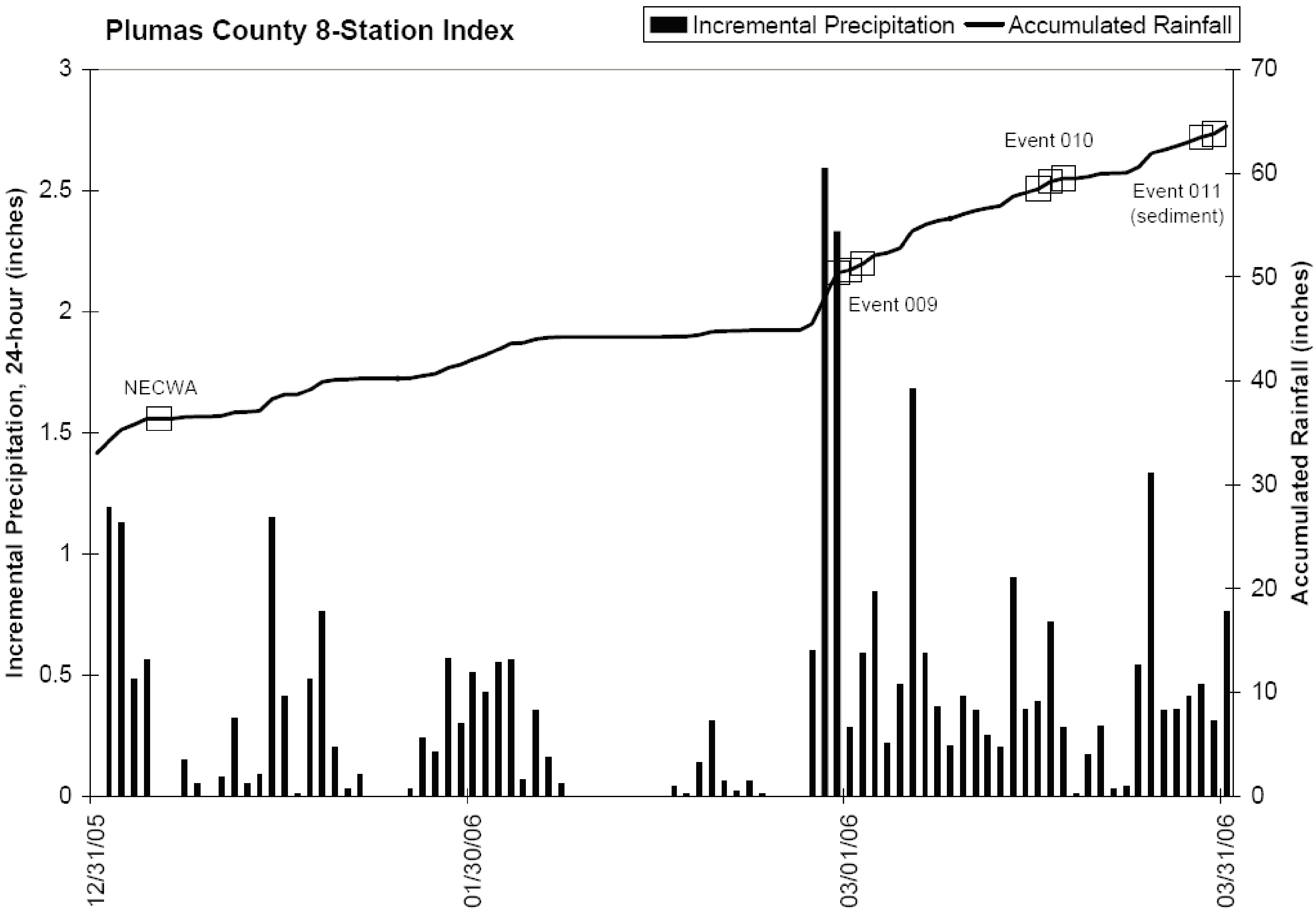
## SUMMARY OF SAMPLING CONDITIONS

Sample collection for the January – March 2006 Coalition storm season was characterized by record-breaking daily precipitation at the beginning of January, a predominantly dry February with regional records set for both low and high temperatures, and a cold and wet March with a record-breaking 19 days of measurable rainfall in the lower Sacramento Valley (as measured at Sacramento Executive Airport). Significant rainfall events occurred throughout the watershed at the beginning of January and during the month of March. These events were characterized by the Coalition's first and second storm season samples (Events 009 and 010, collected in March), as well as the sole Northeastern California Water Association (NECWA) storm season sample collected on January 5$^{th}$. Precipitation was generally greater in the northern part of the watershed and at higher elevations. Regional precipitation patterns are illustrated in Figure 2 a-e. Stream flows throughout the watershed exhibited typical wet season variability in the months of January and March (

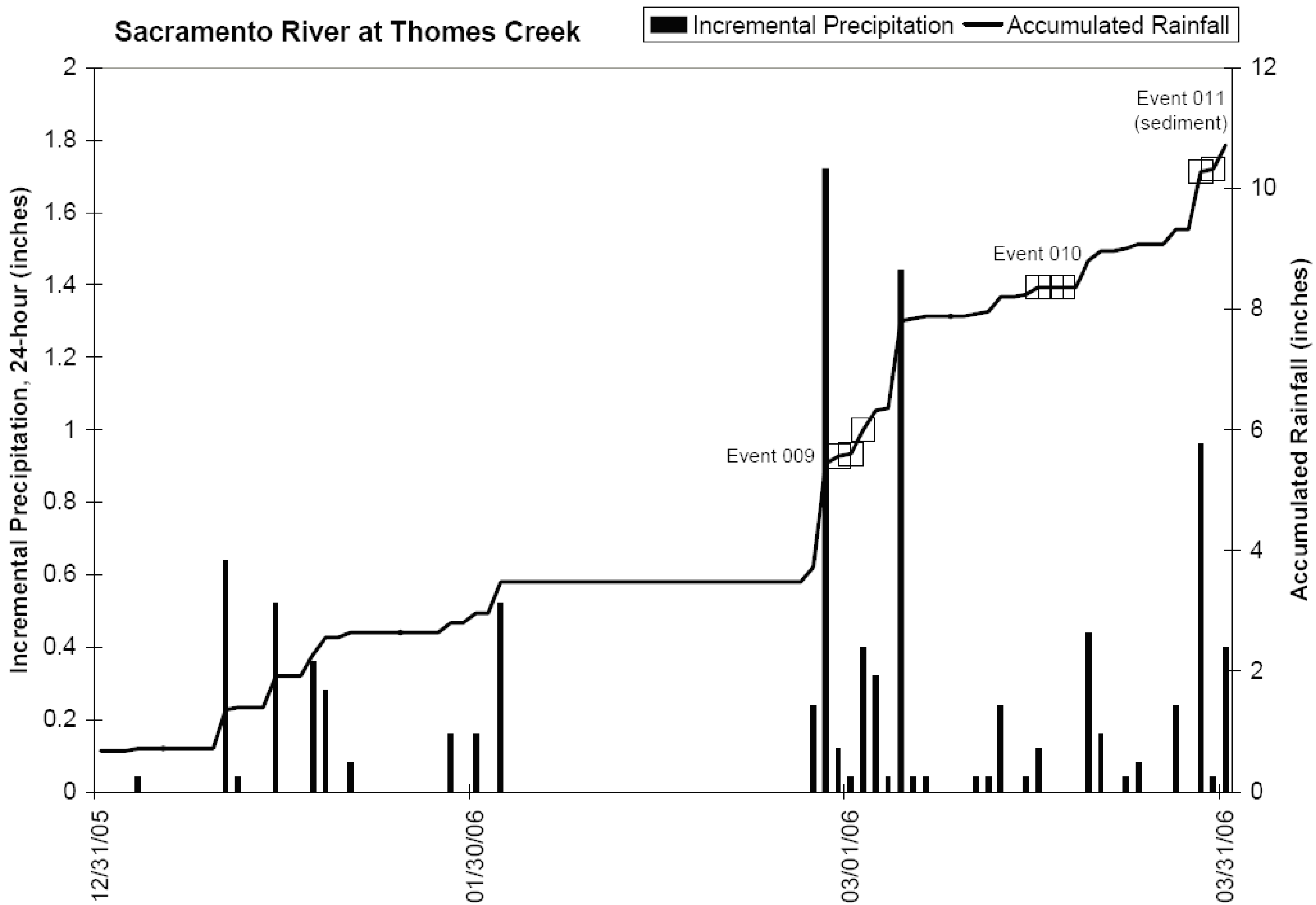
Figure 3 a-f). The majority of stream flows decreased during the month of February. One storm season event was conducted during January, and five were conducted during March (including the last day of February).

**Figure 2 a-e. Precipitation during January – March 2006 Coalition Monitoring**

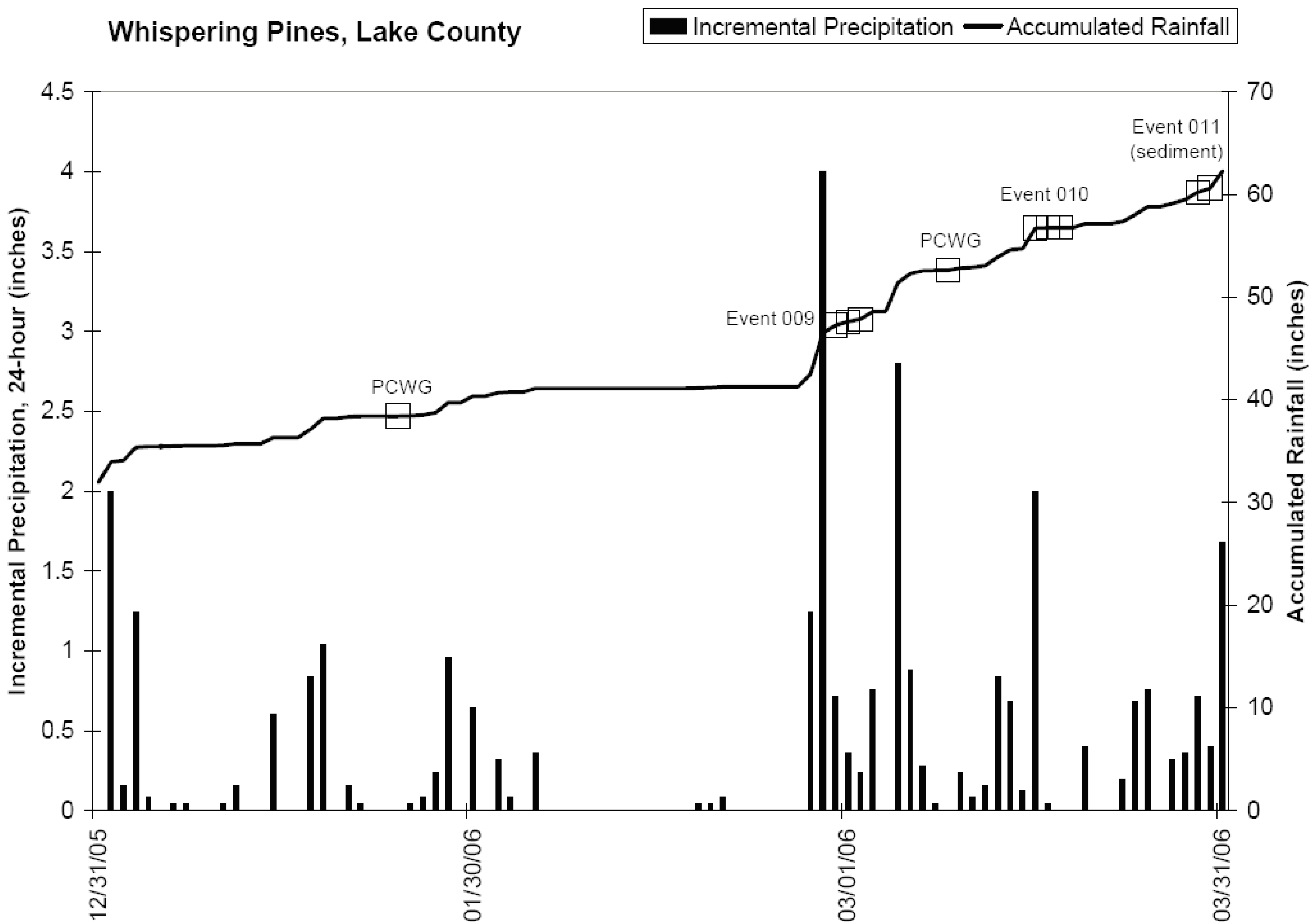
**a. Plumas County**



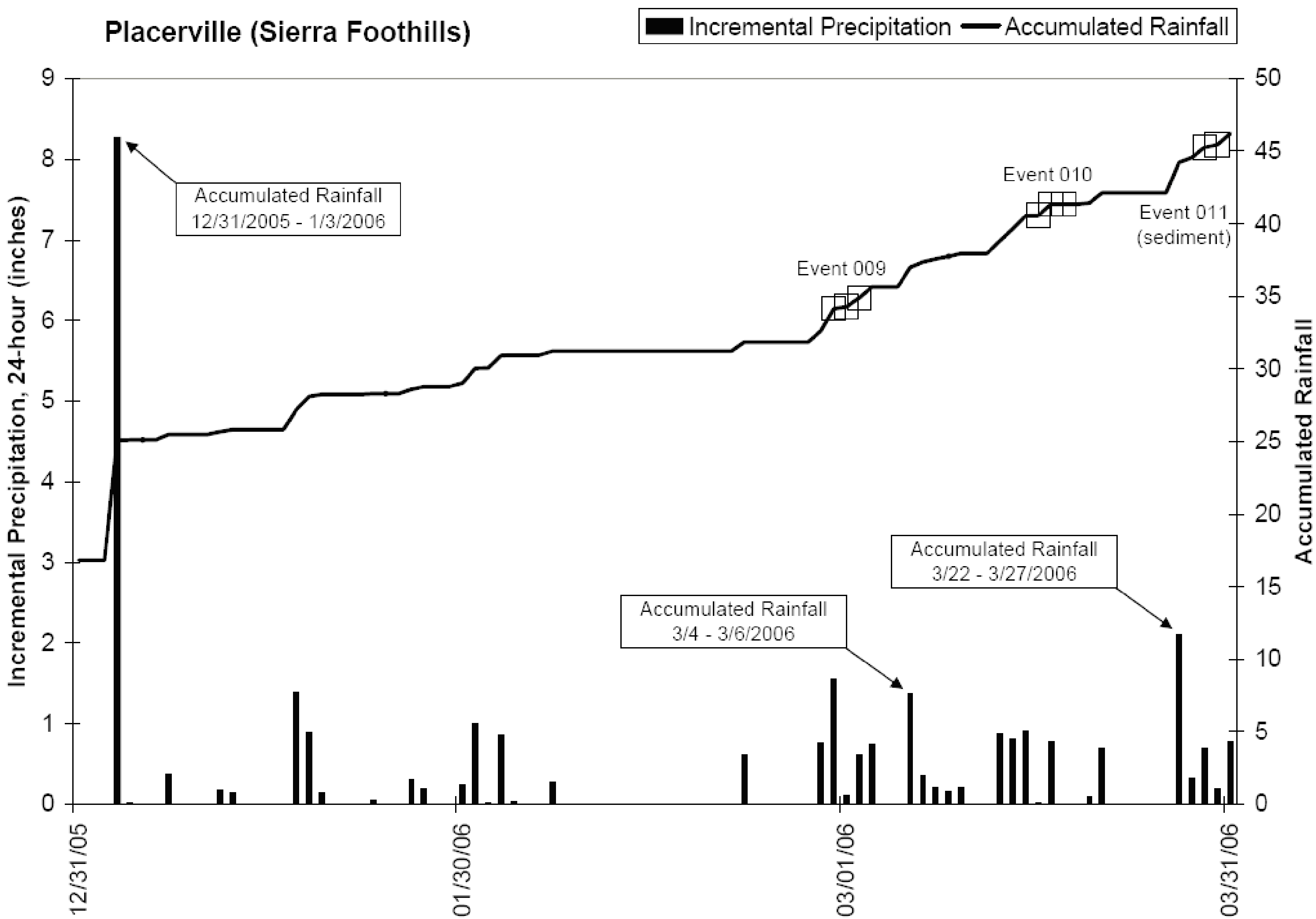
**b. Upper Sacramento Valley**



**c. Lake County**



**d. Sierra Foothills**



**e. Lower Sacramento Valley**

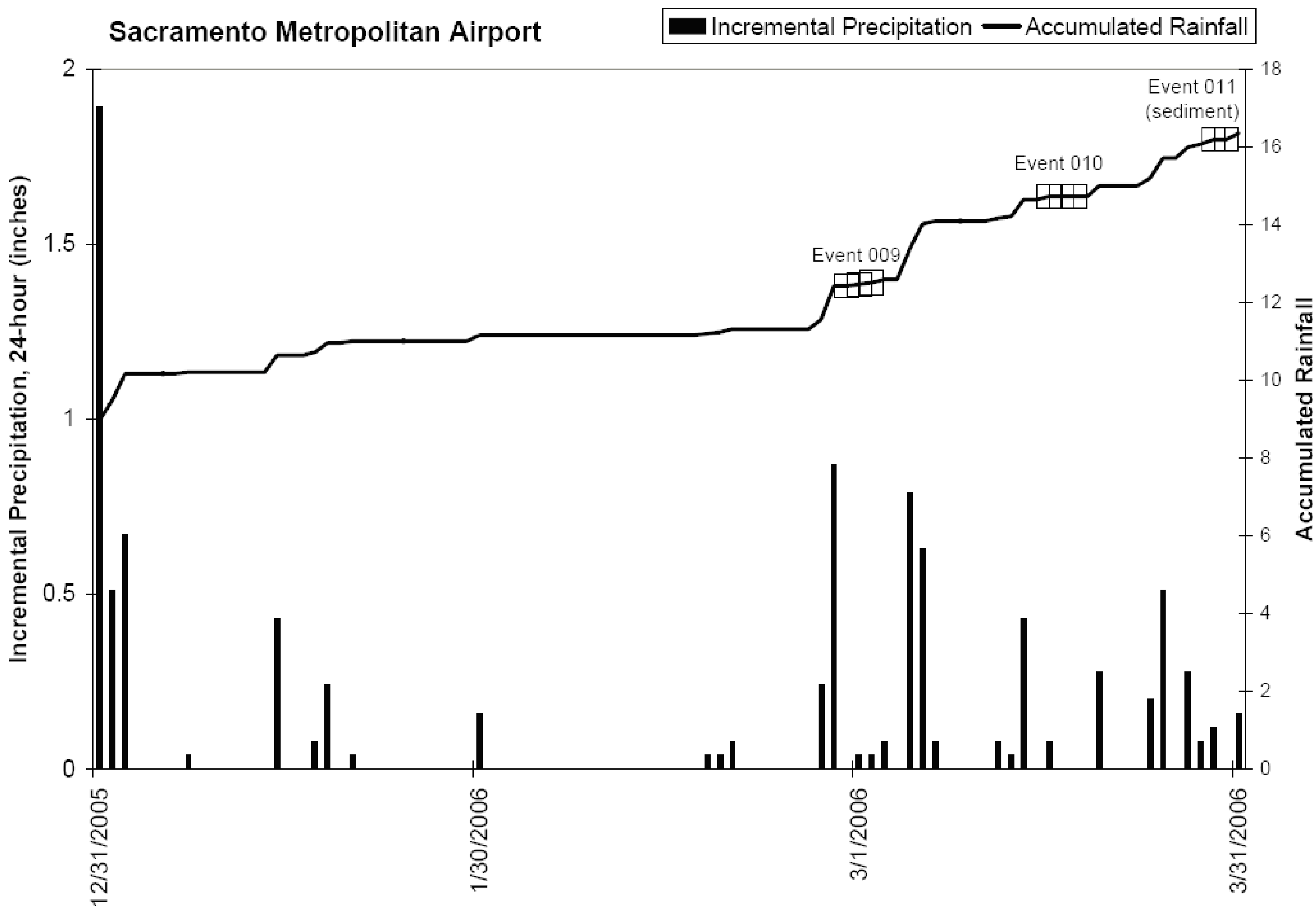
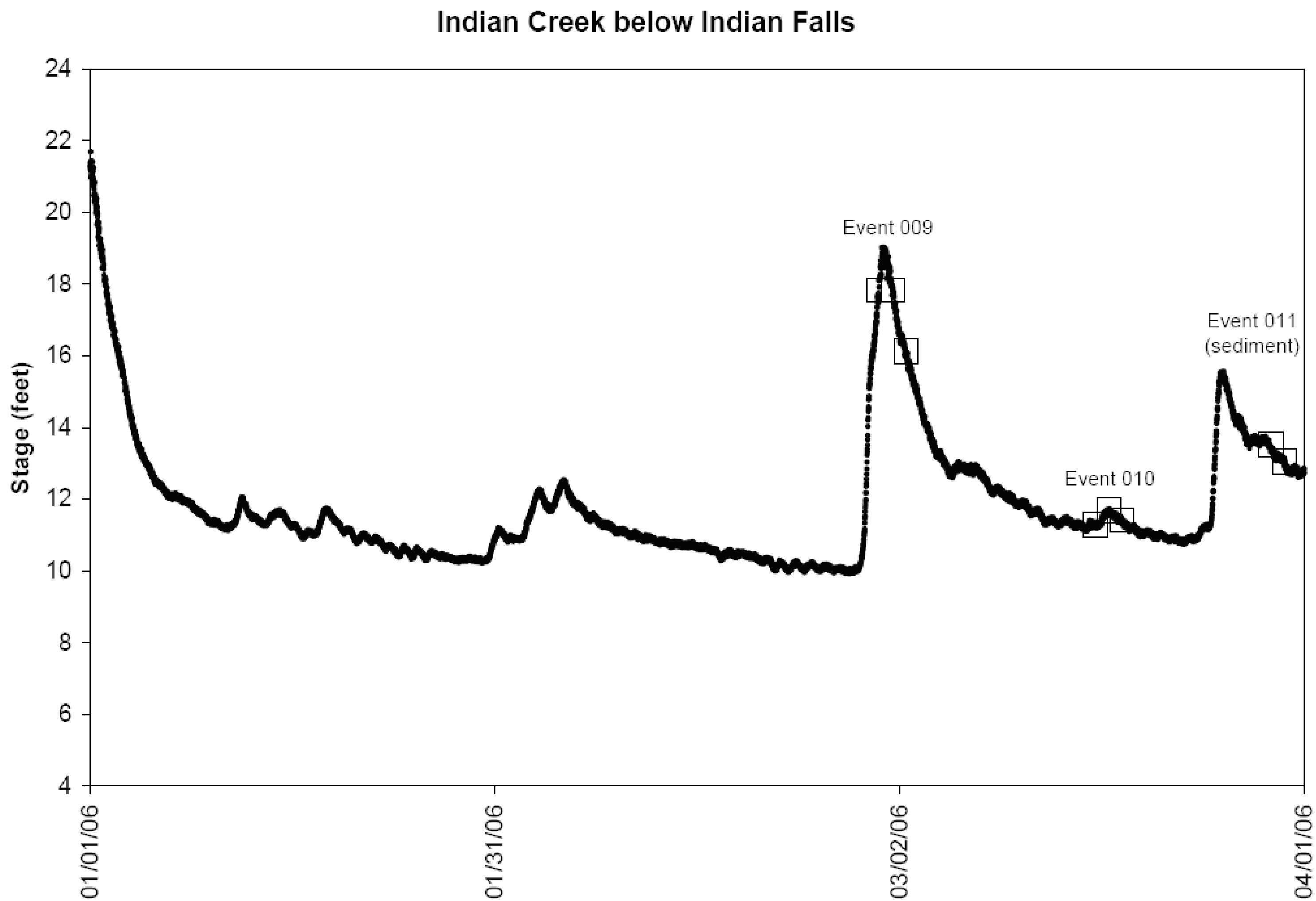
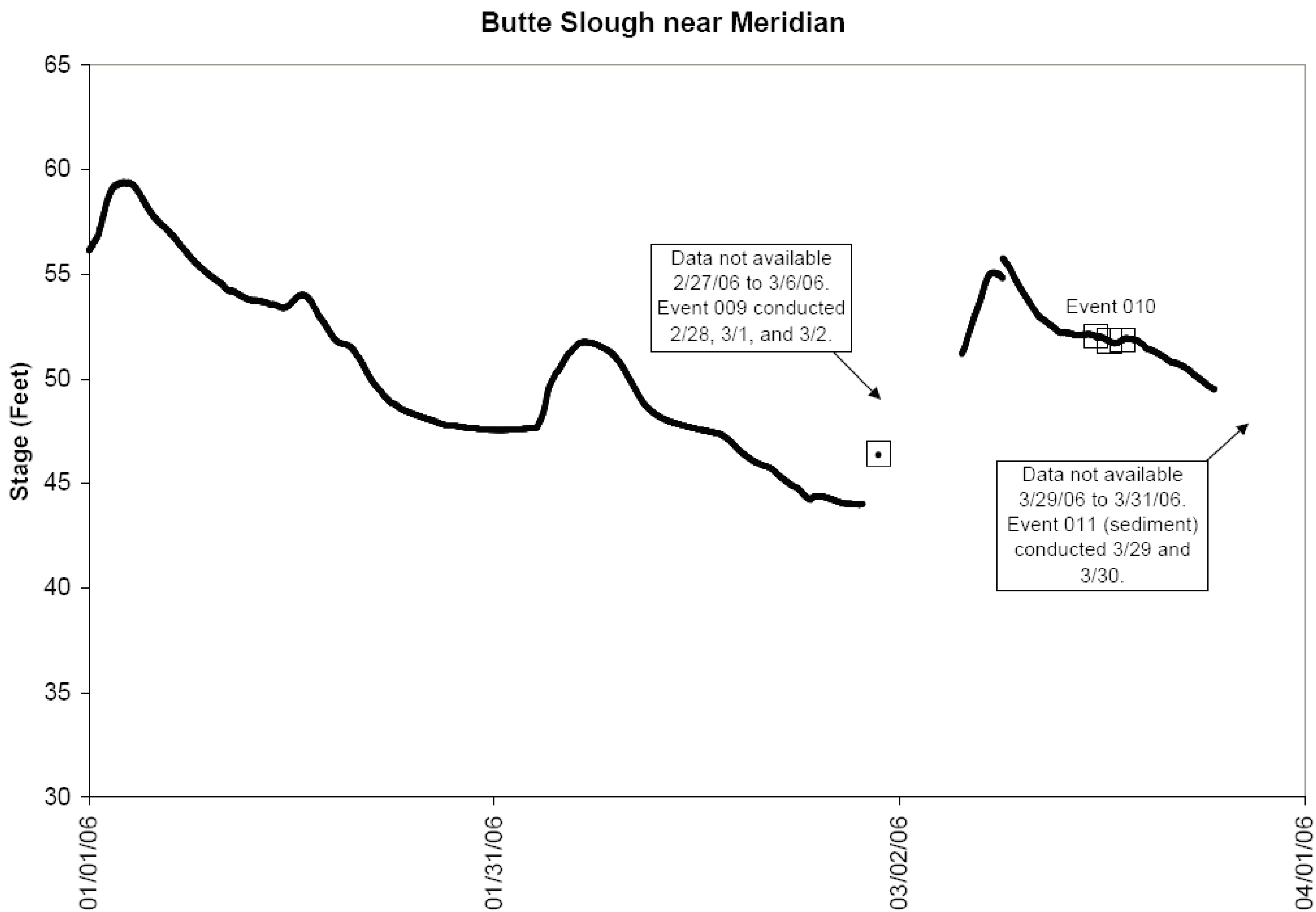


**Figure 3 a-f. Flows during January – March 2006 Coalition Monitoring**

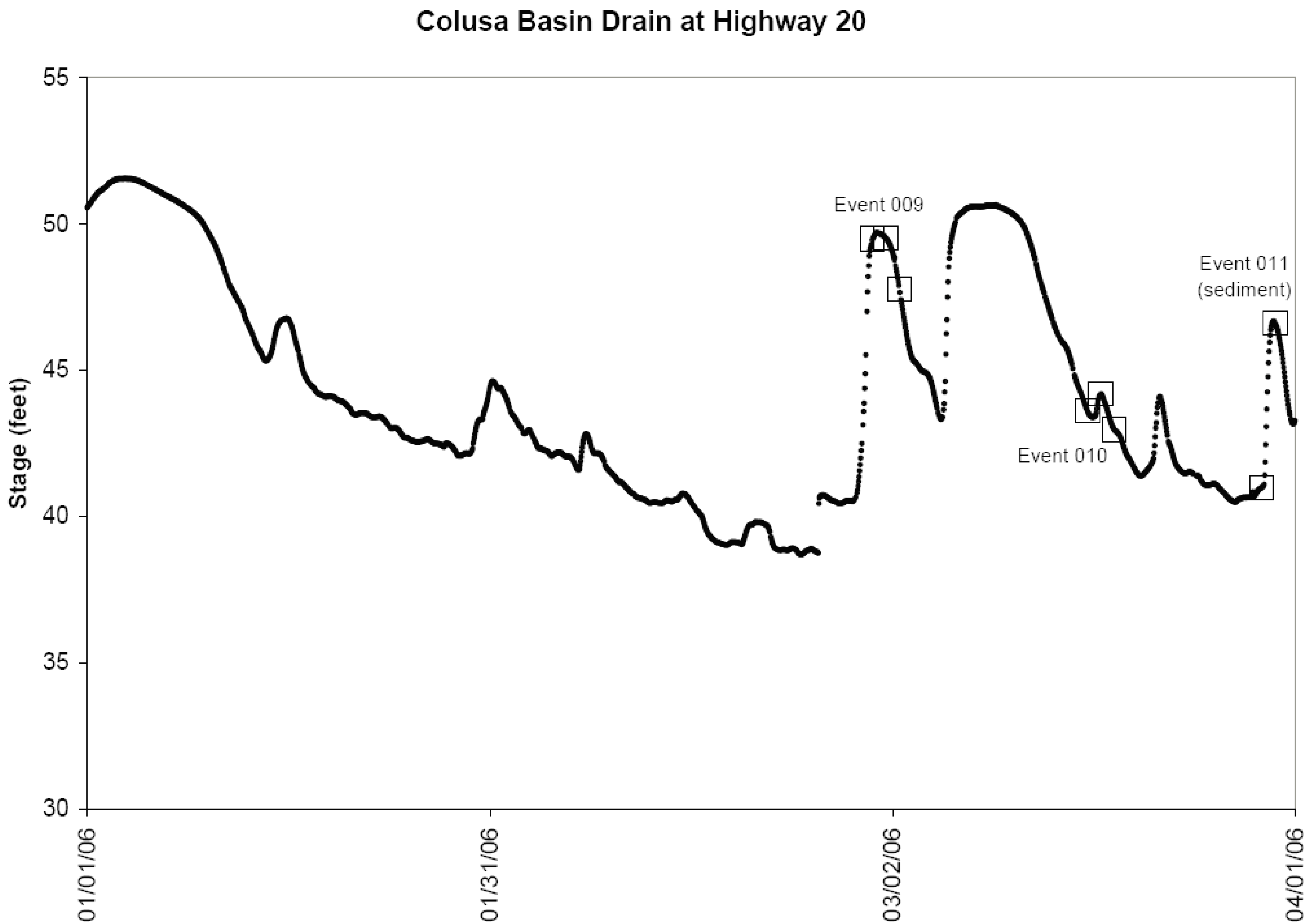
**a. Plumas County**



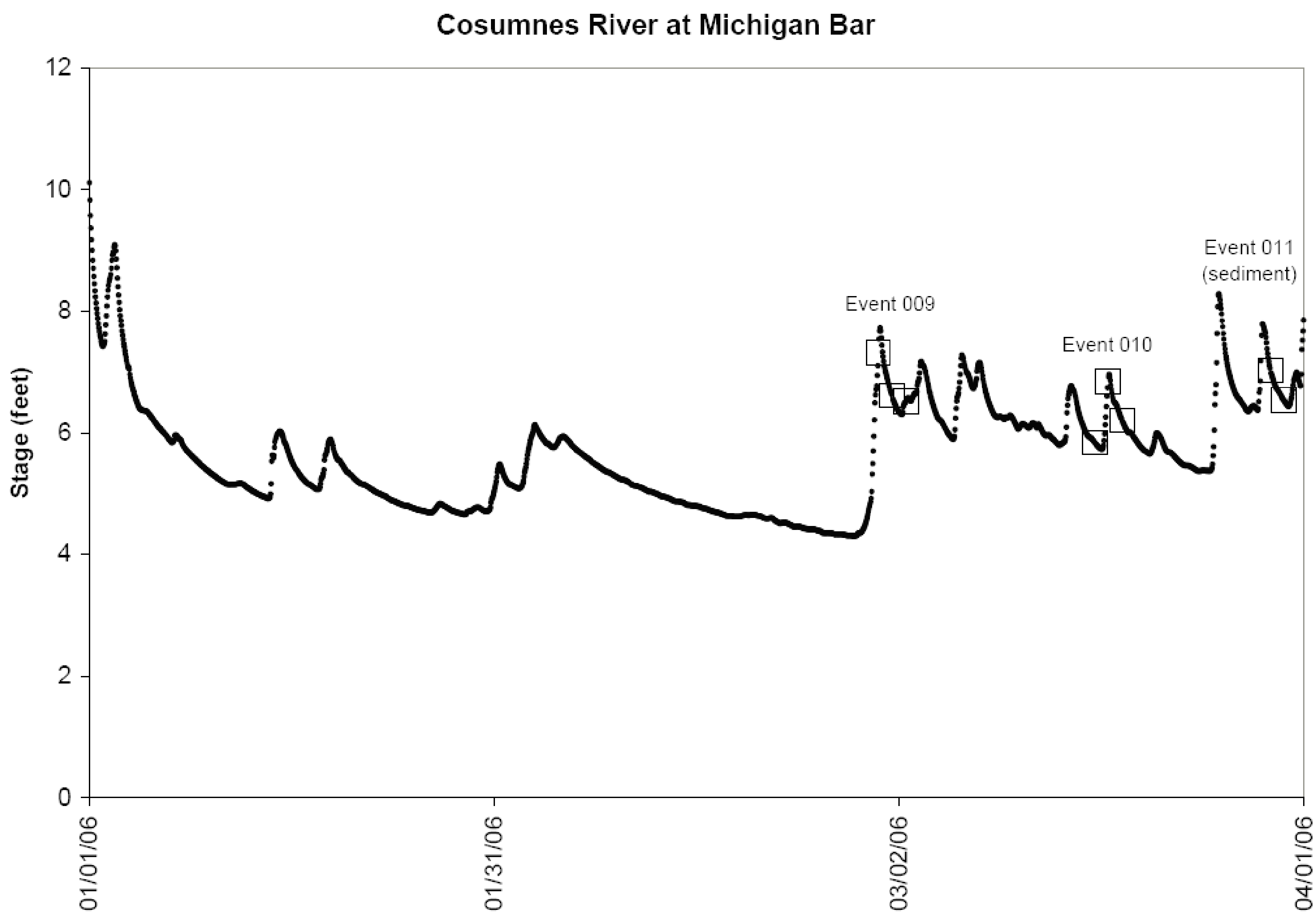
**b. East Sacramento Valley**



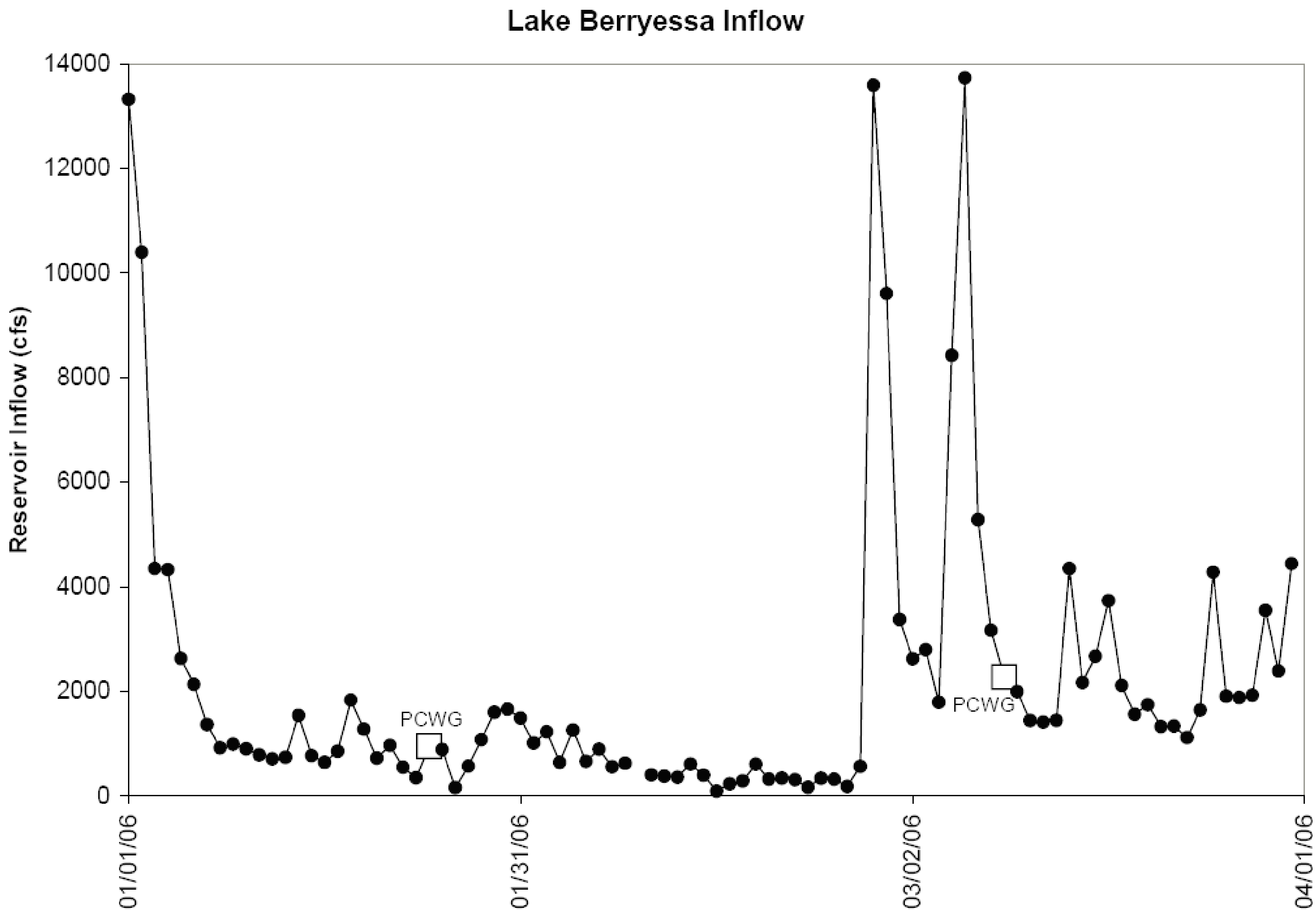
**c. West Sacramento Valley**



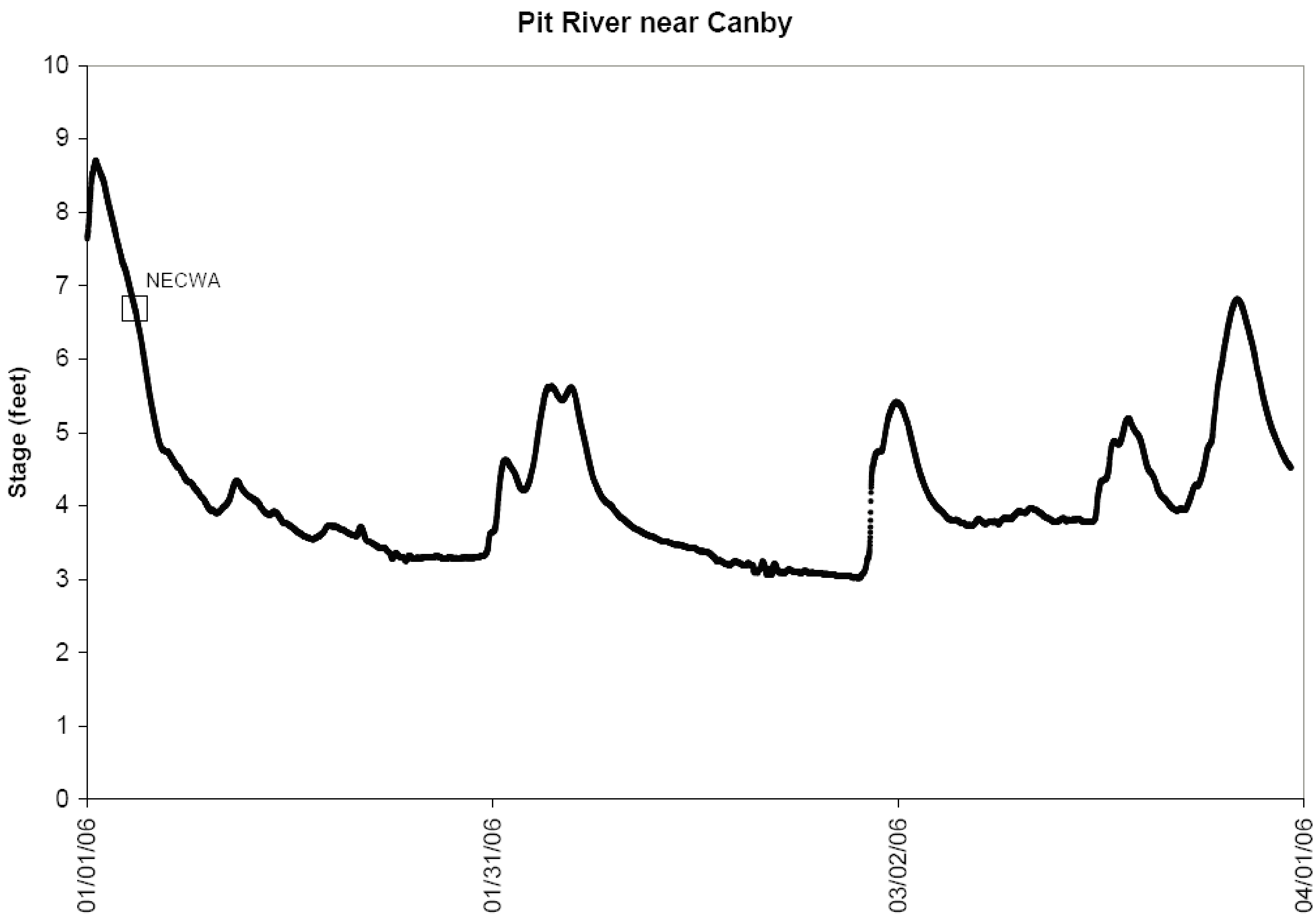
**d. Lower Sacramento Valley**



**e. Lake Berryessa (Reservoir Inflow)**



**f. 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 23). 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 Table 15 and Table 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, and 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 2006 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 |
| Boron, dissolved | (700 as total) | ug/L | NA |
| Boron, total | 700 | ug/L | UN Ag Supply |
| Bromacil | NA | ug/L | NA |
| Cadmium, dissolved | hardness dependent(5) | ug/L | CTR |
| Carbofuran | 0.4 | ug/L | Basin Plan |
| Chlorpyrifos | 0.014 | ug/L | DFG Recommended Criterion |
| Color | 15(4) | CU | CA 1˚ MCL |
| Conductivity | 900 | uS/cm | CA Recommended 2˚ MCL |
| Copper, dissolved | hardness dependent(5) | 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') | .00059 | ug/L | CTR |
| Diazinon | 0.05 | ug/L | Basin Plan Amendment |
| Dieldrin | 0.00014 | ug/L | CTR |
| Dimethoate | NA | ug/L | NA |
| Discharge | NA | CFS | NA |
| Dissolved Oxygen | 5 | mg/L | Basin Plan |
| Diuron | NA | ug/L | NA |
| E. coli (3) | 235 | MPN/100mL | Basin Plan Amendment |
| Endrin | 0.036 | ug/L | CTR |
| Fecal coliform | 400 | MPN/100mL | Basin Plan |
| Glyphosate | 700 | ug/L | CA 1˚ MCL |
| Hardness | NA | mg/L | NA |
| Lead, dissolved | hardness dependent(5) | ug/L | CTR |
| Malathion | 0.1 | ug/L | Basin Plan |
| Molinate | 10 | ug/L | Basin Plan |
| Nickel, dissolved | hardness dependent(5) | ug/L | CTR |
| Nitrate, as N | 10 | mg/L | CA 1˚ MCL |
| Nitrite, as N | 1 | mg/L | CA 1˚ MCL |
| Orthophosphate, dissolved, as P | NA | mg/L | NA |
| Oryzalin | NA | ug/L | NA |
| Oxamyl | 50 | ug/L | CA 1˚ MCL |
| Paraquat | NA | ug/L | NA |
| Parathion, Methyl | 0.13 | ug/L | Basin Plan |
| pH | 6.5-8.5 | -log[H+] | Basin Plan |
| Phosphorus as P, Total | NA | mg/L | NA |
| 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 |

(table continues on following page)

Table 15 (continued from preceding page). Adopted Basin Plan and California Toxics Rule Objectives for Analytes Monitored for the 2006 Storm Season

| Analyte | Most Stringent Objective(1) | Units | Objective Source(2) |
|---|---|---|---|
| Total Dissolved Solids | 500 | mg/L | CA Recommended 2˚ MCL |
| Total Kjeldahl Nitrogen | NA | mg/L | NA |
| Total Organic Carbon | NA | mg/L | NA |
| 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 |
| velocity | NA | ug/L | NA |
| Zinc, dissolved | hardness dependent(5) | ug/L | CTR |

(1) For analytes with more than one limit or averaging basis, 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) Adopted by the Water Board but not yet approved by State Water Resources Control Board

(4) Applied only to treated drinking water.

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

**Table 16. Unadopted Water Quality Limits for Analytes Monitored for the 2006 Storm Season**

| Analyte | Unadopted Limit(1) | Units | Limit Source |
|---|---|---|---|
| Boron, total | 700 | ug/L | UN Agricultural Supply Goal |
| Bromacil | NA | ug/L | NA |
| Cadmium, dissolved | hardness dependent | ug/L | CTR |
| Cadmium, total | (as dissolved) | ug/L | CTR |
| Carbofuran | 0.4 | ug/L | Basin Plan |
| Chlorpyrifos | 0.014 | ug/L | DFG Recommended Criterion |
| Chromium, dissolved | hardness dependent | ug/L | CTR |
| Chromium, total | (as dissolved) | ug/L | CTR |
| Color | NA (15) | CU | CA 1˚ MCL |
| Conductivity | 900 | uS/cm | CA Recommended 2˚ MCL |
| Copper, dissolved | hardness dependent | ug/L | CTR |
| Copper, total | (as dissolved) | ug/L | CTR |
| DDD(o,p') | 0.00083 | ug/L | CTR |
| DDD(p,p') | 0.00083 | ug/L | CTR |
| DDE(o,p') | 0.00059 | ug/L | CTR |
| DDE(p,p') | 0.00059 | ug/L | CTR |
| DDT(o,p') | .00059 | ug/L | CTR |
| DDT(p,p') | .00059 | ug/L | CTR |
| Diazinon | 0.05 | ug/L | Basin Plan Amendment |
| Diazinon | 0.17 | ug/L | USEPA 2006 |
| Dieldrin | 0.00014 | ug/L | CTR |
| Dimethoate | NA | ug/L | NA |
| Discharge | NA | CFS | NA |
| Dissolved Oxygen | 5 | mg/L | Basin Plan |

Table continues on following page…

Table 16 (*continued from previous page*). Unadopted Water Quality Limits for Analytes Monitored for the 2006 Storm Season

| Analyte | Unadopted Limit[1] | Units | Limit Source |
|---|---|---|---|
| Diuron | NA | ug/L | NA |
| E. coli | 235 | MPN/100mL | Basin Plan Amendment |
| Endrin | 0.036 | ug/L | CTR |
| Fecal coliform | 400 | MPN/100mL | Basin Plan |
| Glyphosate | 700 | ug/L | CA 1˚ MCL |
| Hardness | NA | mg/L | NA |
| Lead, dissolved | hardness dependent | ug/L | CTR |
| Lead, total | (as dissolved) | ug/L | CTR |
| Malathion | 0.1 | ug/L | Basin Plan |
| Molinate | 10 | ug/L | Basin Plan |
| Nickel, dissolved | hardness dependent | ug/L | CTR |
| Nickel, total | (as dissolved) | ug/L | CTR |
| Nitrate+Nitrite, as N | 10 | mg/L | CA 1˚ MCL |
| Orthophosphate, dissolved, as P | NA | mg/L | NA |
| Oryzalin | NA | ug/L | NA |
| Oxamyl | 50 | ug/L | CA 1˚ MCL |
| Paraquat | NA | ug/L | NA |
| Parathion, Methyl | 0.13 | ug/L | Basin Plan |
| pH | 6.5-8.5 | -log[H+] | Basin Plan |
| Phosphorus as P, Total | NA | mg/L | NA |
| Selenium, dissolved | (5 as total) | ug/L | CTR |
| Selenium, total | 5 | ug/L | Basin Plan |
| Silver dissolved | hardness dependent | ug/L | CTR |
| Silver, total | (as dissolved) | ug/L | CTR |
| Simazine | 4 | ug/L | CA 1˚ MCL |
| Temperature | narrative | ug/L | Basin Plan |
| Thallium, total | 1.7 | ug/L | CTR |
| Thiobencarb | 1 | ug/L | Basin Plan |
| Diazinon | 0.17 | ug/L | National Criterion |
| Total Dissolved Solids | 500 | mg/L | CA Recommended 2˚ MCL |

**Table 17. Analytes Monitored for the 2006 Storm Season Without Applicable Adopted or Unadopted Limits**

| Analytes | |
|---|---|
| Alkalinity | Orthophosphate, dissolved, as P |
| Bromacil Ammonia, Total as N | Oryzalin |
| Antimony, dissolved | Oxamyl |
| Dimethoate | Paraquat |
| Discharge | Phosphorus as P, Total Parathion, Methyl |
| Dissolved Oxygen | pH |
| Diuron | Total Kjeldahl Nitrogen |
| Hardness E. coli | Total Organic Carbon |

### Toxicity and Pesticide Results

Statistically significant toxicity was observed in seven water quality samples collected from five different sites from January through March 2006. Significant toxicity to the algae *Selenastrum* was observed only at Ulatis Creek at Brown Road. Significant toxicity to *Ceriodaphnia* was observed at five sites (Burch Creek at Woodson Avenue Bridge, MgGaugh Slough at Finley Road East, Dry Creek at Alta Mesa Road, Gilsizer Slough at George Washington Road, and Ulatis Creek at Brown Road). No statistically significant toxicity to *Hyalella azteca* was observed in any of the sediment quality samples collected from thirteen different sites in March 2006. 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 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 any required follow-up testing and results are provided in Appendix D. The results of these reports are summarized below.

#### *Burch Creek at Woodson Ave. Bridge (BRCWB), 02/28/2006*

The Coalition observed complete mortality to *Ceriodaphnia* at the Burch Creek within 48 hours of test initiation. Several follow-up actions were implemented to further evaluate the observed toxicity to *Ceriodaphnia* in the Burch Creek sample.

Serial dilution tests were initiated on March 4, 2006 to determine the magnitude of toxicity present in the original Burch Creek sample. The results of this test indicated that toxicity was not persistent in the original sample, suggesting rapid degradation of the primary cause of toxicity.

Pesticide-targeted Toxicity Investigation Evaluations (TIE) were initiated with the Burch Creek sample on March 4, 2006 to investigate the cause of toxicity. TIEs were pesticide-targeted because the sample event was associated with the end of the dormant spray application period it was considered that there was a high probability that organophosphate pesticides were causing or contributing to the toxicity. The TIE treatments used included centrifugation to remove causes of toxicity strongly adsorbed to particulates, $C_8$-Solid Phase Extraction to remove non-polar organic compounds (which includes most pesticides), and Piperonyl butoxide (PBO), a treatment that causes inactivation of the Cytochrome P-450 enzyme system of the test organisms. Because toxicity was not persistent in the 100% baseline sample, none of the treatments resulted in reduction or removal of the observed toxicity. Therefore, the TIEs initiated did not provide a definitive result as to the cause of toxicity in the original sample. However, the results of the TIE did indicate a rapid breakdown or loss of the causative toxicant(s) in the intervening 4 days between sample collection and initiation of the TIEs. In combination with the previous results, this suggests that the causative toxicant may have a short hydrolysis half-life. Due to the lack of persistence of toxicity, this TIE provided no additional evidence of the cause of toxicity in the Burch Creek sample.

The results of chemical analyses were evaluated for potential causes of toxicity. Sample bottles intended for pesticide analysis in the Burch Creek sample were received broken by the laboratory and therefore no pesticide analyses were conducted. The lack of toxicity persistence in the original sample suggests that pesticides potentially responsible for toxicity would have a short half-life and would likely have been applied within a few days of this sample date.

Concentrations of trace metals did not exceed objectives based on protection of aquatic life and did not approach concentrations expected to result in acute toxicity to *Ceriodaphnia*. Other detected analytes are not acutely toxic to Ceriodaphnia and are unlikely to be significant causes or contributors to toxicity. Based on these results, the primary cause(s) of the observed toxicity in the Burch Creek sample remains unknown.

Resampling of Burch Creek was not conducted for this event because the initial samples were collected for a specific storm event.

Recent pesticide applications were investigated with the assistance of the county Agriculture Commissioner, and local growers were contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of organophosphate pesticides confirmed in the Burch Creek drainage were suspected to be a potential cause of the toxicity, this could not be confirmed through chemical analysis due to breakage of the original sample during shipping.

#### *McGaugh Slough (MCGSL), 02/28/2006*

The Coalition observed 70 percent mortality to *Ceriodaphnia* at McGaugh Slough within 48 hours of test initiation. Mortality was 93.3% at the completion of this test. Several follow-up actions were implemented to further evaluate the observed toxicity to *Ceriodaphnia* in the McGaugh Slough sample.

Pesticide-targeted Toxicity Investigation Evaluations (TIE) were initiated with the McGaugh Slough samples on March 4, 2006 to investigate the cause of toxicity. Toxicity was not persistent in the 100% baseline sample, and none of the treatments resulted in reduction or removal of toxicity. Therefore, the TIEs initiated did not provide a definitive result as to the cause of toxicity in the original sample. The results of the TIE did indicate a rapid breakdown or loss of the causative toxicant(s) between sample collection and initiation of the TIEs, suggesting that the causative toxicant may have a short hydrolysis half-life. Due to the lack of persistence of toxicity, this TIE provided no additional evidence of the cause of toxicity in the McGaugh Slough sample.

The only pesticide detected in the McGaugh Slough sample was simazine (0.224 ug/L). Simazine is an herbicide that exhibits low toxicity to invertebrates. The average 48-h LC50 for daphnids is >1,000 ug/L, so it is reasonable to conclude that simazine was not the cause of *Ceriodaphnia* toxicity. No other organophosphate, organochlorine, triazine, or pyrethroid pesticides were detected in the McGaugh Slough sample. These results indicate that the cause of the toxicity observed in the McGaugh Slough sample is almost certainly not one of these pesticides. Recent pesticide applications in this drainage were also investigated with the assistance of the county Agriculture Commissioner, and local pear growers were also contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of chlorpyrifos (Lorsban) in the McGaugh Slough drainage were suspected to be a potential cause of the toxicity, this pesticide was not detected in the samples. Concentrations of trace metals did not exceed objectives based on protection of aquatic life and did not approach concentrations expected to result in acute toxicity to *Ceriodaphnia*. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. Based on these results, the primary cause(s) of the observed toxicity in the McGaugh Slough sample remains unknown.

### *Ulatis Creek at Brown Road*

In toxicity tests conducted with the green alga *Selenastrum*, the Coalition observed a reduction in algal cell density of 37% compared to the control. The observed toxicity (<50% reduction compared to control) did not trigger initiation of Toxicity Identification Evaluation (TIE) procedures or serial dilution tests.

Pesticides detected in the Ulatis Creek sample included chlorpyrifos (0.023 ug/L and <0.005 ug/L in replicate samples), and diazinon (0.076 ug/L and 0.081 ug/L in replicate samples). Both of these are organophosphate pesticides with relatively low toxicity reported to algae (>10 ug/L), so it is reasonable to conclude that these pesticides were not the cause of the observed *Selenastrum* toxicity. No toxicity was observed in this sample to *Ceriodaphnia*, which are much more sensitive to these pesticides. No other organophosphate or organochlorine pesticides were detected in this sample. These results indicate that the cause of the toxicity observed in the Ulatis Creek sample collected on 2/28/2006 is almost certainly not one of these pesticides. Triazines and other herbicides were not analyzed in the Ulatis Creek sample. However, several herbicides (simazine, diuron, and bromacil) were detected in samples collected from other Solano/Yolo sampling locations (none were associated with toxicity), indicating that herbicides were likely also being applied in the Ulatis Creek drainage prior to this sampling event. This was subsequently confirmed by the county Agriculture Commissioner through review of the pesticide use records for the Ulatis Creek drainage. Concentrations of trace metals did not exceed objectives based on protection of aquatic life and did not approach concentrations expected to result in acute toxicity to *Selenastrum*. Other detected analytes are not acutely toxic to *Selenastrum* and are unlikely to be significant causes or contributors to toxicity. Based on these results, the primary cause(s) of the observed toxicity in the Ulatis Creek sample remains unknown.

### *Burch Creek at Woodson Ave. Bridge (BRCWB), 03/17/2006*

In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in survival of 40% compared to the control. No TIEs of serial dilution tests were triggered by this result. Additional samples were also collected at Burch Creek at Rawson Road (BRCRR), upstream from the Burch Creek at Woodson Avenue Bridge site. Because significant toxicity was observed in the Burch Creek at Woodson Avenue Bridge sample, the additional upstream samples were tested for *Ceriodaphnia* toxicity and organophosphate pesticides. The *Ceriodaphnia* acute toxicity test was initiated with the BRCRR sample on March 22, 2006.

Samples collected from Burch Creek were also analyzed for organophosphate, organochlorine, triazine, and pyrethroid pesticides; trace metals; nutrients; *E. coli* bacteria; and conventional and physical parameters. The only pesticide detected in the Burch Creek samples was simazine (0.013 ug/L). Simazine is an herbicide that exhibits low toxicity to invertebrates. The average 48-h LC50 for daphnids is >1,000 ug/L, so it is reasonable to conclude that simazine was not the cause of *Ceriodaphnia* toxicity. No other organophosphate, organochlorine, triazine, or pyrethroid pesticides were detected in the BRCWB sample. These results indicate that the cause of the toxicity observed in the BRCWB sample collected on 3/17/2006 is almost certainly not one of these pesticides. Concentrations of trace metals did not exceed objectives based on protection of aquatic life and did not approach concentrations expected to result in acute toxicity to *Ceriodaphnia*. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity.

Because significant toxicity was observed to *Ceriodaphnia* in the BRCWB sample (40% reduction in survival compared to control), the additional upstream samples were tested for

*Ceriodaphnia* toxicity and organophosphate pesticides. The *Ceriodaphnia* acute toxicity test was initiated with the BRCRR sample on March 22, 2006, and caused no *Ceriodaphnia* toxicity (100% survival). No organophosphate pesticides were detected in the Burch Creek samples.

The magnitude of observed toxicity at BRCWB did not trigger TIEs, and based on chemistry results, the primary source(s) and cause(s) of the observed toxicity in the BRCWB sample remain unknown. However, the results indicate that the source of toxicity was between the Rawson Road and Woodson Bridge locations on Burch Creek, and suggest that a non-agricultural source (e.g., the old landfill below Rawson Road) was the likely cause or significant contributor to observed toxicity in lower Burch Creek. To more clearly focus on agricultural sources, all future samples in this drainage will be collected from the site above Rawson Road, as agreed with Water Board staff.

#### *Gilsizer Slough at George Washington Rd (GILSL), 03/16/2006*

In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in survival of 20% compared to the control. No TIEs of serial dilution tests were triggered by this result. The only pesticide detected in the *GILSL* sample was diazinon (0.032 ug/L). Diazinon is an insecticide that exhibits toxicity to invertebrates at low concentrations. However, the average 96-h LC50 for *Ceriodaphnia* is ~0.4 ug/L, so it is reasonable to conclude that diazinon was not the cause of *Ceriodaphnia* toxicity in the GILSL sample. No other organophosphate pesticides were detected in the GILSL sample. These results indicate that the cause of the toxicity observed in the GILSL sample is almost certainly not an organophosphate pesticide. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. The magnitude of observed toxicity did not trigger TIEs, and based on chemistry results, the primary cause of the observed low toxicity in the GILSL sample remains unknown.

#### *Ulatis Creek at Brown Road (UCBRD), 03/16/2006*

In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in survival of 25% compared to the control. The only pesticide detected in the UCBRD sample was diazinon (0.026 ug/L). Diazinon is an insecticide that exhibits toxicity to invertebrates at low concentrations. However, the average 96-h LC50 for *Ceriodaphnia* is ~0.4 ug/L, so it is reasonable to conclude that diazinon was not the cause of *Ceriodaphnia* toxicity in the UCBRD sample. No other organophosphate or organochlorine pesticides were detected in the UCBRD sample. These results indicate that the cause of the toxicity observed in the UCBRD sample is almost certainly not in one of these pesticides classes. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. The magnitude of observed toxicity did not trigger TIEs, and based on chemistry results, the primary cause(s) of the observed toxicity in the GILSL sample remains unknown.

#### *Dry Creek at Alta Mesa Road (DCGLT), 03/16/2006*

In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in survival of 40% compared to the control. No pesticides were analyzed in the DCGLT sample. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. The magnitude of observed toxicity did not trigger TIEs, and based on chemistry results, the primary cause(s) of the observed toxicity in the DCGLT sample remains unknown.

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

| Site | Date | | Units | Result |
|---|---|---|---|---|
| Burch Creek at Woodson Ave Bridge | 02/28/2006 | *Ceriodaphnia* survival | % of Control | 0.0% |
| | | Pesticides | ug/L | Not analyzed due to shipping damage. |
| McGaugh Slough at Finley Road East | 02/28/2006 | *Ceriodaphnia* survival | % of Control | 6.7% |
| | | Simazine | ug/L | 0.224 |
| | | OP pesticides, OC pesticides, other triazines, and pyrethroids | ug/L | Not Detected |
| Ulatis Creek at Brown Road | 02/28/2006 | *Selenastrum* Cell density | % of Control | 63% |
| | (replicate) | *Selenastrum* Cell density | % of Control | 57% |
| | | Chlorpyrifos | ug/L | 0.0225(1) |
| | | Diazinon | ug/L | 0.0764(1) |
| | | Other OP pesticides and OC pesticides | ug/L | Not Detected |
| | | Triazines and other herbicides | ug/L | Not measured |
| | | Trace metals | ug/L | detected, below WQOs |
| Burch Creek at Woodson Ave Bridge | 03/17/2006 | *Ceriodaphnia* survival | % of Control | 60% |
| | | Simazine | ug/L | .0132(2) |
| | | OP pesticides, OC pesticides, other triazines, and pyrethroids | ug/L | Not Detected |
| | | Trace metals | ug/L | Detected below WQOs |
| Burch Creek west of Rawson Rd. | 03/17/2006 | *Ceriodaphnia* survival | % of Control | 111% (not significant) |
| Dry Creek at Alta Mesa Road | 03/16/2006 | *Ceriodaphnia* survival | % of Control | 60% |
| | | Pesticides | ug/L | Not Measured |
| | | Trace metals | ug/L | Not Measured |
| Gilsizer Slough | 03/16/2006 | *Ceriodaphnia* survival | % of Control | 80% |
| | | Diazinon | ug/L | .032(3) |
| | | Other OP and OC pesticides | ug/L | Not Detected |
| Ulatis Creek at Brown Road | 03/16/2006 | *Ceriodaphnia* survival | % of Control | 75% |
| | | Diazinon | ug/L | .0259 |
| | | Other OP pesticides | ug/L | Not Detected |

(1) This concentration is not toxic to *Selenastrum*

(2) This concentration of simazine is not acutely toxic to *Ceriodaphnia*

(3) This concentration of diazinon is not acutely toxic to *Ceriodaphnia*

### Pesticides Detected in Coalition Monitoring

Pesticides were analyzed in 114 individual water column samples collected from January through March 2006. Analyses were conducted for organophosphates, carbamates, organochlorines, triazines, glyphosate, paraquat, and pyrethroid pesticides. Within these categories, nine different pesticides were detected in 39 separate samples collected for Coalition monitoring conducted January through March 2006 (atrazine, bromacil, chlorpyrifos, DDE, diazinon, dimethoate, diuron, oryzalin, and simazine). All detected pesticide concentrations for Coalition monitoring conducted between January and March 2006 are summarized in Table 19.

- Detected pesticides did not appear to be the cause of toxicity in any samples, and no pesticides were detected in 66% of samples analyzed for pesticides.
- Atrazine was detected in one sample from North Canyon Creek (3/16/2006) and did not exceed the California 1˚ MCL (1 ug/L).
- Bromacil was detected in two samples. Detected concentrations were below levels expected to cause toxic effects to test species and detections were not associated with toxicity. There is no adopted objective for bromacil.
- Chlorpyrifos was detected in only one sample (Ulatis Creek, 2/28/2006). The detected concentration (0.0225 ug/L) exceeded the recommended California Department of Fish and Game criterion of 0.014 ug/L (Siepmann and Finlayson 2000), but was qualified as *estimated* based on non-detection in a replicate sample. There was no toxicity to *Ceriodaphnia* in the associated sample, and the reported concentration is not likely to be the cause of the reduced growth of *Selenastrum* observed in the associated sample.
- DDE was detected in two samples from two different sites. DDE is breakdown product of the organochlorine pesticide DDT. Both detected concentrations exceeded the California Toxics Rule criterion (.00059 ug/L) for DDE. The detected concentrations of DDE are well below concentrations expected to be acutely toxic to aquatic organisms.
- Diazinon was detected in ten samples from eight different sites. Detected concentrations exceeded the site-specific Basin Plan objective of 0.05 ug/L in five samples, but exceeded the revised National criterion (0.17 ug/L, USEPA 2006) in only one sample. Two samples associated with *Ceriodaphnia* toxicity were below the National criterion and Basin Plan objective, and below concentrations expected to cause *Ceriodaphnia* mortality (Table 18).
- Dimethoate was detected in two samples and was not associated with any observed sample toxicity. There is no adopted objective for dimethoate.
- Diuron was detected in eight samples. Detected concentrations were below levels expected to cause toxic effects to test species and detections were not associated with toxicity. There is no adopted objective for diuron.
- Oryzalin was detected in two samples. Detected concentrations were below levels expected to cause toxic effects to test species and detections were not associated with toxicity. There is no adopted objective for diuron.
- Simazine was the most common of the pesticides detected (in 25 samples from 16 different sites). Detected concentrations were below levels expected to cause toxic effects to test species. Simazine exceeded the California 1˚ MCL of 4 ug/L in one sample in Stony Creek (3/1/2006).
- Pyrethroid pesticides were not detected in any samples.
- Paraquat and glyphosate were not detected in any samples.

## Table 19. Pesticides Detected in Coalition Monitoring, January – March 2006

| Site | Date Sampled | Analyte | Result[1] (ug/L) | Water Quality Limits[2] | |
|---|---|---|---|---|---|
| Andersen Creek at Ash Creek Road | 03/17/2006 | Simazine | .0109[3] | 4 | CA Primary MCL |
| Big Indian Creek at Bridge | 03/01/2006 | Simazine | .778 | 4 | CA Primary MCL |
| Burch Creek at Woodson Ave Bridge | 03/17/2006 | Simazine | .0132 | 4 | CA Primary MCL |
| Butte Creek at Gridley Rd Bridge | 03/17/2006 | Simazine | .0198 | 4 | CA Primary MCL |
| Butte Slough at Pass Road | 03/18/2006 | Simazine | J .0084 | 4 | CA Primary MCL |
| Colusa Drain near Maxwell Road | 03/01/2006 | Diazinon | .0805 | 0.05 | Basin Plan |
| | | Diuron | 2.9 | — | NA |
| | | Oryzalin | J .51 | — | NA |
| | | Simazine | 1.31 | 4 | CA Primary MCL |
| | 03/17/2006 | Simazine | .124 | 4 | CA Primary MCL |
| Coon Creek at Striplin Road | 02/28/2006 | Bromacil | J .35 | — | NA |
| | | Diuron | 1.1 | — | NA |
| | | Simazine | .0453 | 4 | CA Primary MCL |
| | 03/16/2006 | Diazinon | .0194 | 0.05;<br>0.17 | Basin Plan;<br>USEPA 2006 |
| | | Diuron | J 0.28 | — | NA |
| | | Simazine | .0419 | 4 | CA Primary MCL |
| Cosumnes River at Twin Cities Rd | 03/01/2006 | Simazine | .0406 | 4 | CA Primary MCL |
| | 03/16/2006 | Simazine | .0501 | 4 | CA Primary MCL |
| Gilsizer Slough | 02/28/2006 | Diazinon | .154 | 0.05<br>0.17 | Basin Plan<br>USEPA 2006 |
| | 03/16/2006 | Diazinon | .032 | 0.05;<br>0.17 | Basin Plan;<br>USEPA 2006 |
| McGaugh Slough at Finley Road East | 02/28/2006 | Simazine | .224 | 4 | CA Primary MCL |
| North Canyon Creek | 03/01/2006 | DDE(p,p') | .0072 | 0.00059 | CTR |
| | | Dimethoate | .0372 | — | NA |
| | 03/16/2006 | Atrazine | .0479 | 1 | CA Primary MCL |
| Pine Creek at Nord Gianella Road | 03/01/2006 | Simazine | .11 | 4 | CA Primary MCL |
| | 03/18/2006 | Simazine | .0151 | 4 | CA Primary MCL |
| Rough and Ready Pumping Plant | 02/28/2006 | DDE(p,p') | .007 | 0.00059 | CTR |
| | | Diuron | E 14[3] | — | NA |
| | | Simazine | .269 | 4 | CA Primary MCL |
| | 03/16/2006 | Diuron | J 0.27 | | |
| | | Simazine | .0252 | 4 | CA Primary MCL |
| Shag Slough at Liberty Island Bridge | 03/01/2006 | Simazine | .0417 | 4 | CA Primary MCL |
| | 03/16/2006 | Simazine | .0469 | 4 | CA Primary MCL |
| Stone Corral Creek | 03/01/2006 | Diazinon | .0142 | 0.05 | Basin Plan |
| | 03/17/2006 | Simazine | .0213 | 4 | CA Primary MCL |
| Stony Creek on Hwy 45 near Rd 24 | 03/01/2006 | Diazinon | .222 | 0.05;<br>0.17 | Basin Plan;<br>USEPA 2006 |
| | | Diuron | E 7.8[3] | — | NA |
| | | Oryzalin | 3.4 | — | NA |
| | | Simazine | ***4.71*** | 4 | CA Primary MCL |

Table continues on following page…

Table 19 (*Continued*). Pesticides Detected in Coalition Monitoring, January – March 2006

| Site | Date Sampled | Analyte | Result[(1)] (ug/L) | Water Quality Limits[(2)] | |
|---|---|---|---|---|---|
| Tule Canal at I-80 | 02/28/2006 | Dimethoate | .03 | — | NA |
| | | Diuron | 3.1 | — | NA |
| | | Simazine | .392 | 4 | CA Primary MCL |
| | 03/16/2006 | Diazinon | .0049[(3)] | 0.05; 0.17 | Basin Plan; USEPA 2006 |
| | | Simazine | .0227 | 4 | CA Primary MCL |
| Ulatis Creek at Brown Road | 02/28/2006 | Diazinon | .0764 | 0.05; 0.17 | Basin Plan; USEPA 2006 |
| | | (sample rep) | .0811 | | |
| | | Chlorpyrifos | .0225[(3)] | .014 | CDFG 2000 |
| | 03/16/2006 | Diazinon | .0259 | 0.05; 0.17 | Basin Plan; USEPA 2006 |
| Wadsworth Canal at South Butte Rd | 03/18/2006 | Diazinon | .0159 | 0.05; 0.17 | Basin Plan; USEPA 2006 |
| | | Simazine | .0396 | 4 | CA Primary MCL |
| Z Drain – Dixon RCD | 03/01/2006 | Bromacil | J .21 | — | NA |
| | | Diuron | 1.1 | — | 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); "CDFG" is the recommended criterion for protection of aquatic life developed by the California Department of Fish and Game for chlorpyrifos, It is provided as an unadopted "Advisory Objective" for evaluation of the potential aquatic life impacts of chlorpyrifos; "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 and dissolved oxygen, conductivity and total dissolved solids, boron, selenium, and *E. coli* bacteria, (Table 20).

### *pH*

pH was measured in 63 samples from 25 Coalition sites. 23 results were rejected from the first storm season sample event due to the use of unreliable field meters during this event. In the remaning samples, pH exceeded the Basin Plan maximum of 8.5 Standard Units (-log[$H^+$]) in 4 Coalition samples collected from 3 different sites from January through March, and was below the 6.5 minimum limit in two samples from two different sites. 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 there is less light and lower temperatures. Irrigation return flows may influence this variation primarily by increasing or decreasing instream temperatures, or by increasing available nutrients or organic matter. Another factor capable of affecting pH is snowmelt runoff, which is naturally low in pH. Snowmelt is the likely cause of low pH observed in the Middle Fork Feather River sample collected on March 16, 2006. The causes of elevated pH observed in other samples during the storm season has not been determined. The Coalition has since implemented an automatic resampling protocol to evaluate potential diurnal variation of pH in cases where it is observed to exceed Basin Plan limits.

#### *Dissolved Oxygen*

Dissolved oxygen was measured in 63 samples from 25 sites. Dissolved oxygen concentrations were above the Basin Plan minimum objective (5.0 mg/L) in all samples, and there were no exceedances for this parameter.

#### *E. coli bacteria*

*E. coli* bacteria were monitored in 44 samples from 24 sites. Coliform bacteria numbers exceeded the single sample maximum objectives for *E. coli* (235 MPN/100mL) in 15 samples from 14 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 the primary sources of *E. coli* and other bacteria in agricultural runoff and irrigation return flows.

#### *Conductivity and Total Dissolved Solids*

Conductivity was monitored in 63 samples from 25 sites. Conductivity exceeded the California recommended 2˚ MCL (900 uS/cm) for drinking water in 3 samples collected from 2 sites. Total dissolved solids (TDS) was monitored in 51 samples from 24 sites. TDS exceeded the California recommended 2˚ MCL (450 mg/L) for drinking water in 4 samples collected from three sites, including two that exceeded the conductivity objective (Stone Corral Creek and Z-Drain). The conductivity and TDS objectives are intended to apply to treated drinking water and are based on aesthetic acceptance by consumers of the water. Most of these exceedances (4 of 7) were observed at the Z-Drain/Dixon RCD site in the Solano/Yolo Subwatershed. This continues the pattern of exceedances of these parameters discussed in previous reports. Exceedances of these parameters were also observed at the Rough and Ready Pumping plant during one event.

#### *Nutrients*

Nutrients monitored during the 2006 storm season included nitrate+nitrite nitrogen, total Kjeldahl nitrogen (TKN), ammonia, total phosphorus, and dissolved orthophosphate. Nutrients were monitored in 41 samples at 20 different Coalition sites, and did not exceed water quality objectives at any sites in the 2006 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.

#### *Trace Metals*

Total and dissolved trace metals required for Phase 2 *ILP* monitoring included arsenic, boron, cadmium, copper, lead, nickel, selenium, and zinc. Trace metals were monitored in 78 samples collected from 22 Coalition sites. Selenium exceeded the Basin Plan objective of 5 ug/L in one sample from Z-drain in the Solano/Yolo subwatershed, and was the only trace metal observed to exceed adopted Basin Plan objectives or CTR criteria in any sample. Boron exceeded the unadopted UN Agricultural Supply Goal (700 ug/L) at Solano/Yolo subwatershed two sites during the first storm season sample. Boron is naturally high in the soil and groundwater in this drainage. These exceedances are being evaluated and addressed by a regional management plan for Yolo County.

**Table 20. Other Physical, Chemical, and Microbiological Parameters Observed to Exceed Numeric Objectives in Coalition Monitoring, January – March 2006**

| Site | Date | Analyte | Units | WQO | WQO Source(1) | Result |
|---|---|---|---|---|---|---|
| Andersen Creek at Ash Creek Road | 02/28/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2400 |
| Big Indian Creek at Bridge | 03/01/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 580 |
| Burch Creek at Woodson Ave Bridge | 02/28/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2400 |
| Cappel Cr. upstream from Lake Berryessa | 1/24/2006 | PH | -log[H+] | 6.5-8.5 | Basin Plan | 6.0 |
| Colusa Drain near Maxwell Road | 03/01/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2400 |
| | 03/17/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 520 |
| Coon Creek at Striplin Road | 02/28/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2400(5) |
| Dry Creek at Alta Mesa Road | 03/01/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2400 |
| Gilsizer Slough | 02/28/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2400(5) |
| McGaugh Slough at Finley Road East | 02/28/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2000(5) |
| Middle Fork Feather R. at County Rd A-23 | 03/16/2006 | PH | -log[H+] | 6.5-8.5 | Basin Plan | 6.49 |
| North Canyon Creek | 03/01/2006 | PH | -log[H+] | 6.5-8.5 | Basin Plan | 8.74 |
| Pine Creek at Nord Gianella Road | 03/01/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 1700 |
| Rough and Ready Pumping Plant (RD 108) | 02/28/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 650(5) |
| | 03/16/2006 | TDS | mg/L | 500 | CA 2˚ MCL(2) | 540 |
| Stone Corral Creek | 03/01/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2400 |
| | 03/17/2006 | EC | uS/cm | 900 | CA 2˚ MCL(2) | 940 |
| | | PH | -log[H+] | 6.5-8.5 | Basin Plan | 9.12 |
| | | TDS | mg/L | 500 | CA 2˚ MCL(2) | 600 |
| Tule Canal at I-80 | 02/28/2006 | Boron | ug/L | 700 | UN Ag Goal(3) | 740, 760(4) |
| | | E. Coli | MPN/100mL | 235 | Basin Plan | 2400(5) |
| Ulatis Creek at Brown Road | 02/28/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 2400 |
| Wadsworth Canal at South Butte Rd | 03/02/2006 | E. Coli | MPN/100mL | 235 | Basin Plan | 610 |
| Z Drain – Dixon RCD | 03/01/2006 | Boron | ug/L | 700 | UN Ag Goal(3) | 790, 740(4) |
| | | EC | uS/cm | 900 | CA 2˚ MCL(2) | 1100 |
| | | Selenium | ug/L | 5 | Basin Plan, CTR | 6 |
| | | TDS | mg/L | 500 | CA 2˚ MCL(2) | 620 |
| | 03/16/2006 | EC | uS/cm | 900 | CA 2˚ MCL(2) | 1113 |
| | | PH | -log[H+] | 6.5-8.5 | Basin Plan | 8.9 |
| | | TDS | mg/L | 500 | CA 2˚ MCL(2) | 650 |
| | 3/30/2006 | PH | -log[H+] | 6.5-8.5 | Basin Plan | 8.85 |

(1) Sources of adopted objectives are the Central Valley Basin Plan and the California Toxics Rule (CTR).
(2) Unadopted limit, California recommended secondary MCL
(3) Unadopted limit, United Nations Agricultural Supply Goal
(4) Replicate sample result
(5) Qualified as *estimated* due to hold time exceedance.

# Summary of Management Practices

### COALITION STRATEGY

The Coalition on May 10, 2005 sent a "Management Practices Action Plan" to the Chairmen of the Water Boards (provided in Appendix G). This letter describes the aggressive approach that the Coalition has and will undertake to ensure the timely implementation of management practices in the Sacramento River Basin. Based upon the cumulative results at each site, the Coalition will determine the appropriate level of outreach and education with farmers and ranchers in the drainage area, as well as with other potential dischargers. This approach is consistent with the following Coalition (and *ILP*) monitoring objectives requiring: 1) determination of the degree of implementation of management practices to reduce discharge of specific wastes that impact water quality, and 2) evaluation of compliance with existing narrative and numeric water quality objectives to determine if additional implementation of management practices are necessary.

Pesticide treatments, in particular dormant orchard applications, are made in a relatively narrow time period (January, February). When or if toxicity is observed and attributed to dormant season pesticides, those results are not known with certainty until after such treatments are completed in the Sacramento Valley. Hence, recommendations for management practices to mitigate the problems must be promoted to growers and crop advisors prior to the following seasonal use of dormant spray applications (September through December). This will ensure that this information is fresh in growers' minds prior to decisions being made on dormant season applications and mitigation measures.

The Coalition plans to employ a broad strategy to ensure this approach is both effective and efficient, focusing on both general and direct communications with Coalition participants, tracking management practices implementation, and evaluating the effectiveness of management practices. The Coalition will soon convene a subcommittee comprised of pest control advisors, growers, commodity groups, farm advisors, county farm bureau representatives, resource conservation district representatives, agricultural commissioners and other Coalition partners to develop the strategy. The following is a general outline that will guide strategy development:

#### Communications

1. General Communications:
   - Clearly explain responsibility of Coalition representatives and Coalition members as it pertains to follow-up on analytical results
   - Distribute to current participants throughout entire watershed as follow-up to the monitoring and reporting program plan flyer
   - Develop direct communications with regulatory board members explaining strategy
2. Focused Communications Based upon sampling results, Implementation Plan, WER Section 3.1
   - Use sampling results
   - Identify growers upstream in appropriate drainage area
   - Invite growers to workshop through direct mail

- Clearly explain incentives for participation (e.g., financial, regulatory)
- Invite pesticide registrants
- Invite representatives from relevant commodity groups

#### Tracking Management Practices Implementation

- Use workshop as opportunity to conduct survey in consultation with commodity group and registrant representatives
- Develop GIS component for management practices survey results
- Use results of initial workshop to engage additional commodity groups (e.g., Almond Board, Canning Peach Association, and Dried Plum Board) in the development of similar workshops related to historical results and current trends
- Encourage commodity group to utilize publication(s) to communicate with similar commodity growers in other regions of the Sacramento Valley regarding content and outcomes of workshops
- Utilize Watershed Coalition News, Irrigation Districts and Farm Bureau newsletters to explain management practices outreach efforts

#### Evaluate Effectiveness of Management Practices

- Develop evaluation framework with reasonable expectations
- Coordinate with Coalition sampling program

### DIAZINON – TOTAL MAXIMUM DAILY LOAD

Landowner and crop advisor outreach was conducted in fall and winter 2005 prior to the dormant season sprays initiating in December 2005 and January 2006. These outreach presentations focused on the diazinon label changes and the finalized diazinon TMDL. Also included was information on available Best Management Practice options to protect surface waters from potential impacts of dormant season runoff of alternatives to diazinon, specifically pyrethroid insecticides. Presentations were given at the following events:

| Date | Location/Event | Attendance |
|---|---|---|
| Sept. 22 | Sacramento: PAPA CE meeting: growers/PCAs | 150 |
| Nov. 3 | Woodland: CAPCA CE Meeting: PCAs | 60 |
| Nov. 3 | Yuba City: Sutter Co. Ag Commissioner CE mtg: growers | 35 |
| Nov. 9 | Yuba City: Sutter Co. Ag Commissioner CE mtg: growers | 45 |
| Nov. 17 | Woodland: Western Plant Health Assn CE conference: PCAs | 60 |
| Dec. 7 | Glenn: Glenn Co. Ag Commissioner CE Mtg: growers | 75 |
| Dec. 8 | Colusa: Grower CE mtg: Growers, PCAs | 45 |
| Jan. 27 | Woodland: Yolo County Ag Commissioner. CE Mtg: growers | 75 |
| Feb. 28 | Chico: PAPA CE Meeting: PCAs/ Growers | 150 |

In 2006, a similar outreach effort is planned with growers and PCAs with presentations planned for meetings organized by: County Agricultural Commissioners in Butte, Sutter, Colusa, Yolo and Glenn counties (the major orchard growing regions); California Association of Pest Control Advisors (CAPCA); and Subwatershed groups who are members of the Sacramento Valley Water Quality Coalition.

## MANAGEMENT PRACTICES COMMUNICATIONS

Other outreach activities undertaken by the SVWQC include distribution of *the Watershed Coalition News*, developed by CURES, and the *Sacramento Valley Water Quality Coalition News* quarterly newsletters describing activities of the watershed coalitions and updates on Best Management Practice projects initiated in the region. Approximately 2,500 copies were distributed to growers through county Farm Bureaus, county Agricultural Commissioners, NCWA, and irrigation districts.

# Actions Taken

## LANDOWNER OUTREACH EFFORTS

Highlights of the outreach effort conducted for specific subwatersheds between November 2005 and April 2006 by the Coalition and its partners are described below.

### El Dorado Subwatershed

#### *November 2005*

- El Dorado County Farm Bureau gave a PowerPoint® presentation to the El Dorado County Water Agency on the status of the watershed group and the ILP. Five (5) board members and approximately six (6) staff/general public were in attendance.

#### *December 2005*

- Membership outreach letter and database update form sent via mail with an article updating participants on monitoring and other activities of the Coalition. More than 400 letters were distributed, resulting in increased membership.

#### *January 2006*

- El Dorado County Farm Bureau published and distributed 1,800 newsletters providing updated information on the subwatershed group and the subwatershed meeting schedule.

### Glenn/Colusa Subwatershed

#### *December 2005*

- Articles were published in the Colusa and Glenn County Farm Bureau Newsletter.
- Letters regarding program requirements were mailed to landowners.

#### *February 2006*

- Articles were published in the Colusa and Glenn County Farm Bureau Newsletter.
- Individual discussions took place with landowners in the watershed.
- Presentations were given to local water districts.

#### *Ongoing (Monthly)*

- Monthly updates are provided to local agricultural organizations regarding monitoring program activities and results. Contact with individual applicators is maintained at the agricultural department level.

### Lake/Napa Counties

#### *November 2005*

- A 45-minute presentation was made to the Lake County Board of Supervisors on the ILP. The presentation included a PowerPoint® presentation and was broadcast on the local television station.

- Mendocino College Pest Management Day was held in Ukiah and attended by approximately 120 individuals. The event was co-sponsored by Mendocino College Lake County Winegrape Commission and the University of California at Davis Cooperative Extension (UCCE).
- The Lake County Farm Bureau gave a PowerPoint® presentation at the Lake County Cattlemen's Annual Dinner Meeting on the subject of the Lake County subwatershed program. John Harper, UCCE Livestock Advisor, also gave a presentation on water quality. Attended by approximately 25 growers.
- The November/December Farm Bureau Newsletter included an article on the Regional Board's enforcement action, the 2005 Agriculture Commissioner's Grower Meetings, and the Sustainable Winegrowing Workshops. This newsletter was mailed to all members of Lake County Farm Bureau, totaling more than 850 members.

***December 2005***

- Sustainable Winegrowing Workbook Self-Assessment and Ecosystem Management meeting. The program included a presentation on "Recent changes in the Irrigated Lands Conditional Waiver Program" by Bill Croyle, Director of the ILP for the Water Board. The meeting was co-sponsored by Lake County Winegrape Commission and the California Sustainable Winegrowing Alliance. Approximately 30 growers were in attendance.
- Two (2) Lake County Agriculture Commissioner's Annual Grower Meetings were held. Both meetings included general ILP information, updates of laws and regulations, and a summary of inspections from the prior year. Attended by 87 growers.

***January 2006***

- Napa County's Putah Creek Watershed Group Steering Committee monthly meeting.

***February 2006***

- During analyses for the February 28 - March 2, 2006 water quality monitoring event in Lake County, the adopted toxicity objectives for *Ceriodaphnia* were exceeded. Recent pesticide applications were investigated with the assistance of the County Agriculture Commissioner. Although recent applications of chlorpyrifos (Lorsban) in the McGaugh Slough drainage were suspected to be a potential cause of the toxicity, this particular pesticide was not detected in the samples. Local pear growers were contacted and provided information about the observed *Ceriodaphnia* toxicity.

  Based on the TIE and chemical results, as well as the fact that the only pesticide recently applied, chlorpyrifos, was not detected in samples, a non-agricultural cause of the observed toxicity is most probable in this case. Growers have been informed, and the most likely agricultural source of the observed toxicity has been ruled out, so no additional follow-up targeted at agricultural sources is recommended on the basis of the observed toxicity. The Agricultural Commissioner and the Farm Bureau are assisting the Coalition by mapping the parcels comprising the subwatershed to help determine if the toxicity exceedance is a result of residential or industrial/commercial activities within the drainage area.

*March 2006*

- Two (2) outdoor Water Quality Management meetings were held: one at Hillside and one at Valley Vineyard. Topics covered included grower perspectives on vineyard management practices for water quality; cover crop options for hillside and valley vineyards; erosion control best management practices (BMPs); Natural Resources Conservation Service (NRCS) technical resources and funding opportunities; and permit coordination for BMPs. Sponsors included the Lake County Winegrape Commission, California Sustainable Winegrowing Alliance, and UCCE. The first workshop was attended by 18 growers and the second was attended by 21 growers.
- The March/April Farm Bureau Newsletter included articles on the State Board's proposal to increase ILP fees, the Clear Lake Nutrient Total Maximum Daily Load (TMDL) and its possible relationship to the ILP, and an update on the proposed changes to the tentative ILP. This newsletter was mailed to all members of the Lake County Farm Bureau, totaling more than 850 members.

*April 2006*

- Napa County's Putah Creek Watershed Group Steering Committee monthly meeting.

### Butte/Yuba/Sutter Counties Subwatershed

*December 2005*

- Glenn County Annual Growers Meeting. Attended by 45 growers.

*January 2006*

- Pilot Program kickoff meeting with Margaret Wong, Water Board. Attended by seven (7) growers.
- Ag Waiver report/update to the Butte Resource Conservation District (RCD). Attended by 12 growers.
- Butte and Glenn County Department of Pesticide Regulations, Pilot Program for the ILP meeting. Attended by seven (7) growers.

*February 2006*

- Walnut-Almond Day Pilot Program PowerPoint® presentation at the Masonic Family Center in Chico. Attended by more than 200 growers.
- Butte County RCD Consolidated Grant Program meeting. Attended by 14 growers.
- Coalition meeting. Attended by 34 growers.
- Butte County Ag Advisory meeting Pilot Program presentation. Attended by five (5) growers.
- Butte/Yuba/Sutter Water Quality Coalition meeting. Attended by 18 growers.

*March 2006*

- During analyses for the March 16-18, 2006 water quality monitoring event in the Butte/Yuba/Sutter subwatershed, *Ceriodaphnia* mortality was observed at Gilsizer Slough. Recent pesticide applications were investigated with the assistance of the County Agriculture Commissioner, and local growers were contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of organophosphate pesticides in the Gilsizer Slough drainage were suspected as a potential cause of the toxicity, these pesticides were not detected in the samples at toxic concentrations and were ruled out by the results from chemical analyses.

Diazinon was the only organophosphate pesticide detected in these samples, and it was detected at concentrations below those toxic to *Ceriodaphnia*. The results suggest that either another category of pesticide or a non-agricultural source is the likely cause of the observed toxicity. No additional, immediate follow-up actions in response to these results have been initiated or are currently planned on the basis of the observed toxicity in Gilsizer Slough.

- Butte/Yuba/Sutter Water Quality Coalition meeting to discuss Sutter County RCD/TMDL Subcontract language. Attended by 15 growers.
- Butte Mosquito/Vector control GIS/Hydro Mapping meeting. Attended by five growers.
- Butte County NRCS/RCD meeting. Attended by 12 growers.

#### *April 2006*

- Butte County Water Commission meeting. Attended by 20 growers.
- Butte/Yuba/Sutter Water Quality Coalition Sutter County RCD/TMDL and Butte RCD Subcontract. Attended by 15 growers.

### Northeastern California Water Association (Pit River Subwatershed)

#### *December 2005*

- Distributed a newsletter to members that included a history of the Northeastern California Water Association (NECWA), updated monitoring results, and preliminary annual meeting information (e.g., date, time).

#### *March 2006*

- Annual meeting was held with numerous speakers addressing a variety of issues; meeting was covered by the InterMountain News newspaper. Attended by approximately 75 growers.
- NECWA President Ted deBraga addressed the Fall River-Big Valley Cattlemen’s Association at their annual meeting. Attended by approximately 40 growers.

#### *Additional Efforts*

- Organized a committee to compile and archive historical data on the Upper Pit River Watershed with the intention of making it available to all members.
- Wrote a letter in support of the Pit River Alliance's grant seeking funding for a Watershed Management Strategy.

### Sacramento/Amador Subwatershed

#### *November 2005*

- Amador Irrigators general meeting presentation regarding water quality testing results. Attended by eight (8) growers.

#### *December 2005*

- Amador Grape Grower Association meeting presentations by Jeff Gibson on water quality testing results and Donna Hirschfelt, UCCE, on herbicide use. Attended by 30 growers.

#### *January 2006*

- Amador Irrigators meeting with presentation on water quality testing results and a presentation on herbicide use by Donna Hirschfelt. Attended by seven (7) growers.
- Ranch Water Quality Short Course. A 16-hour course presented by the UCCE on various aspects of water quality. Attended by 35 growers.
- Sacramento Irrigators meeting with presentation on water quality testing results. Attended by eight (8) growers.

#### *March 2006*

- During analyses for the March 16-18, 2006 water quality monitoring event in the Sacramento/Amador subwatershed, *Ceriodaphnia* mortality was observed. The Exceedance Report was provided to the Amador, Sacramento, and San Joaquin County Agriculture Commissioners, and local growers were provided information regarding the observed *Ceriodaphnia* toxicity. The Coalition is working with the Agricultural Commissioners to identify potential causes of *Ceriodaphnia* toxicity. No chemical analyses were conducted because pesticides are not currently monitored at this location. No additional immediate follow-up actions in response to these results have been initiated or are currently planned on the basis of the observed toxicity in Dry Creek.
- Sloughhouse Irrigators meeting presentations by Sacramento County Agricultural Commissioner on pesticide use and rodent control. A presentation was also given by Jeff Gibson regarding water quality testing results. Attended by 45 growers.
- Sacramento Irrigators meeting with presentations on water quality issues. Attended by five (5) growers.
- Amador Irrigators meeting with presentation on water quality issues. Attended by nine (9) growers.

### Shasta/Tehama Subwatershed

The Shasta Tehama Watershed Education Coalition (STWEC) has an active and extensive outreach program implemented by the Board of Directors, members and supporting agencies. The following summarizes some recent key events during which STWEC presentations were made. Attendance at these events was generally in the range of 50 to 100 growers.

#### *January 2006*

- Shasta County Cattlemen's Association Annual Meeting in Palo Cedro

#### *February 2006*

- During analyses for the February 28 - March 2, 2006 water quality monitoring event in Tehama County, *Ceriodaphnia* toxicity was observed. Recent pesticide applications were investigated with the assistance of the County Agriculture Commissioner, and local growers were contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of organophosphate pesticides in the Burch Creek drainage area were considered to be a potential cause of the toxicity, this could not be confirmed through chemical analyses due to damage to the original sample during shipping. As agreed in the initial Exceedance Report, additional samples were collected during the subsequent storm event conducted March 16-17, 2006 at Burch Creek at Rawson Road (BRCRR), upstream from the Burch Creek at Woodson Avenue Bridge site (BRCWB).

Because significant toxicity to *Ceriodaphnia* was observed in the BRCWB sample (40% reduction in survival compared to control), the additional upstream samples were tested for *Ceriodaphnia* toxicity and organophosphate pesticides. The *Ceriodaphnia* acute toxicity test was initiated with the BRCRR sample on March 22, 2006, and no *Ceriodaphnia* toxicity was observed. In addition, no organophosphate pesticides were detected in either the BRCRR sample or the BRCWB sample for the March 16-17, 2006 event. These results indicate that a non-agricultural source (e.g., the no longer in use landfill below Rawson Road) may be the cause of or significant contributor to observed toxicity in lower Burch Creek. To more clearly focus on agricultural sources, all future samples in this drainage area will be collected from a site at Rawson Road, as approved by Water Board staff. No additional follow-up actions in response to these results have been initiated or are currently planned on the basis of the observed toxicity in Burch Creek.

- UCCE Winter Livestock Meeting in Cottonwood

#### *March 2006*

- During analyses for the March 16-18, 2006 water quality monitoring event in Tehama County, *Ceriodaphnia* mortality was observed. Recent pesticide applications were investigated with the assistance of the County Agriculture Commissioner, and local growers were contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of organophosphate pesticides in the Burch Creek drainage were suspected to be a potential cause of the toxicity, these were ruled out by the results of chemical analyses. No additional, immediate follow-up actions in response to these results have been initiated or are currently planned on the basis of the observed toxicity in Burch Creek. All future Burch Creek samples will be collected at the Rawson Road location to reduce interference from non-agricultural sources.
- Prune Grower's Day in Red Bluff

#### *April 2006*

- Spring Conservation Workshop in Anderson

#### *Additional Activities*

The STWEC also provides updates at local Board of Directors' Meetings for organizations such as the Cow Creek Watershed Management Group, Cottonwood Creek Watershed Group, and Shasta County Cattlemen's Association. Further outreach is accomplished through a multi-page newsletter which is sent to all members twice a year, as well as through frequent newspaper coverage by local papers in both counties.

### Solano/Yolo Subwatershed

***November 2005***

- Solano RCD conducted a "Farm Water Quality Planning Workshop" at the Dixon Fairgrounds.
- Growers Meeting organized by the Yolo County Farm Bureau Education Corporation (YCFBEC). Yolo County RCD promoted the ILP, and the YCFBEC presented the ILP to participants.
- Yolo County RCD, together with the Yolo County Planning and Public Works, hosted a tour for the Non-point Source Conference of Yolo County habitat and water quality management sites.
- Grower Meeting – Notices were mailed to 800 pesticide permit holders in Yolo County.
- Landowner Meeting – Notices were mailed to 6,000 landowners in Yolo County.

***December 2005***

- "Ag Waiver Program Meeting" organized by YCFBEC for landowners. Yolo County RCD promoted the ILP and YCFBEC presented the ILP. This meeting took place at the Yolo County Fairground, Woodland.
- ILP updates were presented by the Yolo County RCD to Dunnigan Water District Board of Directors during their board meeting.
- Letters were mailed to 7,800 growers and landowners in Yolo County with information regarding the requirement to provide participant/non-responder information to the Regional Board.
- Dixon RCD published its annual newsletter, which included a summary update for the Dixon/Solano RCD Watershed Group, and distributed it to 300 landowners within Solano County.

***January 2006***

- Yolo County RCD gave a brief presentation at the Tomato Production meeting in Woodland on the "Ag Water Quality Management Support Program" organized by UCCE.
- "Management Practices for Protecting Water Quality" meeting organized by the YCFBEC and targeted to farmers, landowners, and farm advisors. Yolo County RCD promoted the ILP, and YCFBEC presented the ILP to participants.
- Yolo County Grower Meeting – Notices were mailed to 800 pesticide permit holders.
- Solano RCD published a description of the program in the January 2006 "The Irrigator" newsletter (Solano Irrigation District). Newsletters were distributed to 450 farmers, landowners, and agricultural professionals in Solano County.

***February 2006***

- During analyses for the February 28 - March 2, 2006 water quality monitoring event in the Solano/Yolo subwatershed, samples exceeded adopted toxicity objectives for *Selenastrum*. Recent pesticide applications were investigated with the assistance of the County Agriculture Commissioner. The Agricultural Commissioner has evaluated pesticide applications in the Ulatis Creek drainage and determined that there were significant applications of herbicides (primarily oxyfluorfen, glyphosate, MCPA, and 2,4-D) in the drainage that may have contributed to observed low *Selensastrum* toxicity. Local growers are being contacted and provided information regarding the observed *Selenastrum* toxicity and are being provided BMP guidance.

- "Dixon/Solano RCD Water Quality Annual Landowner Information Meeting on the Agricultural Waiver Program". At the meeting, the RCDs described the BMP reimbursement program and collected names of interested cooperators.
- Yolo County Farm Bureau Board of Directors Retreat – PowerPoint® presentation.
- Solano RCD published a description of the program in the February 2006 "Dixon/Solano RCD Watershed Group Update" bulletin. This bulletin was sent to 675 Solano County irrigators enrolled in the Agricultural Waiver Coalition.

***March 2006***

- During analyses for the March 16-18, 2006 water quality monitoring event in the Solano/Yolo subwatershed, *Ceriodaphnia* mortality was observed. Recent pesticide applications were investigated with the assistance of the County Agriculture Commissioner. The Agricultural Commissioner has evaluated pesticide applications in the Ulatis Creek drainage. Applications of insecticides likely to have contributed to *Ceriodaphnia* toxicity were found to be very low preceding this sample event, with a total of only 31 acres treated with diazinon, malathion, and bifenthrin in preceding weeks. The overwhelming majority of pesticide applications consisted of herbicides with low potentials to cause *Ceriodaphnia* toxicity. Local growers are being contacted and provided information regarding the observed *Ceriodaphnia* toxicity and are being provided BMP guidance.
- The Yolo County RCD organized a "Winter and Irrigation Season Tailwater Management Workshop". The workshop took place at the Rominger Brothers Ranch. Themes addressed at the workshop included examples of how a grower could manage runoff from an irrigated field with a two-stage pond design and a cover crop; benefits and considerations of implementing sediment traps and cover crops to manage irrigation season and winter runoff; costs for sediment traps; water quality improvement with vegetated ditches; available programs to cost-share these practices; and an update on the ILP. Attendees toured farms to view implemented BMPs in the field, learn about factors to consider for BMP installation and maintenance, and hear from another farmer regarding how he manages runoff.
- Three presentations (*Tailwater Management with Sediment Traps and Vegetated Ditches*, *Ongoing Conservation Project Maintenance*, and *Streambank Bioengineering*) were provided by Yolo County RCD and partners to inform farmers regarding water quality benefits associated with irrigation or drainage ditch vegetation, habitat value, and bank stability.
- Solano RCD presented the Ag Water Quality (AGWQ) Program at the "Irrigation Scheduling Workshop".
- Yolo County RCD developed and distributed several handouts providing information on BMP costs, sediment traps, and cover crop trial results from past Yolo County RCD projects and available cost-share programs for BMP.

- Mailed 8,000 renewal notices to participating landowners and growers in Yolo County and included the Spring 2006 newsletter.
- Solano RCD published a description of the program in the January 2006 “The Irrigator” newsletter (Solano Irrigation District). Newsletters were distributed to 450 farmers, landowners, and agricultural professionals in Solano County.

#### *Additional Efforts*

- The YCFBEC developed a website. The website will be linked to Solano RCD’s water quality coalition subwatershed group page.
- Yolo County RCD developed a “Yolo-Solano Ag Water Quality Management Support Programs” informational flyer for growers and landowners.
- Yolo County RCD developed a Mobile Water Lab and sediment trap brochures for farmers.
- Yolo County RCD completed the Quality Assurance Project Plan and Monitoring Project Plan for the “Ag Water Quality Management Support Program”. These documents have been submitted to the Water Board for final approval.
- Together with Solano RCD, Yolo County RCD developed and submitted to the Water Board the Project Assessment and Evaluation Plan.
- YCFBEC publicized the “Management Practices for Protecting Water” meeting in the Agri-News magazine
- Yolo County RCD publicized the “Winter and Irrigation Season Tailwater Management Workshop” in the Daily Democrat newspaper.
- Solano RCD published a description of the ILP in the Winter 2006 “Lay of the Land” newsletter. This publication was sent to approximately 450 landowners, plant sale patrons, and partner organizations.
- Solano RCD technical staff met with 3 growers at their farms to discuss applying water quality BMPs on their properties as a part of the Yolo/Solano Ag Water Quality Management Support Program.

#### *Scheduled Fall 2006*

- “Streambank Bioengineering”, a three-day indoor and outdoor intensive hands-on workshop in Woodland and on-site in Capay Valley will be presented by Yolo County RCD and partners.

### Upper Feather River Subwatershed

#### *January 2006*

- Subwatershed meetings to update the public on water quality results and future testing plans of UCCE.

#### *February 2006*

- Subwatershed meetings were held to update the public on water quality results and future testing plans of UCCE.

***April 2006***

- A Directors-only meeting was held on the subwatershed budget
- Two (2) meetings to provide the public updates on water quality results, the future testing plans of UCCE and how UCCE testing will be coordinated with the Coalition.

# Conclusions and Recommendations

The Coalition submits this 2006 Storm Season Semi-Annual Monitoring Report (SAMR) under the Water Board's Irrigated Lands Program (*ILP*). The 2006 Storm Season SAMR provides a detailed description of our monitoring results as part of our ongoing efforts to characterize agricultural and wetlands related water quality in the Sacramento River Basin.

To summarize, the results from the storm season monitoring in 2006 are generally positive and suggest that there are not major water quality problems with agricultural and managed wetlands discharges in the Sacramento River Basin. Specifically, toxicity was observed in less than 9% of the toxicity tests performed in 2006 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 January through March 2006. To date, a total of four Coalition storm season sampling events and 6 irrigation events have been completed. For the period of record in this Semi-Annual Report (January – March 2006), samples were collected during three events at 27 locations.

From January through March 2006, 76 water column toxicity tests were conducted with three aquatic species on 27 samples from 17 sites. There were eight statistically significant water column toxicity exceedances (6 *Ceriodaphnia*, and 2 *Selenastrum*) with reductions greater than 20% compared to control. In total, 10.5% of all tests and 30% of samples exhibited a statistically significant reduction in *Ceriodaphnia* survival or *Selenastrum* cell density greater than 20% compared to the control. The frequency of significant toxicity observed during this storm season was greater than reported for the previous irrigation season annual report. No samples caused toxicity to the fathead minnow (*Pimepheles promelas*). Chemical results were evaluated for all of the cases of observed toxicity, and in none of these cases was the toxicity explained by concentrations of detected pesticides or other water quality parameters. For the two samples that triggered TIE procedures to investigate the cause of toxicity, toxicity was not persistent (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.

There were no statistically significant sediment toxicity exceedances for the 14 total sediment samples tested with *Hyalella azteca*. Sediment samples for the 2006 storm season monitoring were collected following very high flows caused by near-record amounts of seasonal precipitation. The lack of significant toxicity at all sites suggests that these flows did not result in deposition of toxic concentrations of sediment-bound pesticides (or other potentially toxic chemicals), and may have flushed any such deposits from the drainage system. It also suggests that monitoring of sediments during the storm season is unlikely to provide useful information regarding potential causes of toxicity, may not be warranted for the *ILP*.

When detected, pesticides rarely exceeded applicable objectives, and were not typically not associated with toxicity. 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 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 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 have been 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 is charged with developing recommendations for amendments to the current *ILP* Monitoring and Reporting Program requirements and procedures.

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.

Substantial progress has been made by the Coalition toward full compliance with the *ILP*. 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 are now being incorporated into these documents and will be (or already have been) implemented during the 2006 irrigation season monitoring.

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 (Provided in Separate Volumes)**

These documents are available as hard copies only.

## APPENDIX B: Lab Reports and Chains-of-Custody (Provided in Separate Volumes)

These documents are available as hard copies only.

## APPENDIX C: Tabulated Monitoring Results

Tabulated monitoring results are found in the two Excel™ files included with this CD-ROM.

# APPENDIX D: Communication Reports

# SVWQC Exceedance Report

DATE: March 6, 2006

TO: Margaret Wong, RWQCB
cc Bill Croyle, RWQCB

FROM: Sacramento Valley Water Quality Coalition

SUBJECT: Toxicity Exceedances

## DATE AND SITE

The Sacramento Valley Water Quality Coalition (Coalition) conducted water sampling from February 28, 2006 through March 2, 2006, as required by the Irrigated Lands Conditional Waiver and the Coalition's Monitoring and Reporting Program Plan (MRP). This exceedance report includes results for the following samples:

- Burch Creek at Woodson Ave., collected February 28, 2006. The Burch Creek drainage is part of the Shasta/Tehama subwatershed.

- Anderson Creek at Ash Creek Road, collected March 01, 2006. The Anderson Creek drainage is part of the Shasta/Tehama subwatershed.

- McGaugh Slough, collected February 28, 2006. The McGaugh Slough drainage is part of the Lake/Napa subwatershed.

All three tests were initiated on March 01, 2006.

## TEST TYPE AND RESULTS

Burch Creek at Woodson Ave.: The Coalition observed complete mortality to *Ceriodaphnia* at the Burch Creek within 48 hours of test initiation. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity

McGaugh Slough: The Coalition observed 70 percent mortality to *Ceriodaphnia* at McGaugh Slough within 48 hours of test initiation. Mortality was 93.3% at the completion of this test. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity.

Anderson Creek at Ash Creek Road: The Coalition observed 35 percent mortality to *Ceriodaphnia* at the Anderson Creek within 48 hours at the completion of this test. The final lab control results for this test (85% survival) was slightly below the acceptance criteria for the *Ceriodaphnia* test, and this result was not statistically significant. This sample is being retested to achieve an acceptable control result and definitive test of toxicity significance.

The final lab control results for this set of tests were slightly below the acceptance criteria for the *Ceriodaphnia* test. However, because the mortality observed at McGaugh Slough and Burch Creek sites was clearly substantial and significant, follow-up testing was initiated immediately.

## FOLLOW-UP ACTIONS

Based upon these findings, the Coalition will implement the following actions:

The observed toxicity (>50% mortality) triggers initiation of Toxicity Identification Evaluation (TIE) procedures in the McGaugh slough and Burch Creek samples. The TIEs were initiated on Saturday, March 4. TIEs will be pesticide-targeted, because this sample event is associated with the end of the dormant spray application period and there is a high probability that organophosphate pesticides are causing or contributing to the toxicity.

The 100% mortality observed in the Burch Creek sample also requires performing a dilution series for a definitive LC50 test. The dilution series test was also initiated on Saturday, March 4.

A retest of the original Anderson Creek sample was initiated on March 6 to provide a definitive statistical significance test of toxicity. The need for additional follow-up in the Anderson Creek drainage will be determined pending the results of the retest.

In response to the observed toxicity, the following additional actions will be taken in the Burch Creek and McGaugh Slough subwatersheds:

- Recent pesticide applications will be investigated with the assistance of the local Agriculture Commissioners,
- Information about the observed toxicity will be provided to growers in these subwatershed through local outreach efforts, and
- Additional samples will be collected at locations upstream from the Burch Creek site during the next storm event.
- Discussion of additional follow actions in the McGaugh Slough drainage will be initiated with the representatives of the Lake/Napa County subwatershed.

## SCHEDULE AND SUBSEQUENT REPORT

TIEs and the definitive dilution series test were initiated on Saturday, March 4. The retest of the Andersen Creek sample was initiated on March 6, 2006. The Coalition will provide the Regional Board with results of the initial follow-up toxicity testing by March 13. A Communication Report documenting the results of all follow-up actions in response to this exceedance will be provided by May 1, as required by the MRP.

## SVWQC Exceedance Report

DATE: March 10, 2006

TO: Margaret Wong, RWQCB
Bill Croyle, RWQCB

FROM: Sacramento Valley Water Quality Coalition

SUBJECT: Toxicity Exceedances

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**DATE AND SITE**

The Sacramento Valley Water Quality Coalition (Coalition) conducted water sampling from February 28, 2006 through March 2, 2006, as required by the Irrigated Lands Conditional Waiver and the Coalition's Monitoring and Reporting Program Plan (MRP). This exceedance report includes results for the following samples:

- Ulatis Creek at Brown Road., collected February 28, 2006. The Ulatis Creek drainage is part of the Yolo/Solano subwatershed.

The toxicity tests for this sample were initiated on March 01, 2006.

**TEST TYPE AND RESULTS**

*Ulatis Creek at Brown Road*: In the toxicity tests conducted with the green alga *Selenastrum*, the Coalition observed a reduction in algal cell density of 37% compared to the control. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity

The lab control results for this set of tests met all test acceptability requirements.

**FOLLOW-UP ACTIONS**

The observed toxicity (<50% reduction compared to control) does not trigger initiation of Toxicity Identification Evaluation (TIE) procedures or serial dilution tests.

In response to the observed toxicity, the following additional actions will be taken in the Ulatis Creek subwatershed:

- Recent pesticide applications will be investigated with the assistance of the local Agriculture Commissioners,
- Chemical results will be reviewed for possible causes of algal toxicity,
- Information about the observed toxicity will be provided to growers in these subwatersheds through local outreach efforts, and

- Discussion of additional follow-up actions in the Ulatis Creek drainage will be initiated with the representatives of the Yolo/Solano County subwatershed.

## SCHEDULE AND SUBSEQUENT REPORT

A Communication Report documenting the results of all follow-up actions in response to this exceedance will be provided by May 12, as required by the MRP.

## SVWQC Exceedance Report

DATE: March 28, 2006

TO: Margaret Wong, RWQCB
Bill Croyle, RWQCB

FROM: Sacramento Valley Water Quality Coalition

SUBJECT: Toxicity Exceedances

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**<u>DATE AND SITE</u>**

The Sacramento Valley Water Quality Coalition (Coalition) conducted water sampling from March 16, 2006 through March 17, 2006, as required by the Irrigated Lands Conditional Waiver and the Coalition's Monitoring and Reporting Program Plan (MRP). This exceedance report includes results for the following samples:

- Gilsizer Slough at George Washington Rd. (GILSL), collected March 16, 2006. The Gilsizer Slough drainage is part of the Butte/Yuba/Sutter subwatershed.
- Dry Creek at Alta Mesa Road (DCGLT), collected March 16, 2006. The Dry Creek drainage is part of the Sacramento/Amador subwatershed.
- Ulatis Creek at Brown Road (UCBRD), collected March 16, 2006. The Ulatis Creek drainage is part of the Yolo/Solano subwatershed.
- Burch Creek at Woodson Ave Bridge (BRCWB), collected March 17, 2006. The Burch Creek drainage is part of the Shasta/Tehama subwatershed.

The toxicity tests for these samples were initiated on March 17 and 18, 2006.

**<u>TEST TYPE AND RESULTS</u>**

*Gilsizer Slough at George Washington Rd*: In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in algal cell density of 20% compared to the control. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity.

*Dry Creek at Alta Mesa Road*: In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in algal cell density of 40% compared to the control. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity.

*Ulatis Creek at Brown Road*: In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in algal cell density of 25% compared to the control. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity.

*Burch Creek at Woodson Ave Bridge*: In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in algal cell density of 40% compared to the control. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity.

The lab control results for this set of tests met all test acceptability requirements.

**FOLLOW-UP ACTIONS**

The observed toxicity (<50% reduction compared to control) did not trigger initiation of Toxicity Identification Evaluation (TIE) procedures or serial dilution tests in any samples.

As agreed prior to conducting this event, additional samples were collected at Burch Creek at Rawson Road (BRCRR), upstream from the Burch Creek at Woodson Avenue Bridge site. Because significant toxicity was observed in the Burch Creek at Woodson Avenue Bridge sample, the additional upstream samples are being tested for *Ceriodaphnia* toxicity and organophosphate pesticides. The *Ceriodaphnia* acute toxicity test was initiated with the BRCRR sample on March 22, 2006.

In response to the observed toxicity, the following additional actions will be taken in the affected subwatersheds:

- Recent pesticide applications will be investigated with the assistance of the local Agriculture Commissioners,
- Chemical results will be reviewed for possible causes of *Ceriodaphnia* toxicity,
- Information about the observed toxicity will be provided to growers in these subwatersheds through local outreach efforts, and
- Discussion of additional follow-up actions will be initiated with the representatives of the affected subwatersheds.

**SCHEDULE AND SUBSEQUENT REPORT**

A Communication Report documenting the results of all follow-up actions in response to this exceedance will be provided by May 22, as required by the MRP.

## SVWQC Exceedance Report

| | |
|---|---|
| DATE: | April 28, 2006 |
| TO: | Margaret Wong, RWQCB<br>Bill Croyle, RWQCB |
| FROM: | Sacramento Valley Water Quality Coalition |
| SUBJECT: | Chemical and Microbiological Water Quality Exceedances,<br>February 28 – March 2, 2006 |

### DATE AND SITE

The Sacramento Valley Water Quality Coalition (Coalition) conducted water sampling from February 28, 2006 through March 02, 2006, as required by the Irrigated Lands Conditional Waiver and the Coalition's Monitoring and Reporting Program Plan (MRP). This exceedance report includes chemical and microbiological results for the following subwatersheds and sites:

| Subwatershed | Site |
|---|---|
| Butte/Yuba/Sutter | Gilsizer Slough at George Washington Rd<br>Pine Creek at Nord Gianella Road<br>Wadsworth Canal at South Butte Rd |
| Colusa Basin | Colusa Drain near Maxwell Road<br>Rough and Ready Pumping Plant (RD 108)<br>Stone Corral Creek<br>Stony Creek on Hwy 45 near Rd 24 |
| El Dorado | North Canyon Creek |
| Lake/Napa | McGaugh Slough at Finley Road East |
| Placer/Nevada/S Sutter/ N Sacramento | Coon Creek at Striplin Road |
| Sacramento/Amador | Big Indian Creek at Bridge<br>Dry Creek at Alta Mesa Road |
| Shasta/Tehama | Andersen Creek at Ash Creek Road<br>Burch Creek at Woodson Ave Bridge |
| Solano/Yolo | Tule Canal at I-80<br>Ulatis Creek at Brown Road<br>Z Drain – Dixon RCD |

### TEST TYPE AND RESULTS

Analyses evaluated for this Exceedance Report include bacteria, pesticides, trace metals, nutrients, and field parameters.

E. coli was observed to exceed the Basin Plan's 235 MPN/100 mL limit at 14 sites in seven subwatersheds (Table 1) during the first 2006 storm season sample event. The Coalition is exploring the use of DNA analysis to determine the sources of the E. coli (e.g., cows, birds, human waste), as part of a pilot effort in the Yolo/Solano subwatershed.

Chemical parameters were observed to exceed water quality objectives or advisory limits during the first storm event at eight sites in four subwatersheds:

- Several pesticides were observed to exceed water quality objectives or advisory limits, including diazinon, chlorpyrifos, simazine, and DDE.
- Selenium also exceeded the Basin Plan limit of 5 ug/L at one Yolo/Solano subwatershed site, and boron exceeded an advisory limit of 700 ug/L at two Yolo/Solano subwatershed sites.
- Conductivity exceeded an agricultural supply advisory limit of 900 uS/cm at one Yolo/Solano subwatershed site.

The majority of these exceedances were observed at locations without significant toxicity, or were not present at concentrations expected to be a cause of the toxicity observed at that site and event. The one exception was that concentrations of diazinon detected at Stony Creek (0.222 ug/L) exceeded levels that may cause toxicity to *Ceriodaphnia*, but toxicity testing is not being conducted at this site in 2006. Chemical water quality exceedances are summarized in Table 2.

No exceedances of dissolved oxygen limits were recorded for this event. The initial pH results indicated that there were problems with the alternate pH meters used for this event, and the pH results are being re-evaluated for potential exceedances. The quality control results for this set of analyses were evaluated and determined not to adversely affect determination of any other exceedances.

## <u>FOLLOW-UP ACTIONS</u>

In response to the observed exceedances, the following actions will be taken in the affected subwatersheds:

- All parameters with detected exceedances are being analyzed in the second 2006 storm event samples collected March 16-17,
- Recent pesticide applications will be investigated with the assistance of the local Agriculture Commissioners,
- Chemical results will be evaluated as possible causes of observed toxicity to *Ceriodaphnia* and *Selenastrum*,
- Information about the observed exceedances will be provided to growers in these subwatersheds through local outreach efforts, and
- Discussion of additional follow-up actions relevant to these exceedances will be initiated with the representatives of the affected subwatersheds.

Plans for further investigation of E. coli exceedances will be deferred pending the outcome of pilot studies to evaluate bacteria sources in the Yolo/Solano subwatershed. A management plan to address conductivity and boron exceedances (as well as E. coli) in the Yolo/Solano has been developed and submitted to Regional board staff previously.

## <u>SCHEDULE AND SUBSEQUENT REPORT</u>

A Communication Report documenting the results of all follow-up actions in response to these exceedances will be provided by June 30, as required by the MRP. Because this Communication

Report is due on the same date as the Storm Season annual monitoring report, the information will be integrated into the Annual Report and will not be provided as a separate document.

**Table 1. Exceedances of E. coli water quality objectives for the first 2006 storm event, February 28-March 2.**

| Subwatershed | Site | Result, MPN/100mL |
|---|---|---|
| ButteYubaSutter | Gilsizer Slough at George Washington Rd | 2400 |
| | Pine Creek at Nord Gianella Road | 1700 |
| | Wadsworth Canal at South Butte Rd | 610 |
| ColusaBasin | Colusa Drain near Maxwell Road | 2400 |
| | Rough and Ready Pumping Plant (RD 108) | 650 |
| | Stone Corral Creek | 2400 |
| LakeNapa | McGaugh Slough at Finley Road East | 2000 |
| PlacerNevadaSSutterNSacramento | Coon Creek at Striplin Road | 2400 |
| SacramentoAmador | Big Indian Creek at Bridge | 580 |
| | Dry Creek at Alta Mesa Road | 2400 |
| ShastaTehama | Andersen Creek at Ash Creek Road | 2400 |
| | Burch Creek at Woodson Ave Bridge | 2400 |
| SolanoYolo | Tule Canal at I-80 | 2400 |
| | Ulatis Creek at Brown Road | 2400 |

**Table 2. Exceedances of chemical water quality objectives for the first 2006 storm event, February 28-March 2.**

| Subwatershed | Site | Analyte | Result | WQO | Units | WQO Basis[5] |
|---|---|---|---|---|---|---|
| Butte/Yuba/Sutter | Gilsizer Slough at G. Washington Rd [1] | Diazinon | 0.154 | 0.05 | ug/L | BPA |
| Colusa Basin | Colusa Drain near Maxwell Road [1] | Diazinon | 0.0805 | 0.05 | ug/L | BPA |
| | Rough and Ready Pumping Plant [2] | DDE(p,p') | 0.007 | 0.00059 | ug/L | CTR |
| | Stony Creek on Hwy 45 near Rd 24 [3] | Diazinon | 0.222 | 0.05 | ug/L | BPA |
| | | Simazine | 4.71 | 4 | ug/L | BP |
| El Dorado | North Canyon Creek [2] | DDE(p,p') | 0.0072 | .00509 | ug/L | CTR |
| Solano/Yolo | Tule Canal at I-80 [2] | Boron | 1500 | 700 | ug/L | Narrative |
| | Ulatis Creek at Brown Road [4] | Chlorpyrifos | 0.0225 | 0.014 | ug/L | Narrative |
| | | Diazinon | 0.1575 | 0.05 | ug/L | Narrative |
| | Z Drain – Dixon RCD [1] | EC | 1100 | 900 | uS/cm | Narrative |
| | | Boron | 1530 | 700 | ug/L | Narrative |
| | | Selenium | 6 | 5 | ug/L | BP |

1 No toxicity was observed in this sample.
2 Toxicity was not tested at this site. Detected concentrations are not expected to result in toxicity.
3 Toxicity was not tested at this site.
4 Detected concentrations do not explain observed toxicity to *Selenastrum* at this site.
5 Water Quality Objective Basis: *BP* = Central Valley Basin Plan; *BPA* = Basin Plan Amendment; *CTR* = California Toxics Rule; *Narrative* = unadopted limits used to interpret Basin Plan narrative objectives by the Central Valley Regional Board.

# SVWQC Exceedance Report

DATE: May 3, 2006

TO: Margaret Wong, RWQCB
cc: Bill Croyle, RWQCB

FROM: Sacramento Valley Water Quality Coalition

SUBJECT: Chemical and Microbiological Water Quality Exceedances, March 16 – March 18, 2006

## DATE AND SITE

The Sacramento Valley Water Quality Coalition (Coalition) conducted water sampling from March 16, 2006 through March 18, 2006, as required by the Irrigated Lands Conditional Waiver and the Coalition's Monitoring and Reporting Program Plan (MRP). This exceedance report includes chemical and microbiological results for the following subwatersheds and sites:

| Subwatershed | Site | Sample Date |
|---|---|---|
| El Dorado | North Canyon Creek | 03/16/2006 |
| Yolo/Solano | Z Drain – Dixon RCD | 03/16/2006 |
| Upper Feather River | Middle Fork Feather River at County Road A-23 | 03/16/2006 |
| Colusa Basin | Stone Corral Creek | 03/17/2006 |
| | Colusa Drain near Maxwell Road | 03/17/2006 |
| | Rough and Ready Pumping Plant | 03/16/2006 |
| | Ulatis Creek at Brown Road | |

## TEST TYPE AND RESULTS

Analyses evaluated for this Exceedance Report include bacteria, pesticides, trace metals, nutrients, and field parameters. There were no exceedances observed for any of the trace metals or pesticides detected, nutrients, or dissolved oxygen.

*E. coli* was observed to exceed the Basin Plan's 235 MPN/100 mL limit at only one site (Table 1) during the second 2006 storm season sample event. The Coalition is exploring the use of DNA analysis to determine the sources of the E. coli (e.g., cows, birds, human waste), as part of a pilot effort in the Yolo/Solano subwatershed.

Other chemical and physical parameters were observed to exceed water quality objectives or advisory limits during the second storm event at six sites in four subwatersheds:

- pH exceeded the Basin Plan limit of 8.5 upper limit at three sites, and was below the 6.5 lower limit at one site.
- Conductivity exceeded an agricultural supply advisory limit of 700 uS/cm at two Solano/Yolo subwatershed site and two Colusa Basin subwatershed sites.
- Total dissolved solids (TDS) exceeded the recommended California 2˚ MCL advisory limit of 500 uS/cm at two Colusa Basin subwatershed sites and one Solano/Yolo subwatershed site. An additional exceedance of this TDS limit observed for the first 2006 storm season sample event at the Solano/Yolo subwatershed site is reported here due to its omission from a previous Exceedance Report (April 28, 2006). This TDS limit is

intended to apply to treated drinking water and based on aesthetic acceptance by consumers of the water.

None of these exceedances were expected to be a cause of any toxicity observed this event.

The quality control results for this set of analyses were evaluated and determined not to adversely affect determination of any other exceedances.

## FOLLOW-UP ACTIONS

In response to the observed exceedances, the following actions will be taken in the affected subwatersheds:

- Information about the observed exceedances will be provided to growers in these subwatersheds through local outreach efforts, and
- Discussion of additional follow-up actions relevant to these exceedances will be initiated with the representatives of the affected subwatersheds.

Plans for further investigation of *E. coli* exceedances will be deferred pending the outcome of pilot studies to evaluate bacteria sources in the Yolo/Solano subwatershed. A management plan to address conductivity and TDS exceedances (as well as E. coli) in the Solano/Yolo subwatershed has been developed and submitted to Regional board staff previously.

## SCHEDULE AND SUBSEQUENT REPORT

A Communication Report documenting the results of all follow-up actions in response to these exceedances will be provided within 45 weekdays, as required by the MRP. Because this Communication Report is due after the storm season annual monitoring report due on June 30, the information will be integrated into the Annual Report and will not be provided as a separate document.

**Table 1. Exceedances of microbiological and chemical water quality objectives for the second 2006 storm event, March 16-March 18.**

| Subwatershed | Site | Analyte | Units | Result | WQO[1] | WQO Basis[2] |
|---|---|---|---|---|---|---|
| El Dorado | North Canyon Creek | pH | -log[H+] | 8.74 | 6.5-8.5 | BP |
| Colusa Basin | Colusa Drain near Maxwell Road | E. Coli | MPN/100 mL | 520 | 235 | BPA |
| | Stone Corral Creek | EC | uS/cm | 940 | 700 | Narrative |
| | | pH | -log[H+] | 9.12 | 6.5-8.5 | BP |
| | | TDS | mg/L | 600 | 500 | Narrative |
| | Rough and Ready Pumping Plant | EC | uS/cm | 867 | 700 | Narrative |
| | | TDS | mg/L | 540 | 500 | Narrative |
| Upper Feather River | Middle Fork Feather River at County Road A-23 | pH | -log[H+] | 6.49 | 6.5-8.5 | BP |
| Solano/Yolo | Z Drain – Dixon RCD | EC | uS/cm | 1113 | 700 | Narrative |
| | | pH | -log[H+] | 8.9 | 6.5-8.5 | BP |
| | | TDS | mg/L | 620[3] | 500 | Narrative |
| | | TDS | mg/L | 650 | 500 | Narrative |
| | Ulatis Creek at Brown Road | EC | uS/cm | 759 | 700 | Narrative |

1. Water Quality Objective or Narrative Interpretation Limit
2. Water Quality Objective Basis: *BP* = Central Valley Basin Plan; *BPA* = Basin Plan Amendment; *CTR* = California Toxics Rule; *Narrative* = unadopted limits used to interpret Basin Plan narrative objectives by the Central Valley Regional Board.
3. Sample collected 03/01/2006 during first 2006 storm season event. This result was inadvertently omitted from the previous Exceedance Report (April 28, 2006).

# SVWQC Communication Report

DATE: May 12, 2005

TO: Margaret Wong, Central Valley Regional Water Board
cc. Bill Croyle, Central Valley Regional Water Board

FROM: Sacramento Valley Water Quality Coalition

SUBJECT: Follow-up to Exceedances of Narrative Toxicity Objective

## DATES AND SITES

The Sacramento Valley Water Quality Coalition (Coalition) conducted water sampling from February 28, 2006 through March 2, 2006, as required by the Irrigated Lands Conditional Waiver and the Coalition's Monitoring and Reporting Program Plan (MRP). This communication report includes results for samples from the following sites.

- Burch Creek at Woodson Ave., collected February 28, 2006. The Burch Creek drainage is part of the Shasta/Tehama subwatershed.
- Anderson Creek at Ash Creek Road, collected March 01, 2006. The Anderson Creek drainage is part of the Shasta/Tehama subwatershed.
- McGaugh Slough, collected February 28, 2006. The McGaugh Slough drainage is part of the Lake/Napa subwatershed.
- Ulatis Creek at Brown Road., collected February 28, 2006. The Ulatis Creek drainage is part of the Yolo/Solano subwatershed.

This Communication Report presents the results of additional evaluations and provides information supplemental to Exceedance Reports previously provided to the Water Board dated March 6, 2006 and March 10, 2006.

## INITIAL TESTS AND RESULTS

*Burch Creek at Woodson Ave. Bridge*: The Coalition observed complete mortality to *Ceriodaphnia* at the Burch Creek within 48 hours of test initiation. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity.

*Anderson Creek at Ash Creek Road*: The Coalition observed 35 percent mortality to *Ceriodaphnia* at the Anderson Creek within 48 hours at the completion of this test. The final lab control results for this test (85% survival) were slightly below the acceptance criteria for the *Ceriodaphnia* test, and this result was not statistically significant. This sample was retested to achieve an acceptable control result and definitive test of toxicity significance. The results of the retest indicated no significant toxicity (100% survival in the control and in the initial sample).

*McGaugh Slough*: The Coalition observed 70 percent mortality to *Ceriodaphnia* at McGaugh Slough within 48 hours of test initiation. Mortality was 93.3% at the completion of this test. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity.

The final lab control results for these two tests were slightly below the acceptance criteria for the *Ceriodaphnia* test. However, because the mortality observed at McGaugh Slough and Burch Creek sites was clearly substantial and significant, follow-up testing was initiated immediately. The results of the follow-up tests met all test acceptance criteria and served as the required retest to achieve acceptable control results.

*Ulatis Creek at Brown Road*: In the toxicity tests conducted with the green alga *Selenastrum*, the Coalition observed a reduction in algal cell density of 37% compared to the control. This result was statistically significant and is in exceedance of the Basin Plan narrative objective for toxicity. The observed toxicity (<50% reduction compared to control) did not trigger initiation of Toxicity Identification Evaluation (TIE) procedures or serial dilution tests.

As proposed in the exceedance reports, several follow-up actions were implemented to further evaluate the observed toxicity to *Ceriodaphnia* in the Burch Creek and McGaugh Slough samples:

- Serial dilution tests were initiated on March 4, 2006 to determine the magnitude of toxicity present in the original Burch Creek sample.
- Pesticide-targeted Toxicity Investigation Evaluations (TIE) were initiated with the Burch Creek and McGaugh Slough samples on March 4, 2006 to investigate the cause of toxicity. TIEs were pesticide-targeted, because the sample event is associated with the end of the dormant spray application period and there is a high probability that organophosphate pesticides are causing or contributing to the toxicity.
- Results of chemical analyses were evaluated for potential causes of toxicity.

Resampling of these sites was not conducted because the initial samples were collected for a specific storm event. The results of these follow-up efforts are discussed below.

## Serial Dilution Testing (Burch Creek)

In the serial dilution series test initiated on March 4, 2006, there was 90% survival in the Lab Control. There was an interrupted concentration response with survival reduced to 55% at the 50% ambient water treatment, which is statistically less than the Control treatment. There was no significant toxicity evident in any of the other dilutions or in the undiluted original sample, indicating that the apparent reduction in survival at the 50% ambient water treatment was not toxicologically significant. The resulting No Observed Effect Concentration (NOEC) was 100% ambient water. The resulting EC50 was therefore >100% and acute Toxicity Units ($TU_a$) in the original sample (calculated as $TU_a = 100\% \div EC50$) could not be calculated. These results suggest rapid degradation of the primary cause of toxicity. The results of the serial dilution tests are summarized in Table 1.

**Table 1. Results of Dilution Series Tests on Burch Creek Sample Collected 2/28/2006**

| Dilution (percent ambient sample) | % Survival | Toxicity (Y/N) | Notes |
|---|---|---|---|
| Lab Control | 90 | N/A | Testing initiated on 03/04/06. |
| 6.25% Ambient Sample | 95 | No | The toxicity observed in tests initiated on 03/01/06 was not persistent in this dilution series retest. |
| 12.5% | 87.5 | No | |
| 25% | 85 | No | |

| | | | |
|---|---|---|---|
| 50% | 55 | Yes | |
| 100% | 90 | No | |

## TIE Results and Chemical Analyses

In the TIEs initiated on 03/04/06, toxicity observed during the original testing of the Burch Creek and McGaugh Slough samples was not persistent in the 100% baseline sample. TIE treatments were targeted towards potential pesticide causes of toxicity, and included the following:

- Centrifugation to remove causes of toxicity strongly adsorbed to particulates
- $C_8$-Solid Phase Extraction column to remove non-polar organic compounds. Most pesticides are in this chemical category.
- Piperonyl butoxide (PBO), a treatment that causes inactivation of the Cytochrome P-450 enzyme system of the test organisms. Removal of toxicity by PBO indicates that metabolically activated compounds (e.g., certain organophosphate pesticides such as diazinon and chlorpyrifos), are probable contributors to toxicity.

Because toxicity was not persistent in the 100% baseline sample, none of the treatments resulted in reduction or removal of the observed toxicity. Therefore, the TIEs initiated did not provide a definitive result as to the cause of toxicity in the original sample. However, the results of the TIE did indicate a rapid breakdown or loss of the causative toxicant(s) in the intervening 4 days between sample collection and initiation of the TIEs. In combination with the previous results, this suggests that the causative toxicant may a short hydrolysis half-life. Due to the lack of persistence of toxicity, this TIE provided no additional evidence of the cause of toxicity in the Burch Creek and McGaugh Slough samples. TIE results are summarized in Table 2.

**Table 2. TIE Results**

| Sample or Treatment Description | % Survival | Significant Toxicity | Notes |
|---|---|---|---|
| Lab water control (9/11/05) | 90 | N/A | TIE testing initiated on 03/04/06. |
| Centrifugation blank | 100 | No | Toxicity observed during the initial test of this sample was not persistent in the 100% TIE Baseline sample. Consequently, none of the treatments were determined to effectively remove the toxicity observed in the initial sample. No blank interference was present in any of the TIE treatments. |
| Centrifugation + C8SPE blank | 90 | No | |
| PBO blank | 95 | No | |
| **Burch Creek Results** | | | |
| 100% Undiluted Baseline sample | 95 | No | |
| 100% Centrifuged sample | 95 | No | |
| 100% Centrifuged sample+C8SPE | 100 | No | |
| 100% Sample + PBO | 100 | No | |
| **McGaugh Slough Results** | | | Toxicity observed during the initial test of this sample was not persistent in the 100% TIE Baseline sample. Consequently, none of the treatments were determined to effectively remove the toxicity observed in the initial sample. No blank interference was present in any of the TIE treatments. |
| 100% Baseline sample | 100 | No | |
| 100% Centrifuged sample | 100 | No | |
| 100% Centrifuged sample+C8SPE | 95 | No | |
| 100% Sample + PBO | 100 | No | |

Samples collected from Burch Creek, McGaugh Slough, and Ulatis Creek were also analyzed for organophosphate, organochlorine, triazine, and pyrethroid pesticides; trace metals; nutrients; *E. coli* bacteria; and conventional and physical parameters.

*Burch Creek* – Sample bottles intended for pesticides analysis in the Burch Creek sample were received broken by the laboratory and therefore no pesticide analyses were conducted. The lack of toxicity persistence in the original sample suggests that pesticides potentially responsible for toxicity would have a short half-life and would likely have been applied within a few days of this sample date. Concentrations of trace metals did not exceed objectives based on protection of aquatic life and did not approach concentrations expected to result in acute toxicity to *Ceriodaphnia*. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. Based on these results, the primary cause(s) of the observed toxicity in the Burch Creek sample remains unknown.

*McGaugh Slough* – The only pesticide detected in the McGaugh Slough sample was simazine (0.224 ug/L). Simazine is an herbicide that exhibits low toxicity to invertebrates. The average 48-h LC50 for daphnids is >1,000 ug/L, so it it reasonable to conclude that simazine was not the cause of *Ceriodaphnia* toxicity. No other organophosphate, organochlorine, triazine, or pyrethroid pesticides were detected in the McGaugh Slough sample. These results indicate that the cause of the toxicity observed in the McGaugh Slough sample collected on 2/28/2006 is almost certainly not one of these pesticides. Concentrations of trace metals did not exceed objectives based on protection of aquatic life and did not approach concentrations expected to result in acute toxicity to *Ceriodaphnia*. Other detected analytes are not acutely toxic to Ceriodaphnia and are unlikely to be significant causes or contributors to toxicity. Based on these results, the primary cause(s) of the observed toxicity in the McGaugh Slough sample remains unknown.

*Ulatis Creek* – Pesticides detected in the Ulatis Creek sample included chlorpyrifos (0.023 ug/L and <0.005 ug/L in replicate samples), and diazinon (0.076 ug/L and 0.081 ug/L in replicate samples). Both of these are organophosphate pesticides with relatively low toxicity reported to algae (>10 ug/L), so it it reasonable to conclude that these pesticides were not the cause of the observed *Selenastrum* toxicity. No toxicity was observed in this sample to *Ceriodaphnia*, which are much more sensitive to these pesticides. No other organophosphate or organochlorine pesticides were detected in this sample. These results indicate that the cause of the toxicity observed in the Ulatis Creek sample collected on 2/28/2006 is almost certainly not one of these pesticides. Concentrations of trace metals did not exceed objectives based on protection of aquatic life and did not approach concentrations expected to result in acute toxicity to *Ceriodaphnia*. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. Based on these results, the primary cause(s) of the observed toxicity in the Ulatis Creek sample remains unknown.

## Duration of Toxicity

As stated in the Exceedance Reports, no resampling was conducted to estimate duration of toxicity in Burch Creek, McGaugh Slough, or Ulatis Creek because these samples were collected during a discrete storm event that ended before toxicity results were available. The results of follow-up testing in the initial Burch Creek and McGaugh Slough samples indicate that the causative agent was no longer present in toxic concentrations 5 days after the original sample collection. The reduction of toxicity likely occurred through normal environmental processes (*e.g.*, hydrolysis, microbial degradation, *etc*.). These results indicate that duration of ambient toxicity could reasonably be expected to be less than this period under the uncontrolled ambient conditions in these waterbodies.

Control results for all toxicity tests were within allowable limits unless stated otherwise, and there was no blank interference for any of the TIE treatments. All test results reported are considered acceptable and valid for the purpose of this report.

## CONCLUSIONS AND OTHER FOLLOW-UP ACTIONS

The findings of the TIEs and chemical analyses resulted in inconclusive findings for all three samples with observed toxicity. Based on these findings, the Coalition has taken or planned the following actions:

In response to the observed toxicity, the following additional actions were taken in the Shasta/Tehama, Lake/Napa, and Solano/Yolo subwatersheds:

- In Lake County, recent pesticide applications were investigated with the assistance of the county Agriculture Commissioner, and local pear growers were also contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of chlorpyrifos (Lorsban) in the McGaugh Slough drainage were suspected to be a potential cause of the toxicity, this pesticide was not detected in the samples.
- Based on the TIE and chemical results, and the fact that chlorpyrifos was the only pesticide recently applied (and not detected), the results suggest that a non-agricultural cause of the observed toxicity is more likely in this case. Because growers have been informed and the most likely agricultural causes of the observed toxicity have been ruled out, no additional follow-up targeted at agricultural sources is recommended on the basis of the observed toxicity. The Agricultural Commissioner and the Farm Bureau will assist the Coalition by mapping the parcels that are part of that subwatershed to help determine if the cause may be a result of residential or industrial/commercial uses within the drainage.
- In Tehama County, recent pesticide applications were investigated with the assistance of the county Agriculture Commissioner, and local growers were contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of organophosphate pesticides in the Burch Creek drainage were suspected to be a potential cause of the toxicity, this could not be confirmed through chemical analysis due to damage to the original sample during shipping. As agreed in the initial Exceedance Report, additional samples were collected during the following storm event conducted March 16-17, 2006 at Burch Creek at Rawson Road (BRCRR), upstream from the Burch Creek at Woodson Avenue Bridge site (BRCWB). Because significant toxicity was observed to *Ceriodaphnia* in the BRCWB sample (40% reduction in survival compared to control), the additional upstream samples were tested for *Ceriodaphnia* toxicity and organophosphate pesticides. The *Ceriodaphnia* acute toxicity test was initiated with the BRCRR sample on March 22, 2006, and caused no *Ceriodaphnia* toxicity. No organophosphate pesticides were detected in the BRCRR sample or the BRCWB sample for this event. These results indicate that a non-agricultural source (e.g., the old landfill below Rawson Road) is the likely cause or significant contributor to observed toxicity in

lower Burch Creek. To more clearly focus on agricultural sources, all future samples in this drainage will be collected from the site above Rawson Road, as agreed with Water Board staff. No additional follow-up actions in response to these results have been initiated or are currently planned on the basis of the observed toxicity in Burch Creek.

- In the Solano/Yolo subwatershed, recent pesticide applications were investigated with the assistance of the county Agriculture Commissioner, and local growers were also contacted and provided information about the observed *Selenastrum* toxicity. The Agricultural Commissioner is currently evaluating pesticide applications in the Ulatis Creek drainage. An update to this communications report will be provided by May 26, 2006.

# SVWQC Communication Report

| | |
|---|---|
| DATE: | May 22, 2005 |
| TO: | Margaret Wong, Central Valley Regional Water Quality Control Board<br>cc: Bill Croyle, Central Valley Regional Water Quality Control Board |
| FROM: | Sacramento Valley Water Quality Coalition |
| SUBJECT: | Follow-up to Exceedances of Narrative Toxicity Objective |

## DATES AND SITES

The Sacramento Valley Water Quality Coalition (Coalition) conducted water sampling from March 16, 2006 through March 18, 2006, as required by the Irrigated Lands Conditional Waiver and the Coalition's Monitoring and Reporting Program Plan (MRP). This Communication Report includes results for samples from the following sites.

- Burch Creek at Woodson Ave Bridge (BRCWB), collected March 17, 2006. The Burch Creek drainage is part of the Shasta/Tehama subwatershed.
- Gilsizer Slough at George Washington Rd. (GILSL), collected March 16, 2006. The Gilsizer Slough drainage is part of the Butte/Yuba/Sutter subwatershed.
- Ulatis Creek at Brown Road (UCBRD), collected March 16, 2006. The Ulatis Creek drainage is part of the Yolo/Solano subwatershed.
- Dry Creek at Alta Mesa Road (DCGLT), collected March 16, 2006. The Dry Creek drainage is part of the Sacramento/Amador subwatershed.

This Communication Report presents the results of additional evaluations and provides information supplemental to Exceedance Reports previously provided to the Regional Board dated March 27, 2006.

## INITIAL TESTS AND RESULTS

*Burch Creek at Woodson Ave Bridge (BRCWB)*: In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in survival of 40% compared to the control.

*Gilsizer Slough at George Washington Rd (GILSL)*: In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in survival of 20% compared to the control.

*Ulatis Creek at Brown Road (UCBRD)*: In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in survival of 25% compared to the control.

*Dry Creek at Alta Mesa Road (DCGLT)*: In the toxicity tests conducted with *Ceriodaphnia*, the Coalition observed a reduction in survival of 40% compared to the control.

These results were statistically significant and were in exceedance of the Basin Plan narrative objective for toxicity.

The lab control results for this set of tests met all test acceptability requirements.

As proposed in the exceedance reports, the following follow-up actions were implemented to further evaluate the observed toxicity to *Ceriodaphnia* in these samples:

- Recent pesticide applications were investigated with the assistance of the local Agriculture Commissioners,
- Results of chemical analyses were evaluated for potential causes of toxicity,
- Information about the observed toxicity was provided to growers in these subwatersheds, and
- Discussion of additional follow-up actions was initiated with the representatives of the affected subwatersheds.

As agreed prior to conducting this event, additional samples were also collected at Burch Creek at Rawson Road (BRCRR), upstream from the Burch Creek at Woodson Avenue Bridge site. Because significant toxicity was observed in the Burch Creek at Woodson Avenue Bridge sample, the additional upstream samples were tested for *Ceriodaphnia* toxicity and organophosphate pesticides. The *Ceriodaphnia* acute toxicity test was initiated with the BRCRR sample on March 22, 2006.

No serial dilution tests or Toxicity Investigation Evaluations (TIE) were triggered by the magnitude of the observed toxicity. Resampling of these sites was not conducted because the initial samples were collected for a specific storm event. The results of these follow-up efforts are discussed below.

## Chemical Analyses and Follow-up Toxicity Results

Samples collected from Burch Creek, Dry Creek, Ulatis Creek, and Gilsizer Slough were also analyzed for organophosphate, organochlorine, triazine, and pyrethroid pesticides; trace metals; nutrients; *E. coli* bacteria; and conventional and physical parameters. Field logs and laboratory reports documenting these results are included on the CD-ROM attached to this Communication Report.

*Burch Creek (BRCWB and BRCRR)*– Results for samples collected in Burch Creek are summarized in Table 1. The only pesticide detected in the Burch Creek samples was simazine (0.013 ug/L). Simazine is an herbicide that exhibits low toxicity to invertebrates. The average 48-h LC50 for daphnids is >1,000 ug/L, so it is reasonable to conclude that simazine was not the cause of *Ceriodaphnia* toxicity. No other organophosphate, organochlorine, triazine, or pyrethroid pesticides were detected in the BRCWB sample. These results indicate that the cause of the toxicity observed in the BRCWB sample collected on 3/17/2006 is almost certainly not one of these pesticides. Concentrations of trace metals did not exceed objectives based on protection of aquatic life and did not approach concentrations expected to result in acute toxicity to *Ceriodaphnia*. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity.

Because significant toxicity was observed to *Ceriodaphnia* in the BRCWB sample (40% reduction in survival compared to control), the additional upstream samples were tested for *Ceriodaphnia* toxicity and organophosphate pesticides. The *Ceriodaphnia* acute toxicity test was initiated with the BRCRR sample on March 22, 2006, and caused no *Ceriodaphnia* toxicity

(100% survival). No organophosphate pesticides were detected in the BRCRR or BRCWB samples.

The magnitude of observed toxicity did not trigger TIEs, and based on chemistry results, the primary source(s) and cause(s) of the observed toxicity in the BRCWB sample remain unknown. However, the results indicate that the source of toxicity was between the Rawson Road and Woodson Bridge locations on Burch Creek, and suggest that a non-agricultural source (e.g., the old landfill below Rawson Road) is the likely cause or significant contributor to observed toxicity in lower Burch Creek. To more clearly focus on agricultural sources, all future samples in this drainage will be collected from the site above Rawson Road, as agreed with Regional Board staff.

**Table 1. Burch Creek Analyses**

| Analyses | BRCWB | BRRRD |
|---|---|---|
| aquatic toxicity, *Ceriodaphnia* survival | 60% of control | 111% of control |
| pH, DO, EC, temperature | In non-toxic range | In non-toxic range |
| TDS, TSS, TOC, color, turbidity, *E. coli* | In non-toxic range | *nm*[1] |
| organophosphate pesticides | ND[2] | ND |
| pyrethroid pesticides | ND | *nm* |
| triazine pesticides | simazine, 0.013 ug/L (not toxic to *Ceriodaphnia* at this concentration) | *nm* |
| organochlorine pesticides | ND | *nm* |
| molinate, thiobencarb | ND | *nm* |
| trace metals | In non-toxic range | *nm* |
| nitrogen and phosphorus compounds | detected below toxic concentrations | *nm* |

1 *nm* = not measured in this sample
2 ND = Not detected

*Gilsizer Slough (GILSL)* – Results for samples collected in Gilsizer Slough are summarized in Table 2. The only pesticide detected in the *GILSL* sample was diazinon (0.032 ug/L). Diazinon is an insecticide that exhibits toxicity to invertebrates at low concentrations. However, the average 96-h LC50 for *Ceriodaphnia* is ~0.4 ug/L, so it is reasonable to conclude that diazinon was not the cause of *Ceriodaphnia* toxicity in the GILSL sample. No other organophosphate pesticides were detected in the GILSL sample. These results indicate that the cause of the toxicity observed in the GILSL sample is almost certainly not an organophosphate pesticide. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. The magnitude of observed toxicity did not trigger TIEs, and based on chemistry results, the primary cause(s) of the observed toxicity in the GILSL sample remains unknown.

**Table 2. Gilsizer Slough Analyses**

| Analyses | GILSL |
|---|---|
| aquatic toxicity, *Ceriodaphnia* survival | 80% of control |
| pH, DO, EC, temperature | In non-toxic range |
| TDS, TSS, TOC, color, turbidity, *E. coli* | In non-toxic range |
| organophosphate pesticides | diazinon, .032 ug/L |

| | |
|---|---|
| | (not toxic to *Ceriodaphnia* at this concentration) |

*Ulatis Creek at Browns Road* (UCBRD) – Results for samples collected in Ulatis Creek are summarized in Table 3. The only pesticide detected in the UCBRD sample was diazinon (0.026 ug/L). Diazinon is an insecticide that exhibits toxicity to invertebrates at low concentrations. However, the average 96-h LC50 for *Ceriodaphnia* is ~0.4 ug/L, so it is reasonable to conclude that diazinon was not the cause of *Ceriodaphnia* toxicity in the UCBRD sample. No other organophosphate or organochlorine pesticides were detected in the UCBRD sample. These results indicate that the cause of the toxicity observed in the UCBRD sample is almost certainly not in one of these pesticides classes. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. The magnitude of observed toxicity did not trigger TIEs, and based on chemistry results, the primary cause(s) of the observed toxicity in the GILSL sample remains unknown.

**Table 3. Ulatis Creek Analyses**

| Analyses | UCBRD |
|---|---|
| aquatic toxicity, *Ceriodaphnia* survival | 75% of control |
| pH, DO, EC, temperature | In non-toxic range |
| TDS, TSS, TOC, color, turbidity, *E. coli* | In non-toxic range |
| organophosphate pesticides | diazinon, .026 ug/L<br>(not toxic to *Ceriodaphnia* at this concentration) |
| organochlorine pesticides | ND |

*Dry Creek at Alta Mesa Road (DCGLT)* – Results for samples collected in Dry Creek are summarized in Table 4. No pesticides were analyzed in the DCGLT sample. Other detected analytes are not acutely toxic to *Ceriodaphnia* and are unlikely to be significant causes or contributors to toxicity. The magnitude of observed toxicity did not trigger TIEs, and based on chemistry results, the primary cause(s) of the observed toxicity in the DCGLT sample remains unknown.

**Table 4. Dry Creek Analyses**

| Analyses | DCGLT |
|---|---|
| aquatic toxicity, *Ceriodaphnia* survival | 60% of control |
| pH, DO, EC, temperature | In non-toxic range |
| TDS, TSS, TOC, color, turbidity, *E. coli* | In non-toxic range |

## CONCLUSIONS AND OTHER FOLLOW-UP ACTIONS

The findings of the chemical analyses resulted in inconclusive findings for all four samples with observed toxicity. This is due in part to the relatively low level of toxicity observed in most of these samples. Organophosphate pesticides were ruled out as a cause of toxicity for three sites (BRCWB, GILSL, UCBRD). Other commonly used pesticides and trace metals were also ruled out for BRCWB. Conventional and physical parameters were in non-toxic ranges for all four sites with observed toxicity.

Based on these findings, the Coalition has taken or planned the following actions:

In response to the observed toxicity, the following additional actions were taken in the Shasta/Tehama, Sacramento/Amador, Butte/Yuba/Sutter, and Solano/Yolo subwatersheds:

- In Tehama County, recent pesticide applications were investigated with the assistance of the county Agriculture Commissioner, and local growers were contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of organophosphate pesticides in the Burch Creek drainage were suspected to be a potential cause of the toxicity, these were ruled out by the results of chemical analyses. No additional immediate follow-up actions in response to these results have been initiated or are currently planned on the basis of the observed toxicity in Burch Creek. All future Burch Creek samples will be collected at the Rawson Road location to avoid interference from non-agricultural sources.
- In the Butte/Yuba/Sutter subwatershed, recent pesticide applications were investigated with the assistance of the county Agriculture Commissioner, and local growers were contacted and provided information about the observed *Ceriodaphnia* toxicity. Although recent applications of organophosphate pesticides in the Gilsizer Slough drainage were suspected to be a potential cause of the toxicity, these pesticides were not detected in the samples at toxic concentrations and were ruled out by the results of chemical analyses. Because diazinon was the only organophosphate pesticide detected (below concentrations toxic to *Ceriodaphnia*), the results suggest that another category of pesticides or a non-agricultural cause of the observed toxicity are the likely cause of the observed toxicity. No additional immediate follow-up actions in response to these results have been initiated or are currently planned on the basis of the observed toxicity in Gilsizer Slough.
- In the Sacramento/Amador subwatershed, the Exceedance Report was provided to the Amador, Sacramento and San Joaquin County Agriculture Commissioners, and local growers were provided information about the observed *Ceriodaphnia* toxicity. The Coalition will work with the Agricultural Commissioners to identify potential causes of *Ceriodaphnia* toxicity. No chemical analysis was conducted because pesticides are not currently monitored at this location. No additional immediate follow-up actions in response to these results have been initiated or are currently planned on the basis of the observed toxicity in Dry Creek.
- In the Solano/Yolo subwatershed, recent pesticide applications were investigated with the assistance of the county Agriculture Commissioner, and local growers were also contacted and provided information about the observed *Selenastrum* toxicity. The Agricultural Commissioner is currently evaluating pesticide applications in the Ulatis Creek drainage. An update to this communications report regarding pesticide applications will be provided by May 26, 2006.

## APPENDIX E: Pesticide Use Trends for Monitored Drainages

Note: Reserved for future reports

# APPENDIX F: Site-Specific Drainage Maps

## Sacramento Valley Water Quality Coalition Monitoring Sites

| Map[1] Index | Drainages | Site Name | Lat | Long |
|---|---|---|---|---|
| 1 | Big Lake, Fall River Valley | Pit River at Pittville | 41.0454 | 121.3317 |
| 2 | Fall River Valley | Fall River at Fall River Ranch Bridge | 41.0351 | 121.4864 |
| 3 | Big Lake, Fall River Valley | Pit River at Canby Bridge | 41.4017 | 120.9310 |
| 4 | Burch Creek | Burch Creek at Woodson Ave Bridge | 39.9053 | 122.1837 |
| 5 | Orland & Lower Stony Creek | Stony Creek on Hwy 45 near Rd 24 | 39.7101 | 122.0040 |
| 6 | Colusa Basin | Colusa Drain near Maxwell Road | 39.2756 | 122.0862 |
| 7 | Colusa Basin | Stone Corral Creek near Maxwell Road | 39.2751 | 122.1043 |
| 8 | Sycamore Area Drainage | Rough and Ready Pumping Plant | 38.8621 | 121.7927 |
| 9 | Colusa Basin | Colusa Basin Drain above Knight's Landing[2] | 38.8121 | 121.7741 |
| 10 | Butte Creek | Butte Creek at Gridley Rd Bridge | 39.3619 | 121.8927 |
| 11 | Lower Coon Creek, Upper Coon Creek | Coon Creek at Striplin Road | 38.8661 | 121.5803 |
| 12 | Butte Creek, Cherokee Canal | Butte Slough at Pass Road | 39.1873 | 121.9085 |
| 13 | Wadsworth | Wadsworth Canal at South Butte Rd | 39.1534 | 121.7344 |
| 14 | Pine Creek | Pine Creek at Nord-Gianella Road | 39.7811 | 121.9877 |
| 15 | Butte/Yuba/Sutter | Sacramento Slough[2] | 38.7833 | 121.6338 |
| 16 | Lower Yolo | Z Drain – Dixon RCD | 38.4157 | 121.6752 |
| 18 | Upper Yolo | Tule Canal at I-80 | 38.5700 | 121.5800 |
| 19 | N. Fk. Feather River (American Valley) | Spanish Cr. above confluence with Greenhorn Cr. | 39.9678 | 120.9164 |
| 20 | Middle Fork Feather Plumas | Middle Fork Feather River at County Road A-23 | 39.8189 | 120.3918 |
| 21 | North Fork Feather (Indian Valley) | Indian Creek downstream from Indian Valley | 40.0507 | 120.9741 |
| 22 | Big Valley | McGaugh Slough at Finley Road East | 39.0042 | 122.8623 |
| 23 | Putah Creek (Napa County) | Pope Creek upstream from Lake Berryessa | 38.6464 | 122.3642 |
| 24 | Putah Creek (Napa County) | Capell Creek upstream from Lake Berryessa | 38.4825 | 122.2411 |
| 25 | Coloma | North Canyon Creek | 38.7604 | 120.7102 |
| 26 | Lower Cosumnes | Cosumnes River at Twin Cities Rd | 38.2910 | 121.3804 |
| 27 | Lower Cosumnes | Dry Creek at Alta Mesa Road[3] | 38.248 | -121.226 |
| 28 | North Fork Cosumnes | Big Indian Creek at Bridge | 38.5498 | 120.8478 |
| 29 | Lower Yolo | Shag Slough at Liberty Island Bridge | 38.3068 | 121.6934 |
| 30 | Shasta County | Anderson Creek at Ash Creek Road[3] | 40.4180 | -122.2136 |
| 32 | Ulatis Creek | Ulatis Creek at Brown Road[3] | 38.3070 | 121.7940 |
| 33 | Gilsizer Slough | Gilsizer Slough at G. Washington Rd[3] | 39.0090 | -121.6716 |
| 34 | Burch Creek | Burch Creek west of Rawson Rd[3] | 39.9254 | -122.2182 |

(1) Numbered indices for the Coalition monitoring site map

(2) Coordinated with the Sacramento River Watershed Monitoring Program (SRWP). This site was not monitored in Winter 2006 by the SRWP.

(3) These are new sites implemented in 2006.

# Legend for Monitoring Site Maps

Drainage Boundary

Stream

County Boundary

Monitoring Site

## **DWR Land Use**

### Pasture, Idle, Riparian

PASTURE
*Alfafa & mix; Clover; Induced high water table; Mixed; Native

RIPARIAN VEGETATION
*Permanent Duck Club Marsh; Seasonal Duck Club Marsh

IDLE
*Cropped within 3 years; Prep for crop production

### Annual Crops

FIELD CROPS
*Beans (dry); Corn; Cotton; General Field Crops; Safflower; Sudan; Sugar Beets; Sunflowers

GRAIN AND HAY CROP
*Misc. Mixed Grain & Hay; Oats; Wheat

RICE
*Rice; Wild Rice

TRUCK & BERRY CROPS
*Flowers Nursery & Xmas Tree; Melons, squash and cucumbers; Tomatoes; Truck & Berry General

### Tree & Vine Crops

CITRUS AND SUBTROPICAL
*Eucalyptus; Kiwis; Misc. Tropical Fruits; Olives

DECIDUOUS FRUITS AND NUTS
*Almonds; General Deciduous Fruit & Nut; Peaches and Nectarines; Pears Prunes; Walnuts

VINEYARD
*Vineyards General

### Non-Irrigated Lands

BARREN AND WASTELAND

WATER SURFACE

URBAN AND INDUSTRIAL

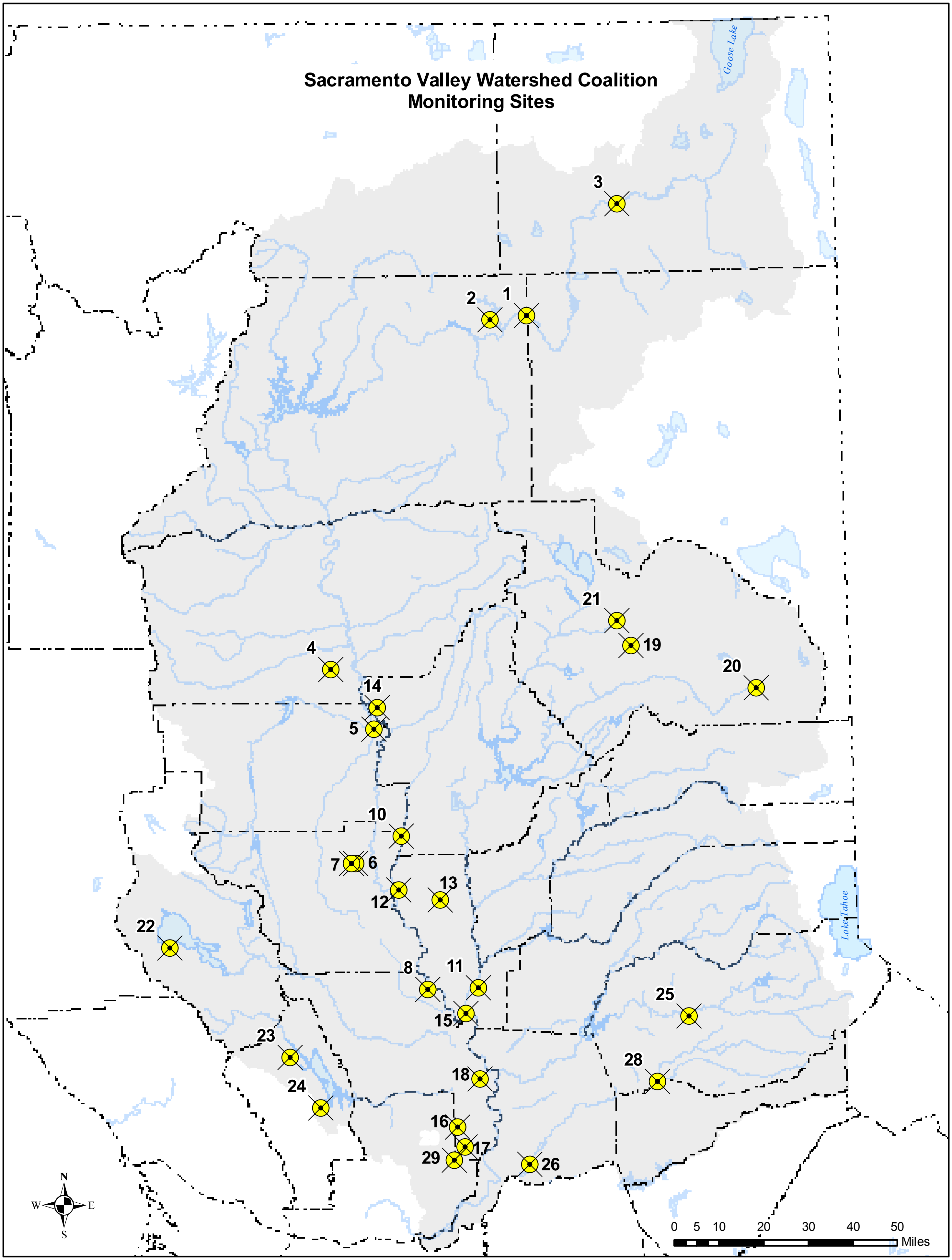
* Crop sub-classes with greater than 3,000 acres throughout the entire Sacramento Valley. Sub-classes with less than 3,000 acres contribute to the map, but are not listed.

DWR land use data not available for Siskiyou, Nevada, Eldorado, Sierra and Napa Counties. LCMMP from CA Dept of Forestry is used for this set of counties. Only general agriculture (green) and urban (gray) is designated in these counties.

AGRICULTURE

URBAN

OTHER



Sacramento Valley Watershed Coalition
Monitoring Sites
Goose Lake
Lake Tahoe
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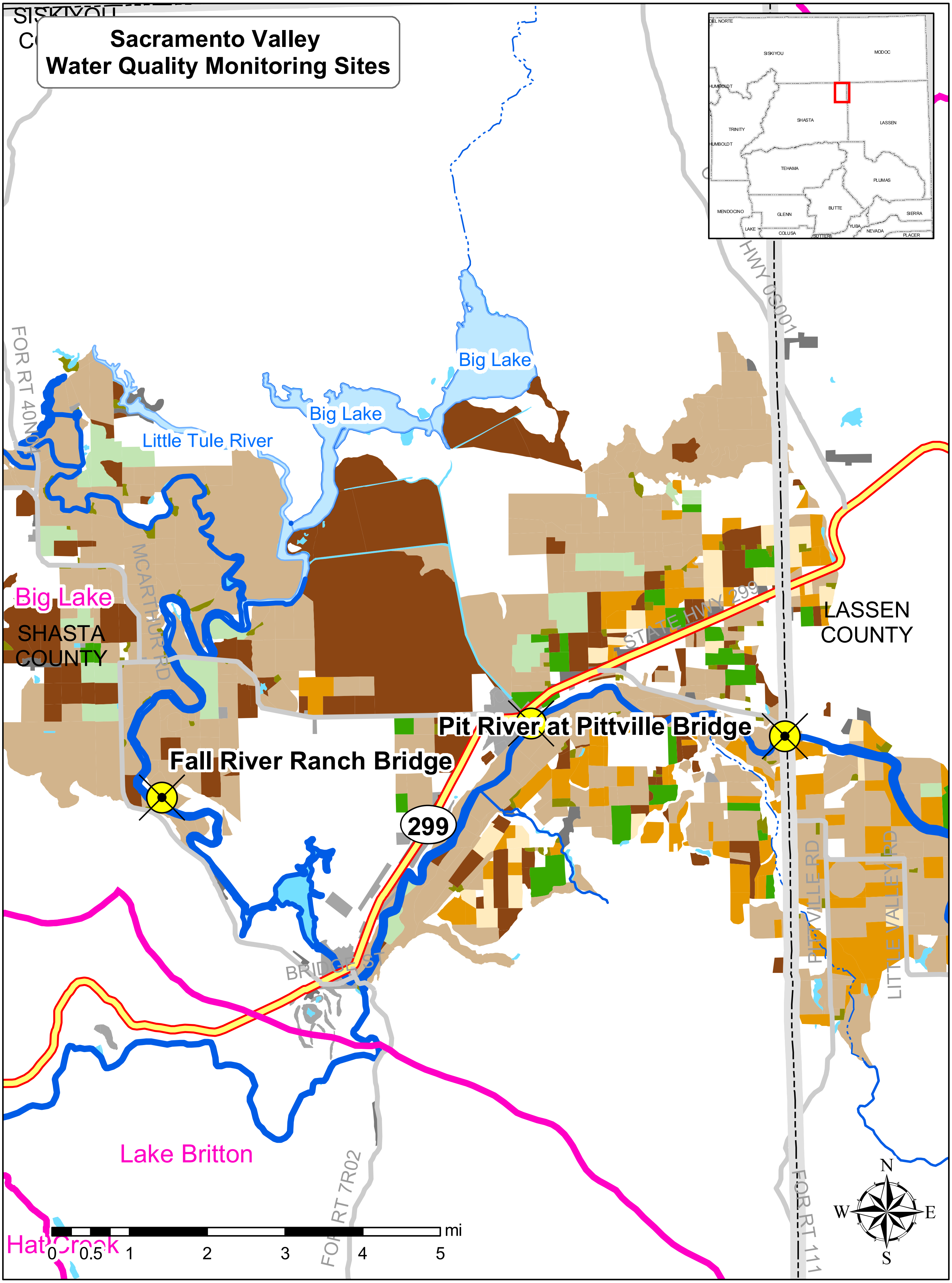
Sacramento Valley
Water Quality Monitoring Sites
Big Lake
Big Lake
Little Tule River
Big Lake
SHASTA COUNTY
LASSEN COUNTY
STATE HWY 299
HWY 0G001
FOR RT 40N04
MCARTHUR RD
Pit River at Pittville Bridge
Fall River Ranch Bridge
299
BRIDGE ST
PITTVILLE RD
LITTLE VALLEY RD
Lake Britton
Hat Creek
FOR RT 7R02
FOR RT 111
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DEL NORTE
SISKIYOU
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TRINITY
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PLUMAS
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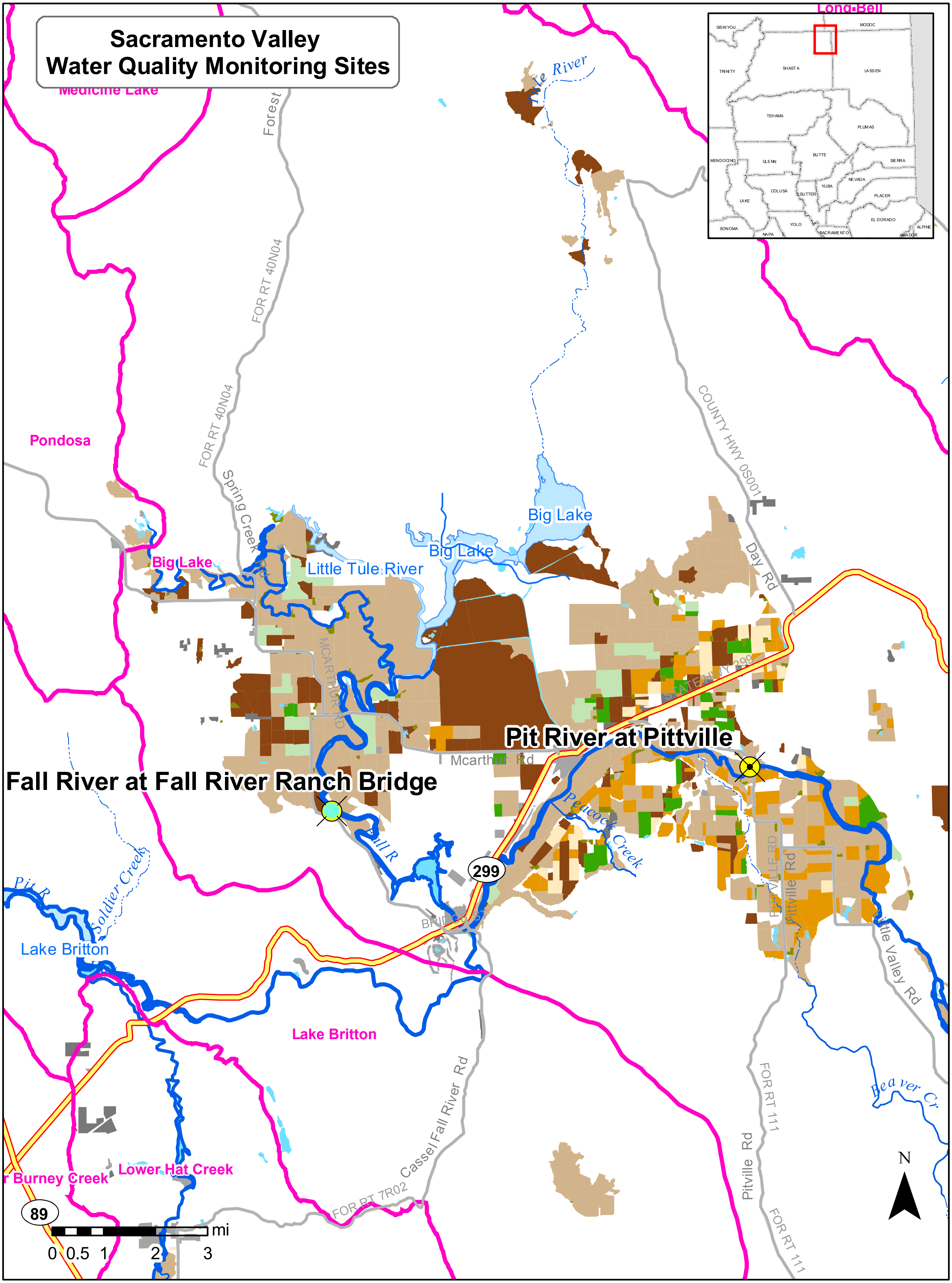
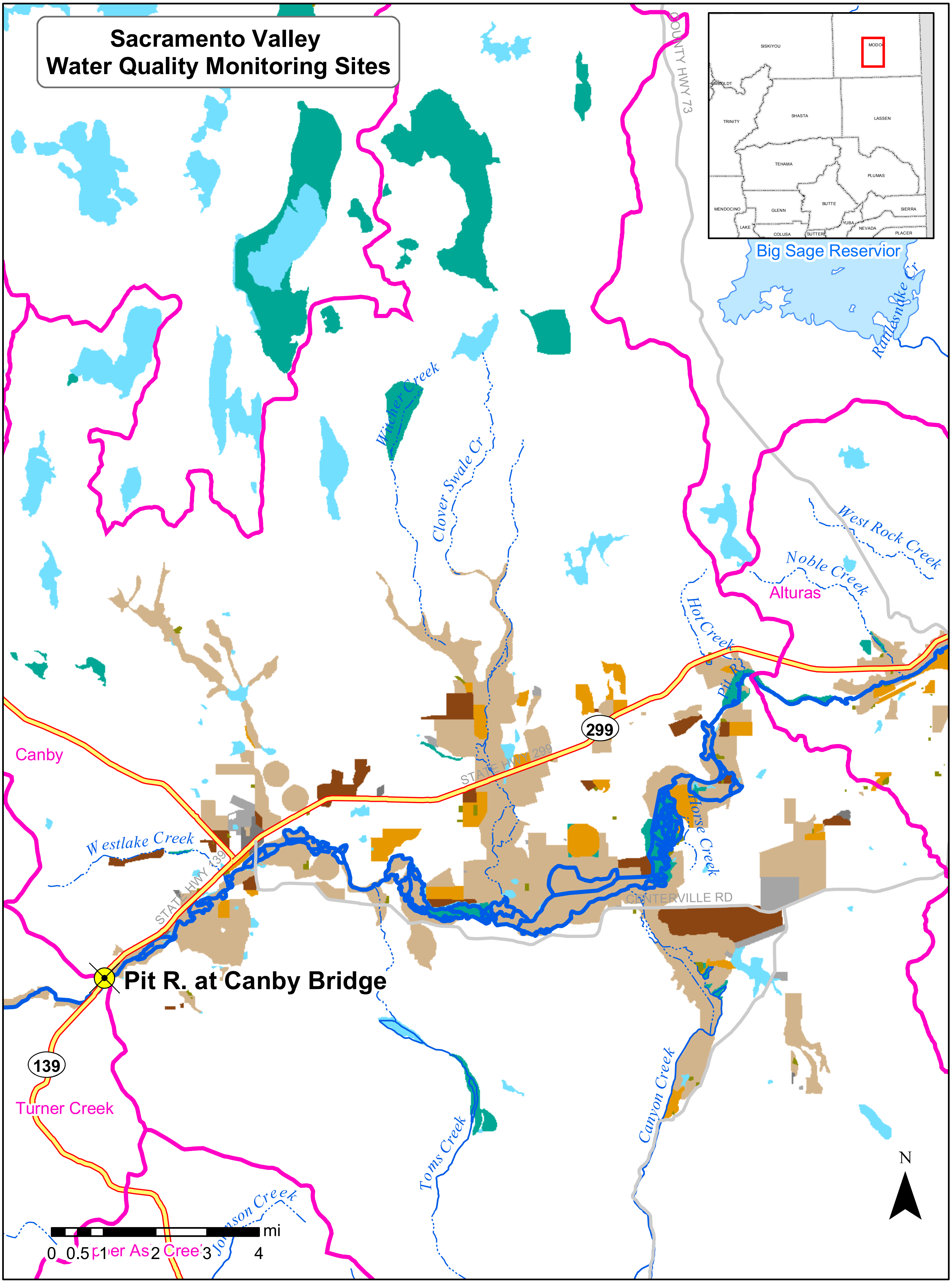
GLENN
BUTTE
SIERRA
LAKE
COLUSA
SUTTER
YUBA
NEVADA
PLACER

## Sacramento Valley Water Quality Monitoring Sites




Sacramento Valley
Water Quality Monitoring Sites
Pit R. at Canby Bridge
Canby
Alturas
Turner Creek
Big Sage Reservior
Rattlesnake Cr
West Rock Creek
Noble Creek
Hot Creek
Pit R.
Horse Creek
Canyon Creek
Toms Creek
Johnson Creek
Westlake Creek
Clover Swale Cr
Witcher Creek
299
139
STATE HWY 299
STATE HWY 139
COUNTY HWY 73
CENTERVILLE RD
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
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SIERRA
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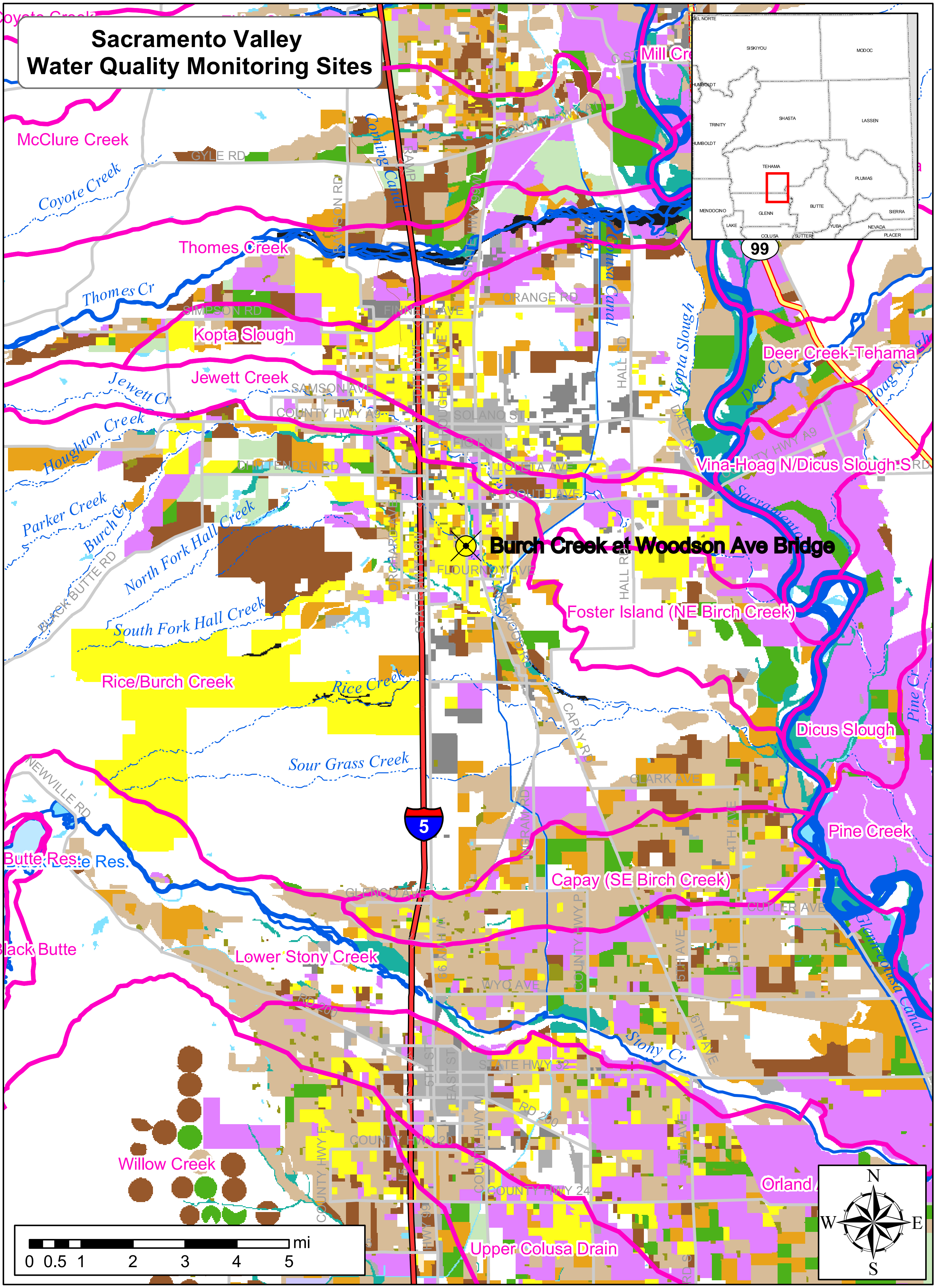

Sacramento Valley
Water Quality Monitoring Sites
Burch Creek at Woodson Ave Bridge
Coyote Creek
McClure Creek
Thomes Creek
Kopta Slough
Jewett Creek
Rice/Burch Creek
Black Butte Res.
Mid Black Butte
Lower Stony Creek
Willow Creek
Upper Colusa Drain
Orland
Capay (SE Birch Creek)
Pine Creek
Dicus Slough
Foster Island (NE Birch Creek)
Vina-Hoag N/Dicus Slough S
Deer Creek-Tehama
Mill Cre
Coyote Creek
Thomes Cr
Jewett Cr
Houghton Creek
Parker Creek
Burch Cr
North Fork Hall Creek
South Fork Hall Creek
Rice Creek
Sour Grass Creek
Stony Cr
Kopta Slough
Deer Cr
Hoag Slough
Sacramento
Pine Cr
Glenn-Colusa Canal
Corning Canal
Tehama Colusa Canal
GYLE RD
SIMPSON RD
ORANGE RD
FINNELL AVE
SAMSON AVE
COUNTY HWY A9
SOLANO ST
LOLETA AVE
SOUTH AVE
FLOURNOY AVE
CHITTENDEN RD
BLACK BUTTE RD
NEWVILLE RD
HALL RD
DALE RD
CAPAY RD
CLARK AVE
CUTLER AVE
GLENDO AVE
WYO AVE
STATE HWY 32
RD 200
COUNTY HWY 20
COUNTY HWY 24
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DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
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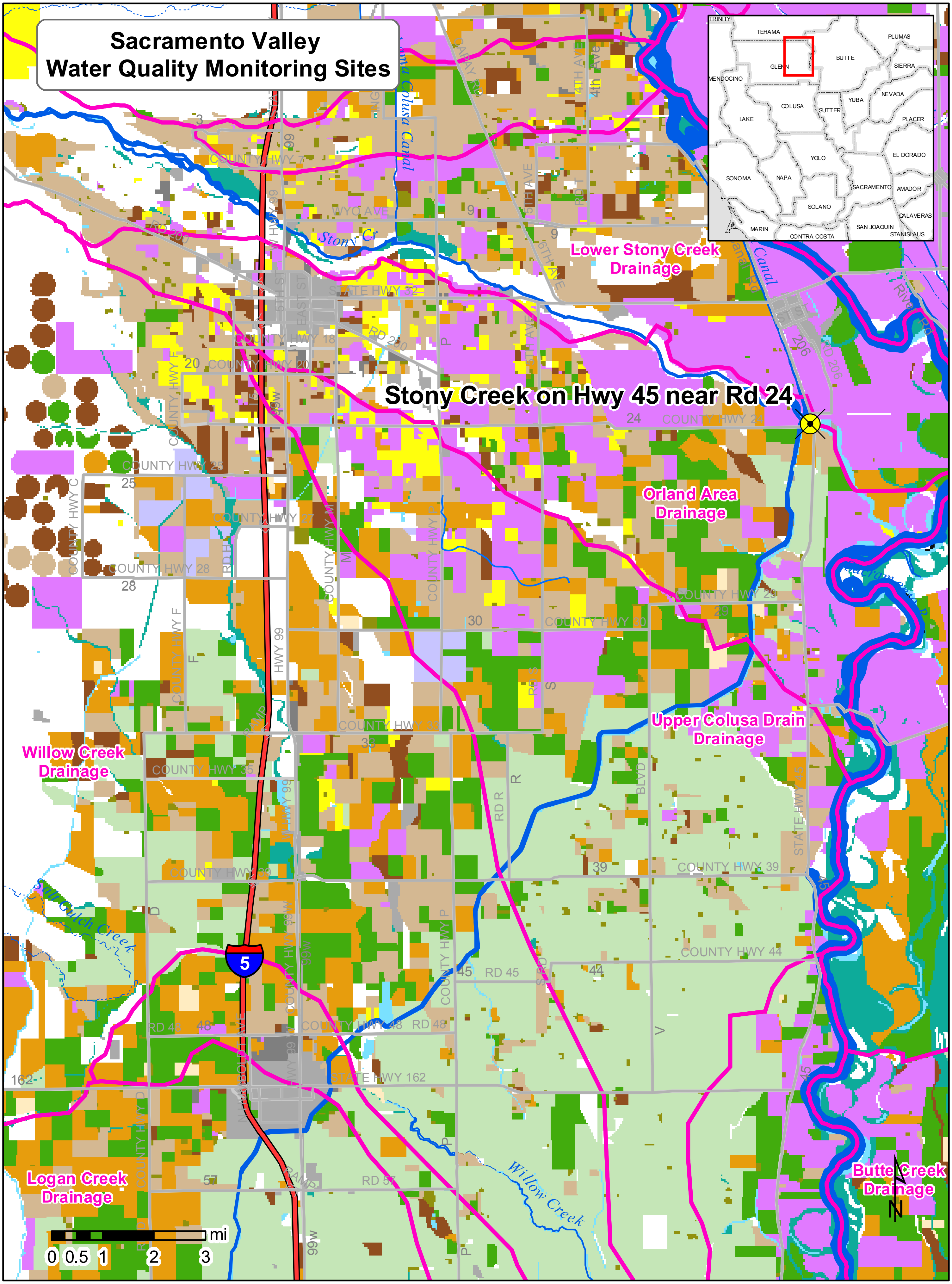

Sacramento Valley
Water Quality Monitoring Sites
Stony Creek on Hwy 45 near Rd 24
Lower Stony Creek
Drainage
Orland Area
Drainage
Upper Colusa Drain
Drainage
Willow Creek
Drainage
Logan Creek
Drainage
Butte Creek
Drainage
Stony Cr
Willow Creek
Salt Gulch Creek
Colusa Canal
TRINITY
TEHAMA
PLUMAS
BUTTE
GLENN
SIERRA
MENDOCINO
YUBA
NEVADA
COLUSA
SUTTER
LAKE
PLACER
EL DORADO
YOLO
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
SAN JOAQUIN
CONTRA COSTA
STANISLAUS
COUNTY HWY 24
COUNTY HWY 25
COUNTY HWY 27
COUNTY HWY 28
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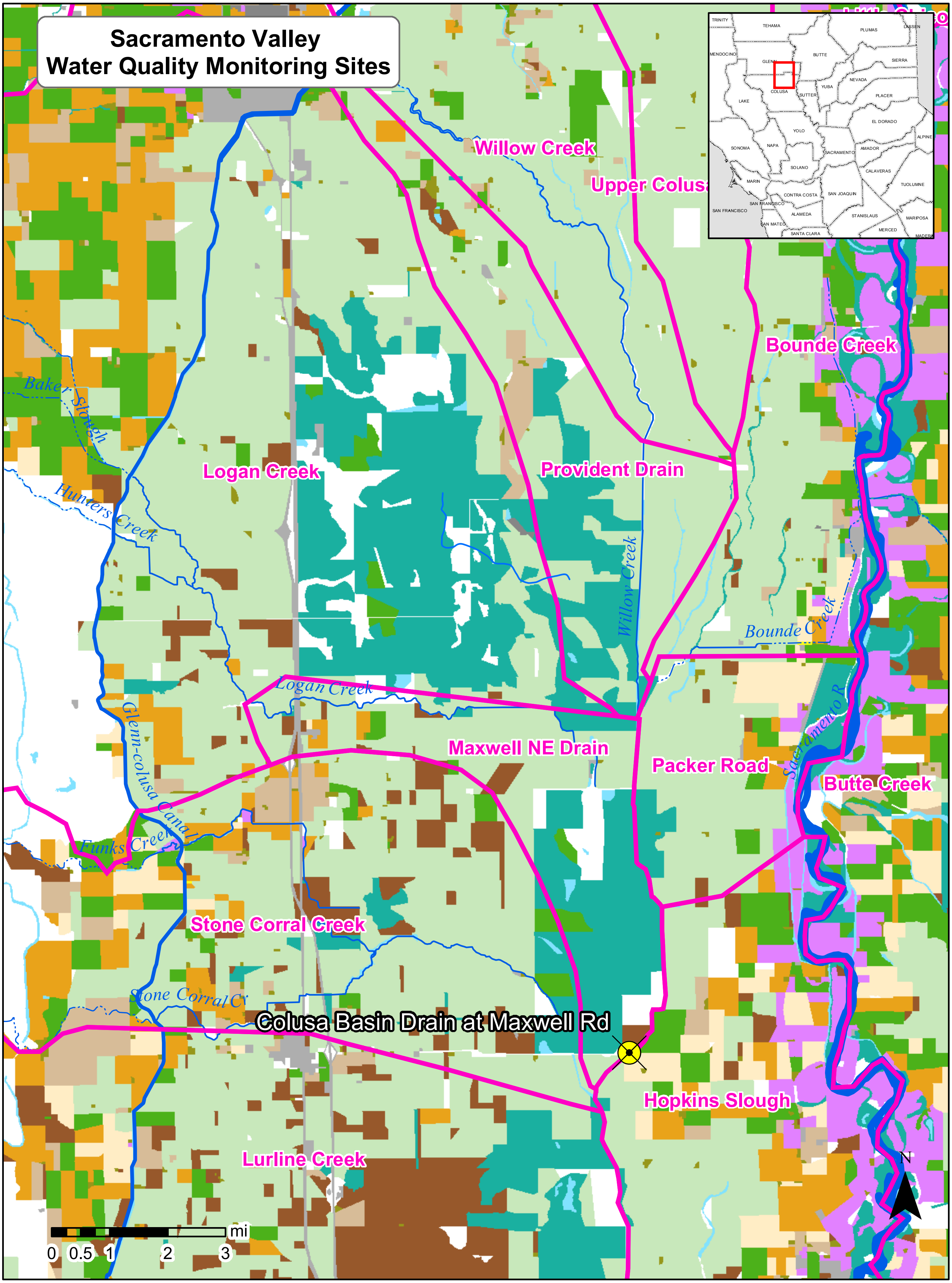
Sacramento Valley
Water Quality Monitoring Sites
Willow Creek
Upper Colusa
Bounde Creek
Logan Creek
Provident Drain
Baker Slough
Hunters Creek
Willow Creek
Bounde Creek
Logan Creek
Glenn-colusa Canal
Maxwell NE Drain
Packer Road
Sacramento R
Butte Creek
Funks Creek
Stone Corral Creek
Stone Corral Cr
Colusa Basin Drain at Maxwell Rd
Hopkins Slough
Lurline Creek
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MENDOCINO
GLENN
BUTTE
SIERRA
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LAKE
PLACER
EL DORADO
YOLO
SONOMA
NAPA
SACRAMENTO
AMADOR
ALPINE
SOLANO
CALAVERAS
MARIN
TUOLUMNE
CONTRA COSTA
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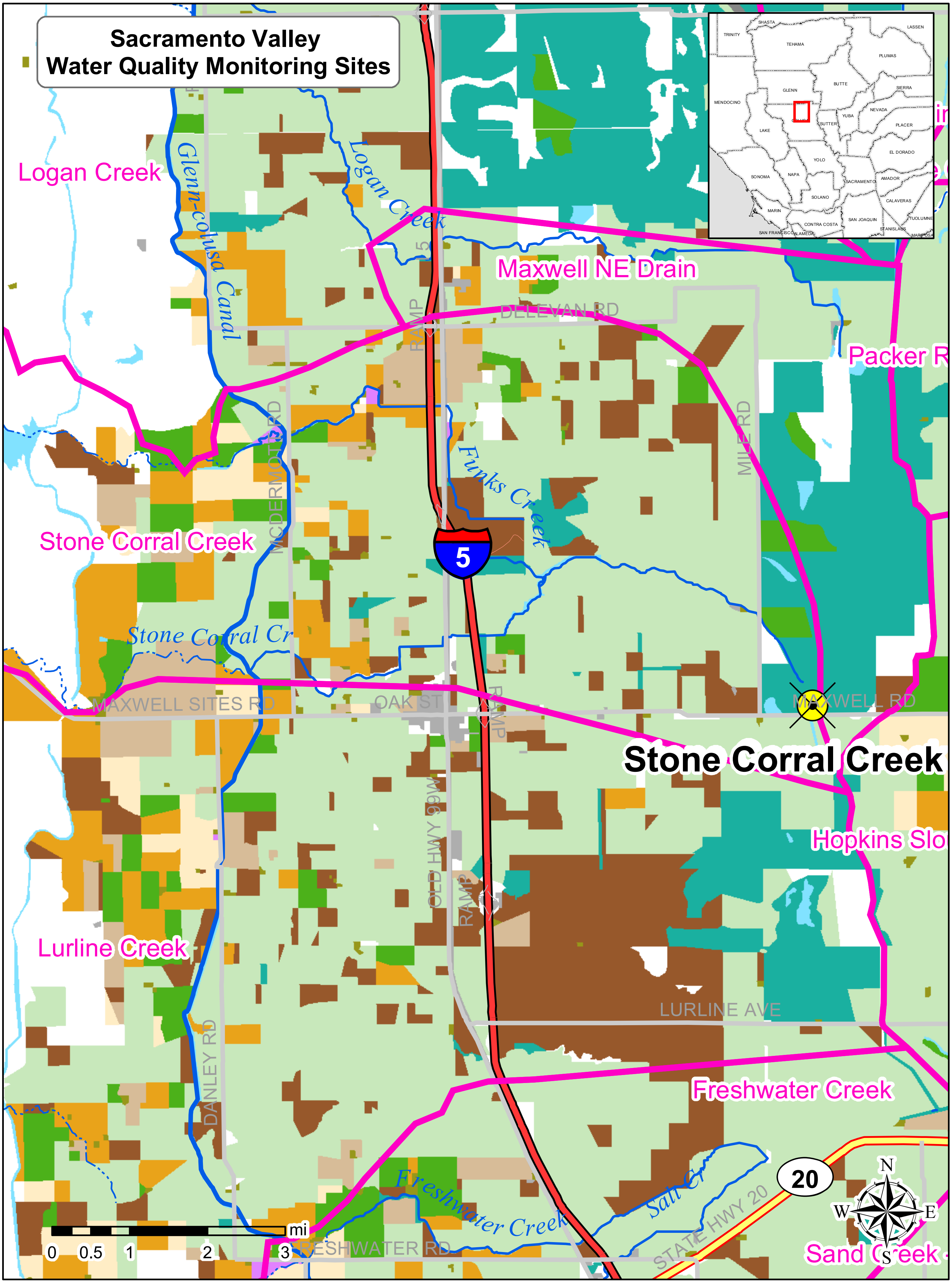
MADERA


Sacramento Valley
Water Quality Monitoring Sites
Logan Creek
Glenn-colusa Canal
Logan Creek
Maxwell NE Drain
DELEVAN RD
Packer R
Stone Corral Creek
MCDERMOTT RD
Funks Creek
MILE RD
Stone Corral Cr
MAXWELL SITES RD
OAK ST
MAXWELL RD
Stone Corral Creek
Hopkins Slo
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Lurline Creek
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DANLEY RD
Freshwater Creek
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Salt Cr
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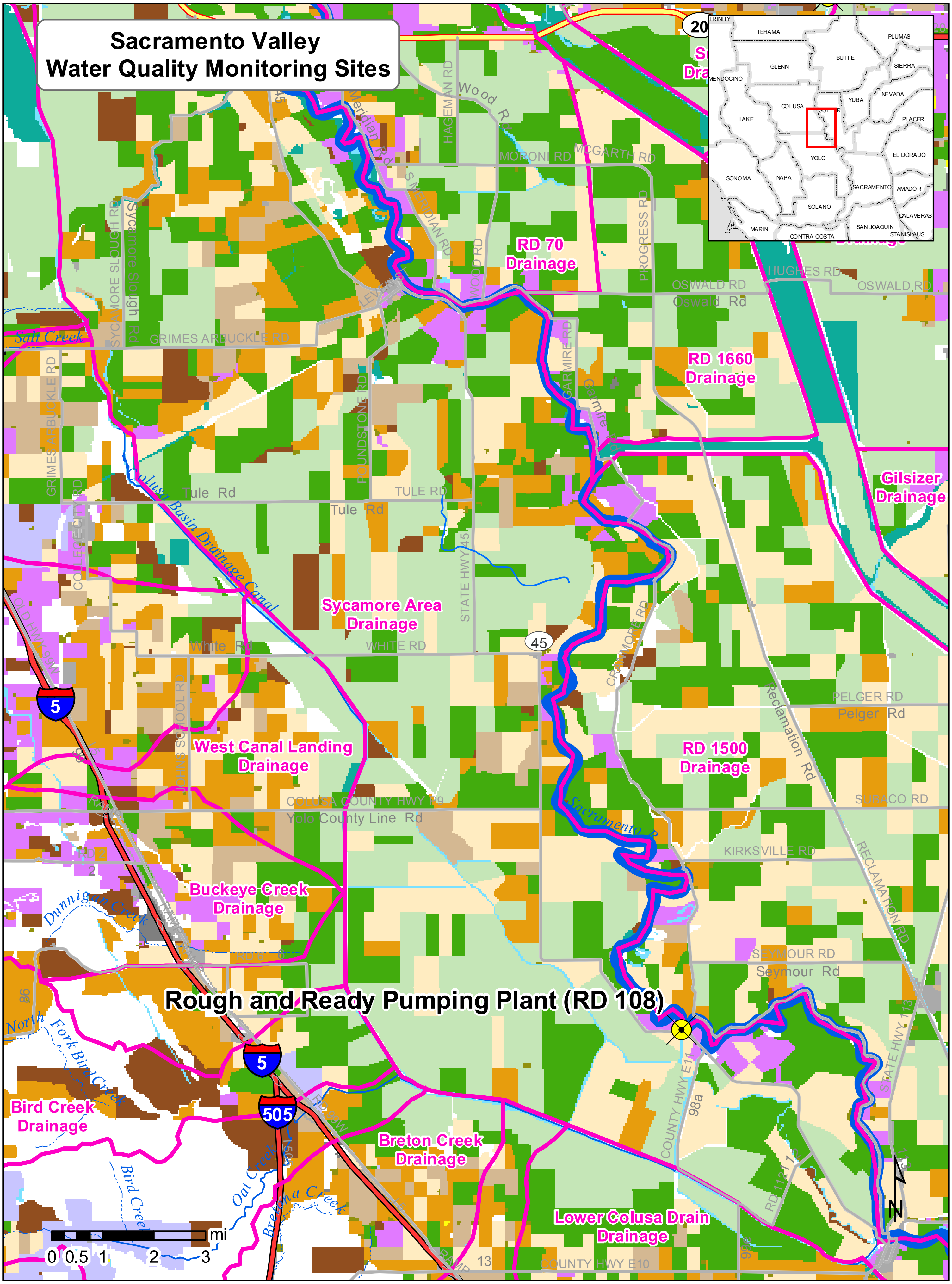
Sacramento Valley
Water Quality Monitoring Sites
Rough and Ready Pumping Plant (RD 108)
RD 70
Drainage
RD 1660
Drainage
Gilsizer
Drainage
Sycamore Area
Drainage
West Canal Landing
Drainage
RD 1500
Drainage
Buckeye Creek
Drainage
Bird Creek
Drainage
Breton Creek
Drainage
Lower Colusa Drain
Drainage
Salt Creek
Colusa Basin Drainage Canal
Sacramento R
Dunnigan Creek
North Fork Bird Creek
Bird Creek
Oat Creek
Bretona Creek
Wood Rd
MORONI RD
MCGARTH RD
HAGEMAN RD
PROGRESS RD
OSWALD RD
Oswald Rd
HUGHES RD
GRIMES ARBUCKLE RD
SYCAMORE SLOUGH RD
Sycamore Slough Rd
POUNDSTONE RD
TULE RD
Tule Rd
WHITE RD
White Rd
STATE HWY 45
CARMIRE RD
Carmire Rd
JOHNS SCHOOL RD
COLUSA COUNTY HWY 99
Yolo County Line Rd
PELGER RD
Pelger Rd
Reclamation Rd
RECLAMATION RD
SUBACO RD
KIRKSVILLE RD
SEYMOUR RD
Seymour Rd
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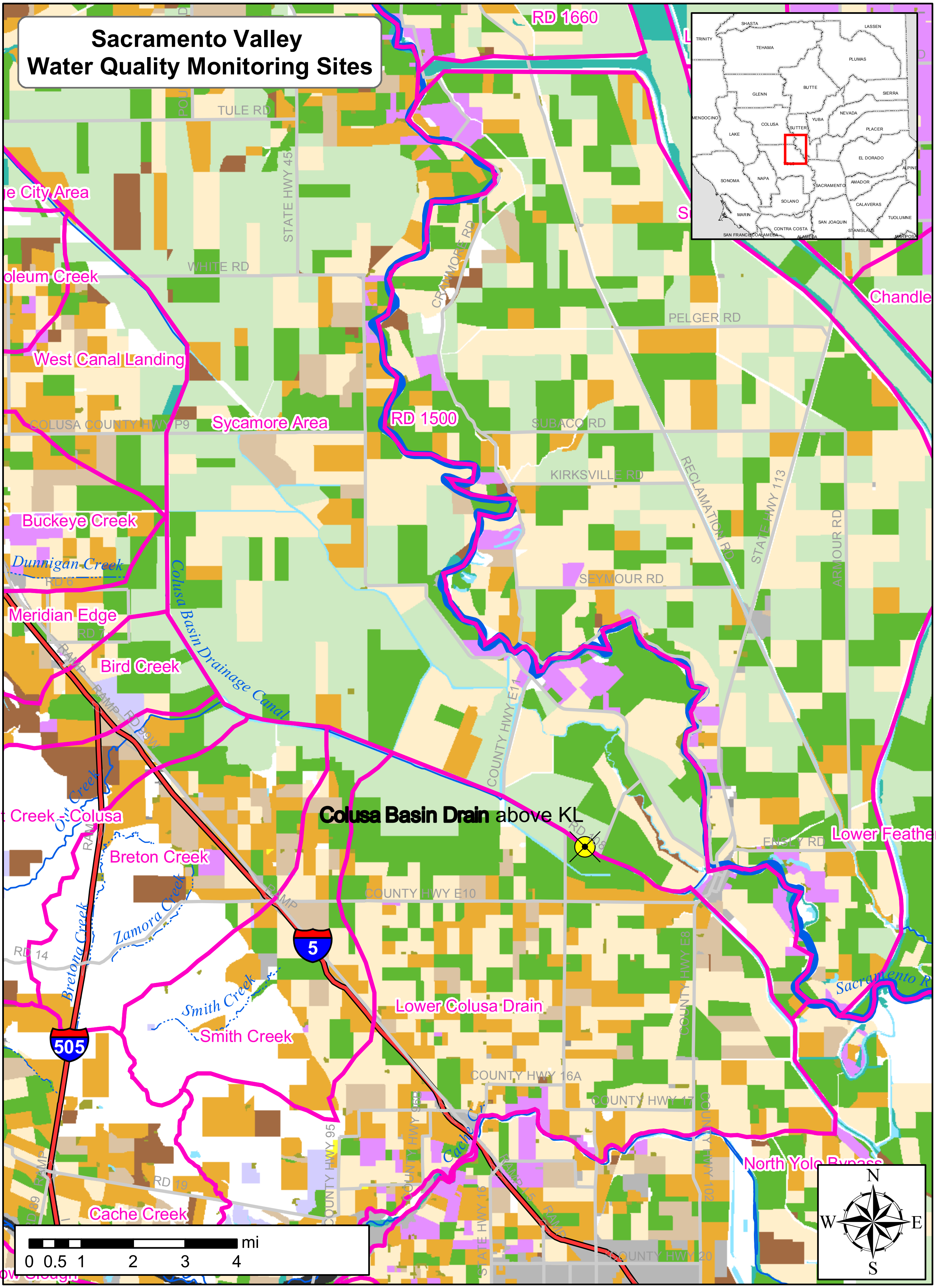
Sacramento Valley
Water Quality Monitoring Sites
RD 1660
TULE RD
STATE HWY 45
WHITE RD
West Canal Landing
COLUSA COUNTY HWY P9
Sycamore Area
RD 1500
SUBACO RD
PELGER RD
KIRKSVILLE RD
RECLAMATION RD
STATE HWY 113
ARMOUR RD
SEYMOUR RD
Buckeye Creek
Dunnigan Creek
Meridian Edge
Bird Creek
Colusa Basin Drainage Canal
COUNTY HWY E14
Oat Creek - Colusa
Colusa Basin Drain above KL
ENSLEY RD
Breton Creek
COUNTY HWY E10
Zamora Creek
Bretona Creek
Smith Creek
Lower Colusa Drain
COUNTY HWY E8
COUNTY HWY 16A
COUNTY HWY 17
Cache Creek
North Yolo Bypass
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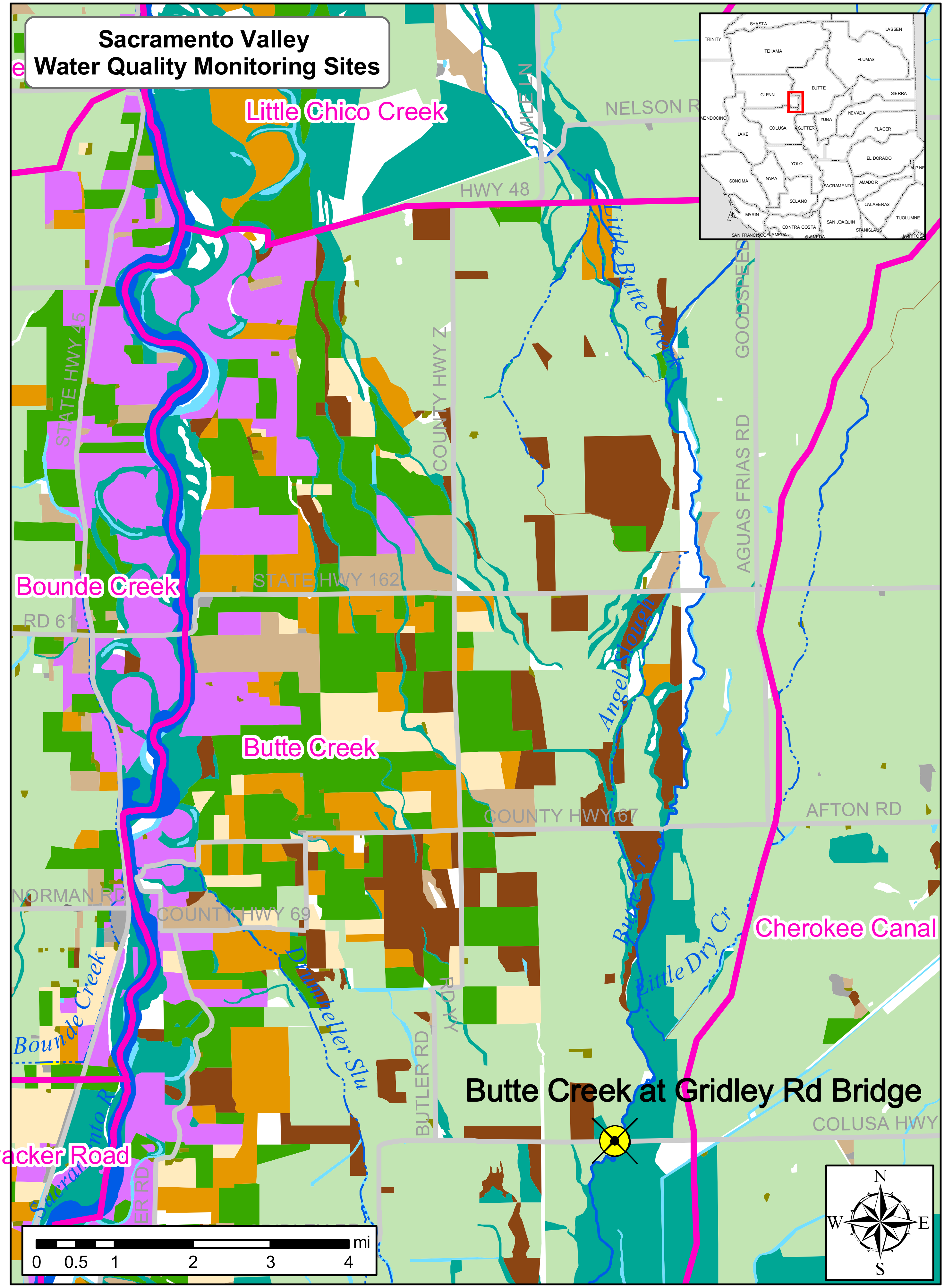

Sacramento Valley
Water Quality Monitoring Sites
Little Chico Creek
Bounde Creek
Butte Creek
Cherokee Canal
Packer Road
Butte Creek at Gridley Rd Bridge
NELSON R
HWY 48
MILE LN
STATE HWY 45
COUNTY HWY Z
GOODSPEED
AGUAS FRIAS RD
STATE HWY 162
RD 61
COUNTY HWY 67
AFTON RD
NORMAN RD
COUNTY HWY 69
RD YY
BUTLER RD
COLUSA HWY
Little Butte Creek
Angel Slough
Butte Cr
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NEVADA
PLACER
LAKE
EL DORADO
YOLO
ALPINE
SONOMA
NAPA
SACRAMENTO
AMADOR
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TUOLUMNE
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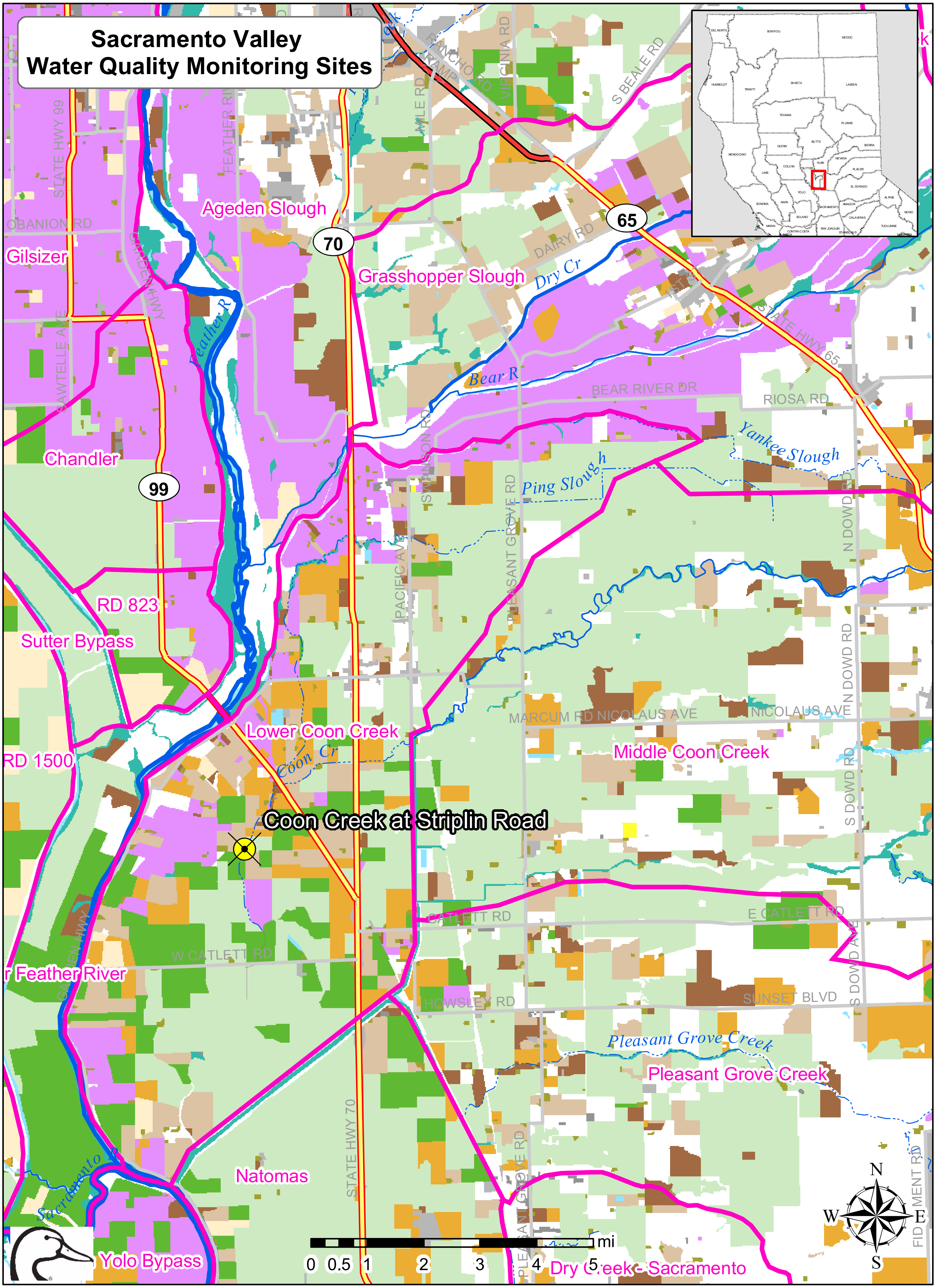
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA


Sacramento Valley
Water Quality Monitoring Sites
Coon Creek at Striplin Road
Ageden Slough
Gilsizer
Grasshopper Slough
Chandler
RD 823
Sutter Bypass
RD 1500
Lower Coon Creek
Middle Coon Creek
r Feather River
Pleasant Grove Creek
Natomas
Yolo Bypass
Dry Creek - Sacramento
Feather R
Dry Cr
Bear R
Yankee Slough
Ping Slough
Coon Cr
Pleasant Grove Creek
Sacramento R
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65
STATE HWY 99
STATE HWY 70
STATE HWY 65
OBANION RD
GARDEN HWY
SAWTELLE AVE
FEATHER RIVER
PLUMAS ARCHER RD
VIRGINIA RD
S BEALE RD
RANCHO RD
MILE RD
DAIRY RD
BEAR RIVER DR
RIOSA RD
SWANSON RD
PACIFIC AVE
PLEASANT GROVE RD
N DOWD RD
S DOWD RD
MARCUM RD NICOLAUS AVE
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CATLETT RD
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FIDDYMENT RD
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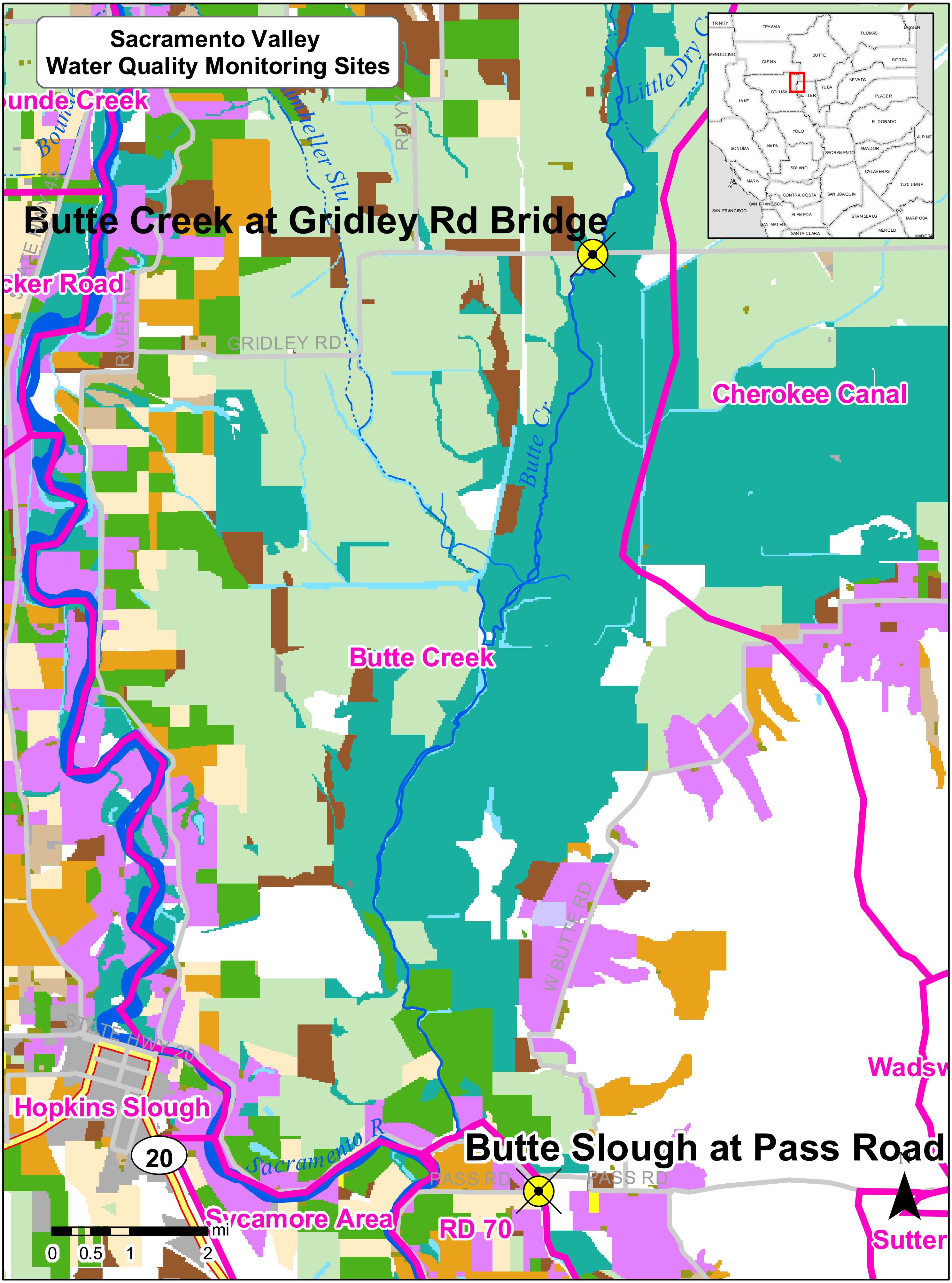

Sacramento Valley
Water Quality Monitoring Sites
Butte Creek at Gridley Rd Bridge
Butte Slough at Pass Road
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Cherokee Canal
Butte Creek
Hopkins Slough
Sycamore Area
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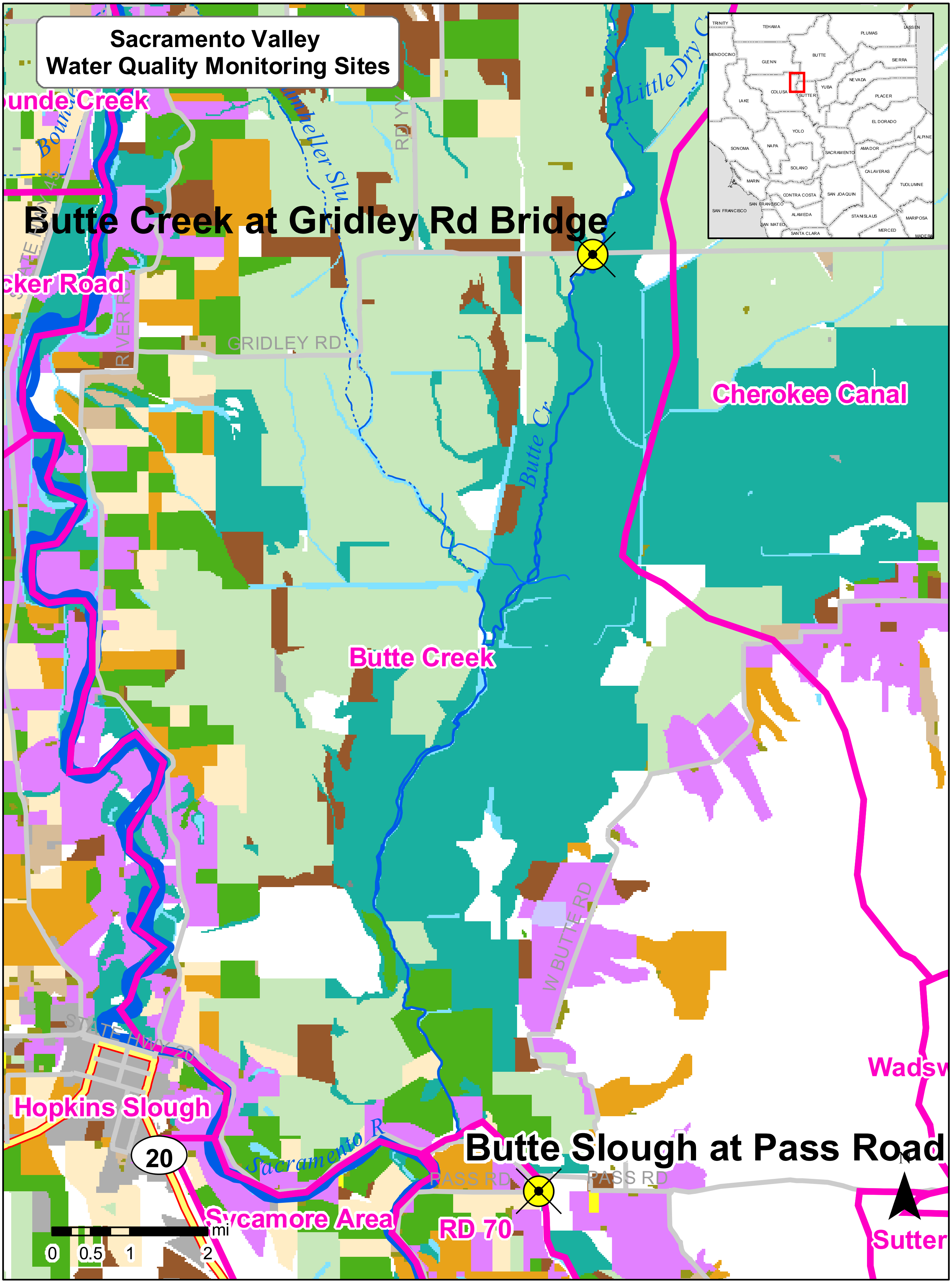

Sacramento Valley
Water Quality Monitoring Sites
Butte Creek at Gridley Rd Bridge
Butte Slough at Pass Road
Cherokee Canal
Butte Creek
Hopkins Slough
Sycamore Area
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Sutter
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COLUSA
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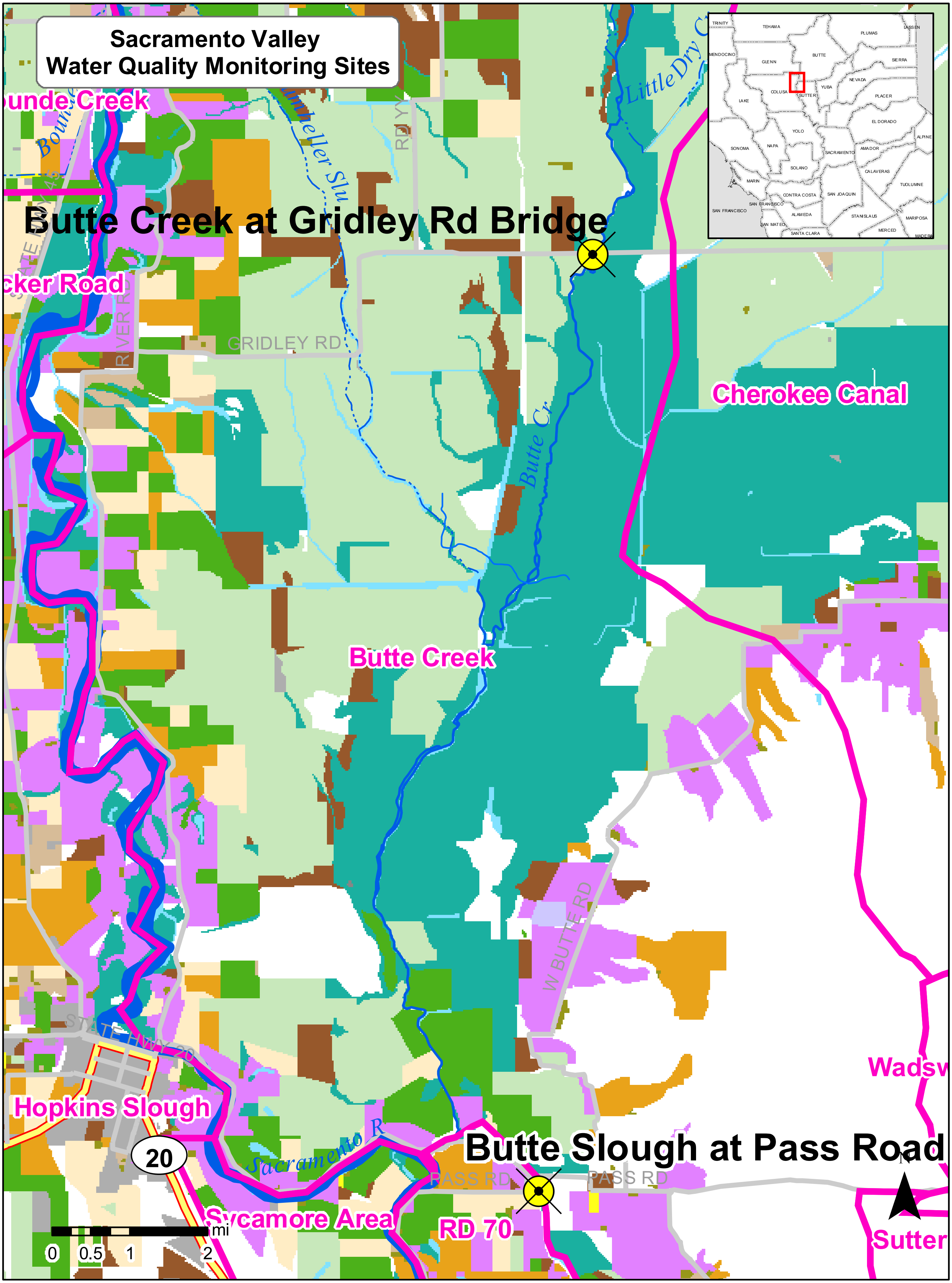
PLACER
LAKE
YOLO
EL DORADO
ALPINE
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
TUOLUMNE
SAN FRANCISCO
CONTRA COSTA
SAN JOAQUIN
ALAMEDA
STANISLAUS
MARIPOSA
SAN MATEO
SANTA CLARA
MERCED
MADERA



Sacramento Valley
Water Quality Monitoring Sites
Butte Creek at Gridley Rd Bridge
Butte Slough at Pass Road
Cherokee Canal
Butte Creek
Hopkins Slough
Sycamore Area
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GRIDLEY RD
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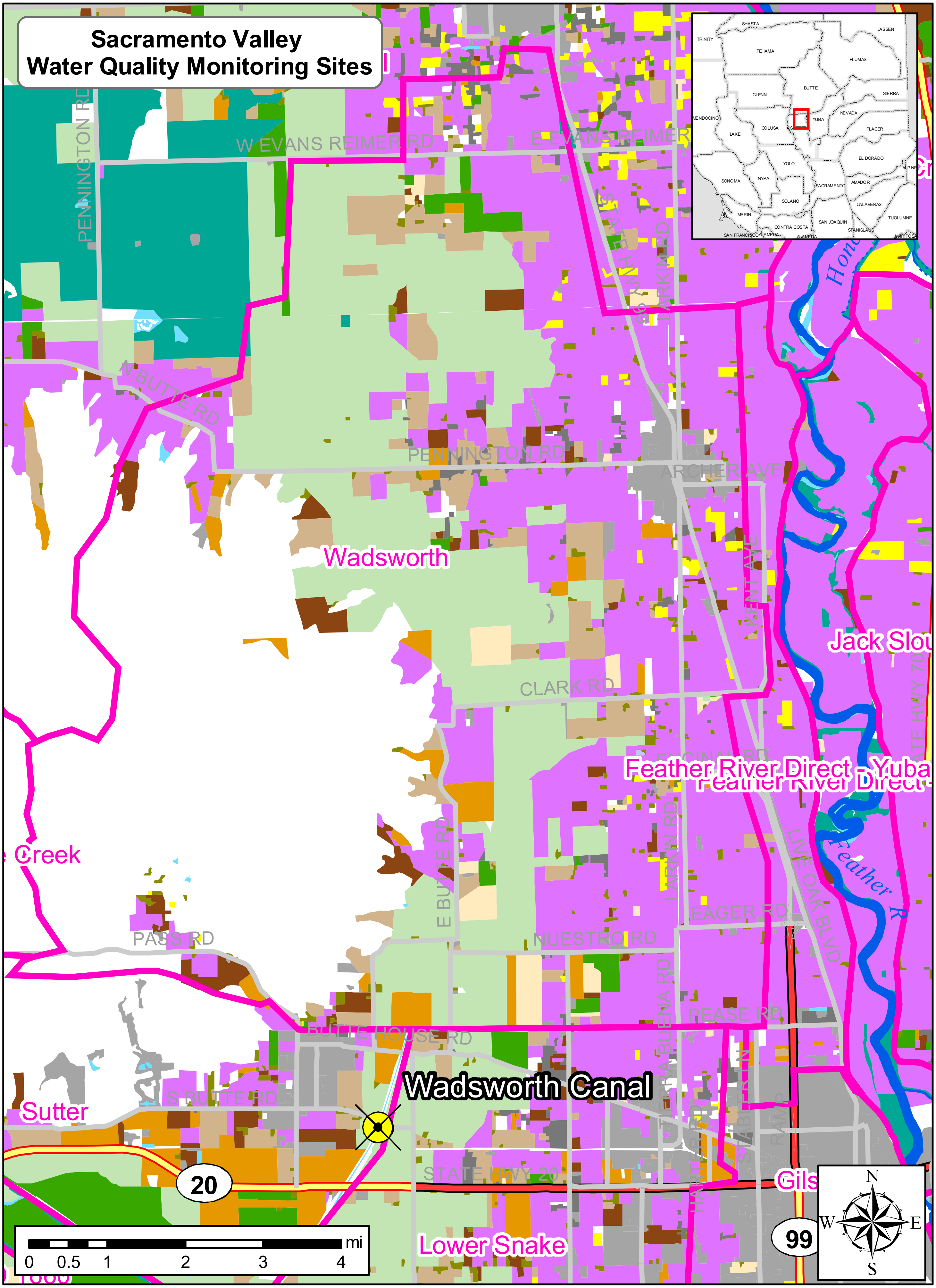
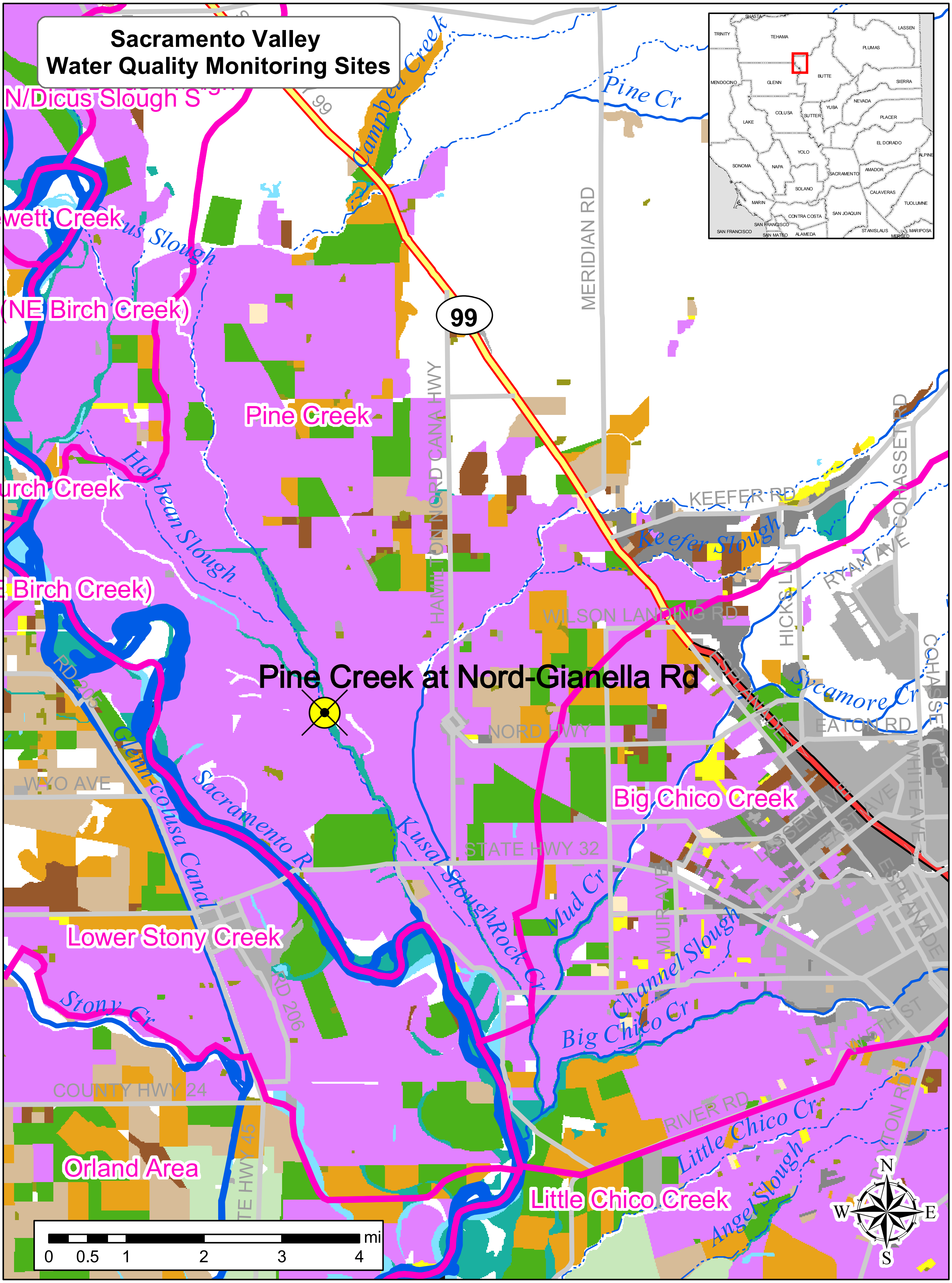
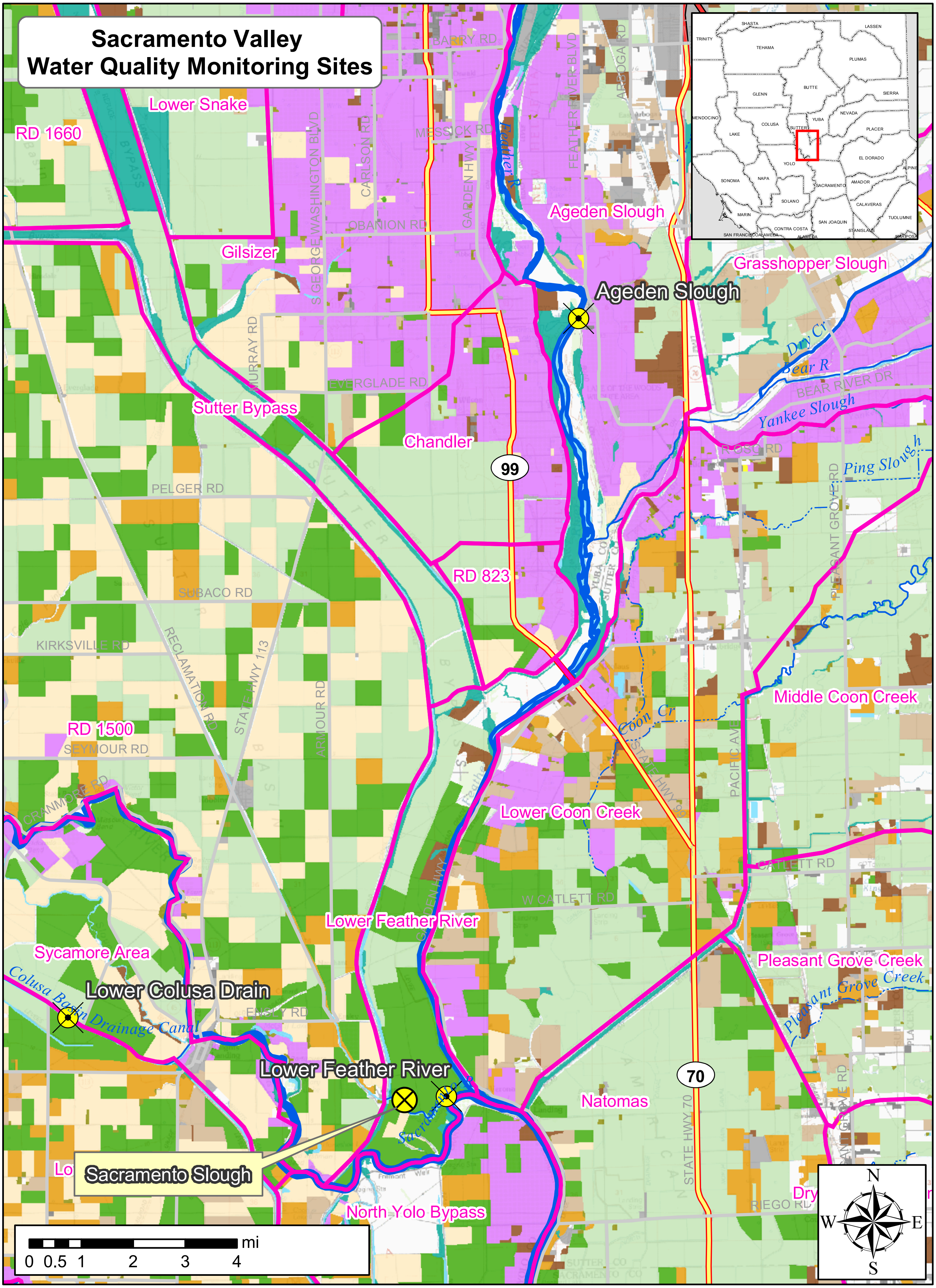
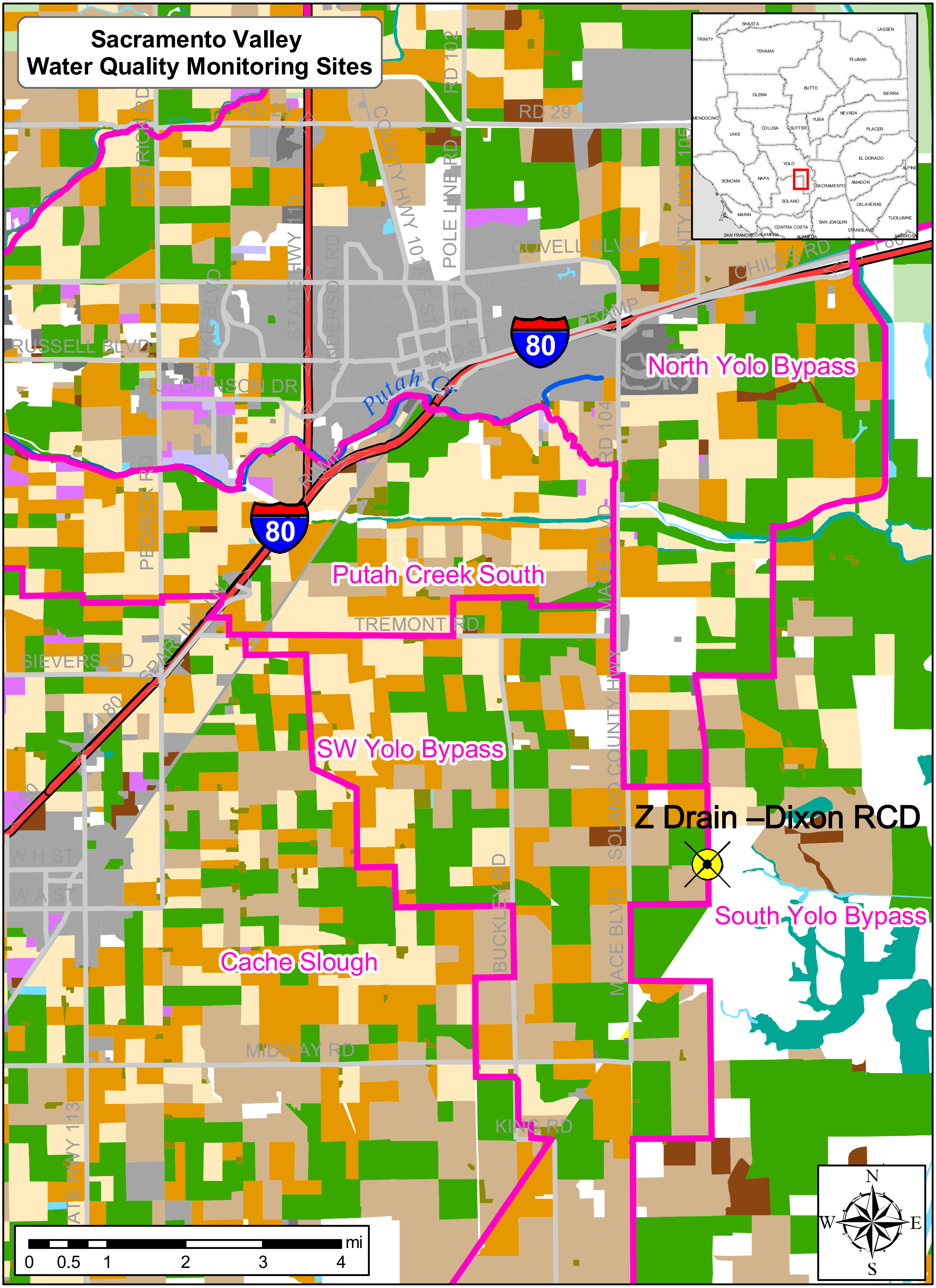


Sacramento Valley
Water Quality Monitoring Sites
Wadsworth
Wadsworth Canal
Feather River Direct - Yuba
Feather River Direct
Jack Slou
Creek
Sutter
Lower Snake
Gils
Feather R
W EVANS REIMER RD
E EVANS REIMER
PENNINGTON RD
W BUTTE RD
ARCHER AVE
CLARK RD
EAGER RD
NUESTRO RD
PASS RD
PEASE RD
BUTTE HOUSE RD
S BUTTE RD
STATE HWY 20
E BUTTE RD
LARKIN RD
LIVE OAK BLVD
20
99
0 0.5 1 2 3 4 mi
N
S
E
W
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
BUTTE
GLENN
SIERRA
MENDOCINO
COLUSA
YUBA
NEVADA
LAKE
PLACER
YOLO
EL DORADO
SONOMA
NAPA
SACRAMENTO
AMADOR
ALPINE
SOLANO
CALAVERAS
MARIN
SAN JOAQUIN
TUOLUMNE
CONTRA COSTA
STANISLAUS
SAN FRANCISCO
ALAMEDA
MARIPOSA

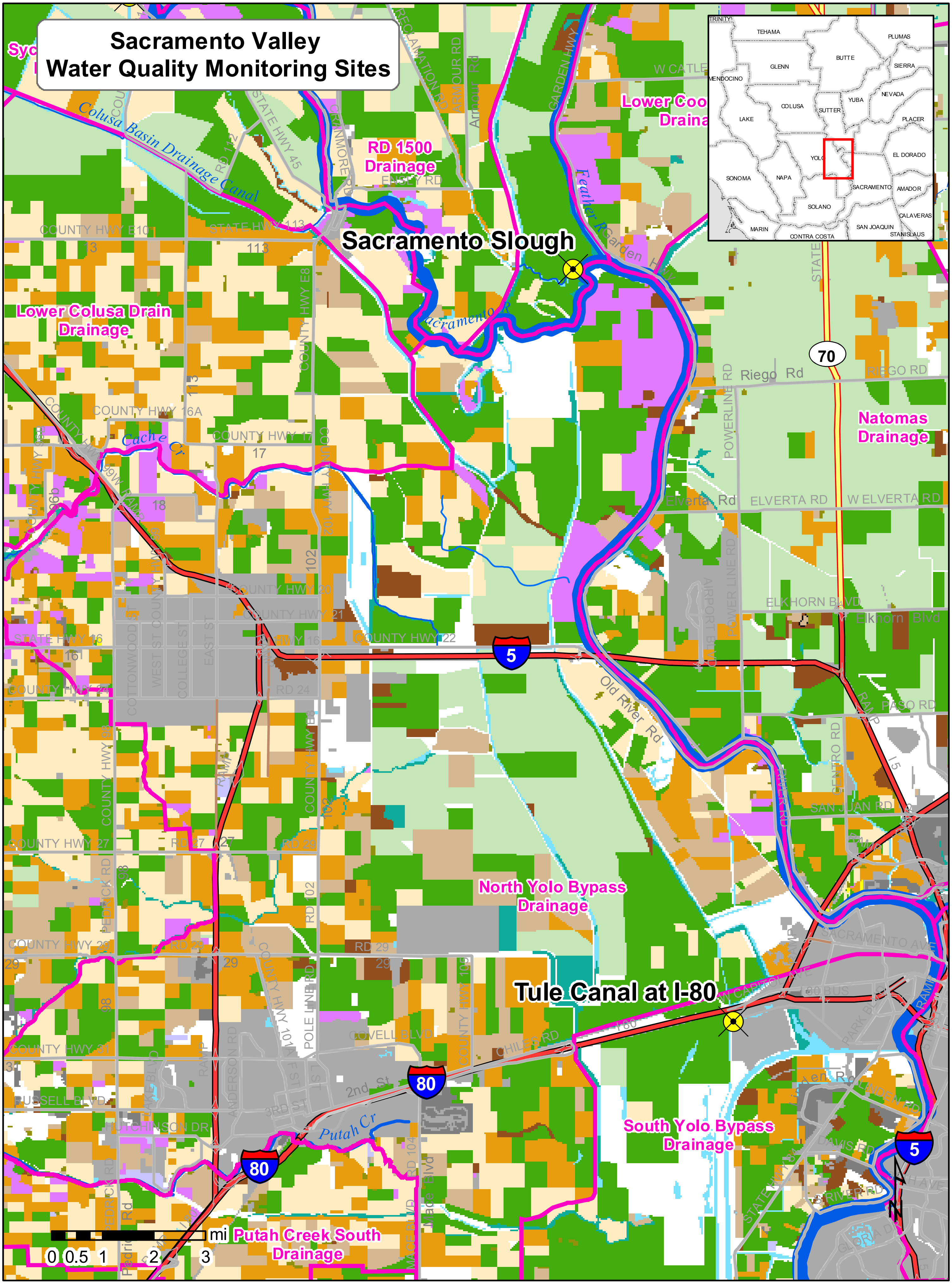


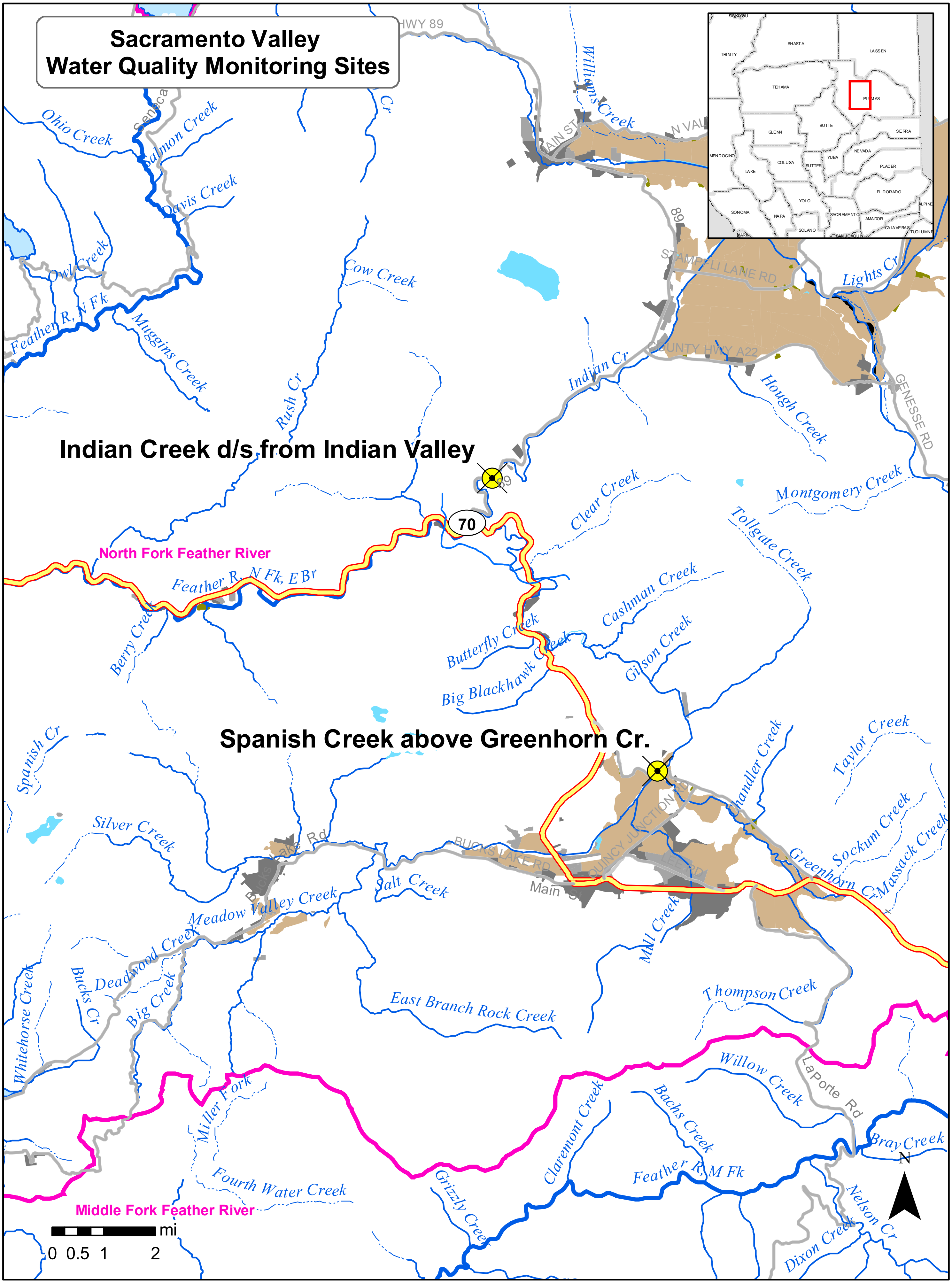
Sacramento Valley
Water Quality Monitoring Sites
Pine Creek at Nord-Gianella Rd
Hoag N/Dicus Slough S
Jewett Creek
land (NE Birch Creek)
Pine Creek
ce/Burch Creek
y (SE Birch Creek)
Big Chico Creek
Lower Stony Creek
Orland Area
Little Chico Creek
Campbell Creek
Pine Cr
Harbean Slough
Keefer Slough
Sycamore Cr
Sacramento R
Glenn-colusa Canal
Kusal Slough
Rock Cr
Mud Cr
Channel Slough
Big Chico Cr
Little Chico Cr
Angel Slough
Stony Cr
99
MERIDIAN RD
HAMILTON NORD CANA HWY
KEEFER RD
RYAN AVE
HICKS LN
COHASSET RD
WILSON LANDING RD
EATON RD
NORD HWY
WYO AVE
STATE HWY 32
COUNTY HWY 24
RD 206
RIVER RD
MUIR AVE
LASSEN AVE
EAST AVE
ESPLANADE
WHITE AVE
0 0.5 1 2 3 4 mi
N
S
E
W

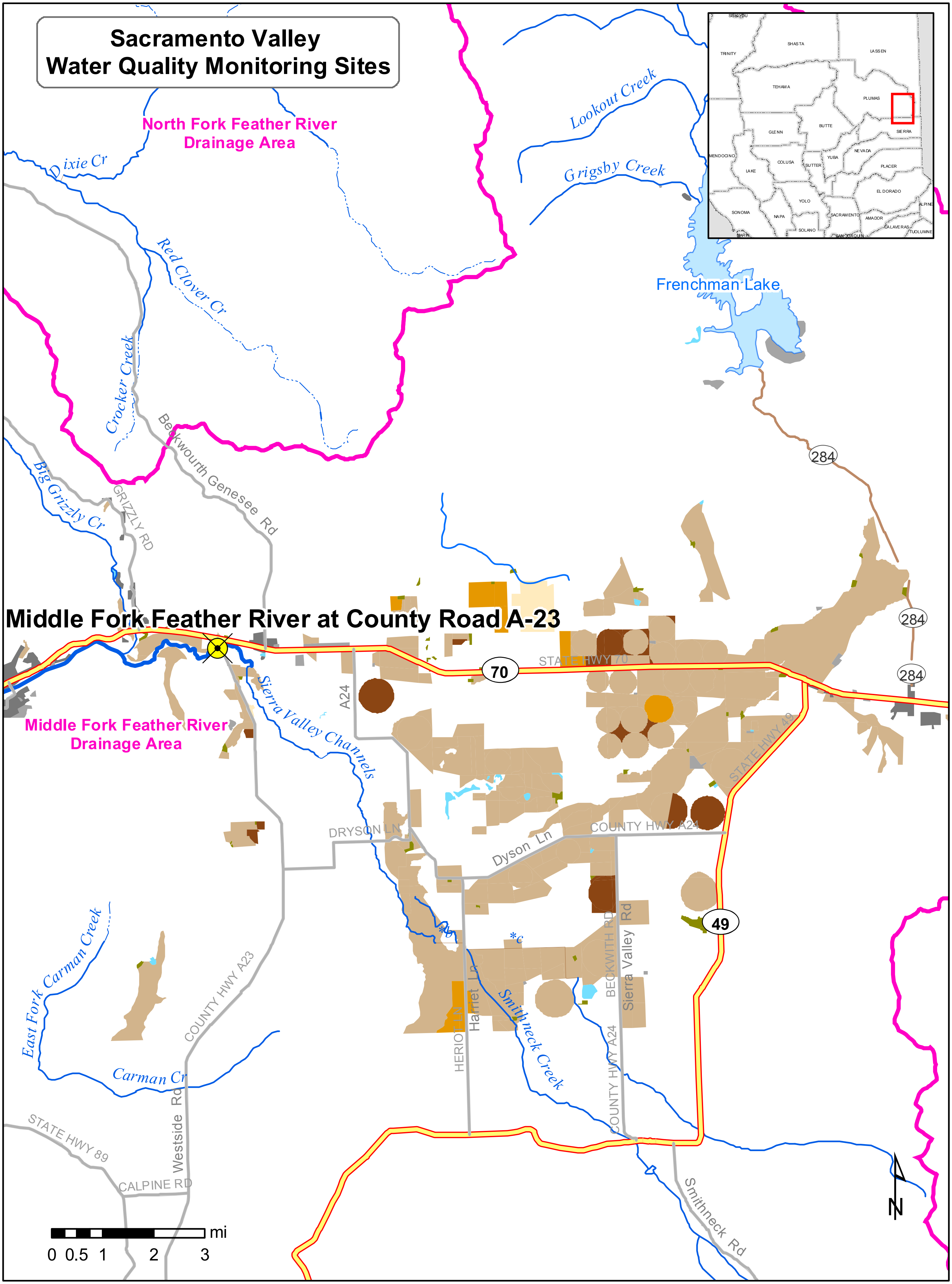

Sacramento Valley
Water Quality Monitoring Sites
Lower Snake
RD 1660
Gilsizer
Ageden Slough
Grasshopper Slough
Ageden Slough
Sutter Bypass
Chandler
RD 823
99
Middle Coon Creek
RD 1500
Lower Coon Creek
Lower Feather River
Sycamore Area
Lower Colusa Drain
Pleasant Grove Creek
Lower Feather River
Natomas
70
Sacramento Slough
North Yolo Bypass
Feather R
Dry Cr
Bear R
Yankee Slough
Ping Slough
Coon Cr
Colusa Basin Drainage Canal
Pleasant Grove Creek
BARRY RD
MESSICK RD
OBANION RD
EVERGLADE RD
PELGER RD
SUBACO RD
KIRKSVILLE RD
SEYMOUR RD
CRANMORE RD
W CATLETT RD
CATLETT RD
RIEGO RD
BEAR RIVER DR
STATE HWY 113
STATE HWY 99
STATE HWY 70
RECLAMATION RD
ARMOUR RD
MURRAY RD
GEORGE WASHINGTON BLVD
CARLSON RD
GARDEN HWY
FEATHER RIVER BLVD
ARBOGA RD
PACIFIC AVE
PLEASANT GROVE RD
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
COLUSA
YUBA
NEVADA
LAKE
SUTTER
PLACER
YOLO
EL DORADO
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
SAN JOAQUIN
TUOLUMNE
CONTRA COSTA
N
W
E
S
mi
0 0.5 1 2 3 4



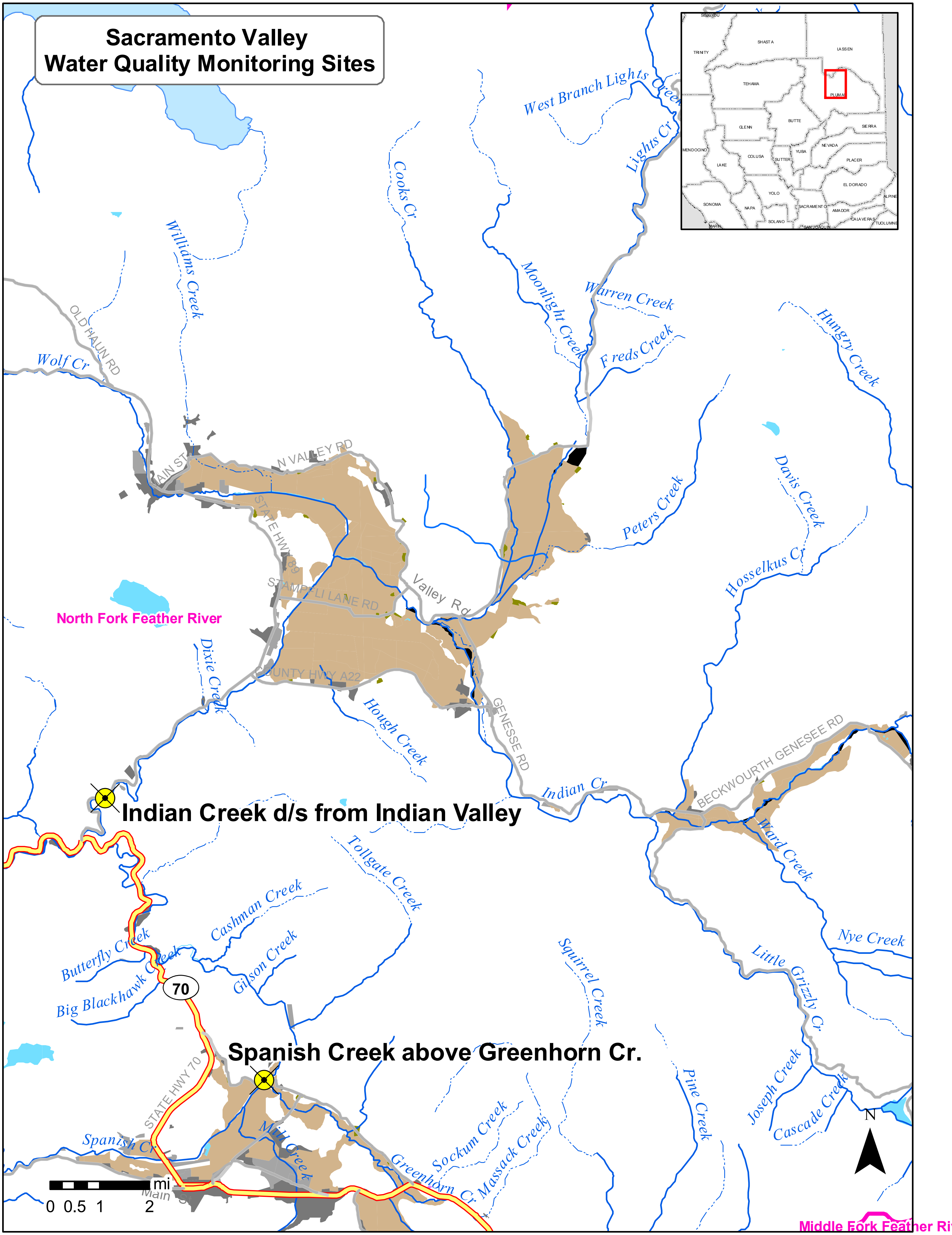
Sacramento Valley
Water Quality Monitoring Sites
North Yolo Bypass
Putah Creek South
SW Yolo Bypass
Z Drain –Dixon RCD
South Yolo Bypass
Cache Slough
Putah Cr.
RUSSELL BLVD
HUTCHINSON DR
COVELL BLVD
CHILES RD
RD 29
RD 102
POLE LINE RD
STATE HWY 113
ANDERSON RD
LAKE BLVD
PEDRICK RD
RD 104
MACE BLVD
TREMONT RD
SIEVERS RD
SOLANO COUNTY HWY
BUCKLEY RD
MIDWAY RD
KING RD
W H ST
W A ST
RAMP
80
mi
0 0.5 1 2 3 4
N
S
E
W


Sacramento Valley
Water Quality Monitoring Sites
Sacramento Slough
Tule Canal at I-80
RD 1500 Drainage
Lower Colusa Drain Drainage
Natomas Drainage
North Yolo Bypass Drainage
South Yolo Bypass Drainage
Putah Creek South Drainage
Colusa Basin Drainage Canal
Feather R
Cache Cr
Putah Cr
0 0.5 1 2 3 mi
TRINITY
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
NEVADA
COLUSA
YUBA
SUTTER
LAKE
PLACER
EL DORADO
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
SAN JOAQUIN
CONTRA COSTA
STANISLAUS

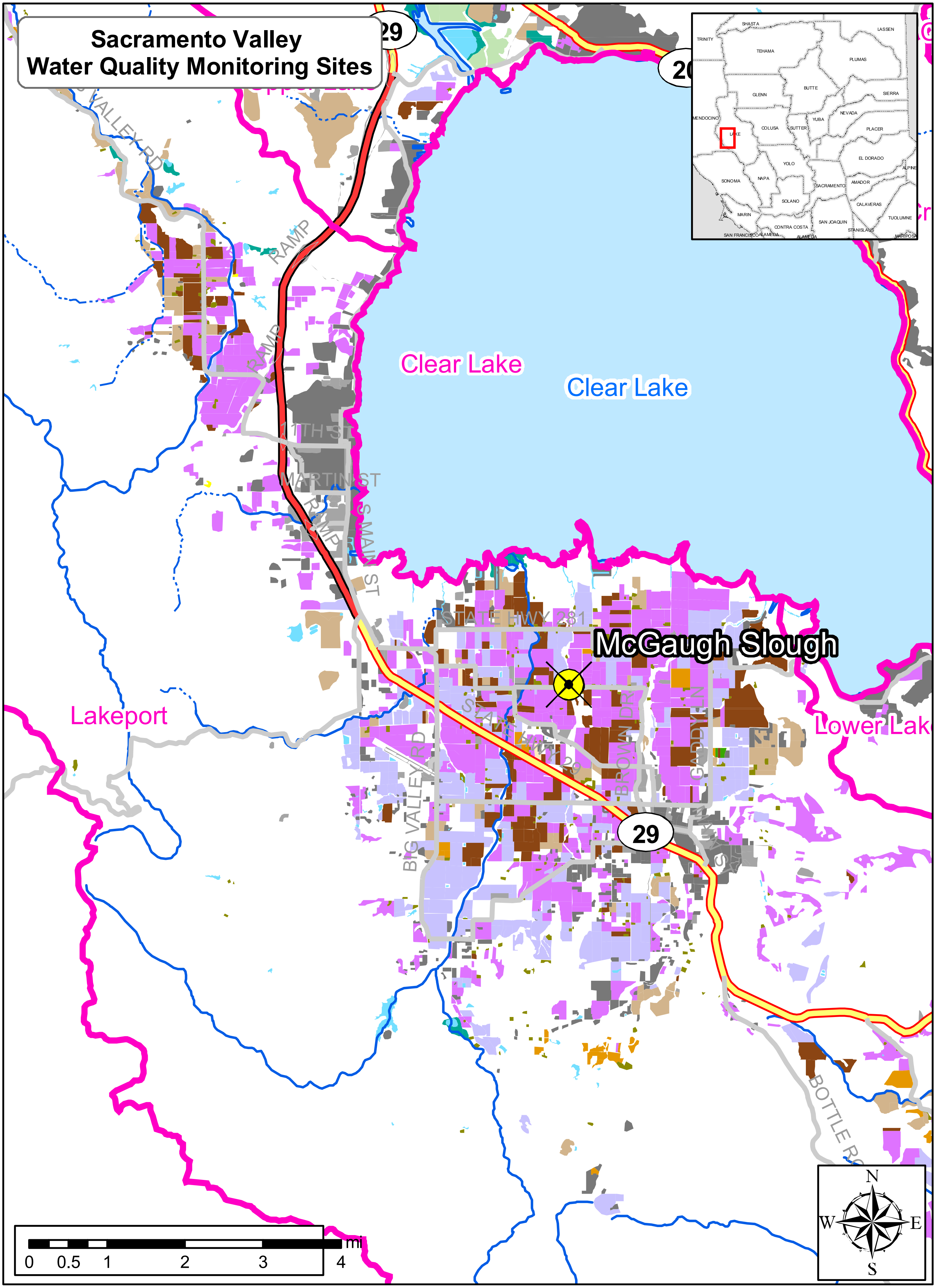

Sacramento Valley
Water Quality Monitoring Sites
Indian Creek d/s from Indian Valley
Spanish Creek above Greenhorn Cr.
North Fork Feather River
Middle Fork Feather River
Ohio Creek
Salmon Creek
Davis Creek
Owl Creek
Feather R, N Fk
Muggins Creek
Rush Cr
Cow Creek
Williams Creek
Indian Cr
Hough Creek
Lights Cr
Montgomery Creek
Tollgate Creek
Clear Creek
Cashman Creek
Gibson Creek
Butterfly Creek
Big Blackhawk Creek
Feather R, N Fk, E Br
Berry Creek
Spanish Cr
Silver Creek
Meadow Valley Creek
Salt Creek
Deadwood Creek
Bucks Cr
Big Creek
Whitehorse Creek
East Branch Rock Creek
Mill Creek
Chandler Creek
Taylor Creek
Sockum Creek
Massack Creek
Greenhorn Cr
Thompson Creek
Willow Creek
Bachs Creek
Claremont Creek
Miller Fork
Fourth Water Creek
Grizzly Creek
Feather R, M Fk
Bray Creek
Nelson Cr
Dixon Creek
HWY 89
89
70
STAMPFLI LANE RD
COUNTY HWY A22
GENESSE RD
BUCKS LAKE RD
QUINCY JUNCTION RD
LaPorte Rd
Main
N
mi
0 0.5 1 2
SISKIYOU
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
COLUSA
SUTTER
YUBA
NEVADA
LAKE
PLACER
EL DORADO
YOLO
SONOMA
NAPA
SACRAMENTO
AMADOR
ALPINE
SOLANO
CALAVERAS
TUOLUMNE
MARIN
SAN JOAQUIN

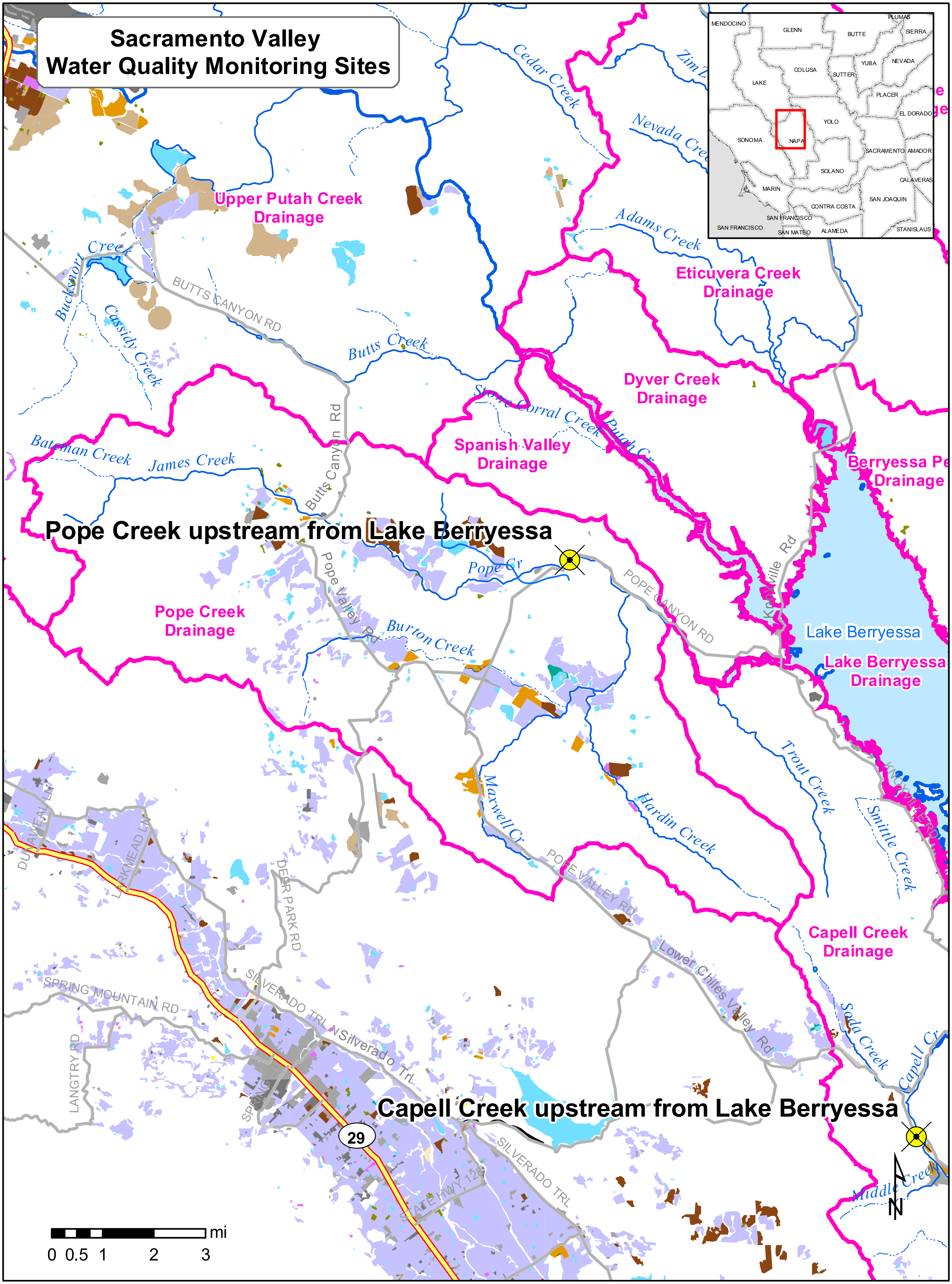


Sacramento Valley
Water Quality Monitoring Sites
North Fork Feather River
Drainage Area
Dixie Cr
Red Clover Cr
Crocker Creek
Beckwourth Genesee Rd
Big Grizzly Cr
GRIZZLY RD
Lookout Creek
Grigsby Creek
Frenchman Lake
284
Middle Fork Feather River at County Road A-23
70
STATE HWY 70
A24
Sierra Valley Channels
Middle Fork Feather River
Drainage Area
DRYSON LN
Dyson Ln
COUNTY HWY A24
STATE HWY 49
49
BECKWITH RD
Sierra Valley Rd
Harriet Ln
HERIOT LN
Smithneck Creek
COUNTY HWY A24
East Fork Carman Creek
COUNTY HWY A23
Carman Cr
Westside Rd
STATE HWY 89
CALPINE RD
Smithneck Rd
N
0 0.5 1 2 3
mi
SISKIYOU
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
COLUSA
SUTTER
YUBA
NEVADA
LAKE
PLACER
EL DORADO
YOLO
SONOMA
NAPA
SACRAMENTO
AMADOR
ALPINE
SOLANO
CALAVERAS
TUOLUMNE
MARIN
SAN JOAQUIN

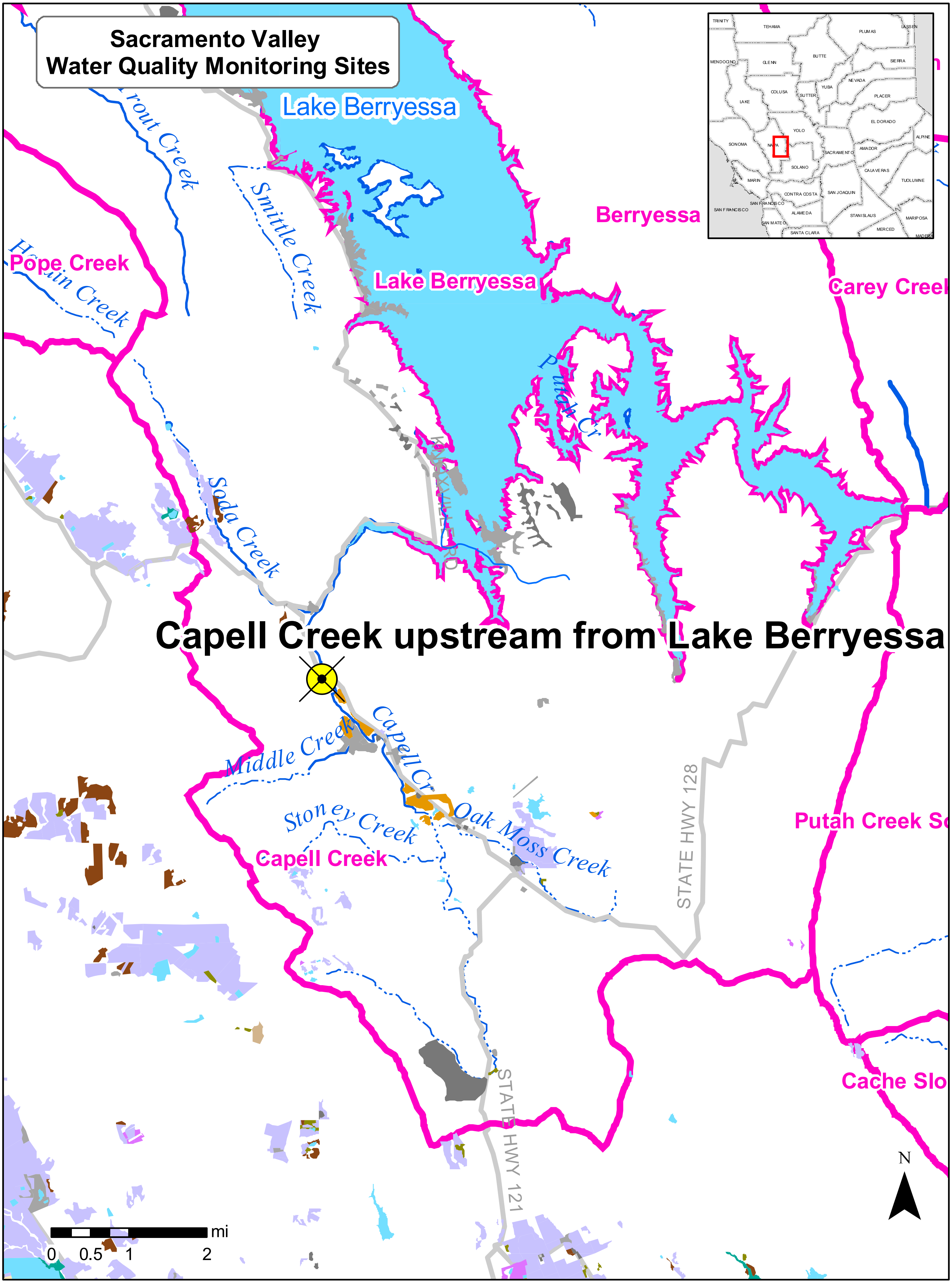


Sacramento Valley
Water Quality Monitoring Sites
Indian Creek d/s from Indian Valley
Spanish Creek above Greenhorn Cr.
North Fork Feather River
Middle Fork Feather River
West Branch Lights Creek
Lights Cr
Cooks Cr
Williams Creek
Moonlight Creek
Warren Creek
F reds Creek
Hungry Creek
Wolf Cr
OLD HAUN RD
MAIN ST
N VALLEY RD
STATE HWY 89
STAMPFLI LANE RD
Valley Rd
Peters Creek
Davis Creek
Hosselkus Cr
Dixie Creek
COUNTY HWY A22
Hough Creek
GENESSE RD
Indian Cr
BECKWOURTH GENESEE RD
Ward Creek
Tollgate Creek
Cashman Creek
Gilson Creek
Butterfly Creek
Big Blackhawk Creek
70
Squirrel Creek
Little Grizzly Cr
Nye Creek
Pine Creek
Joseph Creek
Cascade Creek
STATE HWY 70
Spanish Cr
Mill Creek
Sockum Creek
Massack Creek
Greenhorn Cr
Main St
0 0.5 1 2 mi
N
SISKIYOU
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
COLUSA
YUBA
NEVADA
SUTTER
PLACER
LAKE
YOLO
EL DORADO
ALPINE
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
SAN JOAQUIN
TUOLUMNE

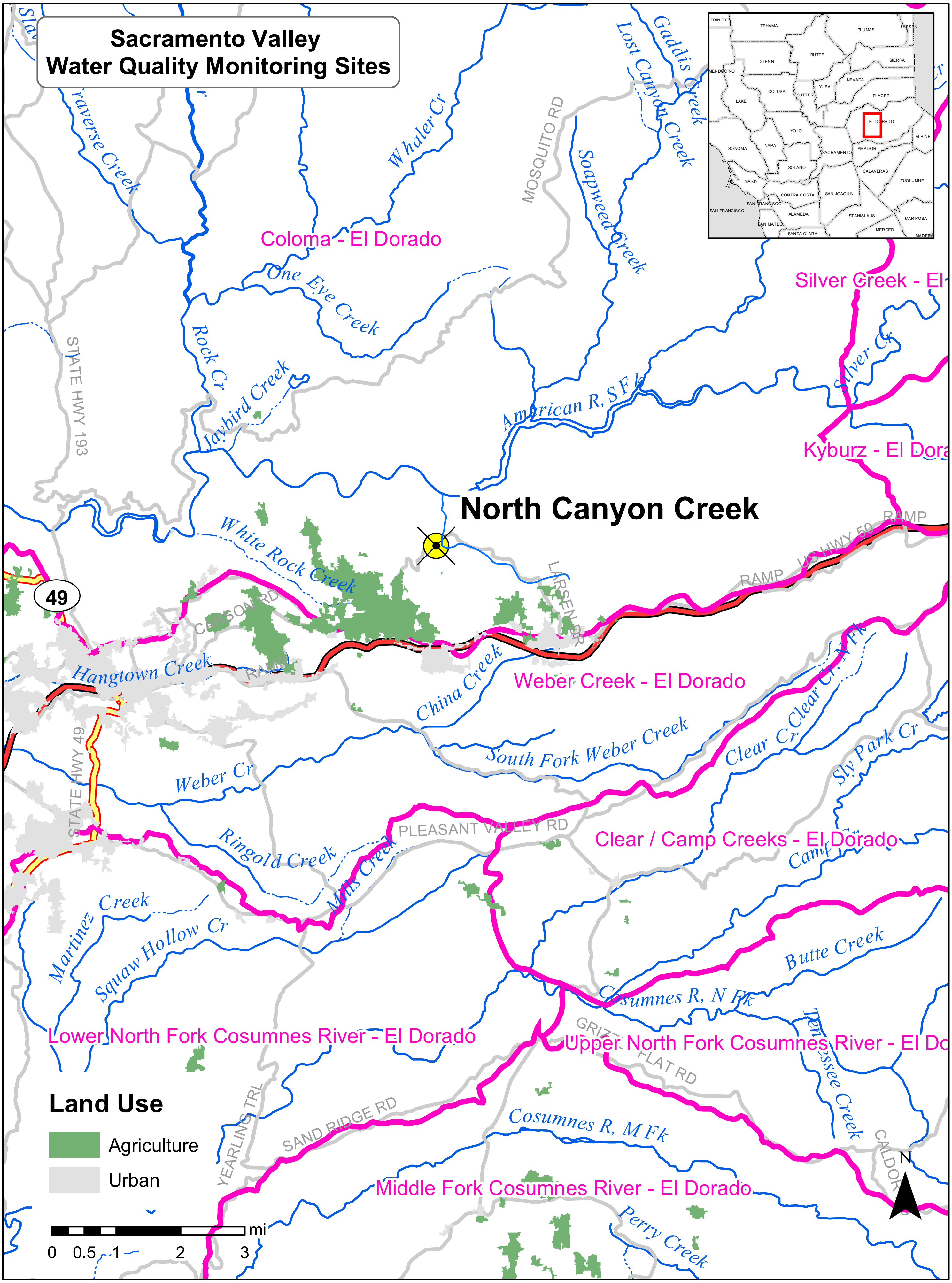

Sacramento Valley
Water Quality Monitoring Sites
McGaugh Slough
Clear Lake
Clear Lake
Lakeport
Lower Lak
29
29
RAMP
RAMP
RAMP
11TH ST
MARTIN ST
S MAIN ST
STATE HWY 281
BIG VALLEY RD
BROWN DR
BOTTLE R
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
BUTTE
GLENN
SIERRA
MENDOCINO
COLUSA
SUTTER
YUBA
NEVADA
PLACER
LAKE
EL DORADO
YOLO
ALPINE
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
TUOLUMNE
SAN JOAQUIN
CONTRA COSTA
STANISLAUS
SAN FRANCISCO
ALAMEDA
MARIPOSA
0
0.5
1
2
3
4
mi
N
W
E
S



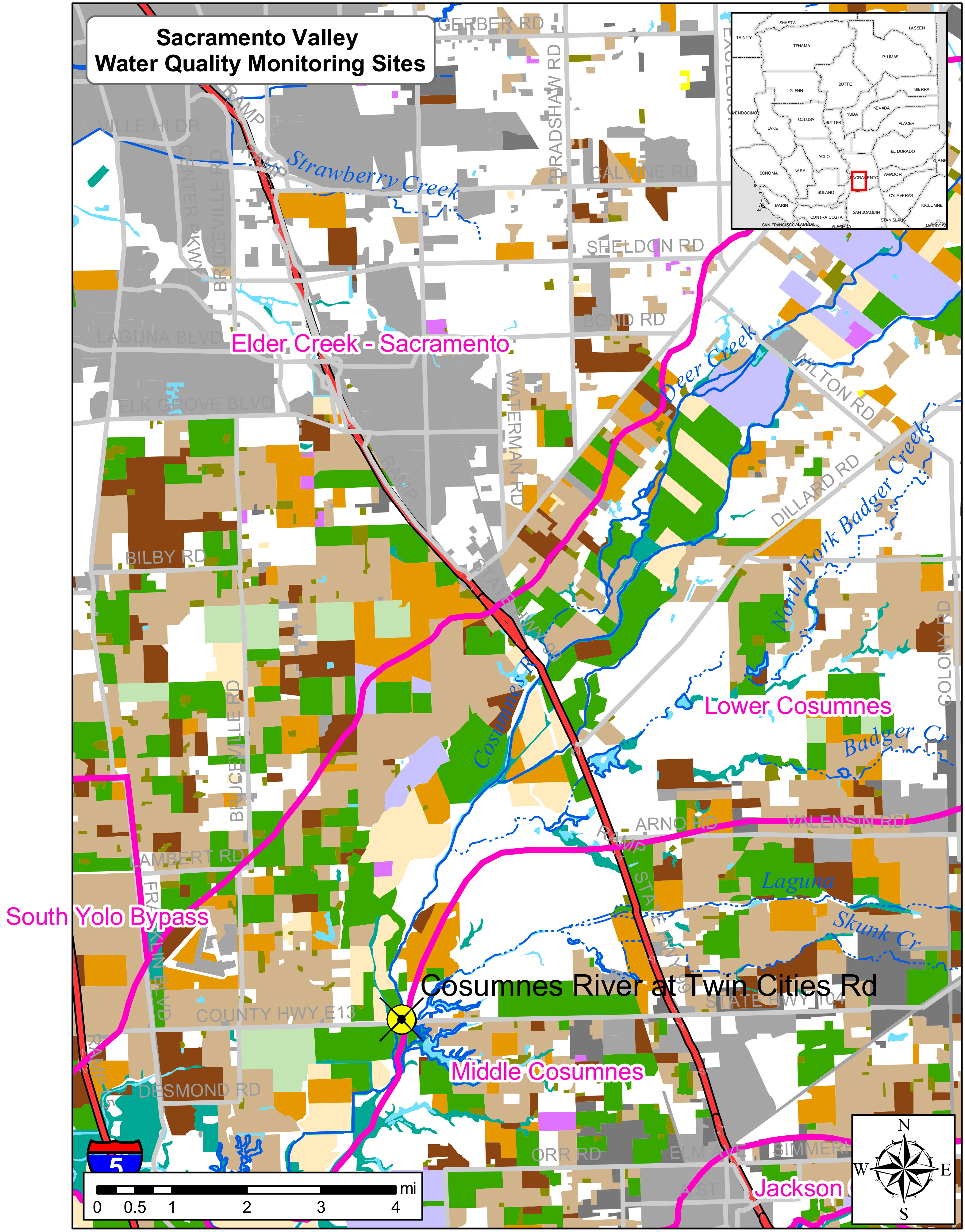
Sacramento Valley
Water Quality Monitoring Sites
Upper Putah Creek
Drainage
Eticuvera Creek
Drainage
Dyver Creek
Drainage
Spanish Valley
Drainage
Berryessa Pe
Drainage
Pope Creek upstream from Lake Berryessa
Pope Creek
Drainage
Lake Berryessa
Lake Berryessa
Drainage
Capell Creek
Drainage
Capell Creek upstream from Lake Berryessa
Cedar Creek
Nevada Cre
Adams Creek
Butts Creek
Cassidy Creek
Bateman Creek
James Creek
Stone Corral Creek
Putah Cr
Pope Cr
Burton Creek
Maxwell Cr
Hardin Creek
Trout Creek
Smittle Creek
Soda Creek
Capell Cr
Middle Creek
BUTTS CANYON RD
Butts Canyon Rd
Pope Valley Rd
POPE CANYON RD
POPE VALLEY RD
Lower Chiles Valley Rd
SILVERADO TRL
Silverado Trl
SPRING MOUNTAIN RD
DEER PARK RD
LANGTRY RD
STATE HWY 128
29
mi
0 0.5 1 2 3
N
MENDOCINO
GLENN
BUTTE
PLUMAS
SIERRA
COLUSA
YUBA
NEVADA
SUTTER
LAKE
PLACER
EL DORADO
YOLO
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
SAN JOAQUIN
CONTRA COSTA
SAN FRANCISCO
SAN MATEO
ALAMEDA
STANISLAUS

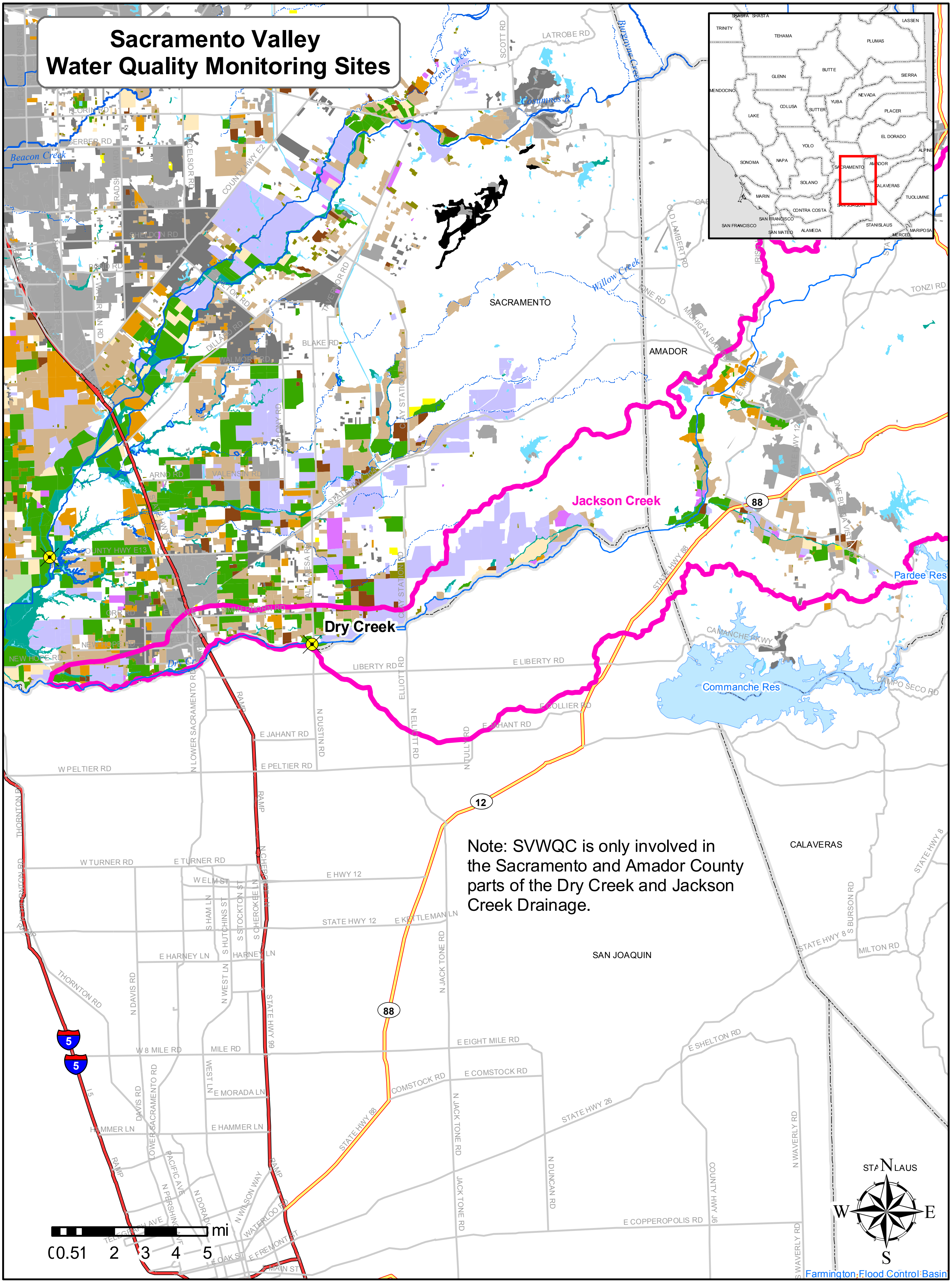


Sacramento Valley
Water Quality Monitoring Sites
Lake Berryessa
Berryessa
Lake Berryessa
Carey Creek
Pope Creek
Hope Valley Creek
Trout Creek
Smittle Creek
Soda Creek
Capell Creek upstream from Lake Berryessa
Middle Creek
Capell Cr
Stoney Creek
Oak Moss Creek
Capell Creek
Putah Creek So
Cache Slo
STATE HWY 128
STATE HWY 121
N
0 0.5 1 2 mi

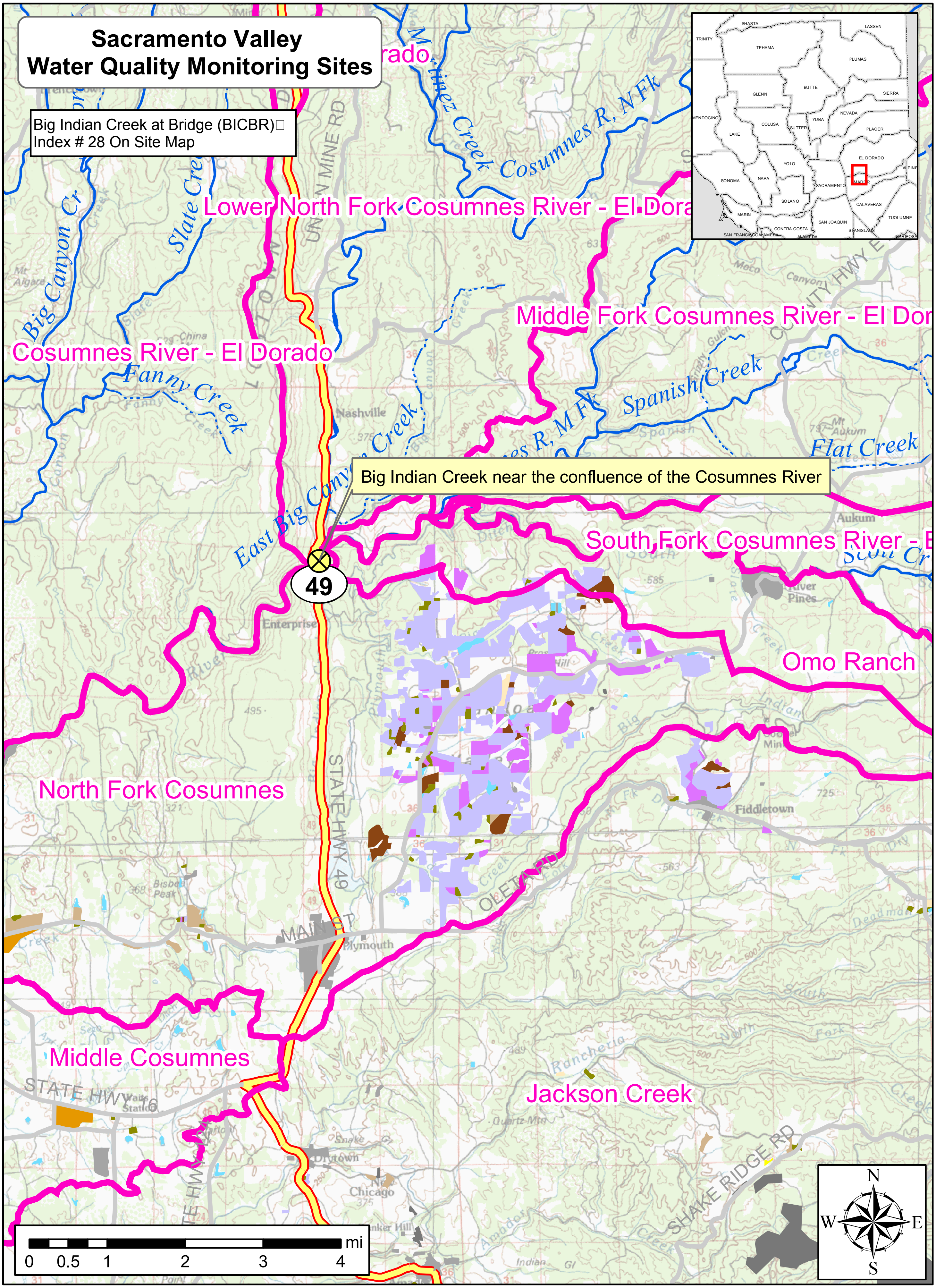


Sacramento Valley
Water Quality Monitoring Sites
North Canyon Creek
Coloma - El Dorado
Silver Creek - El
Kyburz - El Dora
Weber Creek - El Dorado
Clear / Camp Creeks - El Dorado
Lower North Fork Cosumnes River - El Dorado
Upper North Fork Cosumnes River - El Do
Middle Fork Cosumnes River - El Dorado
Traverse Creek
Whaler Cr
Lost Canyon Creek
Gaddis Creek
Soapweed Creek
One Eye Creek
Rock Cr
Jaybird Creek
American R, S F k
Silver Cr
White Rock Creek
Hangtown Creek
China Creek
South Fork Weber Creek
Weber Cr
Clear Cr
Sly Park Cr
Ringold Creek
Mills Creek
Martinez Creek
Squaw Hollow Cr
Butte Creek
Cosumnes R, N Fk
Tennessee Creek
Cosumnes R, M Fk
Perry Creek
MOSQUITO RD
STATE HWY 193
STATE HWY 49
49
CARSON RD
LARSEN DR
US HWY 50
RAMP
PLEASANT VALLEY RD
GRIZZ FLAT RD
SAND RIDGE RD
YEARLING TRL
CALDOR
Land Use
Agriculture
Urban
0 0.5 1 2 3 mi
N
TRINITY
TEHAMA
PLUMAS
LASSEN
GLENN
BUTTE
SIERRA
MENDOCINO
NEVADA
COLUSA
SUTTER
YUBA
PLACER
LAKE
YOLO
EL DORADO
ALPINE
SONOMA
NAPA
AMADOR
SACRAMENTO
SOLANO
CALAVERAS
TUOLUMNE
MARIN
CONTRA COSTA
SAN JOAQUIN
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA
SAN MATEO
SANTA CLARA
MERCED
MADERA

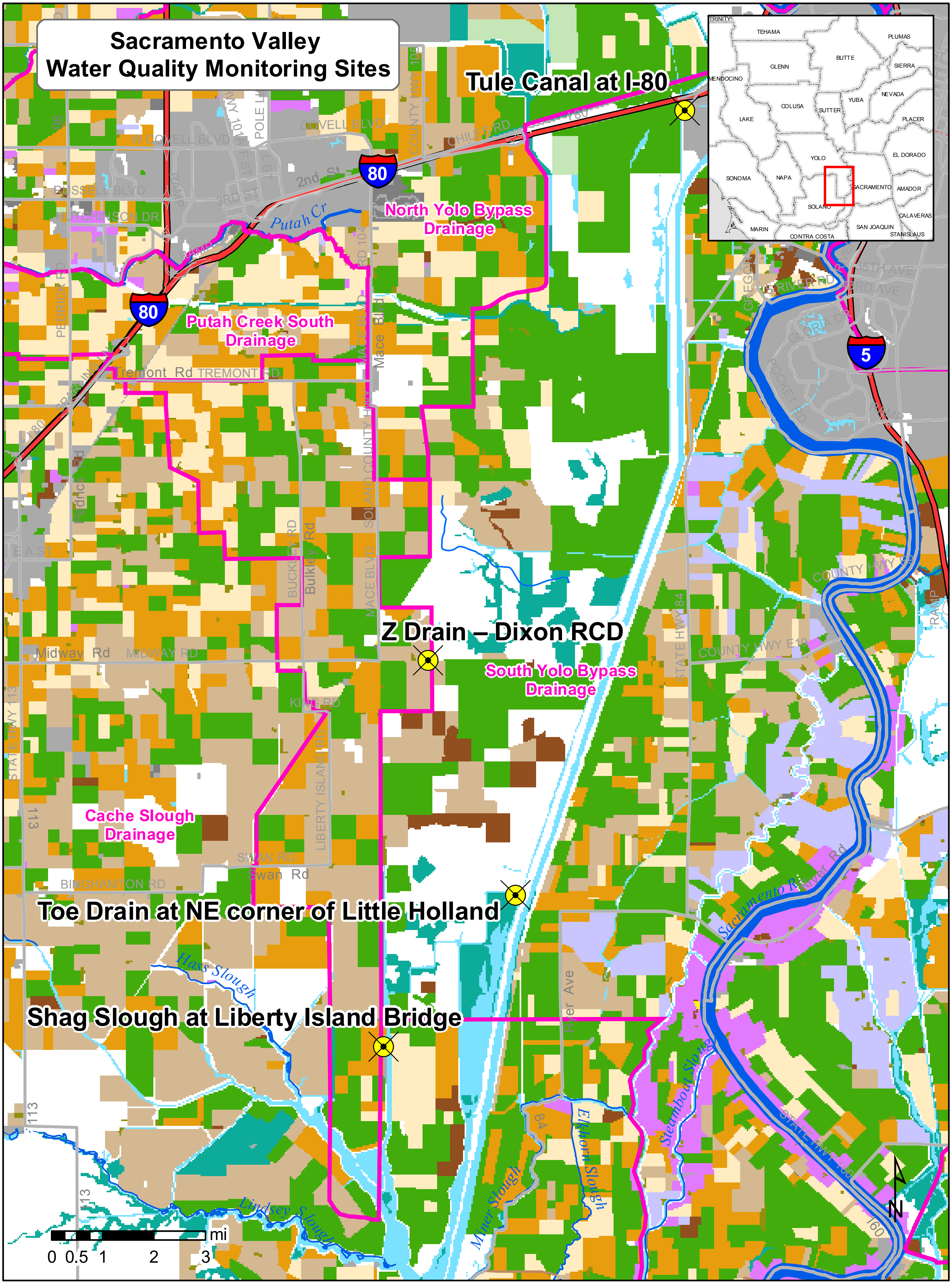

Sacramento Valley
Water Quality Monitoring Sites
Elder Creek - Sacramento
Lower Cosumnes
South Yolo Bypass
Cosumnes River at Twin Cities Rd
Middle Cosumnes
Jackson
GERBER RD
BRADSHAW RD
CALVINE RD
SHELDON RD
BOND RD
LAGUNA BLVD
ELK GROVE BLVD
BILBY RD
BRUCEVILLE RD
CENTER PKWY
WATERMAN RD
WILTON RD
DILLARD RD
COLONY RD
ARNO RD
VALENSIN RD
LAMBERT RD
FRANKLIN BLVD
COUNTY HWY E13
STATE HWY 104
DESMOND RD
ORR RD
ELM AVE
SIMMERH
Strawberry Creek
Deer Creek
North Fork Badger Creek
Cosumnes R
Badger Cr
Laguna
Skunk Cr
RAMP
0 0.5 1 2 3 4 mi
N
S
E
W
5

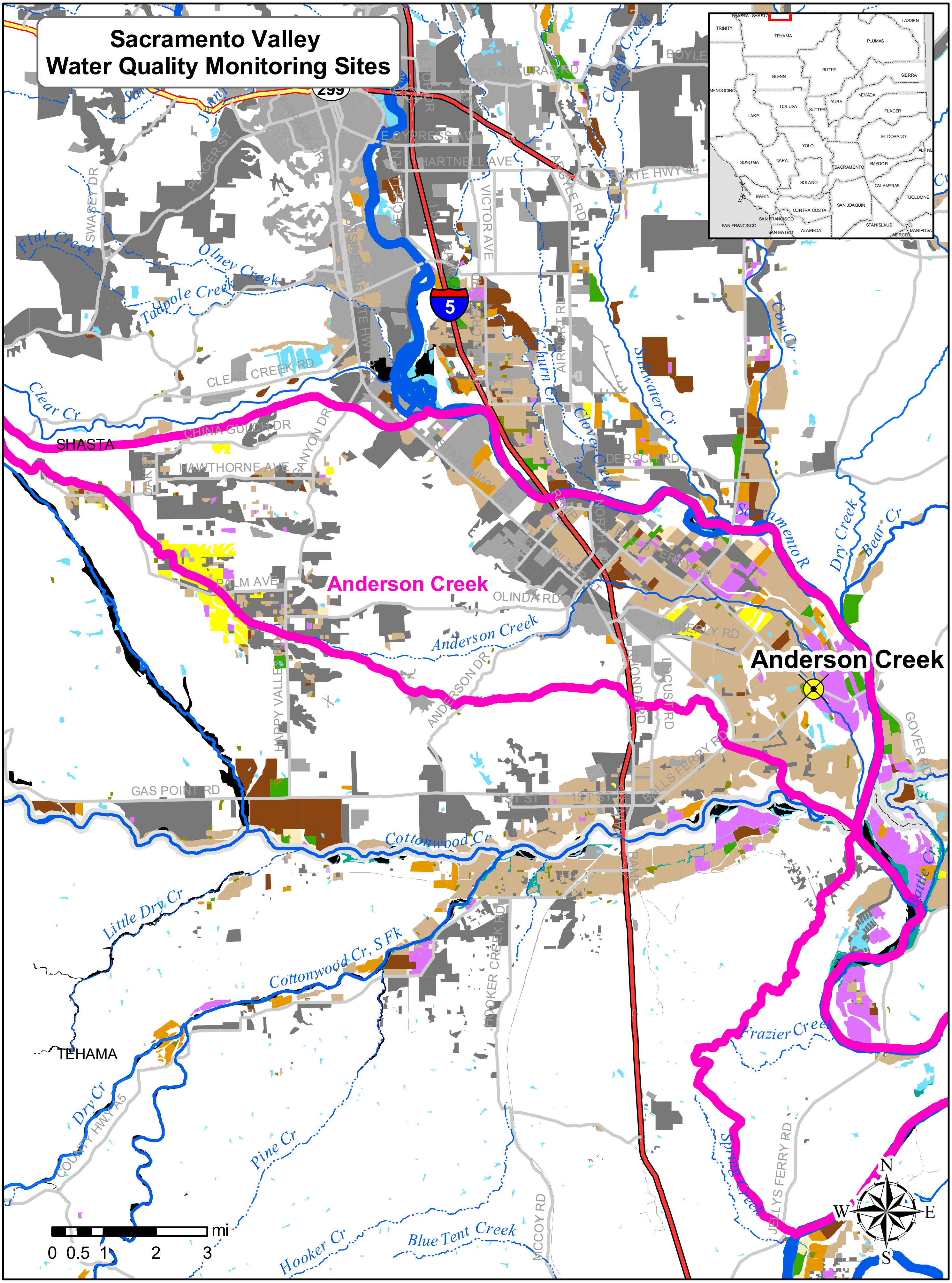


Sacramento Valley
Water Quality Monitoring Sites
Note: SVWQC is only involved in the Sacramento and Amador County parts of the Dry Creek and Jackson Creek Drainage.
Jackson Creek
Dry Creek
SACRAMENTO
AMADOR
CALAVERAS
SAN JOAQUIN
Pardee Res
Commanche Res
Farmington Flood Control Basin
Beacon Creek
Crevis Creek
Cosumnes R
Willow Creek
Dry Cr
88
12
5
0 0.5 1 2 3 4 5
mi
N
S
E
W



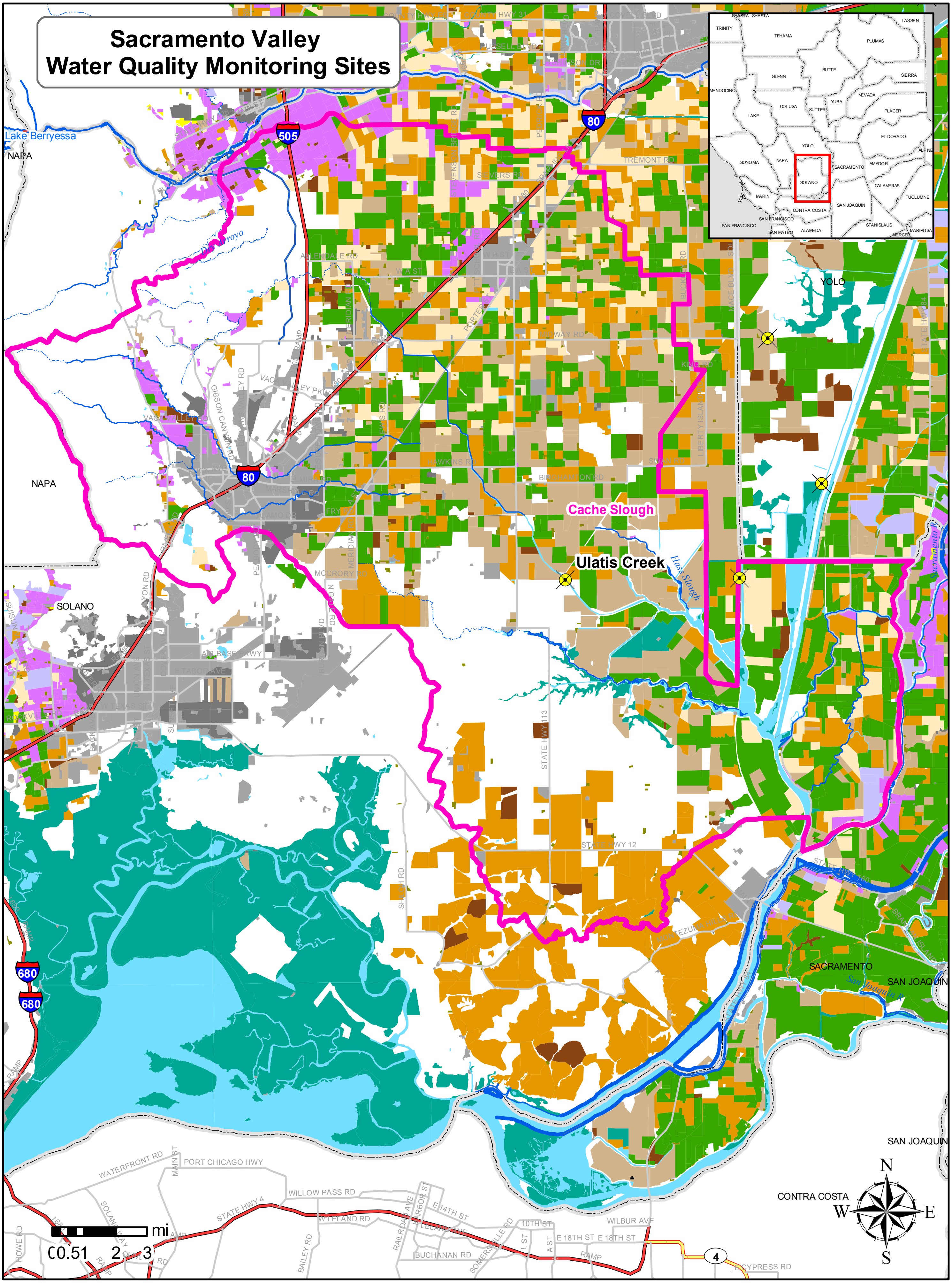
Sacramento Valley
Water Quality Monitoring Sites
Big Indian Creek at Bridge (BICBR)
Index # 28 On Site Map
Big Indian Creek near the confluence of the Cosumnes River
Lower North Fork Cosumnes River - El Dorado
Middle Fork Cosumnes River - El Dor
Cosumnes River - El Dorado
South Fork Cosumnes River - E
Omo Ranch
North Fork Cosumnes
Middle Cosumnes
Jackson Creek
Cosumnes R, N Fk
Spanish Creek
Flat Creek
Fanny Creek
East Big Canyon Creek
Big Canyon Cr
Slate Creek
STATE HWY 49
UNION MINE RD
OLETA RD
MAIN ST
SHAKE RIDGE RD
COUNTY HWY E
Nashville
Enterprise
Plymouth
Fiddletown
Aukum
River Pines
Drytown
Chicago
49
0 0.5 1 2 3 4 mi
N S E W

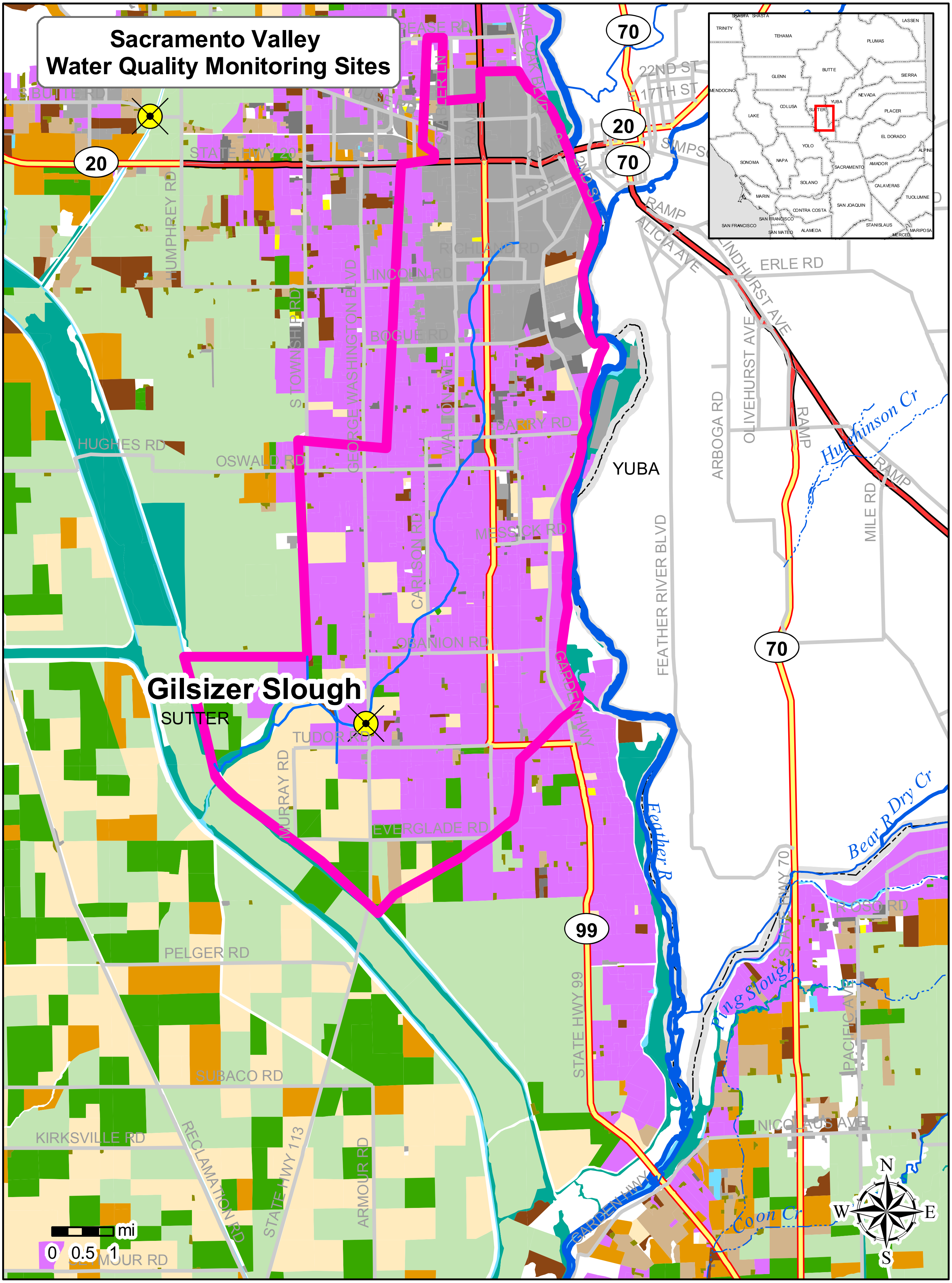

Sacramento Valley
Water Quality Monitoring Sites
Tule Canal at I-80
North Yolo Bypass Drainage
Putah Creek South Drainage
Z Drain – Dixon RCD
South Yolo Bypass Drainage
Cache Slough Drainage
Toe Drain at NE corner of Little Holland
Shag Slough at Liberty Island Bridge
Putah Cr
Hass Slough
Lindsey Slough
Miner Slough
Elkhorn Slough
Steamboat Slough
Sacramento River Rd
80
5
Tremont Rd TREMONT RD
Midway Rd MIDWAY RD
KING RD
SWAN RD
Swan Rd
BINGHAMTON RD
Mace Blvd
Bulkley Rd
BUCKLEY RD
LIBERTY ISLAND RD
STATE HWY 84
STATE HWY 113
COUNTY HWY E19
River Ave
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
COLUSA
YUBA
NEVADA
LAKE
SUTTER
PLACER
YOLO
EL DORADO
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
SAN JOAQUIN
CONTRA COSTA
STANISLAUS
mi
0 0.5 1 2 3
N



Sacramento Valley
Water Quality Monitoring Sites
Anderson Creek
Anderson Creek
SHASTA
TEHAMA
Sacramento R
Cottonwood Cr
Cottonwood Cr, S Fk
Anderson Creek
Clear Cr
Flat Creek
Olney Creek
Tadpole Creek
Little Dry Cr
Dry Cr
Pine Cr
Hooker Cr
Blue Tent Creek
Frazier Creek
Spring Creek
Battle Cr
Bear Cr
Dry Creek
Cow Cr
Stillwater Cr
Churn Cr
Clover Creek
Clough Creek
CLEAR CREEK RD
CHINA GULCH DR
HAWTHORNE AVE
PALM AVE
OLINDA RD
KIMBERLY RD
GAS POINT RD
BALLS FERRY RD
ANDERSON DR
HAPPY VALLEY
LOCUST RD
GOVER RD
JELLYS FERRY RD
MCCOY RD
HOOKER CREEK RD
COUNTY HWY A5
SWASEY DR
PLACER ST
VICTOR AVE
AIRPORT RD
HARTNELL AVE
E CYPRESS AVE
OLD ALTURAS RD
BOYLE
STATE HWY 44
299
5
N
S
E
W
0 0.5 1 2 3 mi
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
COLUSA
SUTTER
YUBA
NEVADA
LAKE
PLACER
EL DORADO
YOLO
ALPINE
SONOMA
NAPA
SACRAMENTO
AMADOR
SOLANO
CALAVERAS
MARIN
TUOLUMNE
CONTRA COSTA
SAN JOAQUIN
SAN FRANCISCO
SAN MATEO
ALAMEDA
STANISLAUS
MARIPOSA
MERCED

# Sacramento Valley Water Quality Monitoring Sites




Sacramento Valley
Water Quality Monitoring Sites
Gilsizer Slough
SUTTER
YUBA
70
20
99
STATE HWY 20
HUMPHREY RD
HUGHES RD
OSWALD RD
S TOWNSHIP RD
GEORGE WASHINGTON BLVD
LINCOLN RD
BOGUE RD
RICHLAND RD
BARRY RD
MESSICK RD
CARLSON RD
WALTON AVE
O'BANION RD
TUDOR RD
MURRAY RD
EVERGLADE RD
GARDEN HWY
PELGER RD
SUBACO RD
KIRKSVILLE RD
RECLAMATION RD
STATE HWY 113
ARMOUR RD
STATE HWY 99
PEASE RD
22ND ST
E 17TH ST
2ND ST
RAMP
ALICIA AVE
LINDHURST AVE
ERLE RD
OLIVEHURST AVE
ARBOGA RD
FEATHER RIVER BLVD
MILE RD
Hutchinson Cr
Feather R
Bear R
Dry Cr
Ping Slough
STATE HWY 70
PACIFIC AVE
NICOLAUS AVE
Coon Cr
N
S
E
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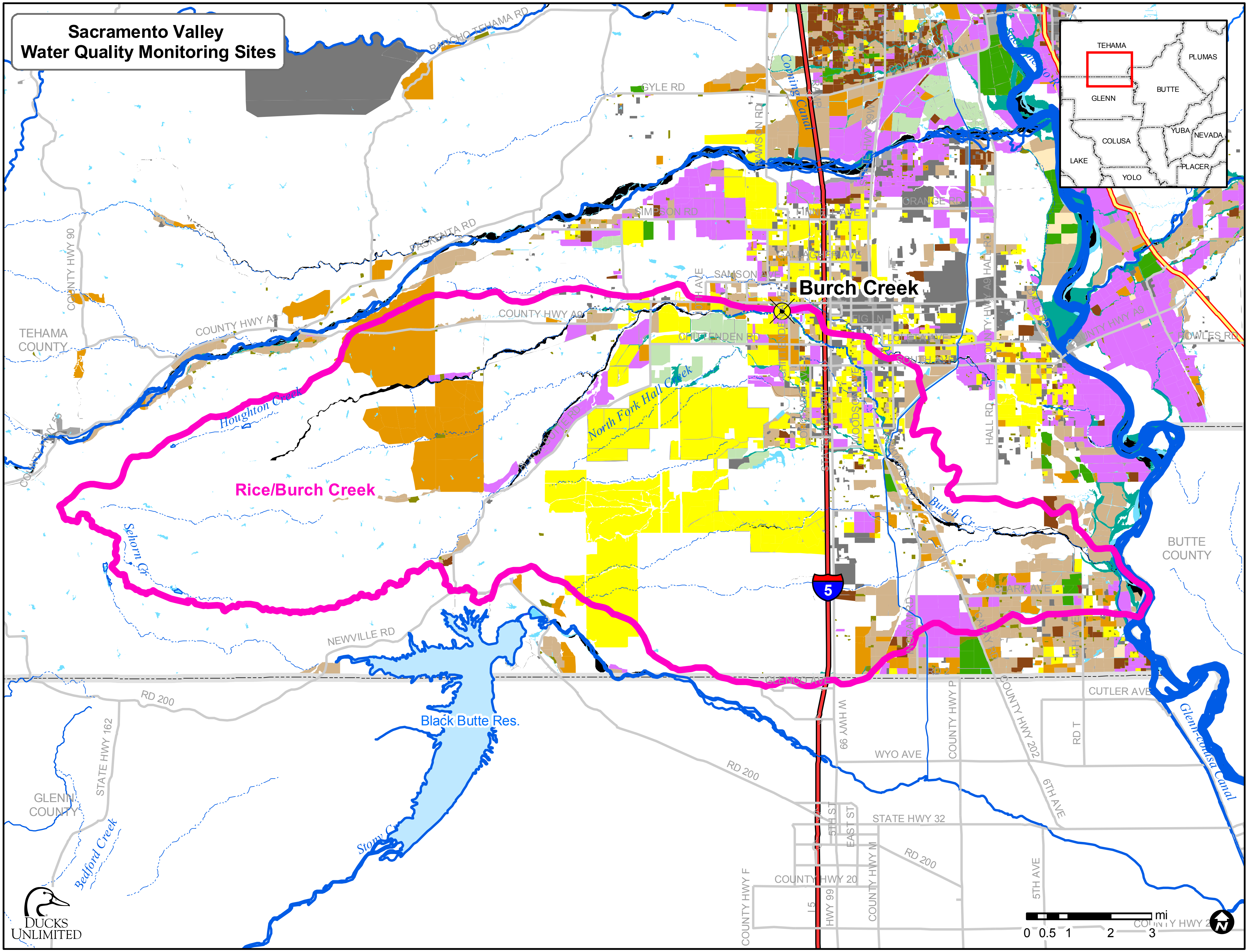

Sacramento Valley
Water Quality Monitoring Sites
Burch Creek
Rice/Burch Creek
TEHAMA COUNTY
BUTTE COUNTY
GLENN COUNTY
Black Butte Res.
Houghton Creek
North Fork Hall Creek
Burch Cr.
Sehorn Cr.
Stony Cr.
Bedford Creek
Glenn-Colusa Canal
Corning Canal
RANCHO TEHAMA RD
GYLE RD
COUNTY HWY A9
CRITTENDEN RD
SIMPSON RD
NEWVILLE RD
RD 200
STATE HWY 162
STATE HWY 32
CUTLER AVE
WYO AVE
COUNTY HWY 202
COUNTY HWY P
COUNTY HWY F
COUNTY HWY 20
COUNTY HWY M
HWY 99 W
5TH ST
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# APPENDIX G: SVWQC Management Practices Action Plan

May 10, 2005

Art Baggett, Chairman
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Robert Schneider, Chairman
Regional Water Quality Control Board,
Central Valley Region
2402 Westernesse Rd.
Davis, CA 95610

**RE: Sacramento Valley Water Quality Coalition – Management Practices Action Plan**

Dear Chairmen Baggett and Schneider:

The Sacramento Valley Water Quality Coalition (Coalition) recently submitted its first Annual Monitoring Report (AMR) to the State and Regional Boards and is now undertaking its second year of water quality sampling and analysis at various sites in the Sacramento River watershed. With the monitoring program underway and a strong internal organization, the Coalition is now embarking on an aggressive **management practices** program as a key part of our Regional Plan for Action (Regional Plan).

As you know, the evolution of agricultural and managed wetland practices is an ongoing, multi-year process involving growers, as well as agronomic and pest management experts. While Sacramento River watershed farmers and wetlands managers have been astute water managers for more than 150 years, they have recently increased their focus on how their operations might impact surface water quality. The watershed based approach advanced by the Coalition is a long-term program that will work within this context to focus on the key field-level decision makers to ensure that while water quality is enhanced for current and future uses, growers retain the broadest operational flexibility to cost-effectively achieve these goals.

In the June 2003 Regional Plan, the Coalition committed to identify and tailor management practices for each of the ten subwatersheds and the crops produced in those areas. The Coalition recognized that "expanding and strengthening the management practices already adopted in the Sacramento River Basin can help enhance water quality and sustain the long-term viability of agriculture and managed wetlands, which will contribute to the long-term health of the watershed" (Page 11).

This letter will describe how the Coalition will implement its Regional Plan and Implementation Plan submitted as part of the Watershed Evaluation Report. To ensure timely implementation of management practices in the Sacramento River watershed, the Coalition recently convened a Management Practices Outreach Committee (MPOC), including leading growers, commodity group representatives, pest control advisors, cooperative extension specialists and farm advisors, county agricultural commissioners, resource conservation districts, county farm bureaus and other Coalition members throughout the region. The MPOC will guide the Coalition and the local implementation of management practices throughout the region.

**Communications**

The Coalition will undertake two levels of communications. First, the Coalition and its Subwatershed Groups will immediately communicate with farmers and wetlands managers through the mail to clearly explain the respective responsibilities of the Coalition, its partners, the Subwatershed Groups and others as it pertains to evaluation of sampling results and assessment of management practices. The Coalition and its Subwatershed Groups will develop and distribute a flyer to current participants throughout the entire watershed as follow-up to the monitoring and reporting program plan flyer prepared early last year for a broad audience. (See Attached MRPP Flyer)

On a more focused level, the Coalition will evaluate results from its monitoring program, as well as the ongoing programs on an event and seasonal basis. The Coalition has contracted with Larry Walker Associates to manage the sampling program. LWA is sub-contracting the analytical work with professional laboratories that have considerable experience in conducting complex toxicity tests and interpreting the results from these tests. Based upon the results, the Coalition will continue to submit Communications Reports to the Regional Board and will implement short-term actions as outlined in the reports. The Coalition also plans to evaluate storm season and irrigation season monitoring results collectively, as the cultural practices vary depending upon the type of runoff potentially contributing to a surface water quality problem. In both cases, local experts will help review data and evaluate relevant land-use and cultural practices that may not only help explain the results, but also highlight issues and help focus outreach efforts. In addition to Communications Reports, the Coalition is developing a consistent data reporting and interpretation format for ongoing communications of all results with Subwatershed Groups. This effort will be closely linked with the Coalition's data management process to ensure comprehensive evaluation and reporting.

If a water quality problem persists, the Subwatershed Groups will communicate with growers in a priority drainage area upstream of a monitoring site using applicable management practice advisories and also inviting growers to a focused workshop to address a specific water quality problem. The advisories will be prepared with the assistance of growers, commodity group representatives, agricultural chemical representatives, County Agricultural Commissioners, Ducks Unlimited, Coalition for Urban Rural Environmental Stewardship, and Larry Walker Associates, each whom not only understand the technical aspects of the issue, but also have the ability to communicate effectively with growers and encourage participation. The communications will include results regarding the specific water quality issue, and also use GIS capabilities to evaluate hydrology, land-use, and pesticide use patterns in the affected drainage area. The written communications will clearly explain the incentives for participation, including the cost-effectiveness of managing water quality problems using a watershed-based approach and the consequences for failing to improve water quality through timely implementation of management practices.

**Management Practices Tracking**

The Coalition will use the workshop described above as an opportunity to survey growers in a priority drainage area regarding existing management practices in consultation with commodity groups, cooperative extension farm advisors and specialists and registrant representatives. The Coalition will develop geographic information to depict both baseline and potential management practices implementation and develop drainage-level maps to depict this information. The Coalition will use results of the grower workshop to engage additional commodity groups (e.g., Almond Board, Canning Peach Association, and Dried Plum Board) in the development of similar workshops related to historical results and current trends, and encourage these commodity groups to utilize publication(s) to communicate with similar commodity growers in other regions of the Sacramento Valley regarding content and outcomes of workshops.

**Evaluate Effectiveness of Management Practices**

The Coalition will work with both water quality and agronomic experts, as well as growers and wetlands managers, to develop a management practices evaluation framework with reasonable assumptions regarding the scope of potential impacts from a specific constituent, the ability to correlate specific practices to water quality improvements and the time horizon required to display improvements related to implementation of these practices. Currently, the Coalition is coordinating efforts for submission of a Management Plan to the Regional Board for purposes of meeting the diazinon Total Maximum Daily Load requirements for the Sacramento and Feather Rivers. Lessons learned from this TMDL process can be utilized on a smaller scale to address priority issues at the drainage level. While effectiveness evaluations will likely require a focused sampling program, there will be opportunities to closely coordinate results with the broader Coalition sampling program to ensure results are understood in the context of the larger watershed.

The Coalition remains committed to implementing an effective water quality management program in the Sacramento Valley and our members believe that the iterative process of evaluating water quality sampling data, communicating with operators making the day-to-day agronomic decisions, evaluating the water quality results following management practices implementation and reporting results will lead to enhanced water quality for current and future uses. We look forward to working with you and your respective staff to implement a successful program.

Sincerely,

David J. Guy
Northern California
Water Association

Mark Biddlecomb
Ducks Unlimited

Parry Klassen
CURES

cc: Mary Ann Warmerdam, California Department of Pesticide Regulation
Celeste Cantu, State Water Resources Control Board
William Croyle, California Regional Water Quality Control Board
Sacramento Valley Water Quality Coalition