California Regional Water Quality Control Board
Lahontan Region

Linda S. Adams
Secretary for Environmental Protection

2501 Lake Tahoe Boulevard, South Lake Tahoe, California 96150
(530) 542-5400 • Fax (530) 544-2271
www.waterboards.ca.gov/lahontan

Arnold Schwarzenegger
Governor

July 9, 2010

Interested Parties and Stakeholders

PROPOSED AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE LAHONTAN REGION: LAKE TAHOE TOTAL MAXIMUM DAILY LOAD (TMDL)

The Lahontan Regional Water Quality Control Board (Water Board) is proposing to amend the Water Quality Control Plan for the Lahontan Region (Basin Plan) by incorporating the Lake Tahoe TMDL and changing portions of the Basin Plan to be consistent with recent scientific information and the Lake Tahoe TMDL.

The Lake Tahoe TMDL describes a restoration plan to halt Lake Tahoe's transparency decline and restore transparency to meet the established standard. The draft Lake Tahoe TMDL, which is a proposed addition to the Basin Plan, and proposed changes to current Basin Plan language are described in the enclosed document: *Proposed Water Quality Control Plan Amendment – Total Maximum Daily Load for Sediment and Nutrients in Lake Tahoe*. Water Board staff have summarized the proposed changes below.

1. Lake Tahoe TMDL Summary

Water Board staff propose to add sub-section 5-18 to Basin Plan Chapter 5 - *Water Quality Standards and Control Measures for the Lake Tahoe Basin* summarizing the Lake Tahoe TMDL. The summary, described in the attached document, includes a brief overview of the TMDL research findings, a detailed synopsis of the TMDL implementation plan, and pollutant load allocation tables.

2. Pollutants of Concern

Current Basin Plan text emphasizes the role of nutrients (nitrogen and phosphorus) in Lake Tahoe's transparency decline. The proposed amendment adds reference to fine sediment particles in all discussions of water quality impairment and pollutant reduction efforts to highlight the role of this pollutant in transparency loss. Amendment language emphasizes fine sediment particles as a discreet pollutant independent of nutrients while maintaining existing references to nitrogen and phosphorus as pollutants affecting Lake Tahoe's transparency.

4. Replace the 20-year Compliance Date ending in 2007 with the TMDL Implementation Plan Timeline

The Tahoe Regional Planning Agency (TRPA) developed the Water Quality Management Plan for the Lake Tahoe Basin (208 Plan) which was amended in 1988. In numerous instances, the current Basin Plan references the 208 Plan and the associated 20-year compliance date ending in 2007 for implementing water quality control measures in the Tahoe watershed.

The proposed Basin Plan amendment will remove references to the 208 Plan compliance schedule and replace it with references to the Lake Tahoe TMDL Implementation Plan timeline.

5. Eliminate Numeric Effluent Limits for Stormwater Discharges to Infiltration Systems

The current Basin Plan includes numeric effluent limits for stormwater discharges to infiltration systems that define maximum allowable concentrations for total nitrogen, total phosphorus, total iron, turbidity, and oil and grease.

Discharges to infiltration systems with sediment, phosphorus, and nitrogen concentrations in excess of the above-referenced effluent limits have not been demonstrated to be harmful to water quality. Excess sediment may clog infiltration systems, but this condition can be addressed with maintenance. Phosphorus is generally associated with sediment and is unlikely to pass into groundwater through the soil column. Urban runoff in the Lake Tahoe basin rarely contains significant concentrations of nitrogen and soil and vegetation can be effective at nitrogen removal. The effluent limits for discharges to infiltration systems are not needed to protect surface and groundwater quality.

These limits on discharges to infiltration systems can deter urban runoff dischargers from infiltrating highly turbid runoff. Although stormwater runoff turbidity often exceeds the current 200 Nephelometric Turbidity Unit limit for discharges to infiltration systems, such systems often include pre-treatment facilities designed to collect bulk sediment to prevent the infiltration system from clogging. Infiltration system owners/operators must periodically maintain these systems by removing accumulated sediment and debris, and most large infiltration systems are owned and operated by municipal jurisdictions or state highway departments who are responsible for maintaining their facilities. With appropriate maintenance, properly maintained infiltration systems are capable of treating runoff with turbidity greater than the current effluent limits allow.

Similarly, the limits for total nitrogen, total phosphorus, and total iron only limit the use of infiltration for treating urban runoff discharges, despite the fact that infiltration is an effective treatment method for these pollutants.

Because the effluent limits for stormwater discharges to infiltration systems discourage the use of infiltration to treat turbid runoff, these limits must be eliminated to maintain an emphasis on infiltration as the best alternative for urban stormwater treatment.

In the event there isn’t sufficient separation between infiltration systems and groundwater levels, the Basin Plan ensures water quality protection by stating that when the separation between infiltration systems and groundwater is less than five (5) feet, discharges may be required to meet effluent limits for discharges to surface waters.

6. Eliminate Numeric Effluent Limits for Total Iron and Oil and Grease for Discharges to Surface Water

The proposed amendment will also eliminate the maximum allowable concentrations for total iron and oil and grease for stormwater discharges to surface water.

All waters of the Lake Tahoe Hydrologic Unit are subject to the Maximum Contaminant Level (MCL) for total iron. The current stormwater effluent limit for total iron is 0.5 milligrams per liter (mg/l). The MCL for iron in surface waters of the Lake Tahoe Hydrologic Unit is 0.3 mg/l. The iron MCL water quality objective is lower than the established effluent limit and because the Basin Plan has no provision for allowing a mixing zone, discharges to surface waters are effectively subject to the water quality objective, which is more stringent than the 0.5 mg/L total iron effluent limit. The total iron effluent limit can be removed without having a negative impact on water quality.

The presence of oil and grease in the waters of the Lake Tahoe basin is subject to the established narrative standard in Chapter 5.1 of the Basin Plan. The standard prohibits concentrations of oil or grease that result in a visible coating on the surface water, on objects in the water, or any other amount that adversely affects the water for beneficial uses. The stormwater effluent limit for oil and grease is a maximum concentration of 2.0 mg/l. Because visual sheens occur at concentrations much lower than 2.0 mg/l, the narrative water quality objective is a more protective standard than the stormwater effluent limit. The effluent limit can be eliminated without diminishing water quality.

7. Describe Stormwater Treatment Requirements

The Lake Tahoe TMDL identifies urban stormwater runoff as the largest source of fine sediment particles and phosphorus and the TMDL implementation plan emphasizes actions to reduce pollutant loading from urban runoff.

The proposed amendments maintain an emphasis on infiltrating all urban stormwater discharges to the maximum extent practicable while acknowledging the realities of physical site constraints and the need to prioritize load reduction actions to make the best use of limited public resources to control roadway runoff.

The Lake Tahoe TMDL establishes fine sediment particle, total phosphorus, and total nitrogen load reduction requirements for the City of South Lake Tahoe, El Dorado County, Placer County, and the California Department of Transportation. The Lake Tahoe TMDL provides these agencies the flexibility to individually prioritize load reduction actions and to consider a variety of design storms for planning sub-watershed or catchment scale activities and projects to collectively achieve the load reduction requirements. The proposed Basin Plan amendment describes the National Pollutant Discharge Elimination System Municipal Stormwater Permits and associated Storm Water Management Plans as the primary regulatory mechanism to ensure that required pollutant load reductions from urban stormwater discharges are achieved.

For new development, redevelopment, and parcel-scale Best Management Practice projects, the proposed amendment requires project proponents to implement every opportunity to infiltrate stormwater. Stormwater treatment facilities must be designed and constructed to infiltrate runoff generated by the 20 year, 1-hour design storm when site conditions permit. Amendment language encourages infiltration and treatment of volumes in excess of the 20 year, 1-hour storm volume. In areas where site constraints limit infiltration opportunities, the proposed amendment will require treatment of the 20 year, 1-hour design storm to meet numeric effluent limits for turbidity, total nitrogen, and total phosphorus.

8. Eliminate Reference to Alternative Deicer Studies

Basin Plan Chapter 4.8 currently includes an out-dated discussion describing alternative products for reducing ice buildup on roadways. The proposed amendment will delete this language because the studies referenced are complete and inconclusive. The Lake Tahoe TMDL implementation plan accounts for pollutants generated by the application of abrasives and associated control measures, therefore municipal jurisdictions and the California Department of Transportation have an incentive to consider alternative deicers and traction abrasive materials as part of jurisdiction-wide Storm Water Management Plan efforts to reduce pollutant loads as required by the Lake Tahoe TMDL.

9. Replace Capital Improvement Plan References with Environmental Improvement Plan

Basin Plan Chapter 5 describes the Capital Improvement Plan (CIP) that was created to implement the requirements of the 208 Plan. The CIP listed proposed projects believed necessary to improve water quality in the Lake Tahoe basin. Many of the projects have been built, and the Tahoe Regional Planning Agency has replaced the CIP project list with the program-focused Environmental Improvement Program (EIP). This amendment updates the Basin Plan to delete language and tables describing the CIP. Where appropriate, the amendment language references the EIP as the relevant program influencing restoration efforts.

If you have any questions or need additional information, please contact me by phone at 530-542-5453 or at dfsmith@waterboards.ca.gov.

Douglas F. Smith
Senior Engineering Geologist

Enclosure: Proposed Water Quality Control Plan Amendments – Total Maximum Daily Load for Sediment and Nutrients in Lake Tahoe

PROPOSED WATER QUALITY CONTROL PLAN AMENDMENTS
TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT AND NUTRIENTS IN LAKE TAHOE

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

July 2010

Table of Contents **Page**

The Basin Plan language below will be added to the Water Quality Control Plan for the Lahontan Region (Basin Plan), as indicated below. 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.

A. Lake Tahoe TMDL for Sediment and Nutrients

<u>Insert the following text into Chapter 5 as section 5.18:</u>

"Total Maximum Daily Load for Sediment and Nutrients, Lake Tahoe, El Dorado and Placer Counties

Introduction: Lake Tahoe is designated an Outstanding National Resource Water by the State Water Resources Control Board and the United States Environmental Protection Agency due to its extraordinary deep water transparency. However, the lake's deep water transparency has been impaired over the past four decades by increased fine sediment particle inputs and stimulated algal growth caused by elevated nitrogen and phosphorus loading.

The Regional Water Quality Control Board, Lahontan Region (Regional Board) and the Nevada Division of Environmental Protection (NDEP) developed the bi-state Lake Tahoe Total Maximum Daily Load (TMDL) to identify the pollutants responsible for transparency decline, quantify the major pollutant sources, assess the lake's assimilative capacity, and develop a plan to reduce pollutant loads and restore Lake Tahoe's deep water transparency to meet the established standard.

The NDEP is responsible for implementing the TMDL on the Nevada side of the Lake Tahoe basin. Because the Regional Board's authority lies with the state of California, there will be no further mention of Nevada's role in TMDL development and implementation in this chapter. Refer to the Lake Tahoe TMDL and associated documentation for additional details regarding the state of Nevada's role in the Lake Tahoe TMDL effort.

Problem Statement: Continuous long term transparency monitoring at Lake Tahoe has documented a decline of approximately 30 feet from 1968 to 2000. The transparency standard of approximately 100 feet has not been achieved since the standard was adopted in 1975. Lake Tahoe TMDL research indicates light scattering by an increase in the number of fine sediment particles in suspension and light adsorption by increased algae production has caused the transparency decline.

Lake Clarity Model results show that approximately two thirds of the transparency condition is driven by the number of inorganic fine sediment particles less than sixteen micrometers in diameter. Consequently, the Lake Tahoe TMDL effort has focused on the number of fine sediment particles as the primary pollutant causing transparency decline.

Desired Conditions: The desired condition for Lake Tahoe's deep water transparency is an annual average Secchi depth measurement of 97.4 feet (29.7 meters) which is the annual average depth recorded from 1967 to 1971.

Source Assessment: The Regional Board and NDEP conducted extensive research and numeric modeling to estimate nutrient and fine sediment particle loads to Lake Tahoe. The primary pollutant sources identified are runoff from upland areas (both urbanized and undeveloped), atmospheric deposition, and stream channel erosion. Groundwater input and shoreline erosion contribute minor amounts of pollutants. Table 5.18-1 presents the pollutant load estimates for each source category. Average annual nitrogen and phosphorus loads are expressed in mass units (metric tons) while average annual fine sediment particle loads are presented as the actual number of particles less than 16 micrometers in diameter.

Upland runoff: Tetra Tech, Inc. developed the Lake Tahoe Watershed Model to simulate runoff and pollutant loads from both the developed and undeveloped upland areas. Supported by a two-year Tahoe basin storm water monitoring study and validated with the long term Lake Tahoe Interagency Monitoring Program water quality dataset, the Lake Tahoe Watershed Model provides average annual, land-use based fine sediment, total nitrogen, and total phosphorus loading values. Model outputs have been divided between urban (or developed) and forest (or undeveloped) upland areas and results indicate that approximately 72 percent of the average annual fine sediment particle load, 38 percent of the average annual total phosphorus load, and 16 percent of the average annual total nitrogen load reaching Lake Tahoe is generated in the urban landscape. Undeveloped portions of the Lake Tahoe watershed are estimated to contribute approximately 9 percent, 26 percent, and 15 percent of the average annual fine sediment particle, total phosphorus, and total nitrogen loads, respectively. Details of the Lake Tahoe Watershed Model development and model results can be found in *Watershed Hydrologic Modeling and Sediment and Nutrient Loading Estimation for the Lake Tahoe Total Maximum Daily Load* (Tetra Tech 2007).

Atmospheric Deposition: The surface of Lake Tahoe occupies a large area relative to its watershed size. Consequently, airborne nutrient and fine sediment particle deposition directly to Lake Tahoe's surface is significant. The California Air Resources Board (CARB) performed the *Lake Tahoe Atmospheric Study* to quantify the contribution of dry atmospheric deposition (i.e. non-storm event deposition) to Lake Tahoe and the UC Davis Tahoe Environmental Research Center (TERC) collected wet (i.e. storm event) and dry deposition samples. The data from these two efforts were used to estimate lake-wide atmospheric deposition of nutrients and fine sediment particles. The findings show that atmospheric deposition is the second largest source of fine sediment particles entering the lake at 15 percent of the basin-wide total load and is the dominant source of total nitrogen, contributing approximately 55 percent of the basin-wide total nitrogen load.

Stream Channel Erosion: The first estimates of stream channel erosion came from the *Lake Tahoe Framework Study: Sediment Loadings and Channel Erosion* (Simon et al. 2003). To better quantify the contributions of fine sediment from stream channel erosion in all 63 tributary stream systems, the USDA-National Sediment Laboratory completed additional work reported in *Estimates of Fine Sediment Loading to Lake Tahoe from Channel and Watershed Sources* (Simon 2006). These research efforts found that while stream channel erosion is a significant source of bulk sediment to the lake, the contribution to the fine sediment particle load is relatively small, accounting for approximately four percent of the average annual fine sediment particle load. Stream channel erosion contributes approximately two percent of the average annual total phosphorus load and less than one percent of the average annual total nitrogen load.

Groundwater: Thodal (1997) published the first basin-wide evaluation of groundwater quality and quantity from 1990-1992. The United States Army Corps of Engineers completed the *Lake Tahoe Basin Framework Study Groundwater Evaluation* (USACE 2003) as an independent assessment of Thodal's (1997) analysis to provide the primary source of groundwater nutrient loading estimates for the TMDL based on existing monitoring data. Because sediment is effectively filtered through the soil matrix, groundwater transport of fine sediment particles to the lake is assumed to be zero.

Shoreline Erosion: Shoreline erosion is the smallest source of pollutants entering Lake Tahoe. The *Historic Shoreline Change at Lake Tahoe from 1938 to 1998: Implications for Water Clarity* (Adams and Minor 2002) report estimates the volume of material eroded by wave action from aerial photographs from 1938-1994 along with grab samples to analyze the nutrient content of the lost shorezone material. The supplementary report *Particle Size Distributions of Lake Tahoe Shorezone Sediment* (Adams 2004) assesses the particle size distribution of collected shoreline sediment samples. These studies indicate shoreline erosion contributes less than one percent of the basin-wide fine sediment particle and total nitrogen loads and approximately four percent of the basin-wide total phosphorus load.

Table 5.18-1. Pollutant Loading Estimates by Pollutant Source Category.

Source Category		Total Nitrogen (metric tons/year)	Total Phosphorus (metric tons/year)	Number of Fine Sediment Particles ($x10^{18}$)
Upland Runoff	**Urban (Developed)**	63	18	348
	Forest (Undeveloped)	62	12	41
Atmospheric Deposition	**(wet + dry)**	218	7	75
Stream Channel Erosion		2	<1	17
Groundwater		50	7	0
Shoreline Erosion		2	2	1
TOTAL		**397**	**46**	**481**

Loading Capacity: UC Davis developed the Lake Clarity Model to predict Secchi depth changes over time in response to fine sediment particle and nutrient load changes. The model includes hydrodynamic, plankton ecology, water quality, particle dynamics, and lake optical property sub-models. As mentioned in the problem statement, Lake Clarity Model results indicate current transparency measurements are primarily driven by the concentration of suspended fine sediment particles. Based on Lake Clarity Model findings, a combined load reduction from all sources, basin-wide, of 65 percent of fine sediment particles, 35 percent of phosphorus, and 10 percent of nitrogen will be needed to meet the transparency water quality standard.

TMDL and Allocations: The TMDL is the sum of wasteload allocations for point sources, load allocations for nonpoint sources, and a margin of safety. The allowable fine sediment particle and nutrient load are allocated to the major pollutant load sources: atmospheric deposition, urban (developed) upland runoff, forest (undeveloped) upland runoff, and stream channel erosion. The basin-wide load reduction needs were determined using the Lake Clarity Model and reflect the 1967-1971 average annual Secchi depth of 29.7 meters as the loading capacity, resulting in TMDL attainment over about 65 years. Load reduction expectations for the pollutant sources are based on the Pollutant Reduction Opportunity Analysis, the Integrated Water Quality Management Strategy Project Report, and the best professional judgment of the Regional Board. Tables 5.18-2, 5.18-3, and 5.18-4 show the respective allowable load allocations for fine sediment particles, total nitrogen, and total phosphorus by source category, listed as a percent reduction from the established baseline load. Each milestone represents five-year implementation phases. Standard attainment is expected following 65 years of implementation.

Table 5.18-2. Fine Sediment Particle Load Allocations by Pollutant Source Category.

	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Load (Particles/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	4.1E+19	9%	6%	9%	12%	12%	13%	14%	15%	16%	17%	18%	19%	20%	20%
Urban Upland	3.5E+20	72%	10%	21%	34%	38%	41%	45%	48%	52%	55%	59%	62%	66%	71%
Atmosphere	7.5E+19	16%	8%	15%	30%	32%	35%	37%	40%	42%	45%	47%	50%	52%	55%
Stream Channel	1.7E+19	3%	13%	26%	53%	56%	60%	63%	67%	70%	74%	77%	81%	85%	89%
Basin Wide Total	4.8E+20	100%	10%	19%	32%	35%	38%	42%	44%	47%	51%	55%	58%	61%	65%

Table 5.18-3. Total Nitrogen Load Allocations by Pollutant Source Category.

	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Nitrogen Load (MT/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	62	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Urban Upland	63	18%	8%	14%	19%	22%	25%	28%	31%	34%	37%	40%	43%	46%	50%
Atmosphere	218	63%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Stream Channel	2	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Basin Wide Total	345	100%	2%	3%	4%	5%	6%	6%	7%	7%	8%	8%	9%	9%	10%

Table 5.18-4. Total Phosphorus Load Allocations by Pollutant Source Category.

	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Phosphorus Load (MT/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	12	32%	1%	1%	1%	2%	1%	1%	2%	2%	2%	2%	2%	3%	3%
Urban Upland	18	47%	7%	14%	21%	23%	26%	28%	31%	33%	36%	38%	41%	44%	46%
Atmosphere	7	18%	9%	17%	33%	36%	39%	42%	45%	48%	51%	53%	56%	58%	61%
Stream Channel	1	3%	8%	15%	30%	32%	34%	36%	38%	40%	42%	44%	46%	48%	51%
Basin Wide Total	38	100%	5%	10%	17%	19%	22%	24%	26%	28%	30%	32%	33%	34%	35%

Margin of Safety and Future Growth Potential:

Margin of Safety: The Lake Tahoe TMDL analysis incorporates conservative assumptions as an implicit margin of safety (MOS) to account for uncertainties inherent to the TMDL development process. Conservative assumptions were included within Lake Clarity Model and Lake Tahoe Watershed Model parameters, the pollutant reduction opportunities, and TMDL implementation strategies.

Future Growth Potential: More than 80 percent of the Lake Tahoe basin is undeveloped land in public ownership. As such, the urban boundary is finite and there are limited opportunities for new development. The Tahoe Regional Planning Agency, the two counties within the Lake Tahoe watershed, and the City of South Lake Tahoe regulate development and redevelopment in the Lake Tahoe basin to ensure stormwater facilities are included in project design and implementation.

Future loads were modeled given worst case development scenarios of Tahoe's finite number of vacant private developable parcels. Results of the Lake Tahoe Watershed Model for the conservative build-out scenario indicated that the number of fine sediment particles loaded to Lake Tahoe would increase by up to two percent if all parcels are developed to the maximum extent allowable under existing regulations. Given the uncertainty involved in the Land-Use Change and Lake Tahoe Watershed models, the estimated two percent increase is considered negligible.

Implementation Plan

The Lake Tahoe TMDL Implementation Plan is a summary of programs the various funding, regulatory, and implementing agencies may take to reduce fine sediment particle, phosphorus, and nitrogen loads to Lake Tahoe to meet established load reduction milestones.

The Regional Board evaluated load reduction opportunities for all pollutant sources as part of the Pollutant Reduction Opportunity analysis (Lahontan and NDEP 2008a) and found that the most cost effective and efficient load reduction options for the forested upland, stream channel erosion, and atmospheric deposition sources are consistent with existing programs.

The analysis found the most significant and quantifiable load reduction options are within the urban uplands source. Consequently, the Lake Tahoe TMDL implementation plan emphasizes implementation actions to reduce pollutant loading from urban stormwater runoff. Due to the magnitude of both the pollutant source and related control opportunities, the Regional Board has devoted time and resources to develop detailed tools and protocols to quantify, track, and account for pollutant loads associated with urban runoff.

The available tools for estimating the benefits from load reduction actions within the stream channel erosion, atmospheric deposition, and forest upland are less advanced than the established methods to estimate urban upland control measure effectiveness.

Acknowledging the state of the science indicating that these sources contribute less pollutants overall (especially fine sediment particles) to Lake Tahoe, coupled with the high cost of developing estimation and tracking tools, the Regional Board has not developed detailed load reduction estimation, accounting, and tracking procedures for stream channel erosion, atmospheric deposition, and forest upland sources.

The following sections briefly describe the policy and programmatic implementation approaches for each of the four major pollutant source categories. The most detailed policy and programmatic changes are for managing urban stormwater.

Urban Runoff: Through stormwater NPDES permits that regulate runoff discharges from the City of South Lake Tahoe, El Dorado and Placer Counties, and the California Department of Transportation, the Regional Board will specify load allocations and track compliance with required load reduction milestones.

The Lake Tahoe TMDL expresses load allocations for the urban upland source as percent reductions from a basin-wide baseline load. The basin-wide pollutant loads for the TMDL reflect conditions as of water year 2003/2004 (i.e. October 1, 2003 – September 30, 2004). To translate basin-wide urban runoff load allocations into jurisdiction-specific load allocations for municipalities and state highway departments, the Regional Board will, in stormwater NPDES permits, require those agencies to conduct a jurisdiction-scale baseline load analysis as the first step in the implementation process. For each five year milestone, specific jurisdiction load reduction requirements will be calculated by multiplying the urban uplands basin-wide load reduction percentage by each jurisdiction's individual baseline load.

To ensure comparability between the basin-wide baseline load estimates and the jurisdiction-scale baseline load estimates for urban runoff, municipalities and the state highway department must use a set of standardized baseline condition values that are consistent with those used to estimate the 2003/2004 basin-wide pollutant loads. Specifically, baseline load estimate calculations must reflect infrastructure and typical basin-wide conditions and management practices as of October 2004.

The Lake Clarity Crediting Program, which is intended to be incorporated into the NPDES permits, provides a system of tools and methods to allow urban jurisdictions to link projects, programs, and operations and maintenance activities to estimated pollutant load reductions. In addition to providing a consistent method to track compliance with stormwater regulatory measures, the Lake Clarity Crediting Program provides specific technical guidance for calculating jurisdiction-scale baseline load estimates.

Forest Uplands: Forest uplands comprise approximately 80 percent of the land area within the Lake Tahoe basin. Fine sediment particles from this source category most often originate from discrete disturbed areas such as unpaved roads, ski runs, and recreation areas in forested uplands.

The United States Forest Service Lake Tahoe Basin Management Unit (LTBMU), California Department of Parks and Recreation, California Tahoe Conservancy (CTC), and other public land managers are responsible for maintaining existing facilities (including unpaved roads and trails), restoring disturbed lands, implementing and maintaining stormwater treatment facilities for all paved/impervious surfaces, preventing pollutant loading from fuels management work, and other activities to reduce fine sediment particle, total nitrogen, and total phosphorus loads.

The forest upland load reductions are expected to be accomplished through continued implementation of watershed management programs. The Regional Board may require forest management agencies to track and report load reduction activities to assess whether expected activities are occurring.

Stream Channel Erosion: Fine sediment from stream channel erosion represents four percent of the total final sediment loading to Lake Tahoe. Less than three percent of the annual total nitrogen and total phosphorus loading to the lake comes from stream channel erosion. The Upper Truckee River, Blackwood Creek, and Ward Creek contribute 96 percent of the basin-wide total for fine sediment from stream channel erosion. The LTBMU and CTC are implementing SEZ restoration projects on Blackwood Creek and Ward Creek. The CTC, City of South Lake Tahoe, CA State Parks, and the LTBMU have plans to restore reaches of the Upper Truckee River. Pollutant control opportunities for these waterways include site-specific stream bank stabilization and ecosystem restoration to prevent pollutant loading from stream channels.

Atmospheric Deposition: Atmospheric deposition contributes roughly half of the nitrogen and approximately 15 percent of the fine sediment particle load that reaches the lake. The TMDL implementation plan emphasizes reducing atmospheric deposition of fine sediment particles by addressing dust sources from paved and unpaved roadways and other unpaved surfaces within the urban landscape.

The majority of fine sediment particle load from the atmospheric source is generated by the urban roadways. Since the control measures for reducing roadway dust are typically the same as measures to reduce fine sediment particles in urban stormwater runoff, the required atmospheric load reductions will be met by implementing regulatory measures in stormwater NPDES permits to control stormwater pollutants from urban roadways under the urban upland source category. Similarly, actions taken to control runoff from unpaved roadways within the forested uplands will also reduce dust from these areas.

The atmospheric deposition of total nitrogen must be reduced by two percent over 65 years to achieve the transparency standard. Mobile sources (vehicle emissions) are the main source of the atmospheric nitrogen load. The Tahoe Regional Planning Agency's air quality and regional transportation plans, which contain requirements to reduce vehicle emissions and comply with health-based air quality standards, are being relied on and are expected to attain the needed two percent nitrogen reduction within 65 years.

Future Needs: Research and monitoring efforts are underway to improve scientific understanding of pollutant loading and load reduction options. Specific projects include an effort to better quantify water quality benefits associated with stream restoration, a project to estimate the impact of proposed vegetation management activities, and ongoing atmospheric deposition monitoring. These projects and others will help determine whether more specific load and load reduction estimation efforts will be needed in the future to better quantify the benefits of air quality, stream channel, and forest management programs.

Schedule of TMDL Attainment, Data Review, and Revision: The estimated timeframe to meet the numeric target and achieve the TMDL is 65 years. The estimate considers the temporal disparities between pollutant release, sediment and nutrient delivery, and the time needed for the target indicators to respond to decreased source loading. Funding constraints may affect the pace of certain implementation actions.

Progress toward meeting the targets will be evaluated by the Regional Board in periodic milestone reports. Research will guide future program adjustments, if necessary. The implementation schedule for the Lake Tahoe TMDL to make needed changes in urban stormwater policy and implementation actions is shown in the table below:

Table 5.18-5. Lake Tahoe TMDL Urban Upland Implementation/Reporting Schedule

Action	Schedule	Responsible Party
Submit Storm Water Management Plans or equivalent to Regional Board describing how 5-year load reduction requirements will be met	The first plan must be submitted no later than two years after TMDL approval*. Future plans must be submitted no less than six months prior to the expiration of the applicable municipal NPDES stormwater permit	El Dorado County Placer County California Department of Transportation City of South Lake Tahoe
Submit jurisdiction-specific 2004 baseline load estimates for fine sediment particles, phosphorus, and nitrogen to the Regional Board for review/approval**	No later than two years after TMDL approval*	
Reduce and maintain pollutant loads of fine sediment particles, total phosphorus, and total nitrogen as specified in Tables 5.18-2, 5.18-3, and 5.18-4	Achieve the percent reduction specified no later than each respective 5-year milestone following TMDL approval*	

*TMDL approval is the date the USEPA approves the Lake Tahoe TMDL.

**The baseline load estimates must be calculated using either the Pollutant Load Reduction Methodology, or an equivalent method acceptable to the Regional Board that uses a continuous hydrologic simulation process and other similar input values.

The Regional Board will annually track actions taken to reduce loads from the major pollutant sources: urban uplands, forest uplands, atmospheric deposition, and stream channel erosion. If agencies responsible for implementing programs to reduce pollutant loads from the atmospheric, forest, and stream channel erosion sources fail to take needed actions to reduce loads from those three sources in accordance with the load allocation schedule, then the Regional Board will evaluate the need for more targeted regulatory action.

Adaptive Management: With appropriate funding, the Regional Board is committed to operating a TMDL Management System throughout the implementation timeframe of the TMDL. The management system framework will enable adaptive management to occur in the context of the TMDL ensuring that important scientific findings and research results are included in management decisions relating to water quality policy in the Tahoe basin.

As part of the TMDL Management System, the Regional Board will annually assess relevant research and monitoring findings and may adjust annual load reduction targets and/or the TMDL implementation approach as needed. Following the first fifteen year implementation period of this TMDL, the Regional Board will evaluate the status and trend of the lake transparency relative to the load reductions achieved. The Regional Board may consider reopening the TMDL if additional detail is needed for the implementation plan, including five-year load reduction milestones. The Regional Board, in partnership with implementation, funding, and regulatory stakeholders, anticipates conducting this adaptive management process as needed to ensure the transparency standard will be met by year 65.

Monitoring Plan: The Regional Board expects the monitoring plan components to be fully developed by agency stakeholders within the first two years following TMDL adoption by USEPA, and full monitoring program operation is expected by the third year. Once fully developed, the monitoring program will assess progress of TMDL implementation and provide a basis for reviewing, evaluating, and revising TMDL elements and associated implementation actions. The monitoring program will cover each of the four major pollutant sources and will monitor the in-lake responses to the pollutant loading. The source monitoring will focus on the largest pollutant source, urban uplands. The in-lake monitoring has been established and operating for about 40 years and is expected to continue.

References

Adams, K.D. 2004. Shorezone erosion at Lake Tahoe: Historical aspects, processes, and stochastic modeling. Final report for the U.S. Bureau of Reclamation and the Tahoe Regional Planning Agency. Desert Research Institute, Reno, NV.

Adams, K.D., and T.B. Minor. 2002. Historic shoreline change at Lake Tahoe from1938 to 1998: implications for sediment and nutrient delivery. Journal of Costal Research, 18(4), 637-651.

Lahontan Regional Water Quality Control Board and Nevada Department of Environmental Protection. Lead authors Reuter, J.E. and David Roberts. Lake Tahoe Total Maximum Daily Load Technical Report. February 2009.

Lahontan Regional Water Quality Control Board and Nevada Department of Environmental Protection. Lake Tahoe TMDL Pollution Reduction Opportunity Report version 2. March 2008.

Lahontan Regional Water Quality Control Board and Nevada Department of Environmental Protection. Integrated Water Quality Management Strategy Project Report. March 2008.

Simon, A. 2006. Estimates of Fine-Sediment Loadings to Lake Tahoe from Channel and Watershed Sources. USDA-Agricultural Research Service, National Sedimentation Laboratory. Oxford, MS.

Simon, A., E.J. Langendoen, R.L. Bingner, R. Wells, A. Heins, N. Jokay and I. Jaramillo. 2003. Lake Tahoe Basin Framework Implementation Study: Sediment Loadings and Channel Erosion. USDA-ARS National Sedimentation Laboratory Research Report. No. 39. 377 p.

Thodal, C.E. 1997. Hydrogeology of Lake Tahoe Basin, California and Nevada, and Results of a Ground-Water Quality Monitoring network, Water Years 1990-92: U.S. Geological Survey Water-Resources Investigations Report 97-4072, 53 p.”

B. Proposed Changes to Existing Basin Plan Language

The following changes are to be made in to the sections designated in the "Location" column. Deletions are shown in strikethrough, additions underlined.

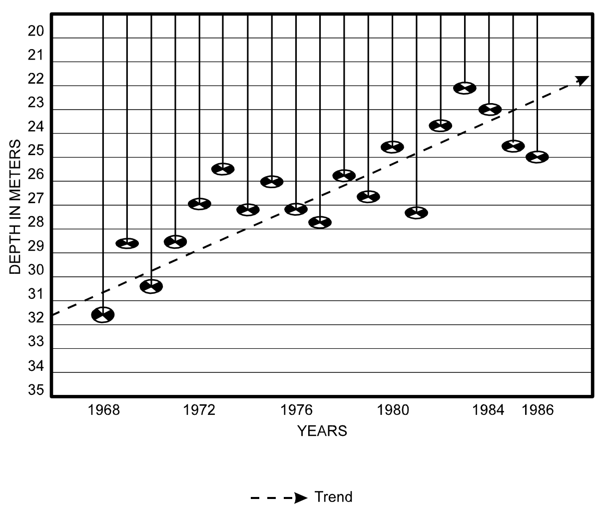
Location	Text
pg. 3-9, column 1, pgph.1	**Transparency:** For Lake Tahoe, the annual average transparency as measured by the Secchi ~~secchi~~ disk ~~transparency~~ shall not be decreased below 29.7 meters, the levels recorded in 1967-71. ~~based on a statistical comparison of seasonal and annual mean values.~~ ~~*The "1967-71 levels" are reported in the annual summary reports of the "California-Nevada-Federal Joint Water Quality Investigation of Lake Tahoe" published by the California Department of Water Resources.*~~
pg. 4-4, column 1, pgph. 3	Some of the water quality control programs for the Lahontan Region do have specific compliance deadlines, which are discussed later in this Basin Plan. ~~For example, the control measures for the Lake Tahoe Basin which are discussed in Chapter 5 are to be implemented over a 20-year period (through 2007) to ensure attainment of objectives.~~ For example, the Lake Tahoe TMDL includes 5-year load reduction requirements for the major pollutant source categories.
pg. 4.3-1, column 2, pgph. 3	Nutrients and fine sediment particles from stormwater are considered a major source of pollution to Lake Tahoe. Fine sediment particles are defined as inorganic particles less than 16 micrometers in diameter. The Lake Tahoe TMDL has identified urban stormwater runoff as the largest source of these pollutants and the TMDL implementation plan emphasizes urban runoff treatment. ~~Deicing compounds are of special concern in the Lake Tahoe/Truckee region because the death of roadside vegetation due to salt impacts can increase erosion, and thus sediment and nutrient loading, to sensitive surface waters. Few quantitative data are available on concentrations of heavy metals and other toxic pollutants in stormwater in these areas.~~
pg. 4.3-3, column 1, pgph. 4	"Areawide treatment systems" for municipal stormwater which involve combinations of infiltration, retention and detention basins, and natural and artificial wetlands, are being proposed in the Lake Tahoe Basin (see Chapter 5). ~~Their ability to meet effluent limitations has not yet been demonstrated.~~ In some states, wastewater treatment plants similar to those used for domestic wastewater have been constructed to treat stormwater.
pg. 4.3-3, column 1, pgph. 5	***Use of Wetlands for Stormwater Treatment*** Natural and artificial wetlands are employed elsewhere in the U.S. for treatment of municipal wastewater and acid mine drainage. Large scale wetland treatment systems for urban runoff are in service in ~~coastal areas of~~ California. The use of "Stream Environment Zones" for removal of fine sediment particles and nutrients from stormwater in the Lake Tahoe Basin is an important part of that area's water quality program (see Chapter 5). In general, wetlands slow the flow of stormwater, allowing time for settling out of fine sediment particles, adsorption of dissolved constituents onto soils, and uptake of nutrients by soil microorganisms and rooted vegetation (see "Wetlands Protection" in Section 4.9 of this Chapter for a more detailed discussion of wetland functions)

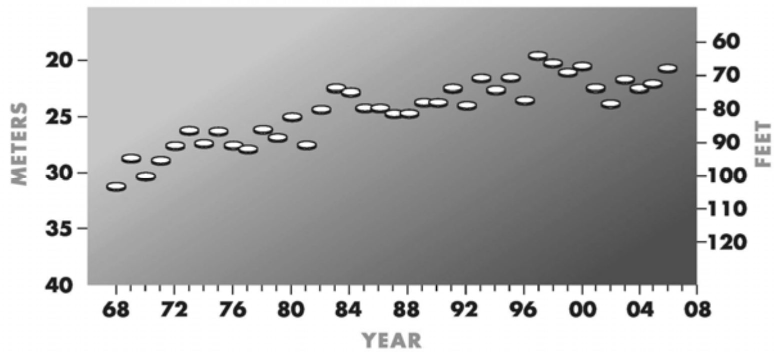
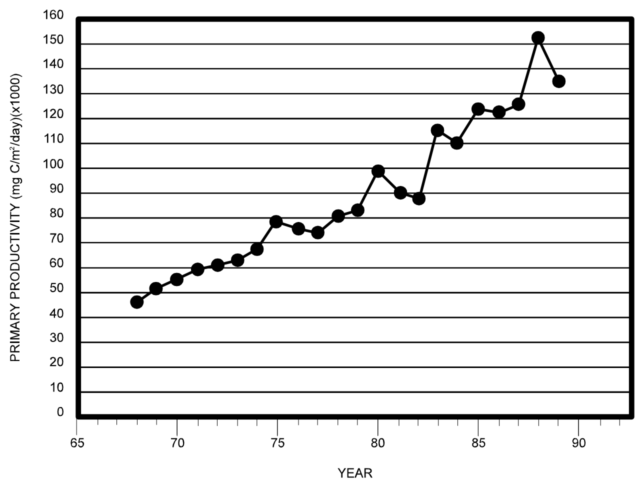
pg. 4.3-4, column 2, pgph. 1	Because of the extraordinary resource values of Lake Tahoe, and the threat to its water quality posed by stormwater discharges containing sediment and nutrients, the State Board determined in 1980 that municipal stormwater was a significant source of pollutants and directed that stormwater NPDES permits should be issued to local governments. Municipal stormwater NPDES permits have been issued to the portions of Placer and El Dorado Counties within the Lake Tahoe Basin, and to the City of South Lake Tahoe, even though their populations are less than 100,000. ~~A special set of surface runoff effluent limitations applies to stormwater discharges in the Lake Tahoe Basin (see Chapter 5).~~
pg. 4.3-7, column1, pgph. 5	~~Only one set of general stormwater effluent limitations has been adopted in the Lahontan Region: the "Tahoe Regional Runoff Guidelines" (see Chapter 5). As more information becomes available about surface runoff quality in different areas, the Regional Board should consider adopting other effluent limitations for specific areas or types of stormwater discharges.~~
pg. 4.3-11, column1, pgph.2	The Tahoe Regional Planning Agency has recognized the importance of ~~windblown sediment~~ airborne fine sediment particulates in nutrient loading to Lake Tahoe, and has called for increases in the rate of BMP retrofit, and additional controls on offroad vehicle use, to reduce wind erosion and aerial deposition from disturbed areas. The Great Basin Air Pollution Control District is leading an interagency effort to reduce wind erosion from the Owens Lake bed through means such as vegetative stabilization. The need for and feasibility of similar controls for other ephemeral lakes in the Lahontan Region (such as Honey Lake, Mono Lake, and the Alkali Lakes in Modoc County) should be investigated.
pg. 4.8-4, column 1, pgph. 2	~~At least three alternate deicers have been explored: calcium magnesium acetate, potassium acetate, and magnesium chloride with corrosion inhibitors. These products have shown some promise, but further study is required. The cost to switch to an alternate deicer will be significant. The road departments are unwilling to make the switch unless an alternate deicer is demonstrably better environmentally, will not require too much adjustment on the part of the maintenance crews and equipment, and will actually do an effective and predictable job when applied.~~
pg. 4.8-4, column 2, pgph. 3	~~In the Lake Tahoe Basin, all governmental agencies assigned to maintain roads are required to bring all roads in the Lake Tahoe Basin into compliance with current "208" standards~~. ~~within a specified time schedule. That is, all existing~~ Existing facilities must be retrofitted to treat ~~handle the~~ stormwater runoff ~~from the 20-year, 1-hour storm,~~ and to restabilize all eroding slopes in a manner consistent with the guidelines for pollutant load reduction requirements described by the Lake Tahoe TMDL. ~~The twenty-year time frame for this compliance process ends in 2008.~~

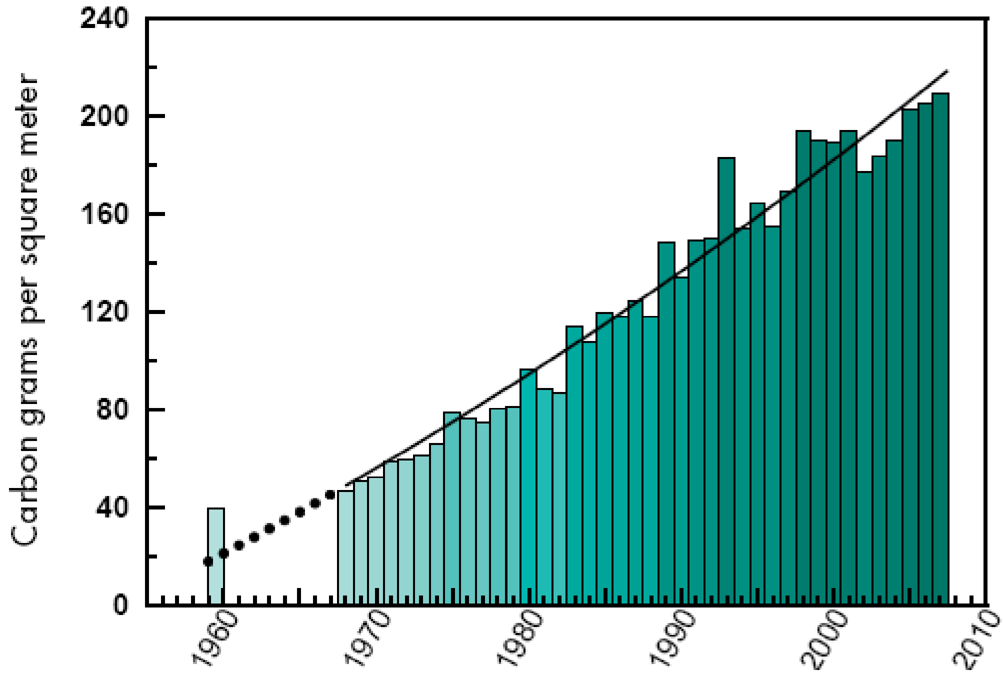
pg. 4.9-27, column 1, pgph. 1	Examples of both of these categories of restoration are found in the Lahontan Region. To prevent pollutant loading into Lake Tahoe, waste discharge prohibitions have been implemented and many millions of dollars have been spent on slope stabilization, revegetation and other remedial erosion control measures (see “Stormwater Runoff, Erosion, and Sedimentation” section in this Chapter). The clarity, nutrient levels and both phytoplankton and periphyton productivity in Lake Tahoe are carefully monitored. Transport of fine sediment particles to the lake, identified by the Lake Tahoe TMDL as a primary cause of deep water transparency decline, has been monitored since 2005 and will continue to be assessed. To prevent nutrient loading into Eagle Lake (Lassen County), waste discharge prohibitions are also implemented. The prolific growth of aquatic weeds in Twin Lakes of the Mammoth Lakes Basin often results in a weed harvest.
pg. 4.9-32, column 1, pgph. 4	Atmospheric deposition is considered a significant part of the nitrogen budget of Lake Tahoe. Precipitation chemistry in the Lake Tahoe Basin has been monitored on an ongoing basis since the early 1980s. Direct ~~wet and dry~~ deposition on the Lake have also been studied by the University of California Tahoe Environmental Research Center and the California Air Resources Board (CARB). Studies by these groups, as reported in the Lake Tahoe TMDL Technical Report, indicate that 69 percent of nitrogen deposition on Lake Tahoe originates locally, with the remaining 31 percent coming from regional sources. Combined, these sources annually contribute an estimated 218 metric tons of total nitrogen to Lake Tahoe. ~~Research Group~~. ~~The relative importance of long distance transportation of nitrogen oxides from outside of the Lake Tahoe Basin and of nitrogen oxide from vehicle and space heater emissions within the Basin has not been conclusively established.~~ Atmospheric deposition is also a key source of fine sediment particle deposition to the lake. The Lake Tahoe TMDL establishes that about 15% of Lake Tahoe’s total fine sediment particle load is from atmospheric sources. Over 70 percent of this particulate deposition is from in-basin sources. The primary in-basin source of fine sediment particles is dust from paved and unpaved roads and construction sites, and other disturbed land.
pg. 4.9-33, column1, pgph. 1	~~In order to reduce transport of airborne nutrients from upwind areas, the 208 Plan commits TRPA to work with California legislators “to encourage additional research into the generation and transport of nitrogen compounds, to require regular reports on the subject from the CARB, and to provide incentives or disincentives to control known sources of NO_x emissions upwind from the Tahoe Region. TRPA shall actively participate in the review and comment on draft air quality control plans from upwind areas to encourage additional NO_x control measures.” TRPA is also committed to further monitoring of the nature and extent of transport of airborne nutrients into the Lake Tahoe region.~~

pg. 4.11-5, column 1, pgph. 3	In the Lake Tahoe Basin, Regional Board staff may apply ~~the local~~ stormwater effluent limitations to nutrient discharges from dredged material dewatering and settling areas (see "Stormwater" section of this Chapter; see also Chapter 5). In other watersheds, effluent limitations for such operations should reflect the characteristics of the slurry, and receiving water standards. In all cases, the Regional Board may require additional site-specific analysis of the material proposed to be dredged (e.g., analysis of the proportion of colloidal material or silt to sand) and may require additional mitigation as necessary.
pg. 5-1, column 1, pgph. 1	Since the 1960s, Lake Tahoe has become impaired by declining transparency and increasing phytoplankton productivity due to increased fine sediment particles and nutrient loading attributable to human activities (Figures 5-1 and 5-2). Fine sediment particles are defined as sediment particles less than 16 microns in diameter. Further increases in algal growth could change the clear blue color of the Lake. Algal growth is fed by nitrogen and phosphorus. Phosphorus sorbed to fine sediment particles is responsible for the majority of Lake Tahoe's phosphorus load. Under federal and state antidegradation regulations and guidelines, no further degradation of Lake Tahoe can be permitted. Attainment of ~~clarity~~ deep water transparency and productivity standards requires control of nutrient and fine sediment particle loading, which in turn requires (1) export of domestic wastewater and solid waste from the Lake Tahoe watershed, (2) restrictions on new development and land disturbance, and (3) remediation of a variety of point and nonpoint source problems related to past human activities in the Tahoe Basin. This Chapter summarizes a variety of control measures for the protection and enhancement of Lake Tahoe which in many cases are more stringent than those applicable elsewhere in the Lahontan Region.
pg. 5-2, column 1, pgph. 1	Development practices which may have little impact elsewhere can cause severe erosion in the Tahoe Basin, increasing fine sediment particle, nitrogen and phosphorus ~~and nutrient~~ loads to Lake Tahoe. ~~Relatively small nutrient loadings can seriously affect Lake Tahoe's water quality.~~ The level of algal growth in the lake is limited by the availability of nutrients; the concentration of nutrients in the lake at present is extremely low. The primary source of additional ~~nutrients~~ phosphorus is erosion resulting from land development and land management practices. Lake Tahoe has historically been considered nitrogen limited. Recent bioassays indicate that phosphorus is also becoming limiting in some situations. ~~It is important to control **all** controllable sources of both nitrogen and phosphorus.~~ Development disturbs vegetation and soils, and creates impervious surface coverage which interferes with natural nutrient and fine sediment particle removal mechanisms. Other sources of nutrients include fertilizers, sewer exfiltration and sewage spills, and leachate from abandoned septic systems, and atmospheric deposition. Fine sediment particles are independently responsible for approximately two thirds of the lake's deep water transparency loss. The mechanism for trasparency loss from fine sediment particles is the scattering of light in the water column. This contrasts with transparency loss due to light absorption caused by enhanced phytoplankton productivity.
pg. 5-2, column 1,	Phytoplankton productivity in Lake Tahoe increased more than ~~200~~ 420 percent, and deep water transparency ~~clarity~~ decreased by ~~22~~ 31 percent, between 1968 and ~~1991~~ 2007. (Water quality standards for clarity and phytoplankton productivity are based on

pgph. 2	1968-1971 levels.) Increased growth of attached algae in nearshore waters ~~has been~~ may be linked to the level of onshore development. As of 2008, research goals have been developed to identify and characterize land use and nonpoint sources in terms of specific pollutant transport processes, loading rates, and associated impacts. While several studies have been funded to evaluate nearshore conditions, it is unclear if appropriate indicators, standards and monitoring plans to assess nearshore condition will result from these studies. The implementation efforts of the Lake Tahoe TMDL are anticipated to improve the nearshore environment by decreasing pollutant loads entering the lake. Appropriate standards and indicators for the nearshore condition should be developed along with specific management actions
pg. 5-2, column 2, pgph. 1	~~Although recent changes in the water quality of Lake Tahoe are drastic, they do not reflect the *full* impact of the increases in erosion rates caused by recent development. There is a long lag time between disturbances in the Basin and the complete expression of their impacts on Lake Tahoe. Increased nutrient loading rates exert their full effect through a gradual buildup of nutrient concentrations over many years. Thus, preventing future increases in erosion rates will not be enough to protect the water quality of Lake Tahoe. A major reduction in the quantities of nutrients reaching Lake Tahoe is required.~~
pg. 5-2, column 2, pgph. 3	The water quality control program for the Lake Tahoe Basin treats erosion and surface runoff (stormwater) as different facets of the same problem. Reducing nutrient and fine sediment particle loads will require both remedial measures to correct existing erosion/runoff problems and strict controls on future development. The principal control measures are: • Large-scale remedial erosion and drainage control ~~(Capital Improvement Program)~~ and SEZ restoration projects.
pg. 5-4, column 1, pgph. 1	All landowners are expected to implement BMPs. ~~over the 20-year lifetime of the 208 Plan.~~
pg. 5-5, column 1, pgph. 4	Lake Tahoe is listed as a “Water Quality Limited Segment” under Section 303(d) of the federal Clean Water Act. ~~When better information becomes available on sediment and nutrient budgets for Lake Tahoe, and on the efficiency of Best Management Practices, the Regional Board will use this information, and estimates of expected water quality improvements due to the control measures outlined in this Chapter, to establish Total Maximum Daily Loads (TMDLs) of pollutants to Lake Tahoe.~~ Section 303(d) requires Total Maximum Daily Loads (TMDLs) to be set for Water Quality Limited Segments in order to ensure the attainment of surface water quality standards. The Lake Tahoe TMDL (Chapter 5.18) addresses Lake Tahoe’s deep water transparency by identifying the causes of transparency decline and estimating the magnitude of the major pollutant sources. The Lake Tahoe TMDL also describes representative pollutant control measures and provides a timeline for accomplishing needed pollutant load reductions. A TMDL must be adopted as a Basin Plan amendment, and must be approved by the USEPA. (See Chapter 4 for additional information on TMDLs).

pg. 5-5, column 2, pgph. 2	The water quality control programs for the Lake Tahoe Basin ~~which~~ are outlined below (including major remedial erosion/stormwater control and SEZ restoration programs) ~~are expected to be implemented over a 20-year period ending in 2007~~. Implementation ~~will~~ involves coordinated actions by state, federal, regional, and local agencies, and by private landowners. ~~TRPA projects attainment of all water quality standards for Lake Tahoe and its tributaries by that date~~.
pg. 5-6, column 2, pgph. 1	The ~~control measures~~ load reduction requirements set forth in this Chapter have been determined to be the **minimum** needed to prevent further degradation of Lake Tahoe due to sediment and nutrient loading, and to ensure eventual attainment of clarity and productivity standards. Additional controls on fine sediment particles and nutrient loading may need to be developed in the future to offset the impacts of unforeseen factors such as ~~the mortality of forest trees due to drought-related stresses in the late 1980s and early 1990s~~ wildfire and climate change.
pg. 5-7, figure 5-1 **Delete**	**Figure 5-1** **ANNUAL AVERAGE SECCHI DISK DEPTH**  At the Index Station, Lake Tahoe

Pg. 5-7, figure 5-1 **Insert**	**Figure 5-1** Annual Average Secchi Disk Depth At the Index Station, Lake Tahoe (UC Davis, 2008) 
pg. 5-8, figure 5-2, **Delete**	**Figure 5-2** **PRIMARY PRODUCTIVITY** **At the Index Station, Lake Tahoe**  At the Index Station, Lake Tahoe
Pg. 5-8, figure 5-1 **Insert**	**Figure 5-2** **PRIMARY PRODUCTIVITY** At the Index Station, Lake Tahoe (UC Davis, 2008)

	
pg. 5-11, Table 5-1	Programs implemented jointly by ~~Regional Board,~~ TRPA, USFS, local governments, other parties. Similar programs implemented in Nevada by TRPA, USFS, and local governments ~~and Nevada Division of Environmental Protection~~. Regional Board and TRPA programs have different jurisdictional boundaries in California. ~~20 year implementation schedule for 208 Plan, ending in 2007. Other compliance schedules for specific types of activities.~~
pg. 5-11, Table 5-1, Stormwater Controls	~~State stormwater effluent limitations for direct discharges to surface water and stormwater infiltrated into soils; similar TRPA thresholds.~~ State stormwater NPDES permits and waste discharge requirements issued by Regional Board. Stormwater controls required in TRPA permits. Areawide stormwater treatment systems to be implemented by local governments in some areas.
pg. 5.1-9, column 2, pgph. 6	**Transparency** For Lake Tahoe, the annual average ~~secchi~~ Secchi disk transparency shall not be decreased below 29.7 meters, the levels recorded in 1967-71. ~~based on a statistical comparison of seasonal and annual mean values.~~ ~~*The "1967-71 levels" are reported in the annual summary reports of the "California-Nevada-Federal Joint Water Quality Investigation of Lake Tahoe" published by the California Department of Water Resources.*~~
pg. 5.3-2, column 2, pgph. 2	~~The BMP Handbook also contains the regional stormwater runoff effluent limitations (Table 5.6-1) and specifies the 20-year, 1-hour design storm for stormwater control facilities (see the section of this Chapter on stormwater problems).~~

pg. 5.6-1, column 1, pgph. 1	Surface runoff from urban areas is the principal controllable source of pollutants affecting Lake Tahoe, contributing fine sediment particles and nutrients to the lake. Development of the watershed has greatly accelerated natural erosion rates, increased stormwater runoff intensity, and increased fine sediment particle and nutrient loading in stormwater. Disturbance of soils and vegetation, particularly in Stream Environment Zones, has reduced the natural treatment capacity for nutrients and sediment in stormwater.
pg. 5.6-1, column 1, pgph. 3	The 208 Plan (Vol. I, page 91) states that management practices to control elevated levels of runoff from existing development should be geared toward treatment of runoff waters through the use of natural and artificial wetlands as close to the source of the problem as possible. Management practices should also infiltrate runoff to negate the effects of increased impervious coverage and drainage density. Management practices should ensure that snow disposal does not harm water quality, and that snow removal from unpaved areas does not expose soils to runoff and further disturbance, contributing to sediment and nutrient loading to receiving waters. This section focuses on ~~effluent limitations,~~ stormwater permits and areawide stormwater treatment systems.
pg. 5.6-1, column 1, pgph. 4 to pg. 5.6-2 column 1, pgph. 2	~~***Effluent Limitations*** In 1980, the State Board adopted an earlier version of the stormwater effluent limitations set forth in Table 5.6-1. The Regional Board uses these effluent limitations in discharge permits for stormwater. Effluent limitations for additional pollutants, especially for toxic substances, may be necessary to ensure compliance with receiving water standards. The “design storm” for stormwater control facilities in the Lake Tahoe Basin is the 20-year, 1-hour storm; however, containment of a storm of this size does not necessarily ensure compliance with effluent limitations, or receiving water quality standards. The 208 Plan incorporates the State Board's 1980 effluent limitations, and TRPA has adopted them as regional “environmental threshold carrying capacity standards” for ground water, with the addition of the following provision:~~ ~~*“Where* there *is a direct and immediate hydraulic connection between ground and surface waters, discharges to groundwater shall meet the guidelines for surface discharges.”*~~ ~~TRPA has also adopted the following environmental threshold standard related to surface runoff:~~ ~~Numerical standard~~ ~~Achieve a 90 percentile concentration value for dissolved inorganic nitrogen of 0.5 mg/l, for dissolved phosphorus of 0.1 mg/l, and for dissolved iron of 0.5 mg/l in surface runoff directly discharged to a surface water body in the Basin.~~ ~~Achieve a 90 percentile concentration value for suspended sediment of 250 mg/l.~~ ~~Management standard~~ ~~Reduce total annual nutrient and suspended sediment loads as necessary to achieve loading thresholds for tributaries and littoral and pelagic Lake Tahoe.~~ ~~(The latter standard refers to other TRPA environmental threshold standards which involve reductions in nutrient loading from all sources.)~~ ~~Table 5.6-1 includes revisions of the 1980 limitations. The Lahontan Regional Board~~

	~~applies the numbers in Table 5.6-1 on a site- or project-specific basis in response to identified erosion or runoff problems. Monitoring through 1988 showed that urban runoff exceeds the limitations for discharge to surface waters in more than 90 percent of the samples taken (208 Vol. 1 page 262).~~ ~~The effluent limitations at the top of Table 5.6-1 apply to stormwater discharges to surface waters, and generally to surface runoff leaving a specific project site. If surface runoff enters a project site from upgradient, its quality and volume may together with the quality and volume of runoff generated onsite, affect the quality of runoff leaving the site. Regional Board stormwater permits for sites where offsite stormwater enters the property will take these effects into consideration. In general, where the quality of runoff entering the site is worse than that of runoff generated on site, there should be no statistically significant increase (at a 90 percent confidence level) in pollutants in the water discharged from the site. If the quality of runoff entering the site is equal to or better than the quality of runoff generated on the site, stormwater exiting the site should be of the quality which would be expected if there were no onsite runoff (i.e., onsite stormwater should not degrade clean runoff flowing through the site).~~ ~~The effluent limitations at the bottom of Table 5.6-1 apply to stormwater discharges to infiltration systems. Infiltration systems include, but are not limited to, trenches, dry wells, ponds, vaults, porous pavement and paving stones. Infiltration effectively filters out sediments and results in reductions in heavy metals, oil and grease, and nutrients bound to particulate matter. Dissolved nutrient concentrations can be reduced by incorporating vegetation and an organic soil layer into the infiltration system (e.g., grass-lined swales, vegetated ponds, etc.) Since runoff is treated by infiltration through vegetation and soil layers, the effluent limits are greater for discharges to infiltration systems. Locating infiltration systems in areas of high ground water may result in ground water contamination and reduced percolation rates. Therefore, discharges to infiltration systems located in areas where the separation between the highest anticipated ground water level and the bottom of the infiltration system is less than five (5) feet may be required to meet the effluent limits for stormwater discharges to surface waters.~~
pg. 5.6-1, **Replacing** Effluent Limitation Section – add new Sections	**Stormwater Management and the Lake Tahoe TMDL** The goal of the Lake Tahoe TMDL is to protect the lake and achieve the deep water transparency standard. To this end, the TMDL identifies the maximum annual average amounts of fine sediment particles, nitrogen, and phosphorus that the lake can assimilate and meet the deep water transparency standard. The amount of fine sediment particles is quantified by particle number, while nitrogen and phosphorus are quantified by mass. The largest source of fine sediment particles is the urban source, which contribute an estimated 72 percent of the fine sediment particle load to Lake Tahoe. Consequently, the Lake Tahoe TMDL implementation strategy emphasizes actions to reduce fine sediment particle loads from urban stormwater runoff. Municipal stormwater permits issued to the City of South Lake Tahoe, the Counties of El Dorado and Placer, and to the California Department of Transportation will include enforceable load reduction requirements linked to TMDL allocation milestones. In accordance with NPDES permitting requirements, each jurisdiction will be required to develop, implement, and maintain a Storm Water Management Plan (SWMP) to guide

	municipality plans to achieve required pollutant load reductions for each five year permit term. **Sustainable Development Practices** State Water Resources Control Board Resolution No. 2008-0030 highlights the importance of implementing stormwater management techniques that maintain or restore the natural hydrologic functions of a site by detaining water onsite, filtering pollutants, and infiltrating runoff from impervious surfaces. Such measures have been, and continue to be, the foundation of stormwater management policy in the Lake Tahoe basin. Infiltration is the most effective method for controlling urban stormwater runoff volumes and reducing associated pollutant loads. Infiltrating stormwater through soil effectively removes fine sediment particles and reduces nutrient concentrations. Additionally, infiltration reduces the volume of stormwater thereby reducing its erosive effects. Consequently, infiltration remains the preferred method for urban stormwater treatment. **Stormwater Treatment Requirements** All new development projects, existing development retrofit projects, and roadway runoff treatment projects shall first evaluate and implement all opportunities to infiltrate stormwater discharges from impervious surfaces to the maximum extent practicable. Pollutant concentrations and runoff volumes from non-roadway parcels differ greatly from commingled stormwater from roads and parcels. Municipal jurisdictions and state highway departments are responsible for roadway runoff, while runoff from non-roadway areas is the primary responsibility of local municipalities. Private property owners share the responsibility for private property runoff with the local municipalities. Municipal jurisdictions and state highway departments must meet load reduction requirements specified by the Lake Tahoe TMDL (Tables 5.18-2 – 5.18-4). These agencies must consider a variety of different design storms, alternative treatment options, and roadway operations practices, and local ordinances to maximize average annual pollutant load reductions to meet waste load allocations. NPDES stormwater permits require Lake Tahoe basin municipalities and the California Department of Transportation to develop and implement comprehensive Storm Water Management Plans (SWMPs) describing how proposed operations and maintenance activities, capital improvements, facilities retrofit projects, and ordinance enforcement will meet required pollutant load reduction requirements. SWMPs provide responsible jurisdictions the opportunity to prioritize pollutant load reduction efforts and target sub-watersheds that generate the highest annual average pollutant loads. The Water Board developed the Lake Clarity Crediting Program to establish protocols for tracking and accounting for load reductions. The Lake Clarity Crediting Program links actions to improve urban stormwater quality to expected fine sediment particle and nutrient loads and provides the flexibility for the discharger to maximize pollutant load reduction opportunities. For new development and re-development projects and individual parcel Best Management Practice efforts, project proponents shall first consider every opportunity to

<table>
<tr>
<td></td>
<td>
designed and constructed to infiltrate runoff generated by the 20 year, 1-hour storm which equates to approximately one inch of runoff. Where conditions permit, project proponents should consider designing infiltration facilities to accommodate runoff volumes in excess of the 20 year, 1-hour storm to provide additional stormwater treatment.
Runoff from parking lots, retail and commercial fueling stations, and other similar land uses may contain oil, grease, and other hydrocarbon pollutants. Project proponents designing treatment facilities for these areas must include pre-treatment devices to remove hydrocarbon pollutants prior to infiltration or discharge and contingency plans to prevent spills from polluting groundwater.
Infiltrating runoff volumes generated by the 20 year, 1-hour storm may not be possible in some locations due to shallow depth to seasonal groundwater levels, unfavorable soil conditions, or other site constraints such as existing infrastructure or rock outcroppings.
In the event that site conditions do not provide opportunities to infiltrate the runoff volume generated by a 20 year, 1-hour storm, projects must meet the numeric effluent limits in Table 5.6-1. These limits shall apply to urban runoff discharges to surface waters for runoff volumes generated by a 20-year, 1-hour storm. These limits only apply to stormwater discharges that cannot be infiltrated and are not tributary to stormwater management facilities that are part of a municipality’s plan to meet average annual fine sediment and nutrient load reduction requirements.
TABLE 5.6-1 Stormwater Discharge Effluent Limits
<table>
<tr><th>Constituent</th><th>Maximum Concentration</th></tr>
<tr><td>Total Nitrogen as N</td><td>0.5 mg/L</td></tr>
<tr><td>Total Phosphate as P</td><td>0.1 mg/L</td></tr>
<tr><td>Turbidity</td><td>20 NTU</td></tr>
</table>
</td>
</tr>
<tr>
<td>pg. 5.6-4, column 1, Table 5.6-1</td>
<td>~~TABLE 5.6-1, Stormwater Effluent Limitations~~</td>
</tr>
<tr>
<td>pg. 5.7-13, column 1, pgph. 1</td>
<td>Ground water contributes an estimated 15 percent of the annual nutrient loading to Lake Tahoe, but is assumed to contribute no fine sediment particles to the lake. ~~Although data are limited, research to date indicates that ground water nutrient loading represents a substantial contribution to Lake Tahoe.~~ Loeb (1987) found ground water concentrations of nitrate in three watersheds to be lowest (by a factor of two to ten) in areas farthest upgradient from Lake Tahoe and to increase downgradient toward the lake. This corresponds to the degree of land disturbance. The TMDL relies on findings of the Army Corps of Engineers (ACOE) Groundwater Evaluation report (2003). The study divided the Tahoe basin watershed into five ground water basins, and also analyzed the average nutrient concentrations of land use types based on ground water monitoring wells (Table 5.7-5). Findings by the ACOE study supports previously asserted hypotheses that urbanization ~~Urbanization~~ can significantly increase nitrate concentration in ground water</td>
</tr>
</table>

<table>
<tr><td></td><td>through fertilizer addition, ~~irrigation,~~ sewer line exfiltration, ~~sewage spills,~~ infiltration of urban runoff, and leachate from abandoned septic systems. Future development will increase nutrient transport in ground water by removing vegetation which normally recycles nutrients in the watershed. Although ground water disposal of stormwater is generally preferable to surface discharge because it provides for prolonged contact with soils and vegetation which remove nutrients, infiltration of urban stormwater in areas with high groundwater tables may be undesirable because of possible contamination of drinking water supplies from toxic runoff constituents.</td></tr>
<tr><td>INSERT PAGE 5.7-21, new, Table 5.7-5</td><td>TABLE 5.7-5

Average nutrient concentrations of groundwater wells based on land-use types (USACE 2003)

<table>
<tr><th>Land-use</th><th>Nitrogen Ammonia + Organic Dissolved (mg/L)</th><th>Nitrogen Nitrite plus Nitrate Dissolved (mg/L)</th><th>Total Dissolved Nitrogen (mg/L)</th><th>Dissolved Orthophosphorus (mg/L)</th><th>Total Dissolved Phosphorus (mg/L)</th></tr>
<tr><td>Residential</td><td>0.26</td><td>0.37</td><td>0.63</td><td>0.081</td><td>0.11</td></tr>
<tr><td>Commercial</td><td>0.16</td><td>0.51</td><td>0.67</td><td>0.092</td><td>0.12</td></tr>
<tr><td>Recreational</td><td>0.40</td><td>1.2</td><td>1.6</td><td>0.073</td><td>0.10</td></tr>
<tr><td>Ambient</td><td>0.16</td><td>0.11</td><td>0.27</td><td>0.040</td><td>0.049</td></tr>
</table></td></tr>
<tr><td>pg. 5.10-1, column 2, pgph. 3</td><td>Current levels of consumptive water use in the Lake Tahoe Basin are unknown. (Most water use is currently not metered.) New residential construction has occurred since 1982, but conservation efforts (e.g., landscape watering restrictions and requirements for ultra-low flow toilets) have increased due to drought conditions. ~~TRPA predicts that there will be a 27% increase in population of the Lake Tahoe Basin between 1987 and 2007, but has not estimated ultimate buildout.~~ As of 2008 there are fewer than 5000 private, undeveloped, potentially buildable parcels throughout all jurisdictions in the Lake Tahoe Basin. At the highest rate of residential building allowed by TRPA, 294 building allocations per year, these parcels could be built in 16 years. ~~Assuming that the Individual Parcel Evaluation System will permit development of some land capability Class 1, 2, and 3 lots which were not considered buildable under the 1980 Lake Tahoe Basin Water Quality Plan, it is possible that water use at buildout could exceed the Interstate Water Compact limits. The 208 Plan (Vol. I, page 307) states that the "range of ultimate demand for water supply on the California side would be approximately 21,600 to 24,200 afa."~~</td></tr>
</table>

pg. 5.12-1, column 1, pgph. 1	The ~~208 Plan (TRPA 1988, Vol. I, page 88)~~ Lake Tahoe TMDL concluded ~~that limited information indicates~~ that all roads, regardless of jurisdiction, ~~components of the highway transportation system~~ have ~~serious~~ impacts on water quality. Roads ~~also~~ increase impervious surface, decrease infiltration, intensify ~~magnifying~~ surface runoff and often direct~~ing~~ it toward surface waters.
pg. 5.12-2, column 2, pgph. 3	Effective street ~~Street~~ and parking lot sweeping are among the most important maintenance control measures for onsite problems. The revised BMP for street sweeping discusses the efficiency of different types of sweepers and requires sweeping at least once a year. Street sweeping with high efficiency ($PM_{2.5}$) sweepers removes many fine sediment particles that could be potentially entrained in urban runoff and reduces the amount of material that can become airborne. Fine sediment particles are the largest single contributor to impairment of lake clarity, and controlling these pollutants at the source can improve the effectiveness of downstream treatment facilities. The reduction in dissolved nutrients from sweeping will be minor, but the reduction in particulate bound nutrients from street sweeping will be comparable to the reduction in suspended sediments. Street and parking lot sweeping also helps prevent clogging of infiltration facilities.
pg. 5.12-3, column 2, pgph. 3	~~All governmental agencies responsible for road maintenance are required to bring all roads in the Lake Tahoe Basin into compliance with 208 Plan standards within the 20-year implementation schedule of that plan (by 2007). That is, all existing facilities must be retrofitted to handle the stormwater runoff from the 20-year, 1-hour storm, and to restabilize all eroding slopes.~~
pg. 5.12-4, column 1, pgph. 1	~~Specific CIP projects are proposed in Volume IV of the revised 208 Plan. California CIP projects are summarized in Tables 5.12-1 through 5.12-4. The systems proposed are source controls, which incorporate the methods presented in the Handbook of Best Management Practices (208 Plan, Vol. II). Detailed facilities planning will be required to determine exactly what systems will be put on the ground. Completion of these projects is essential if the load of sediment and nutrients causing deterioration of Lake Tahoe is to be reduced. The cost of completing all erosion and urban runoff control projects will be approximately $300 million in 1988 dollars, requiring development of a phased program for completion. The total cost of projects to be implemented in California is estimated at $204.7 million (1988 dollars), including $18 million for Caltrans projects, $58.9 million for City of South Lake Tahoe projects, $49.8 million for El Dorado County projects, and $78 million for Placer County projects. The CIP incorporates the watershed restoration priorities of the USFS, Lake Tahoe Basin Management Unit, by reference.~~
pg. 5.12-4, column 1, INSERT New pgph	Building on the capital improvement program (CIP) established with the original Regional Plan, the TRPA developed the Environmental Improvement Program (EIP) in conjunction with the 1997 Lake Tahoe Presidential Forum. Much of the Basin Plan has been established to ensure that environmental impacts relating to future growth patterns are negated. However, there remains a considerable amount of environmental degradation that is a result of historic development and land use patterns. The EIP is aimed at addressing environmental degradation, attainment of the TRPA Thresholds and compliance with the Tahoe Regional Planning Compact. The EIP is a cooperative effort to preserve, restore and enhance the unique natural and human environment of the Lake Tahoe Region. The EIP defines restoration needs for attaining environmental goals, and

	Environmental Thresholds will be attained. The EIP also includes a global climate change component consistent with TRPA Regional Plan policies that address strategies for reducing greenhouse gases.
pg. 5.12-5, Table 5.12-1	~~Table 5.12-1~~
pg. 5.12-6, Table 5.12-2	~~Table 5.12-2~~
pg. 5.12-7 and 5.12-8, Table 5.12-3	~~Table 5.12-3~~
pg. 5.12-9, Table 5.12-4	~~Table 5.12-4~~
5.16-3, column 1, pgph. 1	~~As noted in Chapter 4 of this Basin Plan, wet~~ Wet and dry atmospheric deposition of nutrients, fine sediment particles, and acids onto surface waters is an issue of concern throughout the Sierra Nevada. ~~Atmospheric deposition is considered a significant part of the nitrogen budget of Lake Tahoe.~~ Atmospheric nutrients and fine sediment particles are important considerations for Lake Tahoe because of the lake's large surface area in relation to the size of its watershed, and the long residence time of lake waters (about 700 years). ~~Precipitation chemistry in the Lake Tahoe Basin has been monitored on an ongoing basis since the early 1980s. Direct wet and dry deposition on the Lake have also been studied by the University of California Tahoe Research Group~~. The Lake Tahoe TMDL concluded that atmospheric deposition contributes an estimated 55 percent of total average annual nitrogen to the lake. Atmospheric deposition also contributes an estimated 15 percent of the average annual fine sediment particle load and about 15 percent of the average annual total phosphorus load. ~~. The relative importance of long distance transportation of nitrogen oxides from outside of the Lake Tahoe Basin and of nitrogen oxides from vehicle and space heater emissions within the Basin has not been conclusively established. Atmospheric nutrients are important considerations for Lake Tahoe because of the lake's large surface area in relation to the size of its watershed, and the long residence time of lake waters (about 700 years).~~ Precipitation chemistry in the Lake Tahoe Basin has been monitored on an ongoing basis since the early 1980s. Direct deposition on the lake has also been studied by the University of California Tahoe Environmental Research Center and by the California Air Resources Board's (CARB) Lake Tahoe Atmospheric Deposition Study (LTADS). Studies by these groups, as reported in the Lake Tahoe TMDL Technical Report, indicate that about 69 percent of nitrogen deposition on Lake Tahoe originates locally, with the remaining 31 percent coming from regional sources. Combined, these sources

	form of NO_x and NH_3 (ammonia). Similarly, an estimated 71 percent of the annual total phosphorus deposition of around 6 metric tons is from local sources. Road dust is the primary contributor. Atmospheric deposition is also a key source of fine sediment particle deposition to the lake. The Lake Tahoe TMDL Technical Report establishes that about 15% of Lake Tahoe's total fine sediment particle load is from atmospheric sources. Over 70 percent of this particulate deposition is from in-basin sources. The primary in-basin sources of fine sediment particles are road dust and wood smoke.
pg. 5.17-1, column 1, pgph. 1	Monitoring of Lake Tahoe, its tributary surface and ground waters, and pollutant sources such as atmospheric deposition and stormwater is a very important part of the implementation program. Long-term monitoring of an "Index Station" in Lake Tahoe by the University of California at Davis Tahoe Environmental Research Center ~~Research Group~~ has documented the ~~trends in clarity~~ transparency and productivity shown in Figures 5-1 and 5-2. Further long-term monitoring is essential to document progress toward attainment of the water quality standards for these parameters, which are based on 1968-71 figures.
pg. 5.17-1, column 1, pgph. 2	Monitoring and special studies have been carried out in the Tahoe Basin by a variety of agencies (including the U.S. Forest Service's Lake Tahoe Basin Management Unit, the California Department of Water Resources, the University of Nevada at Reno, and the U.S. Geological Survey)~~, but long-term records are available only for Lake Tahoe and a few tributary streams~~. In response to the recommendations of the 1980 *Lake Tahoe Basin Water Quality Plan,* special studies were carried out on sewer exfiltration into ground water, nearshore phytoplankton and periphyton productivity in Lake Tahoe, and atmospheric deposition. The *Water Quality Management Plan for the Lake Tahoe Region* ("208 Plan," Volume I) contains a summary of the results of water quality monitoring and special studies through 1988. The State Board organized the Lake Tahoe Interagency Monitoring Program (LTIMP) in 1979; annual reports of this program have been published by the University of California at Davis Tahoe Environmental Research Center. The U.S. Forest Service's Lake Tahoe Basin Management Unit monitors a variety of land use activities on National Forest lands. ~~The Tahoe Research Group is using data from the Interagency Monitoring Program to construct a model of the nutrient budget of Lake Tahoe.~~ Monitoring data from the LTIMP program was used to develop and calibrate the Watershed Model and Lake Clarity Model for the Lake Tahoe TMDL. The Lake Clarity Model bundles five models: a particle fate model, an optical model, an ecological model, a thermodynamic model, and a hydrodynamic model. These two models, coupled with targeted pollutant source analysis studies, provided the framework for the Lake Tahoe TMDL.
pg. 5.17-1, column 2, pgph. 2	The Lake Tahoe TMDL effort addressed research needs identified by the 208 Plan. These needs included details of Lake Tahoe's nutrient budget and the nutrient inputs and outputs of the watershed and the airshed. Ongoing research needs include, but are not limited to, better understanding of the effectiveness of SEZ restoration projects and stormwater treatment techniques, improved quantification of atmospheric deposition

	processes and control measures, and work to clarify the link between development, pollutant sources, and their effect on nearshore clarity. ~~The 208 Plan identifies future research needs including details of Lake Tahoe's nutrient budget, the nutrient inputs and outputs of the watershed and the airshed, and the effectiveness of BMPs and other control measures. Specifically, research needs have been identified in the following areas: (1) development of a database on the treatment of runoff in natural and artificial wetlands and SEZs, (2) the quantity and quality of urban runoff and the contributions of urban runoff to Lake Tahoe's nutrient budget, (3) effectiveness of erosion and runoff control projects, (4) transport of airborne nutrients, particularly nitrogen, from upwind areas into the Tahoe Region, (5) effects of fertilizer use on water quality and effectiveness of fertilizer management programs, and (6) effectiveness of Stream Environment Zone restoration projects and techniques.~~
pg. 5.17-1, column 2, pgph. 3	~~Regional Board staff have been carrying out a stormwater monitoring program for remedial erosion control projects which were implemented with State Assistance Program (SAP) funding. Results will be used to evaluate the success of the projects. Several other studies of the effectiveness of BMPs for erosion/stormwater control in the Lake Tahoe Basin were in progress in 1993. Additional needs for monitoring and research in the Lake Tahoe Basin identified by Regional Board staff include: (1) further study of the role of ground water in nutrient loading to Lake Tahoe, (2) baseline biological monitoring in all types of water bodies, (3) monitoring of priority pollutants in surface runoff, and sediment sampling in marinas for priority pollutants and tributyltin, and (4) follow-up on the shoreline erosion study which began in the 1980s.~~