13.0 SUMMARY/CONCLUSION

In general the SJR receives drainage from a variety of diverse basins. For example, the Grassland Basin is a highly managed system that is dominated by agricultural influences (both traditional cropland and managed wetlands) and receives water from the Sacramento-San Joaquin Delta to support the land use. The Northeast Basin contains the Cosumnes watershed which drains snowmelt from the Sierras and is the last major water body within the Central Valley that does not have flow regulated by a major reservoir. Most of the drainage basin sites are within the valley floor which is dominated by agricultural use and urban development. Even though the land uses are similar for most of the drainage basin sites, the source water from their upper watersheds are completely different across the basins and create a truly unique and complex system.

The spatial trend for most constituents (SC, TSS, turbidity, metals, and minerals) within the SJR is that concentrations seem to increase from Sack Dam to Hills Ferry, as a result of the Grassland influences, and decrease from Hills Ferry down to Vernalis due to the Eastside Basin river sites contribution of high flow Sierra snow melt and reservoir storage flows.

Other constituents displayed strong seasonal trends that were consistent throughout the whole SJR valley floor. For instance, temperature increased at all sites during the warm summer months. Dissolved oxygen concentrations decreased at all sites during the warmer summer months, which may be offset by algal blooms as well as temperature, with a decrease in dramatic fluctuation within SJR sites during the wet WY of 2005. Specific conductivity, TOC, turbidity, and TSS were influenced by storm events, specifically for SC the first storm runoff, and the irrigation season.

Findings by individual Basins included:

Northeast Basin:

> Northeast basin had the lowest levels for most constituents compared to the rest of the SJR basin.
>
> All of the four samples collected for acute algae at Cosumnes River had a reduction of cell growth. This reduction could be due to the minimal nutrients and minerals found in the Cosumnes River watershed, but a toxicity identification evaluation was not conducted.

Eastside Basin:

> The Eastside Basin river sites (Merced, Tuolumne and Stanislaus) typically followed the Northeast basin with low levels for most constituents compared to the rest of the basins.
>
> In contrast, the Harding Drain reported the elevated levels of SC, *E. coli*, nutrients, BOD and minerals. Harding Drain also had dramatic fluctuations of DO.

Southeast Basin:

> Deep Slough had high year round levels of arsenic and total nickel which was unique for the entire SJR Basin and had the majority of detected samples during high flow events.

South Delta Basin:

New Jerusalem Tile Drain, which represents shallow ground water within the South Delta Basin, had higher temperature, SC, nitrate levels, and minerals compared to the rest of the South Delta Basin. The New Jerusalem Drain, even with its high nitrate concentrations, had very low TSS and TOC concentrations with the BOD typically just above the detection limit of 0.1 mg/L--unlike the rest of the South Delta Basin. The New Jerusalem Drain had non-detect values for most of the metals except high concentrations of chromium.

Tom Payne Slough had a consistent seasonal fluctuation of minerals. High concentrations of minerals are seen during the winter months with a drastic drop in mineral concentrations during the summer months.

Westside Basin:

The Westside Basin sites on average had greater turbidity and TSS than the remainder of the SJR Basin sites with concentrations fluctuating greatly during the irrigation season and storm events. The Westside Basin also had relatively higher concentrations of nutrients and minerals than other basin sites.

The Westside Basin had a high volume of detected values for total lead and had overall higher concentrations and major spikes of copper, zinc, and chromium.

Grassland Basin:

The Grassland Basin was sampled more frequently for every site other than those on the main stem of the SJR due to the compliance monitoring program for the Grassland Bypass Project (selenium control program). For all sites within the Grassland Basin, other than for Salt Slough, there is a clear seasonal fluctuation for pH. The pH tends to peak in July and drop to its lowest around January mirroring the temperature results.

The Grassland Basin has high levels of SC, TSS, and minerals compared to the eastern basins.

Salt Slough, having a total of three algal toxicity samples collected, had two toxic events for the increase in growth for acute algae and one toxic event for a reduction in algal growth. Of the seventeen samples within Salt Slough collected for acute fathead minnow and acute *Ceriodaphnia dubia,* no toxic events were found.

When evaluated against the water quality objectives and goals found in Appendix Q1 and Q2 there are multiple areas of concern within the SJR Basin.

<u>Drinking Water/Municipal Supply</u>:

High TOC levels throughout the SJR valley are elevated above guidelines for the delta intended to protect drinking water.

Aquatic life:

Elevated temperatures throughout the basin were a concern during the spring and fall. Total copper had high occurrences in French Camp Slough, Lone Tree Creek, and Pixley Slough. Turbidity was a concern within the Westside Basin, but a more applicable Basin Plan objective is needed to determine potential for impairment.

Irrigation Water Supply:

When compared against the Water Quality Goal for Agriculture of 700 umhos/cm, large areas of the basin appear to be elevated above optimal irrigation water quality guidelines for specific conductance. Salt is an overwhelming ongoing concern for most of the SJR Basin particularly the Grasslands and Westside basin.

Recreation:

E. coli had occasional spikes during the summer months when most of the waterways have a potential for recreational use. A majority of the sites with high percentages of samples exceeding the conservative level percentages may need further evaluation to determine actual level of potential recreational use.

14.0 FUTURE ACTIVITIES

While information collected during this study was utilized to help fine tune the monitoring programs for the Northeast, Eastside and Westside Sub-basins during the rotational portion of the overall effort, after WY 2005 the SJR SWAMP effort was not able to continue the Drainage Basin or Intensive Rotational Basin sites due to funding reductions. Since 2005, the SJR SWAMP sampling has been limited to maintaining the water quality monitoring for the multi-agency Grassland Bypass Project (GBP), with addition of *E. coli* analyses twice a month at the GBP sites.

Since 2003, expanded monitoring of agricultural drainage inflows to the SJR have been conducted by various Agricultural Coalition Groups as part of the Irrigated Lands Regulatory Program (ILRP). SWAMP is providing resources to ensure ILRP water quality information is captured in the statewide SWAMP master database.

To address the salt issue within the SJR Basin the Central Valley Water Board formed the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS). This program is an effort to address the salinity problems within the Central Valley and will adopt long-term solutions to improve water quality and economic sustainability. The following website has up-to-date information about CV-SALTS:

http://www.swrcb.ca.gov/centralvalley/water_issues/salinity/index.shtml .

The Central Valley Water Board SWAMP effort has refocused limited resources on better identifying current monitoring efforts conducted by both internal programs (GBP, ILRP, NPDES receiving water requirements, TMDL, and others) and major external efforts (Department of Water Resources, US Bureau of Reclamation, US Geological Survey, University of California and watershed groups) through the development of a web-based surface water monitoring directory. The directory builds off of a pilot project with the San Francisco Estuary Institute (SFEI) begun by the US EPA within the San Joaquin River Basin, and has been expanded by the Central Valley Water Board SWAMP to include the entire Central

Valley (Sacramento, San Joaquin, and Tulare Basins and Delta). The web-based monitoring directory is designed to only display active monitoring efforts and to identify what is being monitored where, how frequently, for how long, and by which agency. While actual data is not captured, the directory will provide links to any web based database and contact information for the monitoring program manager.

Initial feeding of the directory has focused on multi-agency efforts within the Sacramento-San Joaquin Delta to help identify available water quality information in order to facilitate a more thorough evaluation of water quality. In addition, the directory has been beta-tested by loading information on the internal GBP, ILRP, NPDES, statewide SWAMP, and DWR Northern District efforts for the entire Central Valley. The directory can currently be viewed at the following website http://www.centralvalleymonitoring.org/. It is anticipated that beta testing will be complete and the directory will be available for data entry from interested parties during late spring 2009.

Central Valley SWAMP is also currently:

- Providing resources (staff and contract dollars) to facilitate development of a Regional Monitoring Program for the Sacramento-San Joaquin Delta.

- Supporting the Department of Water Resources staff to continue long-term trend monitoring at 41-sites in the northern Sacramento River Basin in exchange for the addition of selected constituents of concern identified through Central Valley Regional Board efforts (TOC, nutrients, and toxicity) and realignment of 11-sites to correspond with sites utilized by the statewide SWAMP sediment toxicity study.

- Developing a region-wide, long-term trend monitoring framework based on the 30-sites within the Central Valley that are part of the state-wide SWAMP contaminant trend monitoring effort

- Development of the Central Valley Regional Board SWAMP website that documents monitoring activities supported by SWAMP and provides links to final reports and selected water quality data (http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/index.shtml)

Efforts related specifically to the elevated *E. coli* concentrations found within the SJR Basin as well as in other areas of the Central Valley as part of ILRP monitoring, include:

- A survey of *E. coli* concentrations in local swimming holes before during and after a holiday weekend (coordinated with Central Valley watershed groups during both 2007 and 2008)
- A pilot bacteria source identification project with the University of California, Davis, in selected streams with a history of elevated *E. coli* concentrations
- Continued, seasonal *E. coli* monitoring at 30-major integrator sites throughout the Central Valley.

Recommendations for future monitoring for each sub-basin and river site include those parameters identified in Table 8. Data has been posted annually on our website since 2003 and utilized in combination with other available data for assessment in the Clean Water Act Sections 305(b) and 303(d) Integrated Report for the Central Valley Region (CVRWQCB, 2009 Draft).

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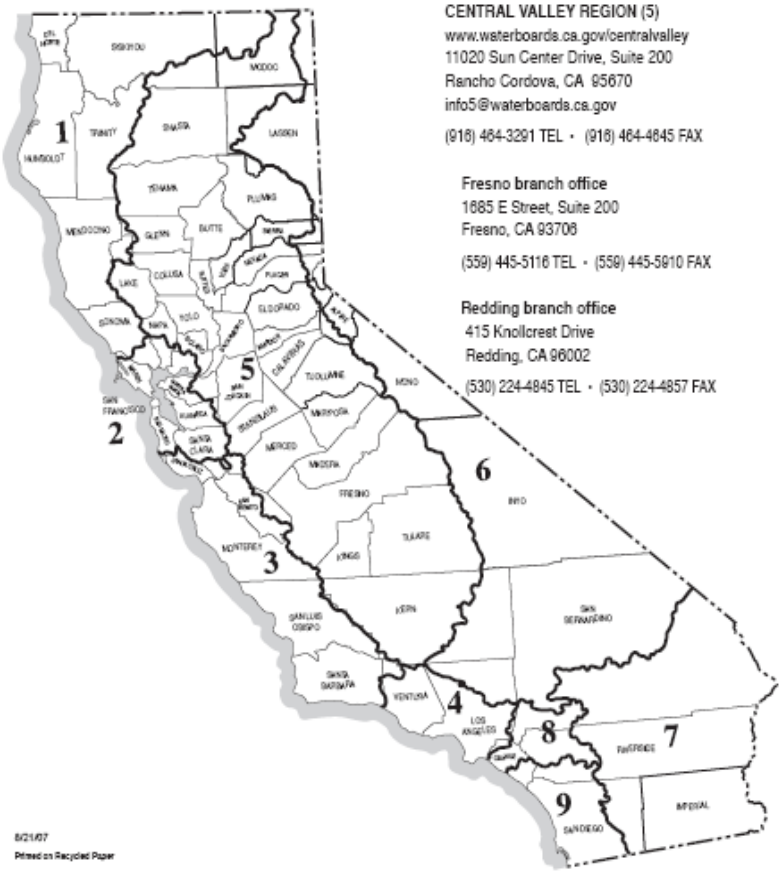

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