

PROJECT PLAN
SUSAN RIVER, LASSEN COUNTY
TOTAL MAXIMUM DAILY LOAD (TMDL) FOR TOXICITY

California Regional Water Quality Control Board
Lahontan Region
Watershed Planning/TMDL Unit
2501 Lake Tahoe Boulevard
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1. PROJECT BACKGROUND

Section 305(b) of the Clean Water Act (CWA) mandates biennial assessment of the nation's water resources, and these water quality assessments are used to identify and list those waters that are not achieving water quality standards. The resulting list is referred to as the 303(d) list. The CWA also requires states to establish a priority ranking for these impaired waters and to develop and implement TMDLs. A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and it allocates pollutant loadings to point and non-point sources such that those standards will be met.

In 1990, as part of a regional research effort by the U.S. Environmental Protection Agency (EPA), chronic toxicity testing was conducted on three locations on the Susan River. Toxicity was exhibited in several samples, and in 1996 the Susan River was placed on the Federal Clean Water Act Section 303(d) list of impaired waters for toxicity of unknown cause.

To begin the TMDL process, staff of the Lahontan Regional Water Quality Control Board (RWQCB) is conducting additional toxicity testing on the Susan River. The current investigation will assess whether water quality in the Susan River has changed relative to the 1990 EPA study results. If toxicity is detected in Susan River, additional analysis will be conducted to identify the cause(s). Toxicity testing began in May 2003, and will be completed by August 2004. Results of the toxicity testing will be available by October 2005.

2. WATERSHED DESCRIPTION

The Susan River originates from Silver and Caribou Lakes in southern Lassen County and flows easterly through McCoy and Hog Flat Reservoirs and the City of Susanville, ultimately discharging into Honey Lake. The Susan River is the major river draining the Honey Lake Valley, which is approximately 2,375 square miles in area. The Honey Lake Valley is bounded by the Basin and Range Province to the east, the granitic Sierra Nevada Range to the southwest,

and the volcanics of the Modoc Plateau and the Cascade Range to the north and west. Figure 1 shows the location of the Susan River.

The Susan River has a steeper gradient in its upper reaches west of Susanville, but from Susanville to Honey Lake, its gradient is greatly reduced. This change is reflected in the river bottom materials, which are characteristically gravels, cobbles and boulders upstream from Susanville, while substrates downstream are usually small gravels, sands, and silts. Fly fishing is popular in the upper reaches of the river, and the California Department of Fish and Game regularly stocks the river with rainbow trout. In the lower gradient sections of the river, catfish and other warmwater fish are present.

The majority of the surface water supply comes from precipitation in the western portion of the watershed, mostly in form of snow. Flow characteristics in the Susan River reflect the important influence of snowmelt. Average flows in the summer are relatively low, increase to a medium range during October through February and are highest during the spring runoff period from March through May¹. The river supplies over thirty percent of the total surface water needs for Lassen County², and is fully developed, with all available water allocated. In the winter and spring, surplus water in the upper river can be stored in McCoy and Hog Flat reservoirs, then released to the river channel in the drier summer months for agricultural uses. Predominant land uses in the Susan River watershed include forestry, recreation, agriculture, industrial and residential uses. The Honey Lake Wildlife Area, at the mouth of the Susan River, provides important habitat for several threatened or endangered species, including the bald eagle, sandhill crane, bank swallow, and peregrine falcon³.

¹ Department of Water Resources. "Susan River Water Quality Study." December 1979

² Limov, Mariam. "Susan River Load Allocation Project Executive Summary," Senior Project, Department of Environmental Resources Engineering, California State University, Humboldt, September 1989.

³ <http://rubicon.water.ca.gov/v2/NLR.html>

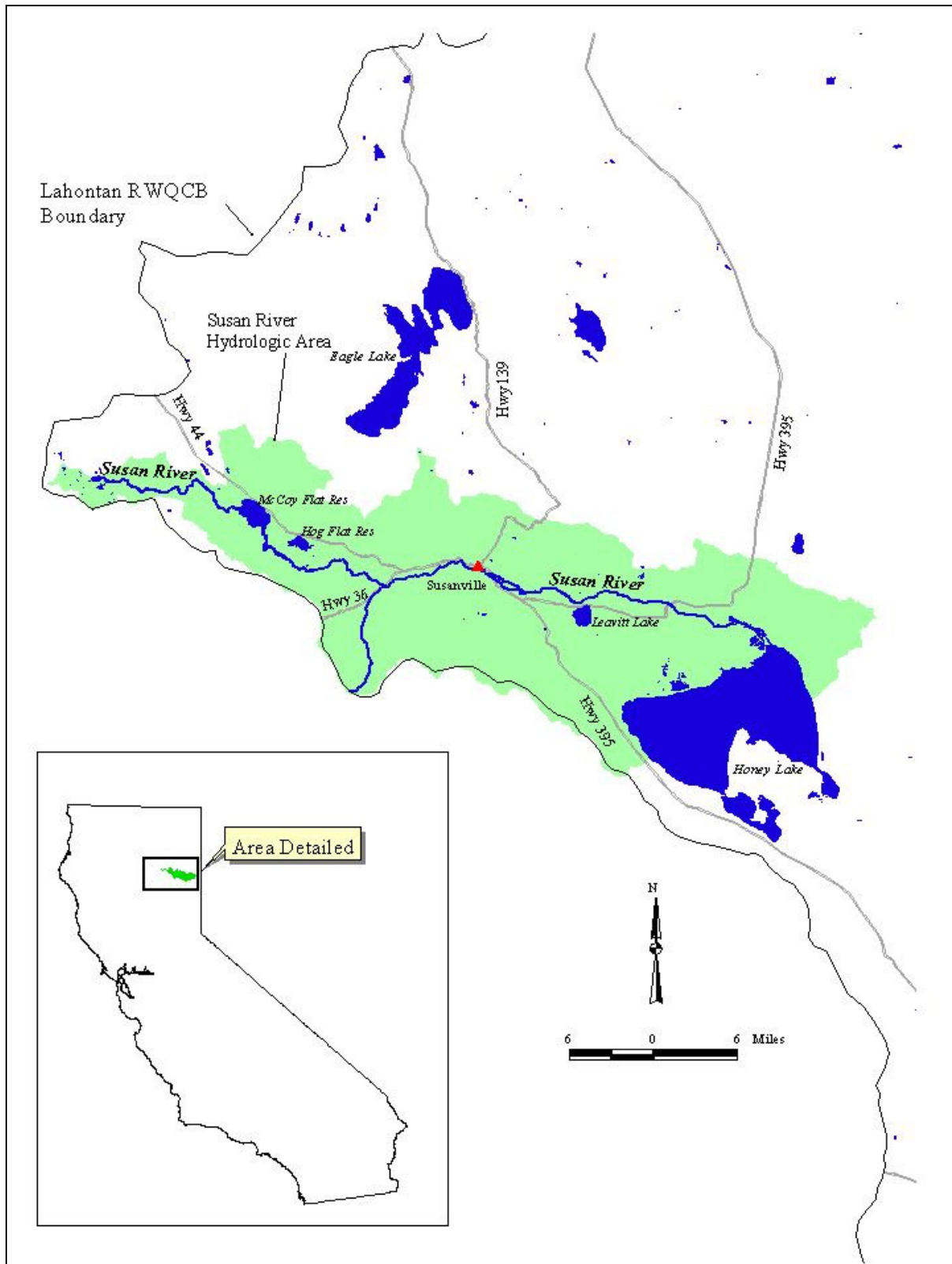


Figure 1. Susan River Location Map.

3. BENEFICIAL USES AND WATER QUALITY OBJECTIVES

Water quality objectives are limits on levels of constituents (such as chemicals or nutrients) or characteristics (such as temperature or pH) that are established to protect beneficial uses of waters. Relevant water quality objectives for this project include the toxicity-based California Toxics Rule aquatic life protection criteria for priority pollutants, primary and secondary drinking water standards, and the *Water Quality Control Plan for the Lahontan Region* (Basin Plan) narrative objectives, particularly the toxicity objective, which states:

"All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life."

Numeric water quality objectives for the Susan River and its major tributaries are defined in the Basin Plan for total dissolved solids, chloride, sulfate, boron, nitrogen and phosphorus.

Beneficial uses of the Susan River include:

- Municipal and Domestic Supply (MUN)
- Agricultural Supply (AGR)
- Industrial Service Supply (IND)
- Groundwater Recharge (GWR)
- Freshwater Replenishment (FRSH)
- Water Contact Recreation (REC-1)
- Non-Contact Water Recreation (REC-2)
- Navigation (NAV)
- Commercial and Sportfishing (COMM)
- Cold Freshwater Habitat (COLD)
- Wildlife Habitat (WILD)
- Warm Freshwater Habitat (WARM)
- Migration of Aquatic Organisms (MIGR)
- Spawning, Reproduction and Development (SPWN)

Complete definitions of these beneficial uses can be found in Chapter 2 of the Basin Plan.

4. TMDL APPROACH

The EPA toxicity data that led to the 303(d) listing are now over 13 years old, and determining the cause of observed toxicity was not an objective of the EPA study. Therefore, the first step in the Susan River TMDL process is to assess the current condition of river's water quality relative to toxicity. The State Water Resources Control Board's Toxicity Testing Program provided funding and executed a contract with the University of California - Davis, Aquatic Toxicology Laboratory (UCD ATL) for this current phase of toxicity testing. UCD ATL specializes in aquatic ecosystem and water quality investigations, and is State-certified to perform EPA toxicity testing. This study phase involves eight sampling events, scheduled for the Spring through Fall of 2003 and Spring 2004, when flow conditions and site access are most favorable, and previous incidences of toxicity were observed. These studies will allow Regional Board TMDL staff to determine: 1) if toxicity is still an issue; 2) if there are any temporal or spatial variations in the magnitude or frequency of toxicity; 3) the chemical or physical characteristics that may be contributing to toxicity; and 4) potential areas to focus future monitoring and source assessment activities. If toxicity is not detected in the Susan River, the data will be used to provide justification to remove the river from the 303(d) list for toxicity.

5. TOXICITY TESTING PLAN OVERVIEW

Four sampling sites were selected along the Susan River, from just upstream of the city of Susanville to the town of Litchfield. Sampling locations were established based on several criteria: 1) safety and accessibility; 2) duplication of 1990 EPA sampling locations; and 3) land use and runoff patterns. Table 1 contains site descriptions and selection criteria. Figure 2 shows the sampling locations.

Table 1. Summary of site descriptions and selection criteria.

Site	Site ID	Rationale for Selection
Susan River near USGS gage at Hobo Camp trailhead to Bizz Johnson trail	SR-1	To duplicate 1990 US EPA toxicity testing site R-6-1, and represent water quality upstream of the City of Susanville.
Susan River at McGowan Lane	SR-2	To capture changes in water quality below confluence with Gold Run Creek, which may have geothermal discharges near 1990 US EPA site R-6-2.
Susan River at Leavitt Lane Bridge	SR-3	Best available access downstream of confluence with Jensen and Brockman Sloughs where Susanville Consolidated Sanitary District discharges and agricultural activity may influence water quality.
Susan River upstream of Litchfield at Bridge 7-34 on Highway 395	SR-4	To duplicate 1990 US EPA site R-6-3 downstream of confluence with Willow Creek

Chronic (7-day) toxicity tests are conducted on water samples collected from the Susan River. *Ceriodaphnia dubia* (water flea, a cladoceran), larval *Pimephales promelas* (fathead minnow, a cyprinid), and *Lemna minor* (duckweed, a free-floating aquatic plant) are placed in beakers containing sample water. Growth, survival and/or reproduction are measured at regular intervals over the duration of the 7-day testing period and compared to a "control" test. The control testing water is similar to distilled or de-ionized water. Toxicity is determined using statistical analysis to indicate if there is a difference in the growth, survival or reproduction of organisms in the Susan River water compared to the control water. If toxicity is exhibited, toxicity identification evaluation (TIE) studies are initiated to determine the cause. TIEs will be performed on *Ceriodaphnia* or larval *Pimephales* that exhibit 50 percent or greater mortality and significant statistical differences from the control within 96 hours in the initial test. No TIE method has been developed for *Lemna minor*, so if toxicity is detected to that organism, additional chemical analysis of the sample water is performed to identify potential causes.

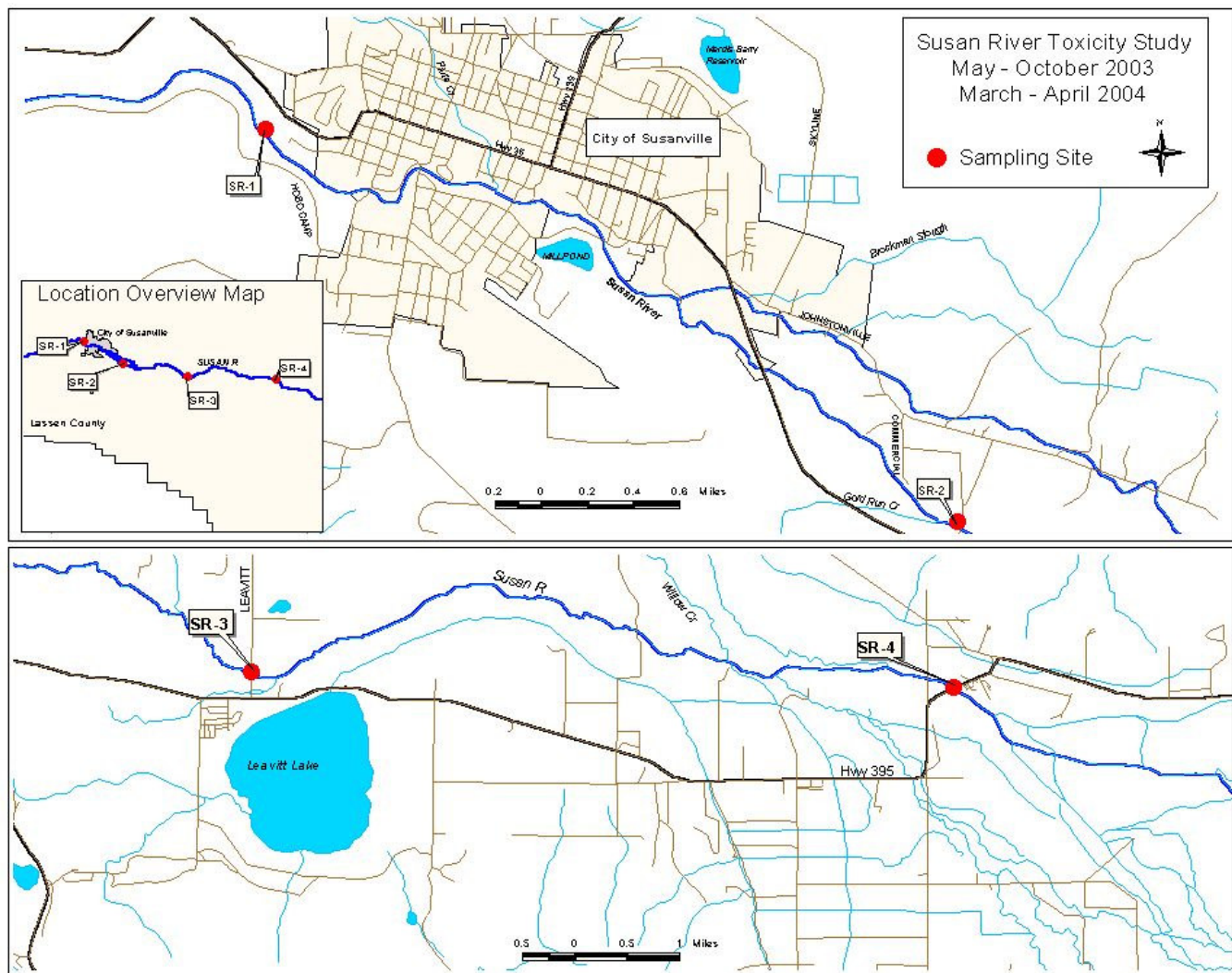


Figure 2. Susan River toxicity testing locations.

6. PROJECT STATUS – Updated October 25, 2005

Toxicity testing was completed in October 2004, and a final project report was submitted by UCD-ATL in June 2005. Results indicate that the Susan River exhibits low to moderate levels of toxicity in some locations. The magnitude of toxicity in Susan River samples toxic to larval fish and *Ceriodaphnia dubia* was relatively low; however, two of the duckweed tests showed greater than fifty percent differences in plant growth compared to the control samples.

Chemical analyses were conducted on several water samples exhibiting duckweed toxicity. Four samples contained low levels of clopyralid (the primary ingredient in the herbicide Transline®),

esfenvalerate (an insecticide), nonyphenol and nonyphenol ethoxylate. Individual chemical concentrations detected were all below published LC₅₀ values and applicable numeric water quality objectives as well (e.g., CTR aquatic life protection criteria, US EPA reference dose levels).

According to UCD-ATL, the current set of data are consistent with low-level or no impacts on aquatic life beneficial uses. However, observed toxicity and pesticide detections in Susan River water samples violates narrative water quality objectives for toxicity and pesticides contained in the Lahontan Basin Plan. The Susan River will continue to be 303(d)-listed for "unknown toxicity", but a TMDL is not currently recommended as the appropriate regulatory response since the pollutant(s) causing toxicity has not been decisively identified by this study. Water Board staff have notified the Department of Pesticide Regulation (DPR) of the pesticide and toxicity detections in the Susan River. A collaborative process between the DPR and the Water Board to identify and address the pesticide use practice(s) responsible for the water quality violations will be implemented in accordance with the Management Agency Agreement between the State Board and DPR. Follow-up monitoring, including additional toxicity testing, will be needed to determine the effectiveness of control measures and need for additional regulatory action.

The final Susan River Toxicity Testing Report is available on our internet site at http://www.swrcb.ca.gov/rwqcb6/TMDL/Susan_River/Susan_Index.htm, or you may request a copy from Anne Holden, the Lahontan Water Board project manager. Her contact information is provided below.

Table 2. Susan River Work Products and Schedule.

Deliverable/Milestone	Status	Date Due or Complete
Meet with ATL Toxicologist/State Board for project scoping	Complete	June 11, 2002
Field reconnaissance of sampling sites	Complete	July 15-16, 2002
Finalize contract scope of work for toxicity testing	Complete	October 2002
Sample collection training (TMDL staff will collect samples)	Complete	November 12, 2002
2003 monthly toxicity sampling and testing	Complete	May - October 2003
Progress Report (2003 testing)	Complete	January 2004
2004 monthly toxicity sampling and testing	Complete	March - August 2004
Draft Final Toxicity Report	Complete	December 2004
Final Toxicity Report	Complete	June 2005
Report review; notify Department of Pesticide Regulation of pesticide detections	Complete	September 2005
Follow up actions (coordinate with DPR)	Upcoming	<i>Estimated Spring 2006</i>

7. LAHONTAN RWQCB CONTACT INFORMATION

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For updates and information on this and other TMDLs in the Lahontan Region, please check our TMDL webpage at: http://www.swrcb.ca.gov/rwqcb6/TMDL/TMDL_Index.htm