

**Watersheds:** Fall River (tributary to Pit River)

**Sampling**

**Period:** September 2003 – September 2005

**Project**

**Objectives:**

1. Document existing water quality conditions in the Fall River;
2. Determine if and to what extent, beneficial water uses are limited or impaired by water quality;
3. Establish a monitoring program that is repeatable and can be used to compare with past and future conditions to evaluate water quality trends in Fall River;
4. Provide the RCD, resource agencies, and other stakeholders with additional environmental information to assist in the development of a river management plan

*KEY STATISTICS*

<i>Length of Fall River &amp; tributaries</i>	63 miles
<i>Number of sites Sampled</i>	12
<i>Number of Constituents measured</i>	12
<i>Grab Samples Taken</i>	~2500
<i>Continuous Sampling</i>	Temperature

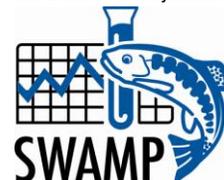
**MESSAGE:** Water quality data collected from 2003 to 2005, expanded baseline information and indicated limited concerns with pH, temperature, and indicator bacteria in the Fall River watershed.

Table 1: Summary of Potential Beneficial Use Concerns: Fall River Watershed (September 2003 – September 2005)

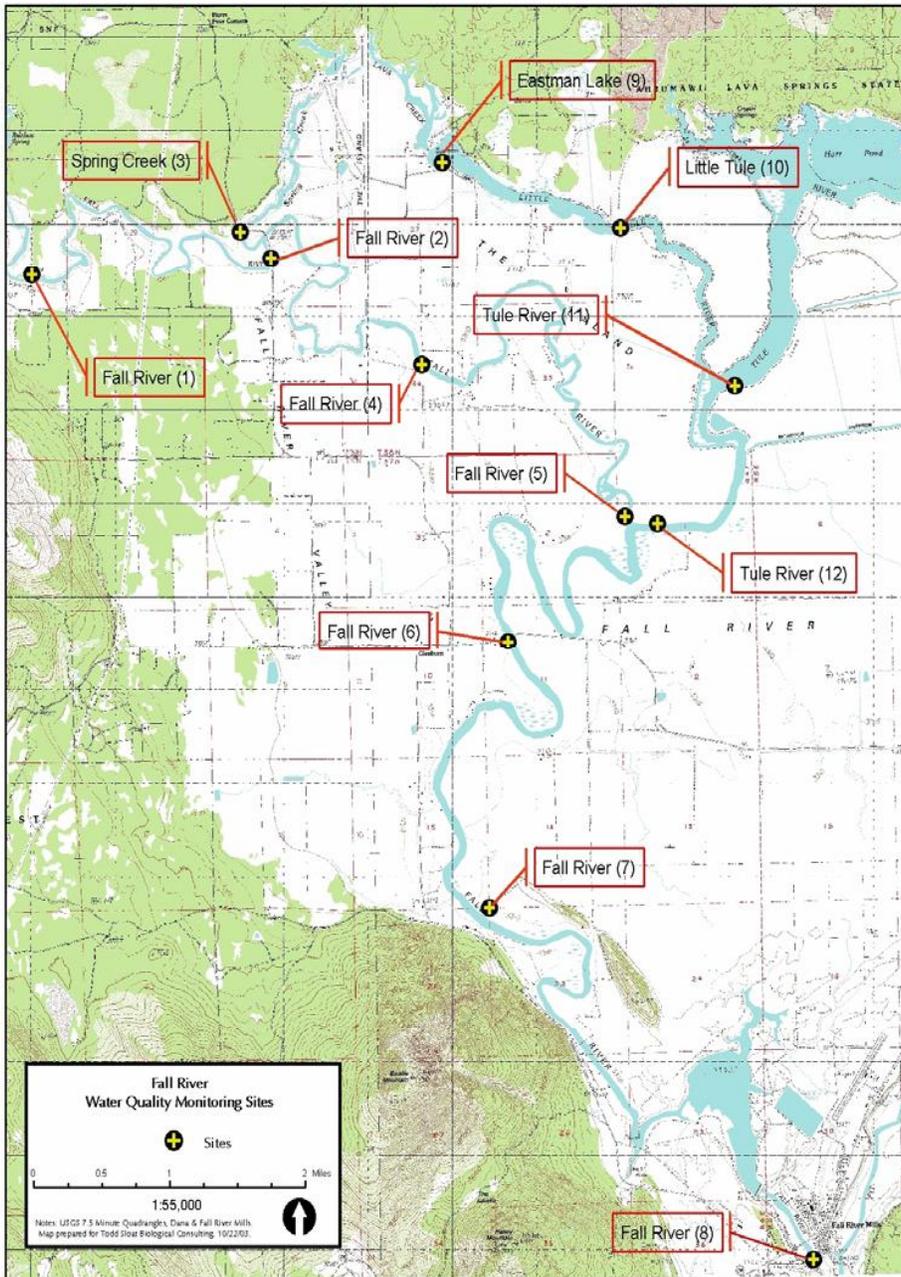
Beneficial Use/ Indicator	Fall River Tributary Drainages				Fall River Sites				
	Spring Creek	Tule River	Little Tule River	Eastman Lake	Fall River Upper WS FR1, FR2	Spring Creek	Fall River Mid Section FR4, FR5	Eastman Lake, Little Tule, Tule	Fall River Lower WS FR6, FR7, FR8
<b>Aquatic Life</b>									
pH 6.5 – 8.5, Basin Plan		X	X	X	X		X		X
Temperature 7 day average >66-F		X							X
Temperature 7 day average >75-F		X							X
<b>Recreation (Swimming)</b>									
Fecal coliform 400 MPN/100ml	X				X		X		X
E. coli 235 MPN/100ml	X				X		X		
<b>Drinking Water</b>									
Specific Conductivity*									
Total Organic Carbon*	NS	NS	NS	NS					
E. coli	X	X	X	X	X		X		X
Nitrate Nitrogen*									
<b>Irrigation Water Supply</b>									
Specific Conductivity*									

\* = Objective, goal, guideline not specified in the report  
 X = One or more result above a goal or objective  
 NS – Not Sampled

Turbidity and TSS were also analyzed, and fall under the Basin Plan objective for Sediment, which is a narrative objective. There is no discussion in the report that addresses whether the objective was met.



**Site Locations:**



**WHAT IS THE MEASURE SHOWING?**

Monthly samples gathered over a 24 month period provides information on water quality from September 2003 – September 2005 and preliminary indications on the potential beneficial use impacts on the Fall River watershed.

Fall River summer **temperatures** show significant warming from near the headwaters to near the PG&E Diversion. Daily maximum river temperatures increased through this reach by about 15 –F. All Fall River and tributary sites monitored showed year round temperature regimes supportive of trout and other cold water species except for Tule River above the Fall River confluence, and Fall River pond in the town of Fall River Mills. Both seasonal and diel (daily) temperature variation in the Fall River and tributaries are low relative to other typical surface water bodies (diel temperature variation ranged from 3 – 7-F during the summer period). Based on the available data record, there is no apparent trend of temperature change in Fall River over the past 20 years. Given the importance of this water quality parameter to the Fall River aquatic ecosystem, temperature should continue to be periodically monitored to evaluate any long-term trends. **Conductivity** in the Fall River and tributaries was relatively low (100 – 200 umhos/cm) and showed little seasonal or spatial variation. The **pH** at Fall River and tributary sites was relatively constant (8.0 to 9.0), showing little seasonal or spatial variation. The pH at the Fall River sites was somewhat higher than the Basin Plan water quality objective for this constituent (6.5 to 8.5), but this is typical of the more alkaline conditions of eastside watersheds. The pH in Spring Creek was somewhat lower than other Fall River and tributary sites, ranging from 7.0 to 8.0. **Turbidity** in Fall River generally ranged from 0 to 5 NTU and is typically less than 2 NTU. One elevated turbidity event occurred on 19 Feb 2004 throughout Fall River from a heavy rainfall event in the watershed. Elevated turbidity at the Tule River sites probably results from the presence of algae rather than soil particles in the water column. **TSS** levels in the Fall River and tributaries are low compared to other ambient waters that are not predominantly spring-fed. One episode of elevated TSS in the Fall River was detected on 19 Feb 2004, likely from a heavy rainfall in the watershed. **Fecal coliform and E. coli** results showed similar seasonal results, e.g., higher summer concentrations as compared to winter, concentrations at levels which should at least be a concern to those taking domestic household water supplies directly from the river, and limited results above the Basin Plan objective for recreation (400MPN/100ml). Management practices that minimize bacteria transport to the River should continue to be promoted. The historic record shows periodic exceedance of the Regional Board's fecal coliform water quality objective for contact recreation. However, the 1981 data show that high concentrations were previously common during the fall and winter months also. Although elevated fecal coliform concentrations continue to periodically occur, summary comparison of the historic data indicates that there has been a significant decline in fecal coliform concentrations over the past 20 years. The levels and frequency of exceedance do not appear to justify an impaired waterbody listing for *E. coli* concentrations. Bacteria concentrations (both fecal coliform and *E. coli*) in ambient waters are highly variable and one must use caution in determining the significance of any single sample results. **Nitrate** levels were about twice as high in the fall/winter months as the spring/summer months at the River and tributary sites, which likely results from weed and algae uptake during their period of high growth. Upstream Fall River sites averaged about twice the levels of nitrates as downstream sites, based on limited data from the latter sites. This again is probably the result of nutrient uptake from weed growth. **Phosphorous** concentrations were similar throughout the monitoring period at Fall River and tributary sites, generally ranging from 0.02 to 0.1 mg/l. Occasional spikes in phosphorous concentrations were detected at the Glenburn Bridge monitoring site. Monitoring results indicate that both phosphorous and nitrate nitrogen may be limiting factors for weed and algae growth in the system. Late spring/summer P levels dropped somewhat compared to levels at other times of the year. Both N and P are reduced in heavy vegetative growth months and increase in low-growth months. The drop in nitrate levels in the spring/summer of 2005 by a factor of four indicates that nitrate may be a more limiting factor than phosphorous in the system. Historic comparison of nutrient monitoring data is difficult due to the inconsistent nature of sampling times and location. Concentrations as compared to historic data did not show an apparent upward or downward trend. Limited **TOC** results are not indicative of a water quality problem in Fall River caused by an organic compound.

**WHY THIS INFORMATION IS IMPORTANT?**

The Fall River Watershed supports multiple beneficial uses (e.g. Contact Recreation, Aquatic Life, Drinking Water, Irrigation Water Supply) and is currently 303(d) listed for impairment from sedimentation. Combining the 2003-2005 findings with water quality data from previous monitoring in the Fall River drainage provides the basis for evaluation of long-term trends. Data collected as part of the 2003-2005 monitoring program was also used by the Northeastern CA Water Association to fulfill monitoring requirements for the Regional Board's Conditional Waiver of Waste Discharge for Discharges from Irrigated Lands (the Ag Waiver Program). The Fall River Resource Conservation District (RCD), a collaborative group of agencies, landowners, and other stakeholders, was formed to protect and enhance water quality, fisheries, and aquatic habitat in Fall River and the surrounding watershed area.

**WHAT FACTORS INFLUENCE THE MEASURE?**

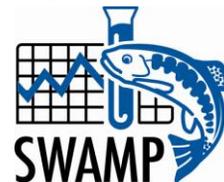
**Land Use:** Trout fishing stream, irrigation/stock water supply for agricultural operations, domestic supply for residents living along the river

**Hydrology:** The Fall River is a major tributary of the Pit River, and drains into the Pit River at Fall River Mills.

**Water Year Type:** Although not discussed in the report, water years 2003 was classified as "Above Normal" and 2004 was classified as "Below Normal" based on the California



CA Regional Water Quality Control Board,  
Redding Office



Department of Water Resources Snow Surveys as applied to criteria in the Basin Plan. A summary of historic water year types is located at <http://cdec.water.ca.gov/cgi-progs/iodir/wsihist>.

**Flow:** Fall River flows peaked in March and April and were lowest in July, August, and September. Flows were similar for 2004 and 2005 with average monthly flows of 1,096 cfs and 1131cfs.

**Environmental:** Constituents can potentially be affected by environmental factors such as water temperature being influenced by air temperature, streamside canopy cover, channel configuration (width/depth ration), and inflowing ground and surface water. Additionally, pH can be affected by acid rain and soil/rock leachate. Additionally, the RCD and other stakeholders had implemented a number of on-the-ground projects to address watershed concerns, including channel and meadow restoration projects on tributary streams, livestock enclosure fencing with watering access ramps for cattle, riverbank revetment, muskrat control, and improvements in application and control of agricultural irrigation water.

**TECHNICAL CONSIDERATIONS:**

- *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern.
- Agencies involved in the study include the Central Valley Water Board, Redding, Fall River Resource Conservation District, and Pit River Watershed Alliance. Staff who collected the samples is not specified in the report. The analytical lab was Basic Lab, inc., Redding.
- References:
  - Public report and fact sheet are available at:  
[http://www.waterboards.ca.gov/centralvalley/water\\_issues/water\\_quality\\_studies/surface\\_waterambient\\_monitoring/swamp\\_water\\_quality\\_reports/swamp\\_report\\_summary\\_sheet/index.shtml](http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_waterambient_monitoring/swamp_water_quality_reports/swamp_report_summary_sheet/index.shtml)
  - Central Valley Regional Water Quality Control Board (CVRWQCB). 2007. Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins, Fourth Edition, August 2006.
  - The results of a University of CA., Davis study on aquatic weed conditions and macroinvertebrate populations in the river, entitled Fall River 2005 Macroinvertebrate and Channel Cross Section Monitoring, March 2006, can be found at [http://www.waterboards.ca.gov/centralvalley/water\\_issues/swamp/water\\_quality\\_reports/fall\\_rvr\\_macro.pdf](http://www.waterboards.ca.gov/centralvalley/water_issues/swamp/water_quality_reports/fall_rvr_macro.pdf)