

**WATER QUALITY CONTROL PLAN AMENDMENT  
TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT  
MIDDLE TRUCKEE RIVER WATERSHED**

California Regional Water Quality Control Board  
Lahontan Region  
2501 Lake Tahoe Boulevard  
South Lake Tahoe, CA 96150  
(530) 542-5400

**May 2008**

***The Basin Plan language below will be added to Section 4.13 of the Basin Plan implementation chapter. Final Basin Plan revisions will include appropriate changes to the “record of amendments” page and the Table of Contents, List of Figures, Index, bibliography, page numbers and headers to reflect the new material. Final locations of tables in relation to text may be changed to accommodate the Basin Plan’s two-column format.***

## **Total Maximum Daily Load for Sediment, Middle Truckee River Watershed, Placer, Nevada, and Sierra Counties**

**Introduction:** The middle Truckee River Watershed Total Maximum Daily Load (TMDL) is a plan to attain sediment-related water quality objectives, especially narrative objectives to protect in-stream aquatic life beneficial uses, such as COLD and SPWN.

This TMDL addresses the segment of the Truckee River from the outflow of Lake Tahoe at Tahoe City to the California/Nevada state line. This reach flows through the eastern parts of Placer, Nevada and Sierra counties, and is commonly referred to as the middle Truckee River. The TMDL also addresses Gray and Bronco creeks, which are adjacent drainages located in the eastern portion of the Truckee River basin, near the California-Nevada state line. The watersheds are rugged, mostly undeveloped areas, with few controllable sediment sources. No data are available to support that Gray or Bronco creeks were listed due to beneficial use impairment in the creeks; rather, the listings were based on reports of sediment discharges from the creeks to the Truckee River during thunderstorm events. Therefore, this TMDL establishes watershed-wide sediment load reductions that are protective of beneficial uses in the Truckee River, and sets load allocations for Gray and Bronco creeks to address their 303(d) listings.

**Problem Statement:** At higher stream flows, suspended sediment concentrations in the middle Truckee River are above those recommended for aquatic life protection, particularly at the Farad gauging station at the downstream end of the TMDL project area. Continuous turbidity monitoring conducted in 2002 and 2003 indicates that flow events resulting from thunderstorms, snow melt and dam releases produce turbidity spikes that exceed the water quality objective. Studies of aquatic insect populations in the river indicate that as deposited sediment volumes increase, the diversity and structure of these communities shift toward more sediment-tolerant species. Lastly, the watershed's population has increased significantly over the last decade and major development and population growth is planned over the next 10 years in formerly undeveloped areas. Increased sedimentation to stream channels is linked to urbanization associated with high growth and population density, accompanied by development in erosion-sensitive landscapes.

**Desired Conditions:** Desired conditions in the Truckee River are expressed by a numeric target for in-stream suspended sediment that is protective of aquatic life, with an emphasis on early life-stage salmonids (e.g., rainbow, cutthroat and brown trout). Based on a review of scientific literature and analysis of 30 years of suspended sediment data in the river, suspended sediment concentrations in the Truckee River

should be less than or equal to 25 milligrams per liter, as an annual 90<sup>th</sup> percentile value.

Desired conditions are also expressed by implementation actions needed to control sediment discharges and improve in-stream conditions in the Truckee River. Implementation actions were identified based on the source assessment, which showed that control of storm water runoff from urban areas, dirt roads, graded ski runs, and legacy sites (past land or in-stream disturbances that have ongoing impacts) is needed to minimize sediment discharges from these sources. Table 4.13-TR-1 summarizes the indicators and target values for this TMDL.

**Source Assessment:** The annual suspended sediment load estimated for the Truckee River at the Farad gauging station is approximately 50,300 tons, based on an above average water year (1996-1997). This is a broad estimate which will vary significantly depending on the characteristics and magnitude of runoff for any given water year. The primary sources are runoff from urban areas, dirt roads, and legacy erosion sites, and in some subwatersheds, graded ski runs. Continuous turbidity monitoring in the river during 2002 and 2003 shows that sediment loading "pulses" attributed to thunderstorms, snowmelt periods and dam releases may account for up to half the total sediment loading. Table 4.13-TR-2 summarizes the sediment source assessment.

**Loading Capacity:** The suspended sediment loading capacity is derived from a mathematical comparison of long-term suspended sediment concentrations in the river and those recommended in literature to provide high quality aquatic life habitat. It is estimated that a 20 percent reduction in overall sediment loading is needed to achieve desired in-stream conditions; therefore, the loading capacity is 40,300 tons per year, based on water year 1996-1997. Attainment of the loading capacity and reduction will be evaluated through the targets shown in Table 4.13-TR-1.

**TMDL and Allocations:** The TMDL is the sum of wasteload allocations for point sources [National Pollutant Discharge Elimination System (NPDES)-regulated sources] and load allocations for nonpoint sources, and includes an implicit margin of safety. The allowable sediment load (i.e., the loading capacity) is allocated to the existing urban and non-urban sources and future development in the watershed. The allocations reflect conservative assumptions about the efficiencies of sediment and erosion control practices that will reduce sediment loading to the river, resulting in TMDL attainment over time. The allocations are summarized in Table 4.13-TR-3.

TMDL attainment will be evaluated through the TMDL targets (Table 4.13-TR-1) that express desired conditions in the watershed, rather than sediment mass reductions. This is appropriate since sediment mass reductions are not a practical indication of beneficial use protection due to the inherent natural variability of sediment delivery and the uncertainties associated with accurately measuring sediment loads and reductions.

**Margin of Safety, Seasonal Variation and Critical Conditions:** The Truckee River TMDL includes an implicit margin of safety. Conservative assumptions that comprise

the implicit margin of safety were incorporated into data interpretations and analysis throughout the TMDL, including the use of a high water year to base loading estimates, and conservative assumptions regarding the ability to reduce sediment loading through management practices. Seasonal variations are accounted for by expression of the SSC target as an annual 90<sup>th</sup> percentile value, allowing for fluctuations in SSC over the target limit, while providing a high level of protection for sensitive aquatic life stages.

**Implementation and Monitoring Plan:** Implementation of the TMDL is based on continuation and improvement of existing erosion control and monitoring programs, NPDES storm water permits, and cooperative agreements with other state and federal agencies.

Existing Waste Discharge Requirements (WDRs), including NPDES storm water permits, contain requirements to control sediment discharges from construction projects, highway operations and maintenance, and facilities with long-term operations such as ski resorts or industrial areas. NPDES municipal permits for the Town of Truckee's and Placer County's jurisdictions in the watershed contain similar requirements. Water quality improvement projects undertaken by entities such as the USFS-Tahoe National Forest, the Tahoe Donner Land Trust, and the Truckee River Watershed Council will complement the Water Board's regulatory activities to meet the TMDL.

Tracking of implementation indicators and compliance with sediment and erosion control requirements in permits will help Water Board staff and the public assess progress toward meeting the TMDL. Monitoring of suspended sediment concentrations in the middle Truckee River will track the in-stream response to improving upland conditions. Table 4.13-TR-4 summarizes the TMDL target monitoring plan.

**Schedule of TMDL Attainment, Data Review and Revision:** The estimated time frame for meeting the numeric targets and achieving the TMDL is 20 years. This estimate takes into consideration time needed for dischargers to devise plans to address sediment sources and iteratively apply appropriate sediment controls. There will also be funding constraints that may affect the pace of certain implementation actions needed to address legacy sites. Further, there may be significant temporal disparities between upland erosion control actions and reduced sediment delivery to the river.

Progress toward meeting the targets will be evaluated by Water Board staff on an annual basis. After 10 years (the halfway point estimated for TMDL attainment), staff shall examine target and compliance data to determine the need for revision of the TMDL, numeric targets, or implementation plan.

Examples of issues to consider during review of the TMDL include:

- precipitation rates and types during the water years
- sampling or data collection problems

- overall compliance with permit conditions
- progress on legacy sites restoration
- completeness of dirt road management plans implemented and monitored
- status of road sand management activities
- other potential sources that could be affecting water quality conditions

Potential outcomes of the 10-year review could include recommendations to reassess sediment sources, revise targets, or adjust the implementation plan.

**Table 4.13-TR-1  
Indicators and Targets for Truckee River TMDL**

<b>Indicator</b>	<b>Target Value</b>	<b>Notes</b>
<p><b>Water Column:</b></p> <p>Suspended sediment concentration</p>	<p>Annual 90<sup>th</sup> percentile value of less than or equal to 25 milligrams per liter (mg/L) suspended sediment.</p> <p>Measured at Farad (USGS gauge 10346000)</p> <p>Data from other monitoring sites along the mainstem Truckee River will be evaluated as needed to assess SSC variations and potential source areas from upstream tributaries.</p>	<p>Target represents protection of aquatic life beneficial uses (COLD and SPWN), based on literature review.</p>
<p><b>Implementation Measure:</b></p> <p>Road sand application best management practices (BMPs), and recovery tracking</p>	<p>Road sand is applied using BMPs and recovered to the maximum extent practicable (MEP).</p>	<p>Road traction sand is needed for public safety; therefore amounts used cannot be specified by TMDL. However, application BMPs and increased road sand recovery can lessen sediment impacts to watercourses.</p>
<p><b>Implementation Measure:</b></p> <p>Ski area BMP implementation and maintenance</p>	<p>Ski areas identify and prioritize areas within their facilities where BMP implementation and maintenance is needed to control erosion and sedimentation to stream channels.</p>	<p>Candidate sites to be identified and prioritized in annual worklists submitted to fulfill WDR permit requirements.</p>
<p><b>Implementation Measure:</b></p> <p>Dirt roads maintained or decommissioned</p>	<p>Identified dirt roads with inadequate erosion control structures are rehabilitated and maintained, or decommissioned.</p> <p>Focus on dirt roads with high potential for sediment delivery to surface waters (e.g., within 200 feet of watercourse).</p>	<p>Candidate roads to be identified and prioritized through watershed assessments or Water Board inspections.</p>
<p><b>Implementation Measure:</b></p> <p>Legacy sites restoration/BMP implementation</p>	<p>Identified legacy sites are restored or storm water BMPs are implemented to prevent erosion and sedimentation to surface waters.</p>	<p>Candidate sites to be identified and prioritized through watershed assessments, or Water Board inspections.</p> <p>Storm water NPDES/WDR holders should identify and prioritize legacy sites in annual worklists.</p>

**Table 4.13-TR-2  
Summary of Suspended Sediment Sources  
in the Truckee River Watershed.**

<b>Summary of Suspended Sediment Sources (Water Year 1996-1997<sup>a</sup> in Tons)</b>			
<b>Subwatershed</b>	<b>Total Watershed Loading (tons/year)</b>	<b>Urban Areas (tons/year)</b>	<b>Non-Urban Areas<sup>b</sup> (tons/year)</b>
Squaw Creek	2,971	430	2,541
Donner/Cold Creeks	2,253	168	2,085
Gray Creek	1,453	0	1,453
Prosser Creek	1,276	108	1,168
Little Truckee River	1,026	0	1,026
Martis Creek	490	20	470
Bear Creek	432	56	376
Bronco Creek	210	0	210
Juniper Creek	173	0	173
Trout Creek	61	46	15
<b>Subwatershed Totals</b>	<b>10,345</b>	<b>828</b>	<b>9,517</b>
Intervening Zones/Unmeasured Inputs <sup>c</sup>	15,973	1832	14,141
Load Measured at Farad	26,318		
Event-Based Loading <sup>d</sup>	24,064	2,406	21,658
<b>Total Suspended Sediment Load</b>	<b>50,382</b>	<b>5,066</b>	<b>45,316</b>
Percent of Total		10%	90%

a. Except for the estimate for event-based loading, which relies on the DRI 2004 study, conducted from May 2002 to June 2003 (see table note "d", below).

b. Calculated as the difference between the sum of load estimates for each subwatershed's urban areas and each subwatershed's total load.

c. Calculated as the difference between the total suspended sediment load from subwatersheds and the total suspended sediment load measured at Farad (26,318 tons minus 10,345 tons).

d. Calculated by multiplying 256 (tons of sediment) by 94 (events). 256 tons is the upper limit of the most frequently occurring suspended sediment event load range. This range also corresponds to most frequent event load occurring at Farad, where the watershed sediment load is calculated. Ninety four represents the most conservative (worst-case) number of events recorded during the DRI 2002-2003 study (at Bridge 8). This conservative estimate is appropriate given that the study occurred over a lower than average water year.

**Table 4.13-TR-3  
Allocations for the Truckee River Watershed Sediment TMDL.**

Subwatershed	Allocations (All Estimates in Tons/Year)			Notes
	Urban Areas (Wasteload Allocation) <sup>a</sup>	Non-Urban Areas (Load Allocation) <sup>b</sup>	Total Allocated Load	
Squaw Creek	350	1,878	2228	Allocations are per Squaw TMDL: Total load = 25% reduction from <u>total watershed load</u> shown in Table 5-6; WLA = road sand/urban allocation from Squaw TMDL.
Donner/Cold Creeks	84	1,626	1710	Controllable non-urban load = 40%
Gray Creek	0	1,293	1293	Controllable non-urban load = 20%
Prosser Creek	54	911	965	Controllable non-urban load = 40%
Little Truckee River	0	800	800	Controllable non-urban load = 40%
Martis Creek	10	315	325	Controllable non-urban load = 60%
Bear Creek	28	293	321	Controllable non-urban load = 40%
Bronco Creek	0	187	187	Controllable non-urban load = 20%
Juniper Creek	0	154	154	Controllable non-urban load = 20%
Trout Creek	23	12	35	Controllable non-urban load = 40%
<b>Total Suspended Sediment Loads Allocated to Subwatersheds</b>	<b>549</b>	<b>7,470</b>	<b>8,019</b>	
Intervening Zones/ Unmeasured Inputs	916	11,030	11,946	Controllable non-urban load = 40%
Event Based Loading	1,203	16,893	18,096	10% to WLA based on existing wasteload/load ratio; Controllable non-urban load =40%
Future Development	2,268		2,268	85% of WLA to existing urban areas.
<b>Totals</b>	<b>4,936</b>	<b>35,393</b>	<b>40,329</b>	
<b>Allocations Summary</b>				
Total WLA			4,936	(549 + 916 + 1,203 + 2,268)
Total LA			35,393	(7,470 + 11,030 + 16,893)
Total Allocated Loads (WLA +LA) <i>Must not exceed TMDL</i>			<b>40,300</b>	(4,936 + 35,393), <b>rounded to nearest 100 tons</b>
TMDL (Loading Capacity)			<b>40,300</b>	(50,382 x 80%; 20% overall load reduction) <b>rounded to nearest 100 tons</b>

a. All WLAs based on 50% load reduction (BMP efficiency of 50%).

b. All LAs based on 55% BMP efficiency applied to percent controllable load.



**Table 4.13-TR-4  
Summary of TMDL Target Monitoring Requirements**

Target	Monitoring and Reporting	Responsible Entities
<p><b>Water Column:</b> Suspended sediment concentration</p> <p>Annual 90<sup>th</sup> percentile value of less than or equal to 25 milligrams per liter (mg/L) suspended sediment.</p>	<p>SSC grab samples measured at least once per month at Farad (USGS gauge 10346000).</p> <p>Upstream SSC data can be assessed for potential variations and source areas if target exceedances are identified at Farad. SSC sampling is conducted on the Truckee River at Tahoe City, and at confluences with Donner, Martis and Juniper Creeks.</p> <p>Additionally, a municipal monitoring program is being developed that covers the jurisdictions of the Town of Truckee, Placer County, and Caltrans. Data generated by this program will be reported annually to further assist the evaluation of potential source areas or variations across the watershed.</p>	<p>SSC data are collected from the Truckee River locations by DRI, for NDEP's Water Quality Planning Branch and stored in the USEPA's STORET system.</p> <p>The Town of Truckee and Placer County are responsible for developing the municipal monitoring program, and Caltrans is required to coordinate with this effort. The program will be coordinated with NDEP's sampling on the Truckee River.</p> <p>The Water Board may require dischargers to contribute to the SSC monitoring on the Truckee River.</p>
<p><b>Implementation Measure:</b> Road sand application and recovery managed to the maximum extent practicable (MEP).</p>	<p>Road sand use and recovery should be tracked and reported annually.</p> <p>Additionally, road sand characteristics such as durability, abrasion loss, sieve analysis, and phosphorous content should be reported annually.</p>	<p>Placer County, Town of Truckee, and Caltrans, as required under municipal storm water permits.</p>
<p><b>Implementation Measure:</b> Ski area BMP implementation and maintenance to control erosion and sediment.</p>	<p>Ski runs and other related facilities are inspected at a minimum of once per year for erosion features once snow cover has dissipated.</p> <p>Annual reports are submitted describing inspection results, projects proposed to correct deficiencies, and effectiveness of erosion control projects previously implemented.</p>	<p>Squaw Valley Ski Corporation, Northstar-at-Tahoe, Alpine Meadows, Tahoe-Donner Ski Area.</p>

Target	Monitoring and Reporting	Responsible Entities
<p><b>Implementation Measure:</b> Dirt roads maintained or decommissioned to control erosion to the extent feasible.</p>	<p>Monitoring should focus on dirt roads with high potential for sediment delivery to surface waters (e.g., within 200 feet of watercourse).</p> <p>Prioritized dirt roads should be monitored annually to evaluate erosion features and potential corrective actions.</p> <p>The number of miles of roads inspected, proposed corrective actions, and effectiveness of previous implementation measures should be reported annually.</p>	<p>Placer County, Town of Truckee, USFS, State Parks, and dischargers regulated by the Water Board.</p> <p>Water Board will respond to complaint-driven issues and oversee grant funded road assessments and improvement projects.</p>
<p><b>Implementation Measure:</b> Legacy site restoration and BMP implementation.</p>	<p>Candidate sites should be identified and prioritized through watershed assessments and Water Board regulatory oversight.</p> <p>A list of legacy sites should be maintained and updated as sites are restored and new information is generated.</p> <p>Legacy site information should be reported annually under the municipal storm water programs.</p>	<p>Placer County, Town of Truckee, and Caltrans are required to evaluate and report annually.</p> <p>USFS should report progress on its OHV road management program.</p> <p>Other information should be collected from entities such as State Parks, TRWC, TDLT, etc.</p> <p>Water Board will respond to complaint driven issues and oversee grant funded road assessments and improvement projects.</p>