Presented below are water quality standards that are in effect for Clean Water Act purposes.

EPA is posting these standards as a convenience to users and has made a reasonable effort to assure their accuracy. Additionally, EPA has made a reasonable effort to identify parts of the standards that are not approved, disapproved, or are otherwise not in effect for Clean Water Act purposes.

Water Quality Control Plan for the Lahontan Region

Effective November 17, 2020

The attached Water Quality Standards are in effect for CWA purposes with the exception of the following approved revisions that are not included in this document. The revisions will appear in the Lahontan Regional Water Quality Control Board's next updated water quality control plan.

Table of Approved Standards

Basin Plan Table 2-1	Summary
Designated Uses	Updates to Table 2-1. Beneficial Uses of Surface Waters of Lahontan Region Please see the below tables:

Please note that Figure 2-1 in the attached was replaced with Figures 2-1.1 and 2-1.2, which will appear in the regional board's next updated water quality control plan.

Designated Uses Removed			
Waterbody	**HU No.**	**Uses Removed**	**40 C.F.R. 131.10(g) factor**
Upper Mojave Hydrologic Area: Mojave River (See Figure 2-1.1) [1]	628.20	COLD	1, 2, 5
Middle Mojave River Hydrologic Area: Mojave River (See Figure 2-1.1)[2]	628.30	COLD	1, 2, 5
Lower Mojave Hydrologic Area: Mojave River (See Figure 2-1.1 and 2-1.2)	628.50	COLD	1, 2, 5
Caves Hydrologic Subarea: Mojave River (See Figure 2-1.1)	628.71	COLD	1, 2, 5
Soda Lake Hydrologic Subarea: Mojave River (See Figure 2-1.1)	628.82	COLD	1, 2, 5

[1] The map labeled Figure 2-1.1 indicates that the COLD use is removed for the portion of the Mojave River in the Upper Mojave Hydrologic Area from one mile downstream of the Route 66 Bridge to Helendale. Figure 2-1.1 also indicates that the current COLD use from Bear Valley Road to one mile downstream of the Route 66 Bridge retains the COLD use. Table 2-1 contains an administrative error as the box for COLD use is checked for the entire portion of the Upper Mojave River from Bear Valley Road to Helendale. This is inconsistent with Figure 2-1.1, however it is clear from the Basin Plan staff report that the intent of the Basin Plan Amendment is to remove the COLD use as indicated in Figure 2-1.1. EPA is approving the COLD use removal for the portion of the Upper Mojave River starting from one mile downstream of the Route 66 Bridge to Helendale.

[2] The map labeled Figure 2-1.1 indicates that the COLD use is removed for the Mojave River in the Middle Mojave Hydrologic Area. Table 2-1 contains an administrative error as the box for COLD use is checked for the Mojave River in the Middle Mojave Hydrologic Area. This is inconsistent with Figure 2-1.1, however it is clear from the Basin Plan staff report that the intent of the Basin Plan Amendment is to remove the COLD use as indicated in Figure 2-1.1. EPA is approving the COLD use removal for the Mojave River in the Middle Mojave Hydrologic Area.

Uses Added to Waterbodies			
Waterbody	**HU No.**	**New Uses**	**Current Uses Added (Editorial)** [3]
Upper Mojave Hydrologic Area: Mojave River (Bear Valley Road to Helendale)	628.20	BIOL, RARE	MUN, AGR, GWR, REC-1, REC-2, COMM, WARM, COLD[4]
Upper Mojave Hydrologic Area: West Fork Mojave River	628.20	BIOL, RARE	
Upper Mojave Hydrologic Area: Deep Creek	628.20	BIOL, RARE	
Lower Mojave Hydrologic Area: Mojave River, Camp Cady Wildlife Area	628.50	BIOL, RARE	MUN, AGR, GWR, REC-1, REC-2, COMM, WARM, WILD
Caves Hydrologic Subarea: Mojave River, Afton Canyon	628.71	BIOL, RARE	MUN, AGR, GWR, REC-1, REC-2, WARM, WILD
Soda Lake Hydrologic Subarea: Mojave River, Afton Canyon	628.82	BIOL, RARE	MUN, AGR, REC-1, REC-2, WARM

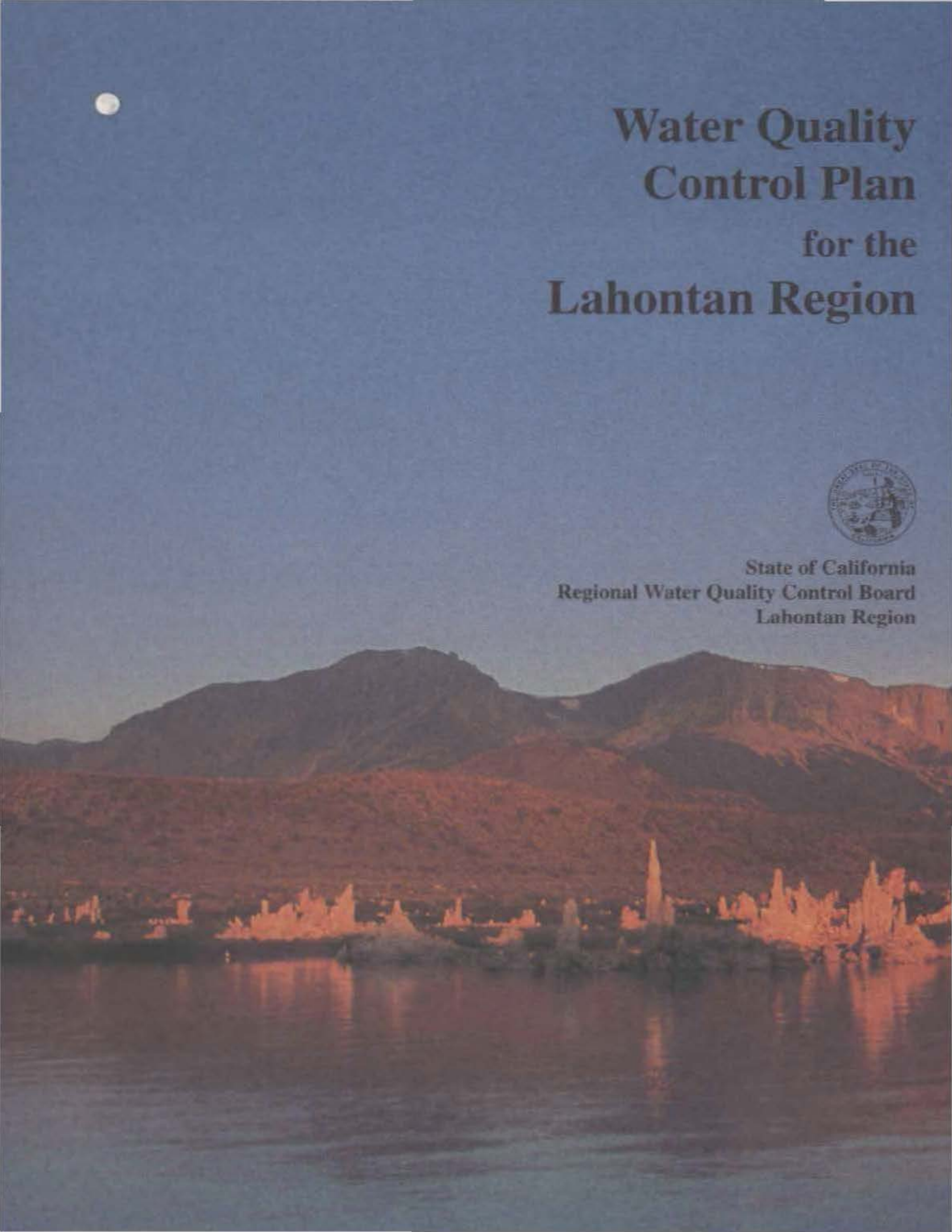
Basin Plan Chapter 3	**Summary**
Water Quality Objectives	Revision of footnote language in Table 3-20. The revised footnote resolves ambiguity regarding the application of site-specific water quality objectives for Total Dissolved Solids (TDS) and Nitrate as Nitrate (NO_3 as NO_3) to the Mojave River (at Lower Narrows). Additionally, Figure 3-13, which is the map that accompanies Table 3-20, is replaced with a revised version that corrects the location of Site No. 4.

[3] The Regional Board added specific segments of the Mojave River to Table 2-1 in order to show where the new BIOL and RARE beneficial uses apply. In addition to the new BIOL and RARE beneficial uses, the Regional Board has also added the current beneficial uses that apply to each segment. The beneficial uses in this column are not new uses, but are carried over from the existing Basin Plan.

[4] Table 2-1 contains an administrative error as the box for COLD use is checked for the entire portion of the Upper Mojave River from Bear Valley Road to Helendale. This is inconsistent with Figure 2-1.1, however it is clear from the Basin Plan staff report that the intent of the Basin Plan Amendment is to remove the COLD use from the segment starting from one mile downstream of the Route 66 Bridge to Helendale. COLD remains as a beneficial use for the segment of the Mojave River starting from Bear Valley Road to one mile downstream of the Route 66 Bridge.

Water Quality Control Plan for the Lahontan Region

State of California
Regional Water Quality Control Board
Lahontan Region



WATER QUALITY CONTROL PLAN FOR THE LAHONTAN REGION

NORTH AND SOUTH BASINS

Plan effective March 31, 1995, amendments effective August 1995 through September 10, 2015.

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
Lahontan Region

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PREFACE

This *Water Quality Control Plan for the Lahontan Region* (Basin Plan) incorporates language from and replaces three earlier plans: the Lahontan Regional Board's 1975 North and South Lahontan Basin Plans, as amended through 1991, and the State Water Resources Control Board's 1980 *Lake Tahoe Basin Water Quality Plan*, as amended through 1989. The earlier plans were combined into a single plan which was adopted by the Lahontan Regional Board in November 1994 and which took effect upon approval by the California Office of Administrative Law in March 1995. The current Basin Plan also incorporates important provisions of the Tahoe Regional Planning Agency's *Water Quality Management Plan for the Lake Tahoe Region*. This Basin Plan was prepared almost entirely by Regional Board staff, using an interdisciplinary approach (see List of Preparers, Appendix A).

The plan is in looseleaf format to facilitate future revisions. Amendments to date are listed on the "Record of Amendments" page near the front of the plan. Copies of this plan and of future amendments will be distributed to county libraries throughout the Lahontan Region, to the State Library, and to university libraries or water resources archives. The plan is available in electronic form through the Lahontan Regional Board's Internet homepage at http://www.waterboards.ca.gov/lahontan and future draft amendments will also be made available on the Internet. The plan can also be purchased in computer disk format. The Basin Plan and related documents may be examined at the Regional Board's offices during normal business hours.

Public participation is an important part of the Basin Plan update process. Responses to public comments are part of the administrative record. The Regional Board maintains and periodically updates mailing lists of persons, agencies, and organizations interested in receiving notices of public hearings and workshops for future Basin Plan amendments.

To be added to the Basin Plan mailing list, or for information on purchasing a paper or disk copy of the plan, contact either office of the Lahontan Regional Board.

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Record of Amendments to the 1995 Water Quality Control Plan for the Lahontan Region

	Subject	Date Adopted by Regional Board	Regional Board Resolution No.	Date in Effect*
1.	Amendments revising boundaries of and language related to Cady Springs septic system prohibition area in Lassen County, and making miscellaneous editorial changes.	4/21/95	6-95-54	8/14/95
2.	Amendments including miscellaneous editorial changes, delegation of authority regarding Lake Tahoe and Truckee River watershed prohibition exemptions, revision of regionwide industrial waste discharge prohibition, and changes to beneficial uses of waters of Searles HA	7/12/00	6-00-66	5/3/02
3.	Amendments removing the Municipal and Domestic Supply (MUN) beneficial use designation from nine surface water bodies	7/12/00	6-00-67	4/29/02
4.	Amendments adding introductory language for a new Section 4.13, and incorporating a sediment TMDL and implementation program for Heavenly Valley Creek	1/11/01	6-01-03	9/30/02
5.	Amendments incorporating a phosphorus TMDL and implementation program for Indian Creek Reservoir	7/24/02	R6T-2002-0047	7/1/03
6.	Amendments to Section 4.1 revising waste discharge prohibition criteria for the Mojave River Hydrologic Unit	9/10/03	R6V-2003-0049	3/24/04
7.	Amendments removing the Municipal and Domestic Supply (MUN) beneficial use designation from surface waters of Owens Lake	7/14/05	R6S-2005-0021	12/21/05

*Basin Plan amendments approved by the Regional Board do not take effect until approved by the State Water Resources Control Board and the California Office of Administrative Law. If an amendment involves adopting or revising a standard which relates to surface waters, it must also be approved by the U.S. Environmental Protection Agency (USEPA) [40 CFR Section 131.21].

cover photo: Mono Lake by Richard R. Knepp

	Subject	Date Adopted by Regional Board	Regional Board Resolution No.	Date in Effect*
8.	Amendments to Chapters 4 and 5 clarifying waste discharge prohibitions	4/12/06	R6T-2006-0015	5/18/07
9.	Amendments incorporating a sediment TMDL and implementation plan for Squaw Creek	4/13/06	R6T-2006-0017	7/27/07
10.	Amendments to Chapter 3 replacing water quality objectives for Percent Sodium in the Carson and Walker River watersheds with new objectives for Sodium Adsorption Ratio	10/12/06	R6T-2006-0047	2008
11.	Amendments revising standards for surface waters downstream of Los Angeles County Sanitation District No. 14 (Lancaster) wastewater discharge to Amargosa Creek in the Antelope Hydrologic Unit	11/29/07	R6T-2007-0036	9/4/09 by Office of Administrative Law (USEPA approval not required)
12.	Amendments incorporating a sediment TMDL and implementation plan for the Middle Truckee River watershed	5/14/08	R6T-2008-0019	9/16/09
13.	Amendments incorporating a sediment and nutrients TMDL and implementation plan for Lake Tahoe	11/16/10	R6T-2010-0058	8/16/11
14.	Amendment to replace the regionwide pesticide water quality objective with a regionwide waste discharge prohibition on pesticides with exemption criteria for aquatic pesticide applications	12/7/2011	R6T-2011-0102	9/6/2012 By Office of Administrative Law 9/10/2015 By USEPA

*Basin Plan amendments approved by the Regional Board do not take effect until approved by the State Water Resources Control Board and the California Office of Administrative Law. If an amendment involves adopting or revising a standard which relates to surface waters, it must also be approved by the U.S. Environmental Protection Agency (USEPA) [40 CFR Section 131.21].

	Subject	Date Adopted by Regional Board	Regional Board Resolution No.	Date in Effect*
13.	Amendments to clarify the antidegradation policy, adding mixing zones provisions, revising certain waste discharge prohibitions, and amending Chapter 5 – Water Quality Control Measures for the Lake Tahoe Basin	4/9/2014	R6T-2014-0027	10/1/2014 By Office of Administrative Law 9/10/2015 By USEPA

*Basin Plan amendments approved by the Regional Board do not take effect until approved by the State Water Resources Control Board and the California Office of Administrative Law. If an amendment involves adopting or revising a standard which relates to surface waters, it must also be approved by the U.S. Environmental Protection Agency (USEPA) [40 CFR Section 131.21].

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Chapter 1
INTRODUCTION

The primary responsibility for the protection of water quality in California rests with the State Water Resources Control Board (State Board) and nine Regional Water Quality Control Boards. The State Board sets statewide policy for the implementation of state and federal laws and regulations. The Regional Boards adopt and implement Water Quality Control Plans (Basin Plans), which recognize regional differences in natural water quality, actual and potential beneficial uses, and water quality problems associated with human activities.

The jurisdiction of the California Regional Water Quality Control Board, Lahontan Region (Regional Board) extends from the Oregon border to the northern Mojave Desert and includes all of California east of the Sierra Nevada crest (Plates 1A, 1B, 2A and 2B). The name of the Region is derived from prehistoric Lake Lahontan, which once covered much of the State of Nevada. Most of the waters of the North Lahontan Basin drain into closed basins which were previously part of Lake Lahontan. Waters of the South Lahontan Basin also drain into closed basin remnants of prehistoric lakes.

The Lahontan Regional Board is a nine-member decision making body appointed by the Governor. The Board holds regular meetings, typically monthly at different sites throughout the Region. Its day-to-day work is carried out by a technical and administrative support civil service staff under an Executive Officer appointed by the Board. There are two Regional Board offices, at South Lake Tahoe and Victorville.

Function of the Basin Plan

This Basin Plan for the Lahontan Region is more than an abstract set of goals and policies; it is the basis for the Regional Board's regulatory program. It sets forth water quality standards for the surface and ground waters of the Region, which include both designated beneficial uses of water and the narrative and numerical objectives which must be maintained or attained to protect those uses. It identifies general types of water quality problems, which can threaten beneficial uses in the Region. It then identifies required or recommended control measures for these problems. In some cases, it prohibits certain types of discharges in particular areas. This Plan summarizes applicable provisions of separate State Board and Regional Board planning and policy documents (e.g., the Regional Board waiver policy), and of water quality management plans adopted by other federal, state, and regional agencies. This Plan also summarizes past and present water quality monitoring programs, and identifies monitoring activities, which should be carried out to provide the basis for future Basin Plan updates and for waste discharge requirements or conditional waivers.

This Basin Plan will be used as a resource by the Regional Board's technical staff. It must also serve as an educational document for both staff and dischargers. Regional Board orders cite the Basin Plan's applicable water quality standards and prohibitions. This Basin Plan will also be used by other agencies in their permitting and resource management activities. Finally, this Plan will serve as a reference document for members of the public, particularly those who are interested in specific water bodies or water quality issues.

Because of the size and diversity of the Lahontan Region, the Basin Plan cannot be encyclopedic. Instead of attempting to cover all available information about water quality and related issues in the Lahontan Region, it directs the reader to more detailed sources of information.

Legal Basis and Authority

This Basin Plan implements a number of state and federal laws, the most important of which are the federal Clean Water Act (P.L. 92-500, as amended), and the State Porter-Cologne Water Quality Control Act (California Water Code § 13000 et seq.). Other pertinent federal laws include the Safe Drinking Water Act, Toxic Substances Control Act, Resource Conservation and Recovery Act, and Endangered Species Act, and the Comprehensive Response, Compensation, and Liability Act (CERCLA or “Superfund”) and Superfund Amendment and Reauthorization Act (SARA). Other applicable California laws include the Health and Safety, Fish and Game, and Food and Agriculture Codes. These and other relevant laws are discussed in greater detail in the following chapters.

The federal Clean Water Act sets forth national goals that waters shall be “fishable and swimmable.” It directs the states to establish water quality standards and to review and update them on a triennial basis (§ 303[c]). Other provisions of the Clean Water Act related to basin planning include Section 208, which authorizes the preparation of areawide wastewater management plans, and Section 319 (added by 1987 amendments) which provides for more specific planning related to control of nonpoint source problems. The 1987 amendments to the Act also mandated adoption by the states of numerical standards for 126 “priority pollutant” toxic chemicals.

The State Board and Regional Boards implement the Clean Water Act in California under the delegation and oversight of the U.S. Environmental Protection Agency (USEPA), Region IX. Direction for implementation of the Clean Water Act is provided by the Code of Federal Regulations (40 CFR) and by a variety of USEPA guidance documents on specific subjects.

The Porter-Cologne Act established the State Board and the nine Regional Boards in their current form. It authorizes the State Board to formulate, adopt, and revise state water policy, which may include water quality objectives, principles, and guidelines (CA Water Code § 13140-13143). The Porter-Cologne Act also authorizes the State Board to adopt water quality control plans on its own initiative (§ 13170). Such plans supersede regional Basin Plans to the extent of any conflict.

Article 3 of the Porter-Cologne Act directs Regional Boards to adopt, review, and revise Basin Plans, and provides specific guidance on factors which must be considered in adoption of water quality objectives and implementation measures.

In adopting objectives (CA Water Code § 13241), Regional Boards must consider:

“(a) Past, present, and probable future beneficial uses of water.

(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of the water available thereto.

(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

(d) Economic considerations.

(e) The need for developing housing within the region.

(f) The need to develop and use recycled water.”

Programs of implementation for achieving water quality objectives (CA Water Code § 13242) are to include, but not be limited to:

“(a) A description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private.

(b) A time schedule for the actions to be taken.

(c) A description of surveillance to be undertaken to determine compliance with objectives.”

The Porter-Cologne Act allows Regional Boards, in Basin Plans or in waste discharge requirements, to “specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted” (CA Water Code § 13243). Where proposed prohibitions affect discharges from individual waste disposal systems, the Regional Board must meet conditions specified in Sections 13280-13284 before adopting them.

In addition to the direction provided by state and federal laws, guidance for basin planning is also contained in certain court decisions. For example, the 1983 Mono Lake Decision (National Audubon Society *v.* Superior Court 33 Cal. 3d 419, 441) reaffirmed the public trust doctrine, holding that the public trust is “an affirmation of the duty of the state to protect the people's common heritage in streams, lakes, marshlands and tidelands, surrendering that right of protection only in rare cases when the abandonment of that right is consistent with the purposes of the trust.” Public trust uses include commerce, navigation, fisheries, and recreation. The Racanelli Decision (United States *v.* State Water Resources Control Board [1986] 182 Cal. App. 3d. 82, 227 Cal. Rptr. 1621-8) directed the State Board, and by implication, Regional Boards, to take a “global view” of water resources in developing water quality objectives.

This decision recognized that an implementing program may be a lengthy and complex process which requires significant time intervals and action by entities over which the State Board may have little or no control. Both of these cases concerned water quality and quantity issues. Additional discussion of such issues is contained in Chapter 4 of this Plan.

USEPA regulations (40 CFR § 131.10) require states to consider downstream water quality standards when setting their own. Many of the waters of the Lahontan Region are interstate waters. Therefore, standards set by other states, or by Indian Tribes. which are considered as states under Section 519 of the Clean Water Act, must be considered during the basin planning process.

Regional Setting

The following is a brief overview of the environmental and socio-economic setting of the Lahontan Region.

The Lahontan Region is defined in terms of drainage basins by Section 13200(h) of the Porter-Cologne Act. For planning purposes, it has historically been divided into North and South Lahontan Basins at the boundary between the Mono Lake and East Walker River watersheds, as shown in Figures 1-1 and 1-2. It is about 570 miles long and has a total area of 39,210 square miles.

The Lahontan Region includes the highest (Mount Whitney) and lowest (Death Valley) points in the contiguous United States, and the topography of the remainder of the Region is diverse. The Region includes the eastern slopes of the Warner Mountains and the Sierra Nevada, the northern slopes of the San Bernardino and San Gabriel Mountains; the southern slopes of the Tehachapi Mountains, and all or part of other ranges including the White, Providence, and Granite Mountains and the western slopes of the New York and Ivanpah Mountains. Topographic depressions include the Madeline Plains, Surprise, Honey Lake, Bridgeport, Owens, Antelope, and Victor Valleys.

The geology and soils of the Lahontan Region have been shaped by a variety of processes, and are correspondingly diverse. Parent materials in the northern mountains are granitic or volcanic; evidence of glacial action is widespread. Soils in the desert valleys of the Region are derived from alluvium. Severe seismic activity has occurred in the past; the Owens Valley earthquake of 1872 formed a 20-foot fault scarp, and earthquakes in the Mammoth area have recently damaged sewer lines. Volcanic activity has occurred fairly recently in the Mono Lake area, and the presence of geothermal springs throughout the Lahontan Region indicates that it could occur in the future. Economically valuable minerals, including gold, silver, copper, sulfur, tungsten, borax, and rare earth metals, have been or are being mined at various locations within the Lahontan Region.

The Lahontan Region also has a variety of climates. The Region is generally in a rain shadow; however, precipitation amounts can be high (up to 70 inches) at higher elevations. Most precipitation in the mountainous areas falls as snow. Desert areas receive relatively little annual precipitation (less than 2 inches in some locations) but this can be concentrated and lead to flash flooding. Recorded temperature extremes in the Lahontan Region range from -45 degrees Fahrenheit at Boca in the Truckee River watershed to 134 degrees Fahrenheit in Death Valley.

The varied topography, soils, and microclimates of the Lahontan Region support a corresponding variety of plant and animal communities. Vegetation ranges from sagebrush and creosote bush scrub in the desert areas to pinyon-juniper and mixed conifer forest at higher elevations. Subalpine and alpine “cushion plant” communities occur on the highest peaks. Wetland and riparian plant communities, including marshes, meadows, “sphagnum” bogs, riparian deciduous forest, and desert washes, are particularly important for wildlife, given the general scarcity of water in the Region.

The existence of “ecological islands,” as a result of topography, glaciation, and climatic changes, has led to the evolution of species, subspecies, and genetic strains of plants and animals in the Lahontan Region which are found nowhere else. Particularly notable are fish such as the Eagle Lake trout, Lahontan and Paiute cutthroat trout, Mojave chub, and several kinds of desert pupfish. (Chapter 4 includes a more detailed discussion of the implications of the Basin Plan for rare, threatened, and endangered species.)

The Lahontan Region is rich in cultural resources (archaeological and historic sites). These range from remnants of Native American irrigation systems to Comstock mining era ghost towns such as Bodie and 1920s resort homes at Lake Tahoe and Scotty's Castle at Death Valley.

Much of the Lahontan Region is in public ownership, with land use controlled by agencies such as the U.S. Forest Service, National Park Service, and Bureau of Land Management, various branches of the military, the California State Department of Parks and Recreation, and the City of Los Angeles Department of Water and Power. While the permanent resident population of the Region (about 800,000 in 1995) is low in relation to that of more urbanized Regions, most of it is concentrated in high density communities in the South Lahontan Basin. In addition, millions of visitors use the Lahontan Region for recreation each year. Rapid population growth has occurred recently and is expected to continue in the Victor and Antelope Valleys and within commuting distance of Reno, Nevada. Principal communities of the North Lahontan Basin include Susanville, Truckee, Tahoe City, South

Lake Tahoe, Markleeville, and Bridgeport. The South Lahontan Basin includes the communities of Mammoth Lakes, Bishop, Ridgecrest, Mojave, Adelanto, Palmdale, Lancaster, Victorville, and Barstow.

Recreational and scenic attractions of the Lahontan Region include Eagle Lake, Lake Tahoe, Mono Lake, Mammoth Lakes, Death Valley, and portions of many wilderness areas. Segments of the East Fork Carson and West Walker Rivers are included in the State Wild and Scenic River system. Both developed (e.g.,camping, skiing, day use) and undeveloped (e.g., hiking, fishing) recreation are important components of the Region's economy.

In addition to tourism, other major sectors of the economy are resource extraction (mining, energy production, and silviculture), agriculture (mostly livestock grazing), and defense-related activities. There is relatively little manufacturing industry in the Region in comparison to major urban areas of the state.

Water Resources and Water Use

The Lahontan Region includes over 700 lakes, 3,170 miles of streams and 19,710 square miles of ground water basins. There are twelve major watersheds (called “hydrologic units” under the Department of Water Resources' mapping system) in the North Lahontan Basin. Among these are the Eagle Lake, Susan River/Honey Lake, Truckee, Carson, and Walker River watersheds. The South Lahontan Basin includes three major surface water systems (the Mono Lake, Owens River, and Mojave River watersheds) and a number of separate closed ground water basins. Very little quantitative information is available on most of the water bodies in the Region.

The natural quality of most high elevation waters, which are derived from snowmelt, is assumed to be very good or excellent, although localized problems related to heavy metals and radioactive elements occur. The soils and waters of the Sierra Nevada have low buffering capacity for acids, and its lakes and streams are considered sensitive to acidification as a result of wet and dry deposition of pollutants from urban areas. Although high quality water supplies are available near streams in desert areas of the Lahontan Region, many desert waters have naturally poor quality (e.g., high concentrations of salts, and minerals such as arsenic and selenium). Threats to beneficial uses from naturally high concentrations of salts, toxic minerals, or radioactive substances can be aggravated by geothermal and agricultural discharges, ground water overdraft which concentrates salts, and disposal of stormwater under conditions where it is unlikely to receive adequate treatment by soils and vegetation.

Water quality problems in the Lahontan Region are largely related to nonpoint sources (including erosion from construction, timber harvesting, and livestock grazing), stormwater, acid drainage from inactive mines, and individual wastewater disposal systems. (The concentration of most of the Region's population in a few high density communities has important implications for areas with no community wastewater treatment facilities.) There are relatively few point source discharges; these include several wastewater treatment plants, fish hatcheries operated by the Department of Fish and Game, and some geothermal discharges. Some types of discharges may be considered either point source or nonpoint source depending upon site-specific circumstances. For example, stormwater which enters one lake through a pipe may be regulated as a point source, while stormwater which enters another lake via sheet flow is considered a nonpoint source discharge. Chapter 4 of this Plan explains both point source and nonpoint source problems in greater detail and outlines recommended control measures for specific problem categories. Additional information on existing water quality and water quality problems associated with particular areas is provided in the regional Water Quality Assessment, discussed in Chapter 7.

Consumptive municipal and agricultural use of water is relatively low in most parts of the Lahontan Region compared to other parts of California, due to the low resident population and the agricultural emphasis on range livestock grazing rather than crops. Irrigation is mostly for pasture, rather than for row crops and orchards. Large volumes of water are exported for consumptive use outside the Lahontan Region. The waters of the Truckee, Carson and Walker Rivers, and of Lake Tahoe, are allocated by court decisions, federal law, and interstate agreements among water users in California and Nevada. The City of Los Angeles Department of Water and Power diverts water from the Mono and Owens River Basins via the Los Angeles Aqueduct for use in the Los Angeles area. Some water is imported to the South Lahontan Basin via the State Water Project's California Aqueduct.

Careful consideration of the relationships between water quality and water quantity will be needed in future Regional Board planning activities. Reasons for concern include projected increases in population and consequent demands for water, and possible future water shortages due to drought, global climate change, and contamination of some water supplies by toxic substances. There is also increasing scientific and public awareness of environmental values associated with natural water volumes in streams, lakes, wetlands and ground water aquifers.

History of Basin Planning in the Lahontan Region

The nine Regional Boards were established as "Regional Water Pollution Control Boards" by the Dickey Act of 1949. The Lahontan Regional Board adopted separate water quality control policies for a number of interstate waters of the North Lahontan Basin (e.g., the Truckee, Carson, and Walker River watersheds) in the late 1960s and early 1970s, pursuant to the 1965 Federal Water Pollution Control Act and to amendments to the Dickey Act. These policies included water quality objectives.

The names of the Regional Boards were changed, and their authority broadened, by the Porter-Cologne Water Quality Control Act in 1969. The development of comprehensive Basin Plans was initiated in response to both federal and state directives. "Interim" Basin Plans were adopted by the Regional Board for the North and South Lahontan Basins in 1971. These plans were amended in 1972 and 1973. Work on revisions of these plans continued and culminated in state adoption of the North and South Lahontan Basin Plans in 1975. The 1975 Basin Plans received final approval by the USEPA. In comparison to previous policies, these plans included water quality standards for more water bodies, and more detailed and stringent control measures.

The 1975 Basin Plans included summaries of earlier beneficial use designations and water quality objectives in chapters entitled "Historical Beneficial Uses" and "Historical Water Quality Objectives." Objectives rendered obsolete by Basin Plan amendments after 1975 were also incorporated into "historical" chapters. In order to simplify the current plan, these chapters have been deleted. Copies of "historical" data may be obtained by contacting either Regional Board office.

Amendments to the North and South Lahontan Basin Plans adopted between 1975 and 1991 have been incorporated into this Basin Plan, with editorial revisions where appropriate. Amendments have included significant changes in beneficial use designations, water quality objectives, and control measures.

Progress has been made toward the control of a number of water quality problems identified in the 1975 Basin Plans, including nonpoint source problems at Lake Tahoe and Mammoth Lakes, acid mine drainage from the Leviathan Mine, and problems associated with septic systems in a number of specific areas. At the same time, new issues and areas of concern have arisen. Better analytical technology makes it possible to detect contaminants at increasingly smaller concentrations, and modern medicine identifies increasingly lower concentrations of toxic substances as health risks. Statewide concern regarding toxic pollutants exists in relation to underground tanks, leaking landfills, and toxic pits. Other "new" areas of concern include acid deposition, biotechnology products such as bacteria being marketed to aid snowmaking at ski areas, and impacts of road salt runoff on vegetation. New treatment technology, such as the use of artificial wetlands for treatment of stormwater, and bioremediation for cleanup of toxic substances, must be evaluated. A continuing planning process based on the latest scientific information is needed to address both "old" and "new" issues.

Basin Plan Amendment Procedures

The federal Clean Water Act (§ 303[c]) directs the states to hold public hearings for the review of water quality standards at least once every three years. The Porter-Cologne Act (CA Water Code § 13240) directs that Basin Plans shall be periodically reviewed to evaluate necessary revisions. The Lahontan Regional Board conducts the "Triennial Review process" by requesting public comments on needs for changes in the Basin Plan, and by combining issues identified by the public with staff-identified needs for changes in the Basin Plan, to formulate and adopt priority lists for future Basin Plan amendments. The Regional Board may also initiate Basin Plan amendments apart from the Triennial Review process, in response to needs which arise on a short-term basis.

Basin Plan amendments generally involve consultation with affected agencies and other interested parties, update of existing mailing lists, preparation and distribution of an amendment "package" (including the proposed amendment language, an environmental document, and a staff report outlining the rationale for the amendments), and a public review period of at least 45 days. Public workshops may be held to inform the Regional Board and the public about planning issues before formal action is scheduled on the amendments. Regional Board action follows at least one duly noticed public hearing. Regional Board staff prepare responses to all public comments as part of the record. Legislation in 1997 added a requirement for scientific peer review of amendments involving scientific justification. Peer review occurs before draft amendments are released for public review.

Since 1980, the planning programs of the State Board and the Regional Boards have been considered “exempt regulatory programs” pursuant to Section 21080.5 of the California Environmental Quality Act (CEQA). This means that these agencies have been formally authorized by the Secretary for Resources to prepare short “functional equivalent” environmental documents in place of lengthy Environmental Impact Reports for plan amendments.

The 1975 Basin Plans included chapters entitled “Plan Assessment.” “Functional equivalent documents” for Basin Plan amendments since 1980 were formally incorporated into these chapters upon adoption of the amendments. At the direction of the State Board, this revised Basin Plan does not include an environmental assessment chapter. Instead, the separate functional equivalent document for the entire plan revision will be included in the record of the planning process. Copies of earlier environmental documents may be obtained by contacting Regional Board staff.

Following their adoption by the Regional Board, Basin Plan amendments and supporting documents are submitted to the State Board for review and approval. The State Board may approve the amendments or remand them to the Regional Board with directions for change. All Basin Plan changes approved by the State Board after June 1, 1992 must be reviewed and approved by the Office of Administrative Law (OAL). For purposes of state law, all amendments take effect upon approval by the OAL. However, the USEPA reviews amendments involving changes in adopted state standards for conformance with federal requirements.

Figure 1-1
NORTH LAHONTAN BASIN

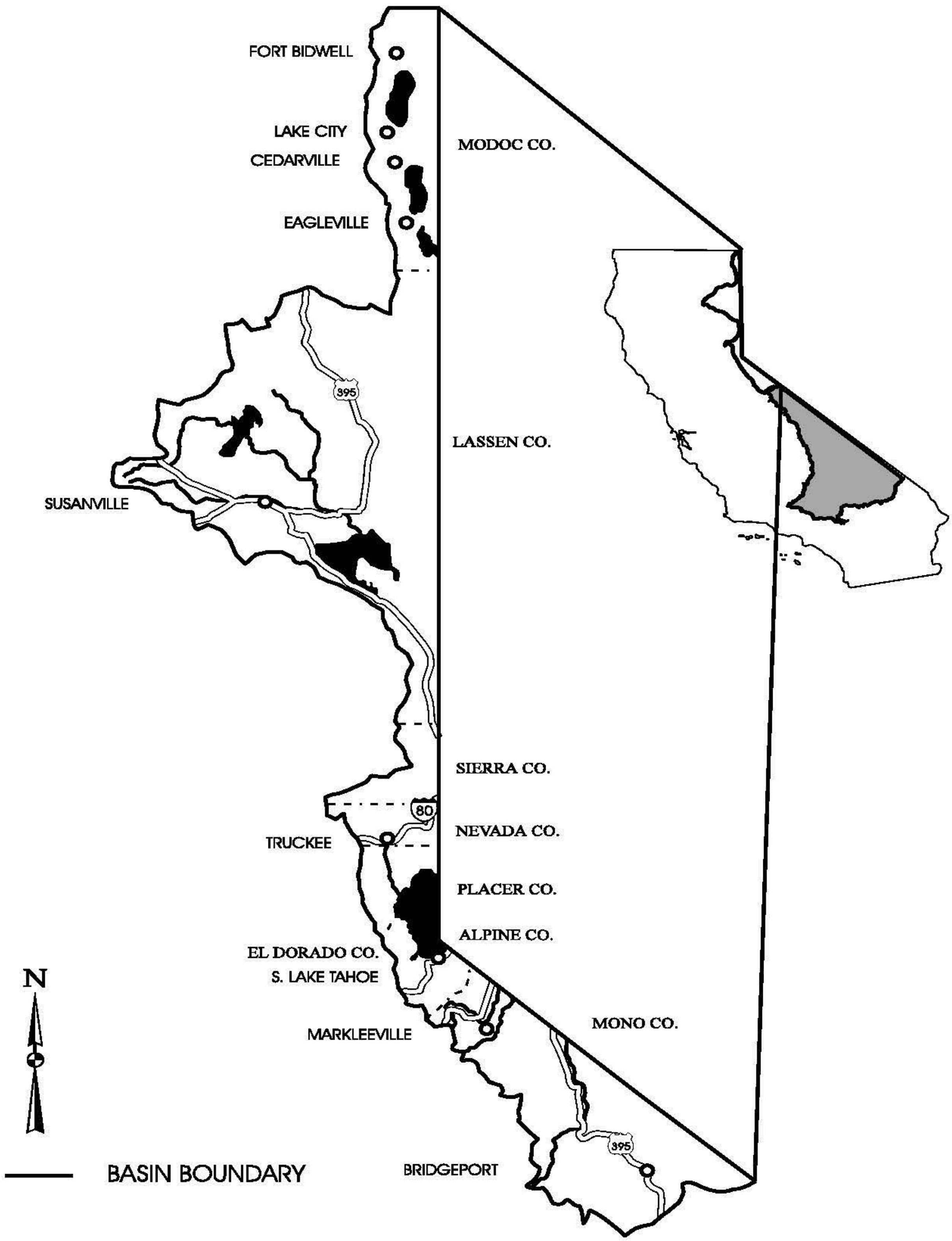
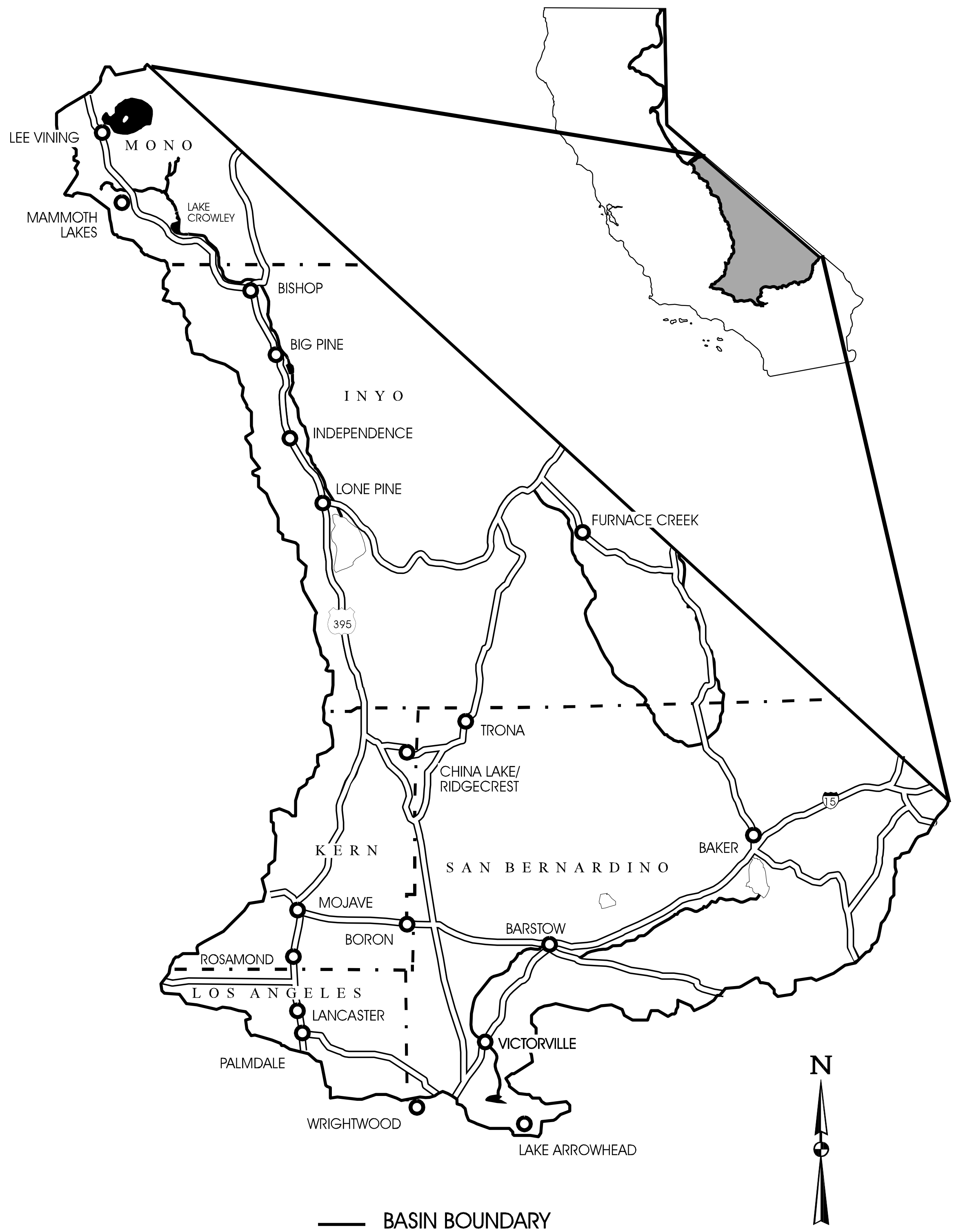


Figure 1-2
SOUTH LAHONTAN BASIN



Chapter 2
PRESENT AND POTENTIAL BENEFICIAL USES

An effective water quality control plan requires determination of the beneficial water uses, which are to be designated and maintained. This Chapter identifies beneficial water uses in the Lahontan Region and projects probable future uses.

Section 303 of the federal Clean Water Act (P.L. 92-500, as amended) defines water quality standards as both the uses of the waters involved and the water quality criteria applied to protect those uses. Under the Porter-Cologne Water Quality Control Act (CA Water Code § 13000 et seq.), beneficial uses and water quality objectives are considered separately (see Chapter 3, Water Quality Objectives). Beneficial uses and water quality objectives to protect those beneficial uses are to be established for all waters of the State, both surface (including wetlands) and ground waters.

Twenty-three beneficial uses and their definitions were developed by the State Board staff and recommended for use in the Regional Board Basin Plans. Three of those beneficial uses (Marine Habitat, Estuarine Habitat, and Shellfish Harvesting) are not found within the Region. Regional Board staff added two additional uses (Water Quality Enhancement, Flood Peak Attenuation/Flood Water Storage). Thus, the following nine beneficial use designations have been added since adoption of the 1975 Basin Plans: Industrial Process Supply, Fish Spawning, Fish Migration, Navigation, Commercial and Sport Fishing, Water Quality Enhancement, Preservation of Biological Habitats of Special Significance, Aquaculture, and Flood Peak Attenuation/Flood Water Storage. Specific wetland habitats and their associated beneficial uses has been added in recognition of the value of protecting wetlands. This Chapter contains two tables (Tables 2-1 and 2-2) designating the beneficial uses of surface waters, ground waters, and wetlands.

Definitions of Beneficial Uses

AGR **Agricultural Supply**. Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.

AQUA **Aquaculture**. Beneficial uses of waters used for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, and harvesting of aquatic plants and animals for human consumption or bait purposes.

BIOL **Preservation of Biological Habitats of Special Significance**. Beneficial uses of waters that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, and Areas of Special Biological Significance (ASBS), where the preservation and enhancement of natural resources requires special protection.

COLD **Cold Freshwater Habitat**. Beneficial uses of waters that support cold water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

COMM **Commercial and Sportfishing**. Beneficial uses of waters used for commercial or recreational collection of fish or other organisms including, but not limited to, uses involving organisms intended for human consumption.

FLD **Flood Peak Attenuation/Flood Water Storage**. Beneficial uses of riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters.

FRSH **Freshwater Replenishment**. Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

GWR **Ground Water Recharge**. Beneficial uses of waters used for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

IND **Industrial Service Supply**. Beneficial uses of waters used for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, geothermal energy production, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

MIGR **Migration of Aquatic Organisms**. Beneficial uses of waters that support habitats necessary for migration, acclimatization between fresh and salt water, or temporary activities by aquatic organisms, such as anadromous fish.

MUN **Municipal and Domestic Supply**. Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.

NAV **Navigation**. Beneficial uses of waters used for shipping, travel, or other transportation by private, military, or commercial vessels.

POW **Hydropower Generation**. Beneficial uses of waters used for hydroelectric power generation.

PRO **Industrial Process Supply**. Beneficial uses of waters used for industrial activities that depend primarily on water quality.

RARE **Rare, Threatened, or Endangered Species**. Beneficial uses of waters that support habitat necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened or endangered.

REC-1 **Water Contact Recreation**. Beneficial uses of waters used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.

REC-2 **Noncontact Water Recreation**. Beneficial uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach-combing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

SAL **Inland Saline Water Habitat**. Beneficial uses of waters that support inland saline water ecosystems including, but not limited to, preservation and enhancement of aquatic saline habitats, vegetation, fish, and wildlife, including invertebrates.

SPWN **Spawning, Reproduction, and Development.** Beneficial uses of waters that support high quality aquatic habitat necessary for reproduction and early development of fish and wildlife.

WARM **Warm Freshwater Habitat**. Beneficial uses of waters that support warm water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

WILD **Wildlife Habitat**. Beneficial uses of waters that support wildlife habitats including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

WQE **Water Quality Enhancement**. Beneficial uses of waters that support natural enhancement or improvement of water quality in or downstream of a water body including, but not limited to, erosion control, filtration and purification of naturally occurring water pollutants, streambank stabilization, maintenance of channel integrity, and siltation control.

Historical Beneficial Uses

The 1975 Basin Plans included brief discussions of the history of human water use in the Lahontan Region, and tables of “historical” beneficial use designations from earlier interstate water policies and “interim” final Basin Plans. Earlier beneficial use designations were primarily on a watershed basis; the 1975 Plans designated uses for specific water bodies. Copies of historical information from the 1975 Plans may be obtained by contacting Regional Board staff. The 1975 beneficial use designations were based on knowledge of the existing and potential water uses, with emphasis on the former. For example, many high quality surface waters of the North Lahontan Basin were not designated for municipal use because water supplies in these areas were taken from ground water sources. Historical beneficial uses have been incorporated into Table 2-1 and 2-2 as potential uses (a use which once existed could potentially exist again).

No beneficial use designations adopted in the 1975 Basin Plans have been removed from waters of the Lahontan Region. Removal of a use designation requires a “Use Attainability Analysis,” using U.S. Environmental Protection Agency methodology, to show that the use does not occur and cannot reasonably be attained.

Present and Potential Beneficial Uses

In the Basin Planning process, a number of beneficial uses are usually identified for a given body of water. Water quality objectives are established (see Chapter 3) which are sufficiently stringent to protect the most sensitive use. The Regional Board reserves the right to resolve any conflicts among beneficial uses, based on the facts in a given case. It should be noted that the assimilation of wastes is not a beneficial use.

In the tables of beneficial uses (Tables 2-1 and 2-2), an “X” indicates an existing or potential use. Many of the existing uses are documented by biological data or human use statistics; some are not. Lakes and streams may have potential beneficial uses established because: (1) plans already exist to put the water to those uses, (2) conditions (location, demand) make such future use likely, (3) the water has been identified as a potential source of drinking water based on the quality and quantity available (see Sources of Drinking Water Policy, in Appendix B), and/or (4) existing water quality does not support these uses, but remedial measures may lead to attainment in the future. The establishment of a potential beneficial use can have different purposes such as: (1) establishing a water quality goal which must be achieved through control actions in order to reestablish a beneficial use as in No. 4, above, or (2) serving to protect the existing quality of a water source for eventual use.

The water body listings in Tables 2-1 and 2-2 name all significant surface waters, ground water basins and wetlands. Maps of the hydrologic units and the ground water basins are included as part of this Basin Plan (see Plates 1A and 1B, 2A and 2B). Hydrologic units, ground water basins, and wetlands are listed from north to south. Unit and basin numbers are provided in the tables for reference to the Department of Water Resources standardized maps. Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1 (i.e., specific surface waters which are not listed have the same beneficial uses as the streams, lakes, wetlands, or reservoirs to which they are tributary). Note that nondegradation policies (see Chapter 3 of this Basin Plan) would supersede in the instances where the tributary is of higher quality than its receiving water. Other minor surface waters, including wetlands, springs, streams, lakes, and ponds, are included under one heading for each hydrologic unit. These minor surface waters have an “X” to designate each potential or existing beneficial use. Also, ground waters which are not a part of the named basins are recognized as potential or existing “municipal and domestic water supply” (MUN). The beneficial uses for ground water which are contained in Table 2-2 are for each ground water basin or subbasin as an entirety. Some ground water basins contain multiple aquifers or a single aquifer with varying water quality which may support different beneficial uses. In some areas of the Region, useable ground water occurs above or below an aquifer of highly mineralized ground water, which can contain concentrations of dissolved solids and metals, such as arsenic, unsuitable for drinking water. Therefore, the placing of an “X” in Table 2-2 does not indicate that all of the ground waters in that particular location are suitable (without treatment) for a designated beneficial use. However, all waters are designated as MUN unless they have been specifically exempted by the Regional Board through adoption of a Basin Plan amendment after consideration of substantial evidence to exempt such waters (see Sources of Drinking Water Policy in Appendix B). Also, certain surface waters, including internal drainage lakes, may have varying water quality from changes in natural conditions (e.g., change in water volume). The designation of multiple beneficial uses in Table 2-1, which may appear conflicting for a particular surface water, indicates existing or probable future beneficial uses that may occur only temporarily.

In most cases, removing a beneficial use designation from Table 2-1 will require a Use Attainability Analysis (UAA) to be conducted (using USEPA methodology). If there is substantial evidence to remove a use designation from a specific water body, the Regional Board will consider adoption of a Basin Plan amendment to remove a designated beneficial use. However, there are many beneficial uses which are not intended to apply to the entire length of a stream or to a surface water during certain temporal conditions (see above). The beneficial use designations that may be considered for temporary or site specific designation are: IND, PRO, GWR, FRSH, NAV, POW, WARM, COLD, SAL, MIGR, SPWN, and WQE. For these situations, Regional Board staff, in order to make a recommendation to the Regional Board, will rely on site-specific documentation which may include: water quality data, field data, professional opinions (from Regional Board staff or other state and federal agencies, also universities), and other evidence collected by a discharger. The most sensitive existing or probable future use will be protected. Uses that did not exist, do not exist and will not exist in the foreseeable future, will not be required to be protected. The MUN designation will not be considered for a site-specific designation since it is designated for all waters, unless specifically exempted by the Regional Board in accordance with the State Board's Sources of Drinking Water Policy.

In the 1975 Basin Plans, industrial use of waters in the Lahontan Region was recognized under the "Industrial Service Supply" (IND) beneficial use designation. "Industrial Service Supply" includes uses of water which do not depend primarily on water quality such as cooling water supply, and gravel washing. The beneficial use designation, "Industrial Process Supply" (PRO) includes industrial uses of water for processing and manufacturing of products which do require specific water quality.

This designation has been added to this Plan to differentiate the types of industrial uses. Many of the waters in the Region meet the high quality standards necessary for manufacturing and processing. However, the "Industrial Process Supply" designation has only been added for Searles Lake, the only water body in the Region with a current industrial process use (North American Chemical Corporation's industrial chemical processing operation).

In the 1975 Basin Plans, the "Freshwater Replenishment" (FRSH) designation was used only for ground waters. This Plan adds this designation for many surface waters in the Region which flow to saline lakes. For example, FRSH has been added to the Susan River which is tributary to Honey Lake.

Beneficial use designations of "Spawning, Reproduction, and Development" (SPWN) and "Migration of Aquatic Organisms" (MIGR) have been added to this Plan. These uses were previously considered to be included under "Cold" or "Warm Freshwater Habitat." However, it is acknowledged that SPWN and MIGR require different or greater resource protection than that afforded by the COLD or WARM designations. "Spawning, Reproduction and Development" (SPWN) is designated for streams and lakes where there is evidence (an historic or presently self-sustaining population) that spawning and reproduction regularly occurs. For example, SPWN has been added to Hot Creek in the Owens River watershed. The beneficial use "Migration of Aquatic Organisms" (MIGR) is designated for streams and lakes through which migrations of fish or other aquatic organisms occur or could occur. Taylor Creek is now designated MIGR to protect the migration corridor of the Kokanee salmon. MIGR and SPWN are designated for the stream or lake in its entirety, although, in most cases they are intended to be applied to only portions of the water body. The Regional Board may apply more stringent protection requirements (such as prohibiting culvert installations which result in detrimental increased stream velocities, or requiring the maintenance of colder stream temperatures for spawning, etc.) along portions of streams where spawning or migration occurs or may occur (see Chapter 3, temperature objectives, and Chapter 4, Fisheries Protection and Management). Conversely, if there is no evidence of, or potential for, spawning, reproduction and/or migration in a specific portion of a water body, specific water quality standards for spawning, reproduction, and/or migration may not be required. The Regional Board will evaluate appropriate use designations on a case-by-case basis if a conflict arises.

The "Navigation" (NAV) beneficial use designation has been added to many surface waters in the Region because of the State Board's revised definition which now includes travel by private vessels. Several rivers, including the Truckee River, and many lakes, including Lake Tahoe, provide for recreational boating and are now recognized with the addition of the NAV beneficial use.

Recreation uses (both Water Contact Recreation, or REC-1, and Non-contact Water Recreation, or REC-2) have been designated for all surface waters of the Lahontan Region. The REC-1 designation meets the intent of the "swimmable" goal of the federal Clean Water Act. Because of the possibility of ingestion, the USEPA expects states to set bacteriological criteria sufficient to support primary contact recreation. The Lahontan Regional Board's regionwide water quality objective for coliform bacteria, which provides that "waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources including human and livestock wastes", is more stringent than the USEPA's current (1986) bacteria criteria for recreational waters, which allow specific minimum concentrations of *Escherichia coli* and enterococci (criteria cited in USEPA, 1998). The USEPA's water quality standards guidance (USEPA, 1993 and 40 CFR 131.10) recognizes that recreation in and on the water may not always be attainable in certain waters, such as wetlands, that do not have sufficient water, at least seasonally, and that "In certain instances, people will use whatever water bodies are available for recreation, regardless of the physical conditions." Although some of the alkaline lakes and geothermal springs of the Lahontan Region may have chemical quality unfit for ingestion, they are generally located within public lands. It would be difficult to show that no public access to a specific water body for water contact recreation has occurred since the adoption of the USEPA water quality standards regulation in 1975, as required for removal of the REC-1 use. The REC-2 use depends to some extent on land uses around surface water bodies, but water quality objectives, including nondegradation, which are designed to protect natural water quality, will help to protect this use. The "aesthetic enjoyment" component of the REC-2 use is an important consideration in efforts to preserve the clarity and deep blue color of Lake Tahoe, and to prevent eutrophication of other oligotrophic waters.

The beneficial use designation of “Commercial and Sport Fishing” (COMM) has been added in recognition of commercial and sport fishing, and the collection of other aquatic organisms, including but not limited to uses involving organisms intended for human consumption. This designation has been added for many surface waters in the Region. This use previously was solely designated to protect large populations of fish for commercial collection. The revised definition emphasizes the protection of human health from consumption of fish or other aquatic species collected for commercial or recreation purposes.

The addition of the “Water Quality Enhancement” (WQE) beneficial use designation recognize additional characteristics of water bodies which previously received no formal designation. Beneficial uses of surface waters include their ability to enhance and protect water quality. Characteristics which enable surface waters to provide water quality enhancement include, but are not limited to, riparian vegetation and streambank configuration. The definition of this use is broad enough to allow designation of virtually all surface waters of the Lahontan Region. However, this use is only being added to named wetlands to give special recognition of the value wetlands provide in improving the water quality of other surface waters.

Previously, other regions incorporated “Areas of Special Biological Significance” (ASBS) in their listings of water bodies and beneficial use designations. ASBS is a formal designation reserved for ocean waters. The State Board's development of the beneficial use, “Preservation of Biological Habitats of Special Significance” (BIOL), enables all regions to identify areas or habitats that require special protection. The watercourses, lakes and wetlands designated BIOL provide important habitat to unique combinations of plant and/or animal species.

The beneficial use designation, “Aquaculture” (AQUA), has been added to surface and ground waters where there is an existing, past, or proposed use of the waters for purposes of aquaculture. Surface waters, such as Oak Creek used by the California Department of Fish and Game for hatcheries or nurseries, are included.

The beneficial use designation of “Flood Peak Attenuation/Flood Water Storage” (FLD) has been added to those riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters. These waters slow runoff and provide temporary storage of direct precipitation and runoff, serving to reduce the heights of flood peaks in adjacent receiving waters and lengthen the periods of runoff supplied to them. This form of water storage is vital to a number of other beneficial uses, including agriculture and wildlife.

Regional Board staff identified the listed wetlands based on existing information gathered during the statewide Water Quality Assessment process, and from a contract with the University of California at Santa Cruz. For information regarding wetlands definition and identification, see the “Wetland” discussion in the “Resources Management” section of Chapter 4. Also, see the discussion of “Stream Environment Zones” in Chapter 5.

The beneficial uses of surface waters of the Lahontan Region generally include REC-1 (swimmable) and WARM, COLD, or SAL (fishable), implementing the national goals expressed by the federal Clean Water Act. In a few cases, such as agricultural reservoirs, wastewater reservoirs, or drinking water canals, and some special wildlife protection areas, REC-1 uses are restricted or prohibited by the entities which control those waters. It is believed that the lists of beneficial uses in Tables 2-1 and 2-2 accurately reflect current and probable future demands on the water resources of the Lahontan Region.

Key to Table 2-1

"HU No." This column contains numbers used by the California Department of Water Resources in mapping surface water Hydrologic Units, Hydrologic Areas, and Hydrologic Subareas (watersheds and subwatersheds). See Plates 1A and 1B. More precise information on wetland locations is available in the Regional Board's wetland database.

"Hydrologic Unit/Subunit/Drainage Feature" This column contains (in bold type) the names of watersheds and subwatersheds corresponding to the Hydrologic Unit numbers in the preceding column, and the names of surface waterbodies, including lakes, streams and wetlands. Many wetlands have no "official" names identifiable on USGS topographic maps. For these wetlands, names were assigned by the Regional Board's wetland identification contractor, generally based on the location or nearby landmarks. For example "Oak Creek Campground Wetlands" (HU No. 603.30) refers to wetlands located at a campground in the Owens River Valley. The wetlands in the Madeline Plains Hydrologic Unit (HU No. 638.00) in Lassen County whose names include the descriptor "Cold Springs Mtn" are located on or near Cold Springs Mountain. Such names should not be understood to simply that a campground or a mountain is a wetland. Hydrologic Units in Table 2-1 are listed in order from north to south. HU numbers, which were originally assigned by the California Department of Water Resources, do not reflect this north to south order. For example, the East Walker River HU (#630.00) is just north of the Mono HU (601.00).

"Waterbody Class Modifier" This column includes descriptive information on each waterbody in the preceding column. It distinguishes perennial from ephemeral streams, and indicates the type of wetlands. Some terms have been abbreviated to save space. The following are definitions of wetland types occurring in the Lahontan Region (Mitsch and Gosselink 1986):

<u>Marsh</u>—A frequently or continually inundated wetland characterized by emergent herbaceous vegetation adapted to saturated soil conditions.

<u>Emergent Wetlands</u>—Wetlands dominated by erect, rooted, herbaceous aquatic plants such as cattails, which extend above the standing water level. Marshes are a type of emergent wetland.

<u>Wet Meadow</u>—Grassland with waterlogged soil near the surface but without standing water for most of the year.

<u>Playa lakes/wetlands</u>—Shallow marshes or intermittent lakes formed in nearly level areas at the bottom of desert basins.

<u>Slough</u>—A slowly flowing shallow marsh.

<u>Vernal Pool</u>—A shallow pond which temporarily holds water from spring precipitation and runoff, but which is dry during the summer.

"Beneficial Uses" The subheadings under this heading are abbreviations of beneficial uses which are defined at the beginning of Chapter 2. An "x" in a column beneath one of these designates an existing or potential beneficial use for a given waterbody.

"Receiving Water" This column names the waterbody to which a "drainage feature" named at the far left of the table is tributary.

"Tributary rule" Table 2-1 does not specifically name all surface waters of the Lahontan Region. Waters not mentioned by name are included in the categories "Minor Surface Waters" and "Minor Wetlands" within each Hydrologic Unit or Hydrologic Area. Beneficial uses are designated for these categories. However, additional beneficial uses may apply to waters with in these categories under the "tributary rule", which provides that water quality standards for specific waterbodies apply upstream to tributaries for which no site-specific standards have been adopted.

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
642.00	COWHEAD LAKE HYDROLOGIC UNIT																								
	COWHEAD LAKE WETLANDS		X	X			X				X	X			X	X		X					X	X	
	COWHEAD LAKE	SEASONAL LAKE/EMERGENT MEADOW	X	X			X				X	X	X		X	X		X					X		INTERNALLY DRAINED LAKE
	COWHEAD SLOUGH	FRESHWATER SLOUGH/EMERGENT MDW	X	X			X	X			X	X			X	X		X		X		X	X	X	COWHEAD LAKE
	NORTH TWIN LAKE	SEASONAL LAKE/PLAYA	X	X			X				X	X	X		X	X	X	X							INTERNALLY DRAINED LAKES
	SOUTH TWIN LAKE	SEASONAL LAKE/PLAYA	X	X			X				X	X	X		X	X	X	X							INTERNALLY DRAINED LAKES
	TWELVE MILE CREEK	PERENNIAL STREAM	X	X			X				X	X				X		X				X			
	SPRINGS/SEEPS/EMERGENT WETLANDS	SPRINGS/SEEPS/EMERGENT MEADOWS	X	X			X	X			X	X				X		X		X		X	X	X	(OREGON & NEVADA)
	MINOR SURFACE WATERS		X	X			X	X			X	X				X				X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X		X		X	X	X	COWHEAD LAKE/GW
641.00	SURPRISE VALLEY HYDROLOGIC UNIT																								
641.10	BARE CREEK HYDROLOGIC AREA																								
	BARE CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			LOWER ALKALI LAKE
	LOWER ALKALI LAKE	SALINE LAKE									X	X	X				X	X		X		X			INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X	X		X	X	X			X	X	X		X	X		X				X			LOWER ALKALI LAKE
	SPRINGS/SEEPS/EMERGENT WETLANDS	COLD & HOT SPRINGS/EMERGENT MDW	X	X			X	X			X	X				X		X		X		X	X	X	LOWER ALKALI LAKE
	EAGLE CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			LOWER ALKALI LAKE
	EMERSON CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			LOWER ALKALI LAKE
	SILVER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			BARE CREEK
	SNAKE LAKE	SEASONAL LAKE/EMERGENT MEADOW	X	X			X	X			X	X				X		X				X	X	X	BARE CREEK
	SPRINGS/SEEPS/EMERGENT WETLANDS	SPRINGS/SEEPS/EMERGENT MEADOWS	X	X			X	X			X	X				X		X				X	X	X	SNAKE LAKE
	SWORINGER RESERVOIR	RESERVOIR	X	X			X	X			X	X	X			X		X				X			SILVER CREEK
	SPRINGS/SEEPS/EMERGENT WETLANDS	SPRINGS/SEEPS/EMERGENT MEADOWS	X	X			X				X	X				X		X				X	X	X	SILVER CREEK
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	LOWER ALKALI LAKE / HA GW
641.20	CEDARVILLE HYDROLOGIC AREA																								
	BOGGS RESERVOIR	RESERVOIR	X	X			X	X			X	X				X		X	X	X		X	X	X	SAND CREEK
	CEDAR CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			MIDDLE ALKALI LAKE
	OWL CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			MIDDLE ALKALI LAKE
	OWL CREEK WETLANDS	WETLANDS	X	X			X	X			X	X				X		X				X	X	X	
	RAIDER CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			MIDDLE ALKALI LAKE
	SAND CREEK	SEASONAL STREAM	X	X			X	X			X	X				X		X	X	X		X			MIDDLE ALKALI LAKE
	MIDDLE ALKALI LAKE	SALINE LAKE									X	X	X				X	X	X	X		X			INTERNALLY DRAINED LAKE
	MIDDLE ALKALI LAKE EMERGENT SHORELINE WETLANDS	ALKALI FLAT/EMERGENT SHORELINE	X	X							X	X					X	X	X	X		X	X	X	MIDDLE ALKALI LAKE
	MIDDLE ALKALI L. SPRINGS/EMERGENT WETLANDS	SPRINGS/EMERGENT MEADOWS	X	X			X	X			X	X			X	X		X	X	X		X	X	X	MIDDLE ALKALI LAKE
	SURPRISE VALLEY MINERAL WELLS/HOT SPRINGS	COLD & HOT SPRINGS/EMERGENT MDW	X	X			X	X		X	X	X			X	X		X	X	X		X	X		MIDDLE ALKALI LAKE

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
641.20	LEONARDS HOT SPRINGS	HOT SPRINGS/EMERGENT MEADOWS	X	X			X	X		X	X	X			X			X	X	X		X	X		MIDDLE ALKALI LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X		X	X		X	X	X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X	X	X		X	X	X	MIDDLE ALKALI LAKE / HA GW
641.30	**FORT BIDWELL HYDROLOGIC AREA**																								
	BIG MUD LAKE	SEASONAL LAKE/PLAYA	X	X			X				X	X			X	X	X	X							INTERNALLY DRAINED LAKE
	DISMAL CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			DEEP CREEK (OREGON)
	DISMAL SWAMP WETLANDS	FLOODPLAIN, EMERGENT MEADOW	X	X			X				X	X				X		X				X	X	X	DEEP CREEK (OREGON)
	SPRINGS/SEEPS/EMERGENT WETLANDS	SPRINGS/EMERGENT MEADOWS	X	X			X				X	X				X		X				X	X	X	DEEP CREEK (OREGON)
	CRANE LAKE	SEASONAL LAKE/EMERGENT MEADOW	X	X			X				X	X				X		X					X	X	UPPER ALKALI LAKE
	BIDWELL CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			UPPER ALKALI LAKE
	MILL CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			UPPER ALKALI LAKE
	ALKALI LAKE WETLANDS	WETLANDS	X	X			X				X	X				X	X	X		X			X	X	
	UPPER ALKALI LAKE	SALINE LAKE									X	X	X				X	X		X		X			INTERNALLY DRAINED LAKE
	SPRINGS/SEEPS/EMERGENT WETLANDS	COLD & HOT SPRINGS/EMERGENT MDWS	X	X			X	X			X	X				X		X		X		X	X	X	UPPER ALKALI LAKE
	MUD LAKE	SEASONAL LAKE/EMERGENT MEADOW	X	X			X	X			X	X				X		X					X	X	INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	UPPER ALKALI LAKE / HA GW
640.00	**DUCK FLAT HYDROLOGIC UNIT**																								
	MINOR SURFACE WATERS		X	X			X	X			X	X			X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X				X		X					X	X	DUCK FLAT GW
639.00	**SMOKE CREEK HYDROLOGIC UNIT**																								
	SMOKE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			SMOKE CREEK RESERVOIR
	SMOKE CREEK RESERVOIR	RESERVOIR	X	X		X	X				X	X	X			X		X							SMOKE CREEK GROUNDWATER
	RUSH CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							SMOKE CREEK GROUNDWATER
	MINOR SURFACE WATERS		X	X			X	X			X	X	X		X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X		X		X	X	X	SMOKE CREEK GROUNDWATER
638.00	**MADELINE PLAINS HYDROLOGIC UNIT**																								
	GRASSHOPPER VALLEY WETLANDS	WET MEADOW/EMERGENT/SPRINGS	X	X			X				X	X				X		X					X	X	GRASSHOPPER VALLEY GW
	BOOT LAKE	EPHEMERAL POND	X	X			X				X	X	X			X		X							RED ROCK CREEK
	RED ROCK LAKE	SEASONAL LAKE/EMERGENT MEADOW	X	X			X				X	X				X		X					X	X	RED ROCK CREEK
	SPRINGS/SEEPS/EMERGENT WETLANDS		X	X			X				X	X				X		X					X	X	RED ROCK CREEK
	RED ROCK CREEK WETLANDS	WETLANDS	X	X			X	X			X	X				X		X					X	X	
	DODGE RESERVOIR	RESERVOIR	X	X			X				X	X	X			X		X							RED ROCK CREEK
	DUNN RESERVOIR	RESERVOIR	X	X			X				X	X	X			X		X							RED ROCK CREEK
	RED ROCK CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							MADELINE PLAINS GW
	SAID RESERVOIR	RESERVOIR	X	X			X				X	X	X		X	X		X							MADELINE PLAINS GW
	COLD SPRING CREEK	EPHEMERAL STREAM	X	X			X				X	X	X			X		X							MADELINE PLAINS GW

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
638.00	SPRINGS/SEEPS/EMERGENT WETLANDS	SPRINGS/SEEPS/EMERGENT	X	X			X	X			X	X				X		X					X	X	MADELINE PLAINS GW
	COLD SPRINGS MTN 5 WETLANDS	WET MEADOW	X	X			X				X	X	X			X		X					X	X	
	COLD SPRINGS MTN 5 MEADOW RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MOON LAKE
	MADELINE 7 WETLANDS	SEASONAL SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	COLD SPRINGS MTN 3 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	BOX SPRINGS
	COLD SPRINGS MTN 6 OVAL RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	BOX SPRINGS
	COLD SPRINGS MTN 4 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK (COLD SPRS CRK)
	COLD SPRINGS MTN 2 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 1 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 2 PINTO RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	BOX SPRINGS
	COLD SPRINGS MTN 6 RES.	SEASONAL SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 6A RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 4 DUNN RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	BIG MEADOWS RESERVOIR
	COLD SPRINGS MTN 5 SPRING	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	BIG MEADOWS RESERVOIR
	COLD SPRINGS MTN 7 LOAMY RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	BIG MEADOWS RESERVOIR
	COLD SPRINGS MTN 4A WETLANDS	SPRING/EMERGENT MEADOW	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 8 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 3 BRAIDED WETLANDS	RIPARIAN/EMERGENT MEADOW	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 2 NAME TAG RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 025 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 048 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 028 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 047 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 046 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 045 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 008 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	COLD SPRINGS CREEK
	COLD SPRINGS MTN 009 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 029 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	COLD SPRINGS MTN 007 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	RAVENDALE 1 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	RAVENDALE SPAULDING RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	COLD SPRINGS CREEK
	RAVENDALE MARR RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	COLD SPRINGS CREEK
	DODGE RESERVOIR COLD SPR DAM	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	COLD SPRINGS CREEK
	RAVENDALE SHORTHORN RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	COLD SPRINGS CREEK
	RAVENDALE LONG SPR. 1 RES.	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	RAVENDALE LONG SPR. 2 RES.	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	RAVENDALE TURKEY RES	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	COLD SPRINGS MTN DRY COW 2 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	BIG MEADOWS RES
	COLD SPRINGS MTN DRY COW 3 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	BIG MEADOWS RES
	COLD SPRINGS MTN DRY COW 1 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	BIG MEADOWS RES
	MADELINE 006 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	VAN LOAN CREEK

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			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
638.00	MENDIBOURE RESERVOIR RES.	RESERVOIR/EMERGENT	X	X			X		X		X	X	X			X		X					X	X	VAN LOAN CREEK
	MADELINE 065 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MENDIBOURE RESERVOIR
	JUNIPER RIDGE POULSEN SPR.	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MENDIBOURE RESERVOIR
	JUNIPER RIDGE 070 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	JUNIPER RIDGE 071 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 069 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 069 ETCHECOPAR SPR.	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 063 RES.	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MENDIBOURE RESERVOIR
	JUNIPER RIDGE 074 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 072 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 073 RES.	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 075 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 078 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 076 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 079 RES.	SPRING/RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 080 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 077 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 061 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MENDIBOURE RESERVOIR
	JUNIPER RIDGE 081 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 082 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 049 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	VAN LOAN RESERVOIR
	MC DONALD PEAK 053 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	VAN LOAN RESERVOIR
	MC DONALD PEAK 052 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	VAN LOAN RESERVOIR
	MC DONALD PEAK 047 13-MILE RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	VAN LOAN CREEK
	MC DONALD PEAK 044 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	3-MILE CREEK
	MC DONALD PEAK 045 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	3-MILE CREEK
	MC DONALD PEAK 046 RES.	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 048 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	3-MILE CREEK
	MC DONALD PEAK 041 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	3-MILE CREEK
	MC DONALD PEAK 051 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 102 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 096 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 099 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 101 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 103 RES.	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	DRY CREEK SPRINGS	SPRING/EMERGENT	X	X			X				X	X			X	X		X		X		X	X	X	DRY CREEK
	MC DONALD PEAK S06 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK S07 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	BIG SPRINGS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	VAN LOAN CREEK
	JUNIPER RIDGE S04 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE S03 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW

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			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
638.00	JUNIPER RIDGE S09 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE S10 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE S11 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	COLD SPRINGS MTN LOWER DRY COW SPR.	SPRING/EMERGENT/RIPARIAN	X	X			X				X	X				X		X					X	X	DRY CREEK
	MC DONALD PEAK DEER SPRING	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	VAN LOAN CREEK
	JUNIPER RIDGE JUOC SPRING	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	JUNIPER RIDGE S12 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE S13 WETLANDS	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	JUNIPER RIDGE NORT SPRING	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	DRY CREEK
	JUNIPER RIDGE EROSION SPR.	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	DODGE RESERVOIR MADELINE SPRING	SPRING/EMERGENT	X	X			X				X	X				X		X					X	X	COLD SPRINGS CREEK
	WHITINGER MTN C47 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY VALLEY GW
	WHITINGER MTN C46 WETLANDS	EMERGENT MEADOW	X	X			X				X	X				X		X					X	X	DRY VALLEY GW
	WHITINGER MTN C48 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	DRY VALLEY GW
	SAID VALLEY A001 RES	RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	SAID VALLEY RESERVOIR
	MC DONALD PEAK 095 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 098 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 086 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 089 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 088 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 090 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 094 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 093 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MC DONALD PEAK 091 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 084 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 085 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	JUNIPER RIDGE 087 RES	SEASONAL RESERVOIR/EMERGENT	X	X			X				X	X				X		X					X	X	MADELINE PLAINS GW
	MINOR SURFACE WATERS		X	X			X	X			X	X	X		X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X				X	X	X	MADELINE PLAINS GW
637.00	**SUSANVILLE HYDROLOGIC UNIT**																								
637.10	**HERLONG HYDROLOGIC AREA**																								
	PURDY CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			LONG VALLEY CREEK
	EVANS CANYON CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			LONG VALLEY CREEK
	BALLS CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			LONG VALLEY CREEK
	WILLOW CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			LONG VALLEY CREEK
	LONG VALLEY CREEK WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X				X	X	X	
	LONG VALLEY CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X		X	X		X				X			HONEY LAKE
	LONG VALLEY CREEK SPRINGS/RIPARIAN/EMERGENT	WETLANDS	X	X			X	X			X	X	X		X	X		X				X	X	X	LONG VALLEY CREEK
	SKEDADDLE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							HERLONG GROUNDWATER

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	RECEIVING WATER
637.10	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X		X		X	X	X	
637.20	SUSAN RIVER HYDROLOGIC AREA																								
	SILVER LAKE	LAKE	X					X			X	X	X			X		X				X			SUSAN RIVER
	MCCOY FLAT RESERVOIR	EPHEMERAL RESERVOIR	X	X			X				X	X	X			X		X							SUSAN RIVER
	CARIBOU LAKE	LAKE	X				X	X			X	X	X			X		X				X			SUSAN RIVER
	ISLAND AT HONEY LAKE WETLANDS	WETLANDS	X	X			X				X	X			X	X	X	X					X	X	
	SUSAN RIVER DELTA WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X					X	X	
	NORVELL FLAT WETLANDS	WET MEADOWS, FLOODPLAINS	X	X			X				X	X				X		X	X	X			X	X	SUSAN RIVER
	HOG FLAT RESERVOIR	EPHEMERAL RESERVOIR	X	X			X				X	X	X			X		X				X	X	X	SUSAN RIVER
	EMERGENT/TRIBUTARY WET MEADOWS/WETLANDS	WET MEADOW	X	X			X				X	X	X			X		X					X	X	HOG FLAT RESERVOIR
	WILLARD CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X			X	X			SUSAN RIVER
	AMEDEE HOT SPRINGS	HOT SPRINGS		X			X	X			X	X	X		X	X		X							HONEY LAKE
	CHENEY CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			SUSAN RIVER
	CADY SPRINGS	SPRING	X	X			X	X			X	X	X			X		X				X			SUSAN RIVER
	PIUTE CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X			X	X			SUSAN RIVER
	BARRY CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			SUSAN RIVER
	GOLD RUN CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			SUSAN RIVER
	LASSEN CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			SUSAN RIVER
	SUSAN RIVER	PERENNIAL RIVER	X	X		X	X	X	X		X	X	X		X	X		X			X	X			HONEY LAKE
	LAKE LEAVITT	RESERVOIR	X	X			X	X			X	X	X		X	X		X				X			SUSAN RIVER
	HARTSON LAKE WETLANDS	WETLANDS	X	X			X				X	X			X	X		X					X	X	
	HARTSON LAKE	RESERVOIR	X	X			X	X			X	X	X		X	X		X							HONEY LAKE
	HONEY LAKE WETLANDS	WETLANDS	X	X							X	X			X	X	X	X		X		X	X	X	
	HONEY LAKE	SALINE LAKE		X			X	X			X	X	X		X	X	X	X						X	INTERNALLY DRAINED LAKE
	WENDEL HOT SPRINGS	HOT SPRINGS		X			X	X		X	X	X						X					X		HONEY LAKE
	WILLOW CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X		X	X		X				X			SUSAN RIVER
	MINOR SURFACE WATERS		X	X			X	X			X	X	X		X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X		X	X	X			X	X	X		X	X		X		X		X	X	X	
637.30	EAGLE DRAINAGE HYDROLOGIC AREA																								
637.31	ANTELOPE MOUNTAIN HYDROLOGIC SUBAREA																								
	SPRINGS	SPRINGS	X	X			X	X			X	X				X		X							
	SHEEP CAMP MEADOWS WETLANDS	WET MEADOW	X	X			X				X	X				X		X	X				X	X	SUSAN RIVER
	MINOR SURFACE WATERS	EPHEMERAL STREAM	X	X			X	X			X	X	X			X		X							SNOWSTORM CREEK
	PITTVILLE ROAD SPRING	SPRING AND WET MEADOW	X	X			X				X	X				X		X	X				X	X	SUSAN RIVER
	LONG LAKE	WET MEADOW, SEASONAL LAKE	X	X			X				X	X				X		X						X	GROUNDWATER
	PINE CREEK DOWNSTREAM OF HWY. 201	PERENNIAL STREAM	X	X			X	X			X	X				X		X	X	X		X	X	X	EAGLE LAKE
	PINE CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X	X	X	X	X			EAGLE LAKE

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
637.31	PAPOOSE MEADOWS WETLANDS	WET MEADOW	X	X			X	X			X	X	X			X		X	X	X		X	X	X	EAGLE LAKE
	PAPOOSE CREEK	EPHEMERAL STREAM	X	X			X	X			X	X	X			X		X		X		X			EAGLE LAKE
	MERRILL CREEK	EPHEMERAL STREAM	X	X			X	X			X	X	X			X		X		X		X			EAGLE LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X	X	X	X	X	X	X	
637.32	EAGLE LAKEHYDROLOGIC SUBAREA																								
	EAGLE LAKE	LAKE	X	X			X		X		X	X	X			X		X	X	X	X	X			INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X				X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X				X		X					X	X	
637.40	SNOWSTORM MOUNTAIN HYDROLOGIC AREA																								
	DEEP CREEK	EPHEMERAL STREAM	X	X			X				X	X	X			X		X							SNOWSTORM CREEK
	SECRET CREEK	EPHEMERAL STREAM	X	X			X				X	X	X			X		X				X			SNOWSTORM CREEK
	SNOWSTORM CREEK	EPHEMERAL STREAM	X	X			X	X			X	X	X			X		X							PETES CREEK
	SNOWSTORM CREEK WETLANDS	WETLANDS	X	X			X	X			X	X				X		X					X	X	
	PETE'S CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X		X	X		X				X			WILLOW CREEK
	WILLOW CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X		X	X		X				X			SUSAN RIVER
	HORSE LAKE WETLANDS	WETLANDS	X	X			X				X	X				X		X					X	X	
	ISOLATED WETLAND BOUNDED BY RR TRACKS ON WEST	VERNAL POOL	X	X			X				X	X				X		X					X	X	CLOSED DEPRESSION
	HORSE LAKE	EPHEMERAL LAKE	X	X			X				X	X	X			X		X				X			PETES CREEK
	PINE CREEK WETLAND AND MEADOWS	WETLANDS	X	X			X	X			X	X				X		X		X	X	X	X	X	
	PINE CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X		X	X		X	X			X			HORSE LAKE
	ROUND VALLEY RESERVOIR	RESERVOIR	X	X			X				X	X	X		X	X		X							WILLOW CREEK
	LITTLE MUD FLAT LAKE	EPHEMERAL LAKE	X	X			X				X	X				X	X	X		X			X		INTERNALLY DRAINED LAKE
	MUD FLAT LAKE	DRY/ SEASONAL LAKE	X	X			X				X	X				X		X		X			X	X	INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X	X	X	X	X	X	X	
636.00	LITTLE TRUCKEE RIVER HYDROLOGIC UNIT																								
	LITTLE TRUCKEE RIVER	PERENNIAL RIVER	X	X			X	X		X	X	X	X			X		X		X	X	X			TRUCKEE RIVER
	WEBBER LAKE	LAKE	X	X			X		X		X	X	X			X		X		X		X			LITTLE TRUCKEE RIVER
	COLD STREAM CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			LITTLE TRUCKEE RIVER
	INDEPENDENCE LAKE	LAKE	X	X			X		X		X	X	X			X		X		X		X			INDEPENDENCE CREEK
	INDEPENDENCE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			LITTLE TRUCKEE RIVER
	STAMPEDE RESERVOIR	RESERVOIR	X	X			X		X		X	X	X			X		X		X		X			LITTLE TRUCKEE RIVER
	SAGEHEN CREEK WETLANDS	WETLANDS	X	X			X				X	X	X			X		X	X	X		X	X	X	
	SAGEHEN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X	X	X		X			STAMPEDE RESERVOIR
	DAVIES CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			STAMPEDE RESERVOIR
	BOCA RESERVOIR	RESERVOIR	X	X			X		X		X	X	X			X		X		X		X			LITTLE TRUCKEE RIVER
	SARDINE MEADOWS WETLANDS	WET MEADOW	X	X			X				X	X	X			X		X				X	X	X	STAMPEDE RESEVOIR

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
636.00	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X	X	X	X	X	X	X	
635.00	TRUCKEE RIVER HYDROLOGIC UNIT																								
635.10	DOG VALLEY HYDROLOGIC AREA																								
	DOG VALLEY WETLANDS	WET MDW, FLOODPLAIN, MINOR STREAMS	X	X			X				X	X	X			X		X		X	X	X	X	X	TRUCKEE RIVER
	DOG VALLEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			TRUCKEE RIVER
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X	X	X	X	X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X	X	X	X	X	X	X	
635.20	TRUCKEE RIVER HYDROLOGIC AREA																								
	TRUCKEE RIVER	PERENNIAL RIVER	X	X		X	X	X		X	X	X	X			X		X		X	X	X			PYRAMID LAKE, NEV.
	BEAR CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X			X		X		X	X	X			TRUCKEE RIVER
	SQUAW CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			TRUCKEE RIVER
	SQUAW VALLEY MEADOW WETLANDS	WETLANDS	X	X			X				X	X				X		X				X	X	X	
	POLE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			TRUCKEE RIVER
	COLD STREAM CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			DONNER CREEK
	DONNER LAKE	LAKE	X	X				X	X		X	X	X			X		X		X		X			DONNER CREEK
	DONNER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			TRUCKEE RIVER
	PROSSER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			TRUCKEE RIVER
	PROSSER RESERVOIR	RESERVOIR	X	X			X		X		X	X	X			X		X		X		X			PROSSER CREEK
	MARTIS CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			TRUCKEE RIVER
	MARTIS CREEK RESERVOIR	RESERVOIR	X	X			X		X		X	X	X			X		X		X		X			MARTIS CREEK
	TROUT CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			TRUCKEE RIVER
	ALDER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			TRUCKEE RIVER
	JUNIPER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			TRUCKEE RIVER
	GRAY CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			TRUCKEE RIVER
	BRONCO CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			TRUCKEE RIVER
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X	X	X	X	X	X	X	
634.00	LAKE TAHOE HYDROLOGIC UNIT																								
634.10	SOUTH TAHOE HYDROLOGIC AREA																								
	TAHOE MEADOWS WETLANDS	WETLANDS	X				X				X	X				X		X					X	X	
	HEAVENLY VALLEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			TROUT CREEK
	COLD CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			TROUT CREEK
	TROUT CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			UPPER TRUCKEE RIVER
	SAXON CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			TROUT CREEK
	GRASS LAKE WETLANDS	WETLANDS	X	X			X				X	X	X			X		X	X			X	X	X	

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
634.10	GRASS LAKE	LAKE	X	X			X				X	X	X			X		X	X			X			GRASS LAKE CREEK
	GRASS LAKE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			UPPER TRUCKEE RIVER
	MEISS MEADOWS/WETLANDS	WETLANDS	X	X			X				X	X				X		X		X		X	X	X	
	MEISS LAKE	LAKE	X	X			X				X	X	X			X		X		X		X			UPPER TRUCKEE RIVER
	UPPER TRUCKEE RIVER	PERENNIAL STREAM	X	X			X		X		X	X	X			X		X			X	X			LAKE TAHOE
	ECHO LAKES	LAKES	X				X		X		X	X	X			X		X				X			ECHO CREEK/U. TRUCKEE RIVER
	UPPER ANGORA LAKE	LAKE	X	X			X		X		X	X	X			X		X				X			LOWER ANGORA LAKE
	LOWER ANGORA LAKE	LAKE	X	X			X		X		X	X	X			X		X				X			ANGORA CREEK
	GLEN ALPINE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			FALLEN LEAF LAKE
	FALLEN LEAF LAKE	LAKE	X						X		X	X	X			X		X				X			TAYLOR CREEK
	TAYLOR CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			LAKE TAHOE
	TAYLOR CREEK MEADOW MARSH	WETLANDS	X	X			X				X	X				X		X		X	X	X	X	X	
	TALLAC CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	CASCADE LAKE	LAKE	X						X		X	X	X			X		X		X		X			CASCADE CREEK
	CASCADE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	MEEKS CREEK MEADOW/WETLANDS	WETLANDS	X	X			X				X	X				X		X					X	X	
	POPE MARSH/WETLANDS	WETLANDS	X				X				X	X				X		X					X	X	
	OSGOOD SWAMP	WETLANDS	X				X				X	X				X		X	X				X	X	
	EAGLE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	MINOR SURFACE WATERS		X	X			X				X	X	X			X		X				X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X	X	X	X	X	X	X	
634.20	**NORTH TAHOE HYDROLOGIC AREA**																								
	LONELY GULCH CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	MEEKS CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			LAKE TAHOE
	GENERAL CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			LAKE TAHOE
	McKINNEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	MADDEN CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			LAKE TAHOE
	BLACKWOOD CREEK	PERENNIAL STREAM	X								X	X	X			X		X			X	X			LAKE TAHOE
	WARD CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X			X	X			LAKE TAHOE
	BURTON CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			LAKE TAHOE
	DOLLAR CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	WATSON CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			LAKE TAHOE
	SNOW CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	CARNELIAN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	GRIFF CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			LAKE TAHOE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X				X			LAKE TAHOE
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X			X	X	X	X	
634.30	**TAHOE LAKE BODY HYDROLOGIC AREA**																								
	LAKE TAHOE	LAKE	X	X			X		X		X	X	X			X		X	X		X	X			TRUCKEE RIVER

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
634.30	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X	X		X	X			
	MINOR WETLANDS	EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X	X		X	X	X	X	
633.00	**WEST FORK CARSON RIVER HYDROLOGIC UNIT**																								
633.10	**WOODFORDS HYDROLOGIC AREA**																								
	W. FORK CARSON MEADOW WETLANDS NEAR WOODFORDS	WETLANDS	X	X			X				X	X				X		X					X	X	
	FREDERICKSBURG CANYON CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			WEST FORK CARSON RIVER
	WEST FORK CARSON RIVER	PERENNIAL RIVER	X	X		X	X	X	X	X	X	X	X			X		X		X		X			CARSON SINK
	DIAMOND, DUTCH AND WADE VALLEYS WETLANDS	WETLANDS/WET MEADOWS	X	X			X				X	X				X		X		X			X	X	INDIAN CREEK/WF CARSON R.
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X				X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	
633.20	**UPPER WEST FORK CARSON RIVER HYDROLOGIC AREA**																								
	FAITH VALLEY WETLANDS	WET MEADOW, FLOODPLAIN	X	X			X				X	X				X		X					X	X	WEST FORK CARSON RIVER
	UPPER WEST FORK CARSON RIVER	PERENNIAL RIVER	X	X		X	X				X	X	X			X		X				X			CARSON SINK
	RED LAKE	LAKE	X	X			X		X		X	X	X			X		X							RED LAKE CREEK
	WETLANDS ON ADJACENT SLOPES TO VALLEY	WETLANDS/WET MEADOWS	X	X			X				X	X				X		X					X	X	HOPE VALLEY
	RED LAKE CREEK VALLEY WETLANDS	WET MEADOW, FLOOD PLAIN	X	X			X				X	X				X		X				X	X	X	WEST FORK CARSON RIVER
	HOPE VALLEY WETLANDS	EMERGENT MEADOW/FLOODPLAIN	X	X			X				X	X				X		X					X	X	WEST FORK CARSON RIVER
	VALLEY SLOPES WETLANDS	SPRINGS/SEEPS/EMERGENT	X	X			X				X	X						X					X	X	HOPE VALLEY
	RED LAKE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			UPPER WF CARSON RIVER.
	WILLOW CREEK	PERENNIAL RIVER	X	X			X				X	X	X			X		X				X			UPPER WF CARSON RIVER.
	MINOR SURFACE WATERS		X	X			X				X	X	X			X		X				X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X				X	X	X	
632.00	**EAST FORK CARSON RIVER HYDROLOGIC UNIT**																								
632.10	**MARKLEEVILLE HYDROLOGIC AREA**																								
	WETLANDS, N. SAGEHEN FLAT TO HEENAN LAKE	WET MEADOW, TRIB FLOODPLAIN	X	X			X				X	X	X			X		X	X	X		X	X	X	EAST FORK CARSON RIVER
	HEENAN RESERVOIR	RESERVOIR	X	X			X				X	X	X	X		X		X		X		X			MONITOR CREEK
	WETLANDS/BIG SPRINGS TO HWY. 89	WET MEADOW, SPRINGS	X	X			X				X	X	X			X		X		X		X	X	X	EAST FORK CARSON RIVER
	WETLANDS, PONDS W. OF MONITOR PASS @ HWY 89	VERNAL POND	X	X			X				X	X	X		X	X		X					X	X	EAST FORK CARSON RIVER
	EAST FORK CARSON RIVER	PERENNIAL RIVER	X	X			X	X	X		X	X	X			X		X		X		X			CARSON SINK
	KINNEY RESERVOIR	RESERVOIR	X	X			X		X		X	X	X			X		X				X			SILVER CREEK
	KINNEY LAKES	LAKES	X	X			X				X	X	X			X		X			X	X			SILVER CREEK
	SILVER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			EAST FORK CARSON RIVER
	WOLF CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			EAST FORK CARSON RIVER
	WOLF CREEK MEADOWS WETLANDS	WETLANDS/WET MEADOW,FLOODPLAIN	X	X			X				X	X			X	X		X	X	X		X	X	X	EAST FORK CARSON RIVER
	SILVER KING CREEK	EPHEMERAL STREAM	X	X			X				X	X	X			X		X		X		X			EAST FORK CARSON RIVER
	CHARITY VALLEY WETLANDS	WET MEADOW, FLOODPLAIN	X	X			X				X	X	X			X		X		X		X	X	X	EAST FORK CARSON RIVER

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
632.10	MONITOR CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X			X		X		X		X			EAST FORK CARSON RIVER
	PLEASANT VALLEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			MARKLEEVILLE CREEK
	PLEASANT VALLEY WETLANDS	WETLANDS	X	X			X				X	X				X		X					X	X	
	MILBERRY CREEK	EPHEMERAL STREAM	X	X			X				X	X	X			X		X							MARKLEEVILLE CREEK
	MARKLEEVILLE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			EAST FORK CARSON RIVER
	LEVIATHAN CREEK (ABOVE LEVIATHAN MINE)	PERENNIAL STREAM	X	X			X				X	X	X			X		X							BRYANT CREEK
	LEVIATHAN CREEK (BELOW LEVIATHAN MINE)	PERENNIAL STREAM	X	X			X				X	X				X		X							BRYANT CREEK
	ASPEN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							EAST FORK CARSON RIVER
	BRYANT CREEK (BELOW LEVIATHAN CREEK)	PERENNIAL STREAM	X	X			X				X	X				X		X							EAST FORK CARSON RIVER
	MINOR SURFACE WATERS		X	X		X	X	X			X	X	X			X		X				X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	
632.20	**INDIAN CREEK HYDROLOGIC AREA**																								
	STEVENS LAKE	LAKE	X	X			X				X	X	X			X		X				X			INDIAN CREEK
	INDIAN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			EAST FORK CARSON RIVER
	INDIAN CREEK RESERVOIR	RESERVOIR	X	X			X	X	X		X	X	X			X		X							EAST FORK CARSON RIVER
	WETLANDS, MEADOWS NW OF SUMMIT LAKE	WETLANDS/WET MEADOW	X	X			X				X	X	X			X		X		X		X	X	X	EAST FORK CARSON RIVER
	DIAMOND, DUTCH AND WADE VALLEYS WETLANDS	WETLANDS/WET MEADOW	X	X			X				X	X						X		X			X	X	INDIAN CREEK/WF CARSON R.
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	
631.00	**WEST WALKER RIVER HYDROLOGIC UNIT**																								
631.10	**ANTELOPE VALLEY HYDROLOGIC AREA**																								
	W. FORK WALKER R. WTLNDS (ABOVE TOPAZ LK MEADOW)		X	X			X				X	X				X		X				X	X	X	
	RODRIGUEZ CREEK	EPHEMERAL STREAM	X	X			X				X	X	X			X		X							WEST WALKER RIVER
	MILL CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X		X		X			WEST WALKER RIVER
	WEST WALKER RIVER (BELOW WALKER)	PERENNIAL RIVER	X	X			X		X		X	X	X			X		X				X			WEST WALKER RIVER
	LOST CANNON CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X		X		X			MILL CREEK
	TOPAZ LAKE	RESERVOIR	X	X			X		X		X	X	X			X		X				X			TOPAZ LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	
631.20	**SLINKARD CREEK HA**																								
	SLINKARD CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			WEST WALKER RIVER
	MINOR SURFACE WATERS		X	X			X				X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X				X	X	X			X		X		X		X	X	X	
631.30	**DESERT CREEK HYDROLOGIC AREA**																								
	DESERT CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			
	LOBDELL LAKE	RESERVOIR	X	X			X				X	X	X			X		X	X	X		X			

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
631.30	MINOR SURFACE WATERS		X	X			X				X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X				X	X	X			X		X		X		X	X	X	
631.40	**UPPER WEST WALKER RIVER HYDROLOGIC AREA**																								
	WEST WALKER RIVER (ABOVE WALKER)	PERENNIAL RIVER	X	X			X	X	X		X	X	X			X		X			X	X			WALKER LAKE
	SILVER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			WEST WALKER RIVER
	HOT CREEK	PERENNIAL STREAM		X			X				X	X	X		X	X		X							LITTLE WALKER RIVER
	FALES HOT SPRINGS	SPRINGS		X			X				X	X	X		X			X							HOT CREEK
	LITTLE WALKER RIVER	PERENNIAL RIVER	X	X			X	X	X		X	X	X			X		X			X	X			WEST WALKER RIVER
	GRIZZLY MEADOW WETLANDS	WETLANDS	X				X				X	X				X		X					X	X	
	PICKEL MEADOWS WETLANDS	WETLANDS	X	X			X				X	X				X		X					X	X	
	LEAVITT MEADOWS WETLANDS	WETLANDS	X	X			X				X	X				X		X					X	X	
	MINOR SURFACE WATERS		X	X			X	X			X	X	X		X	X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X		X		X	X	X	
630.00	**EAST WALKER RIVER HYDROLOGIC UNIT**																								
630.10	**MASONIC HYDROLOGIC AREA**																								
	EAST WALKER RIVER (BELOW BRIDGEPORT RESERVOIR)	PERENNIAL RIVER	X	X		X	X	X	X		X	X	X			X		X		X		X			WALKER LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	
630.20	**BODIE HYDROLOGIC AREA**																								
	ROUGH CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							EAST WALKER RIVER
	BODIE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X		X			EAST WALKER RIVER
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	
630.30	**BRIDGEPORT HYDROLOGIC AREA**																								
	EAST WALKER RIVER (ABOVE BRIDGEPORT RESERVOIR)	PERENNIAL RIVER	X	X			X	X	X		X	X	X			X		X		X		X			BRIDGEPORT RESERVOIR
	BRIDGEPORT RESERVOIR	RESERVOIR	X	X			X		X		X	X	X			X		X				X			EAST WALKER RIVER
	BRIDGEPORT VALLEY WETLANDS	WETLANDS	X	X			X				X	X				X		X					X	X	E WALKER R/BRIDGEPORT GW
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	
630.40	**EAST WALKER TRIBUTARIES HYDROLOGIC AREA**																								
	CLEARWATER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							VIRGINIA CREEK
	VIRGINIA CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			EAST WALKER RIVER
	GREEN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			EAST WALKER RIVER
	LONG VALLEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			SWAUGER CREEK
	SWAUGER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			BRIDGEPORT RESERVOIR

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			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
630.40	ROBINSON CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			EAST WALKER RIVER
	TWIN LAKES	LAKES	X	X			X		X		X	X	X			X		X				X		X	ROBINSON CREEK
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X				X	X	X	
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X				X	X	X	
601.00	**MONO HYDROLOGIC UNIT**																								
	RUSH CREEK (ABOVE GRANT LAKE)	PERENNIAL STREAM	X					X		X	X	X	X			X		X				X			GRANT LAKE
	RUSH CREEK (BELOW GRANT LAKE)	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			MONO LAKE
	GRANT LAKE	LAKE	X								X	X	X			X		X				X			OWENS R/VIA AQUEDUCT/MONO LK
	SILVER LAKE	LAKE	X								X	X	X			X		X				X			RUSH CREEK
	GULL LAKE	LAKE	X						X		X	X	X			X		X				X			REVERSED CREEK
	JUNE LAKE	LAKE	X						X		X	X	X			X		X				X			REVERSED CREEK
	FERN LAKE	LAKE	X	X					X		X	X	X			X		X				X			REVERSED CREEK
	REVERSED CREEK	PERENNIAL STREAM	X								X	X	X			X		X				X			RUSH CREEK
	AGNEW LAKE	LAKE	X							X	X	X	X			X		X				X			RUSH CREEK
	GEM LAKE	LAKE	X							X	X	X	X			X		X				X			RUSH CREEK
	ALGER LAKES	LAKES	X								X	X	X			X		X				X			SILVER LAKE
	MILL CREEK	PERENNIAL STREAM	X	X			X	X		X	X	X	X			X		X				X			MONO LAKE
	LUNDY LAKE	LAKE	X						X	X	X	X	X			X		X				X			TRIBUTARY TO MILL CREEK
	BLUE LAKE	LAKE	X								X	X	X			X		X				X			TRIBUTARY TO MILL CREEK
	CRYSTAL LAKE	LAKE	X								X	X	X			X		X				X			TRIBUTARY TO MILL CREEK
	ONEIDA LAKE	LAKE	X								X	X	X			X		X				X			TRIBUTARY TO MILL CREEK
	LEE VINING CREEK (ABOVE DIVERSION)	PERENNIAL STREAM	X	X			X	X		X	X	X	X			X		X				X			GRANT LAKE/VIA AQUEDUCT
	LEE VINING CREEK (BELOW DIVERSION)	EPHEMERAL STREAM	X				X	X		X	X	X	X			X		X				X			MONO LAKE
	SADDLEBAG LAKE	LAKE	X							X	X	X	X			X		X				X			TRIBUTARY TO LEE VINING CREEK
	TIOGA LAKE	LAKE	X						X	X	X	X	X			X		X				X			TRIBUTARY TO LEE VINING CREEK
	ELLERY LAKE	LAKE	X						X	X	X	X	X			X		X				X			TRIBUTARY TO LEE VINING CREEK
	KIDNEY LAKE	LAKE	X							X	X	X	X			X		X				X			TRIBUTARY TO LEE VINING CREEK
	GIBBS LAKE	EPHEMERAL LAKE	X							X	X	X	X			X		X				X			TRIBUTARY TO LEE VINING CREEK
	WALKER CREEK (INCLUDE WALKER LAKE)	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			TRIBUTARY TO OWENS
	PARKER CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			TRIBUTARY TO OWENS RIVER
	MONO LAKE WETLANDS/MARSHES	WETLANDS									X	X					X	X	X			X	X	X	/VIA AQUEDUCT
	MONO LAKE	SALINE LAKE	X	X		X			X		X	X	X	X			X	X	X	X		X			INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X	X							X	X	X			X		X							
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X				X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X				X	X	X	
602.00	**ADOBE HYDROLOGIC UNIT**																								
	ADOBE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							ADOBE VALLEY GROUNDWATER
	NORTH CANYON CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							TRIBUTARY TO ADOBE CREEK
	ADOBE RESERVOIR	INTERMITTENT LAKE	X	X							X	X	X			X		X							INTERNALLY DRAINED LAKE

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
602.00	RIVER SPRING LAKE	INTERMITTENT LAKE	X	X			X				X	X	X			X		X							INTERNALLY DRAINED LAKE
	BLACK LAKE	INTERMITTENT LAKE	X	X			X				X	X	X			X		X							INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X							
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X					X	X	
602.10	DEXTER CREEK HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X					X	X	
602.20	HUNTOON CREEK HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X					X	X	
603.00	OWENS HYDROLOGIC UNIT																								
603.10	LONG HYDROLOGIC AREA																								
	LAKE CROWLEY	RESERVOIR	X	X					X	X	X	X	X			X		X				X			OWENS RIVER
	WILFRED CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			OWENS RIVER
	OWENS RIVER	PERENNIAL RIVER	X	X			X	X	X		X	X	X			X		X			X	X			CROWLEY LAKE
	DEADMAN CREEK	PERENNIAL STREAM	X	X		X	X	X			X	X	X			X		X				X			OWENS RIVER
	GLASS CREEK	PERENNIAL STREAM	X					X			X	X	X		X	X		X				X			DEADMAN CREEK
	DRY CREEK	PERENNIAL IN UPPER REACHES	X					X			X	X	X			X		X				X			OWENS RIVER
	MAMMOTH CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X		X	X	X			OWENS RIVER
	TWIN LAKES	LAKE	X						X		X	X	X			X		X				X			MAMMOTH CREEK
	LAKE MAMIE	LAKE	X						X		X	X	X			X		X				X			MAMMOTH CREEK
	LAKE MARY	LAKE	X	X					X		X	X	X			X		X				X			MAMMOTH CREEK
	COLD WATER CREEK	PERENNIAL STREAM	X								X	X	X			X		X				X			LAKE MARY
	ARROWHEAD LAKE	LAKE	X						X		X	X	X			X		X				X			MAMMOTH CREEK
	SHELTON LAKE	LAKE	X						X		X	X	X			X		X				X			MAMMOTH CREEK
	WOODS LAKE	LAKE	X						X		X	X	X			X		X				X			MAMMOTH CREEK
	RED LAKE	LAKE	X						X		X	X	X			X		X				X			MAMMOTH CREEK
	LAKE GEORGE	LAKE	X						X		X	X	X			X		X				X			MAMMOTH CREEK
	HOT CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X	X		X		X		X	X	X			OWENS RIVER
	LITTLE HOT CREEK	PERENNIAL STREAM		X			X	X			X	X	X			X		X				X			HOT CREEK OR OWENS RIVER
	HORSESHOE LAKE	LAKE	X								X	X	X			X		X				X			MAMMOTH CREEK
	MCCLOUD LAKE	LAKE	X								X	X	X			X		X				X			MAMMOTH CREEK
	SHERWIN CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			MAMMOTH CREEK
	SHERWIN LAKES	LAKE	X								X	X	X			X		X				X			SHERWIN CREEK
	LOST LAKE	LAKE	X								X	X	X			X		X				X			SHERWIN CREEK
	VALENTINE LAKE	LAKE	X								X	X	X			X		X				X			SHERWIN CREEK

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
603.10	LAUREL CREEK	PERENNIAL STREAM	X								X	X	X			X		X				X			MAMMOTH CREEK
	CONVICT CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			CROWLEY LAKE
	CONVICT LAKE	LAKE	X						X		X	X	X			X		X				X			CONVICT CREEK
	MCGEE CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X				X			CROWLEY LAKE
	HILTON CREEK	PERENNIAL STREAM	X	X		X	X	X			X	X	X			X		X				X			CROWLEY LAKE
	HILTON LAKES	LAKES	X						X		X	X	X			X		X				X			HILTON CREEK
	LITTLE ALKALI LAKE	ALKALI LAKE		X			X	X			X	X	X			X		X				X			CROWLEY LAKE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X				X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X				X	X	X	
603.20	**UPPER OWENS HYDROLOGIC AREA**																								
	OWENS RIVER WETLANDS	WETLANDS	X	X			X				X	X			X	X		X			X		X	X	
	OWENS RIVER (BELOW CROWLEY LAKE)	PERENNIAL STREAM	X					X		X	X	X	X			X		X		X		X			LA DWP POWER PLANT & PLEASANT VALLEY RESERVOIR
	OWENS RIVER (BELOW FIRST P.H.)	EPHEMERAL STREAM	X					X		X	X	X	X			X		X		X		X			LA DWP POWER PLANT & PLEASANT VALLEY RESERVOIR
	OWENS RIVER (BELOW PLEASANT VALLEY RESERVOIR)	PERENNIAL RIVER	X	X			X	X	X		X	X	X			X		X		X		X			TINEMAHA RESERVOIR
	ROCK CREEK	PERENNIAL STREAM	X	X		X	X	X		X	X	X	X			X		X				X			
	ROCK CREEK WETLANDS @ BOUNDARY ROAD	RIPARIAN/FLOODPLAIN/EMERGENT	X	X			X	X			X	X	X			X		X				X	X	X	ROCK CREEK
	ROCK CREEK LAKE	LAKE	X								X	X	X			X		X				X			ROCK CREEK
	EASTERN BROOK LAKES	LAKES	X								X	X	X			X		X				X			ROCK CREEK
	PINE CREEK	PERENNIAL STREAM	X	X		X	X	X		X	X	X	X			X		X				X			PLEASANT VALLEY RESERVOIR
	BIRCHIM LAKE	LAKE	X								X	X	X			X		X		X					PINE CREEK
	PINE LAKE	LAKE	X								X	X	X			X		X				X			PINE CREEK
	HONEYMOON LAKE	LAKE	X								X	X	X			X		X							PINE CREEK
	GABLE LAKES	LAKE	X						X		X	X	X			X		X							GABLE CREEK
	PLEASANT VALLEY RESERVOIR	RESERVOIR	X								X	X	X			X		X							OWENS RIVER
	HORTON CREEK	PERENNIAL CREEK	X	X			X	X			X	X	X			X		X				X			OWENS RIVER
	HORTON CREEK WETLANDS 4 (@ HWY 395)	WET MEADOW/EMERGENT	X	X			X	X			X	X	X			X		X				X	X	X	HORTON CREEK
	HORTON CREEK WETLANDS 5	WETLANDS	X	X			X	X			X	X	X			X		X				X	X	X	HORTON CREEK
	BROCKMAN RD. WETLAND BTWN 395 AND HORTON CREEK	WET MEADOW	X	X			X				X	X	X			X		X					X	X	OWENS RIVER
	SAWMILL CR MARSH @ HWY 395	RIPARIAN/EMERGENT/MARSH	X	X			X	X			X	X	X			X		X				X	X	X	HORTON CREEK
	PINE CREEK WETLANDS @ N. ROUND VALLEY ROAD	RIPARIAN/EMERGENT	X	X			X	X			X	X	X			X		X				X	X	X	PINE CREEK
	PINE CR DISTRIBUTARY CHANNEL	RIPARIAN	X	X			X	X			X	X	X			X		X				X	X	X	PINE CREEK/ROCK CREEK
	WELLS MEADOW SPRING CREEK WETLANDS	WETLANDS	X	X			X	X			X	X	X			X		X				X	X	X	ROCK CREEK
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X		X		X	X	X	
	OWENS RIVER WATERSHED																								
	SAWMILL POND	POND	X	X		X	X				X	X	X		X	X		X							HORTON CREEK
	MCGEE CREEK	PERENNIAL CREEK	X	X			X	X		X	X	X	X			X		X	X			X			BISHOP CREEK & HORTON CREEK
	OWENS RIVER CANAL	EPHEMERAL CANAL	X	X			X				X	X	X			X		X							OWENS RIVER

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
603.20	FISH SLOUGH WETLANDS	WETLANDS	X	X			X				X	X			X	X		X	X	X		X	X	X	
	FISH SLOUGH(INYO-MONO CO LINE)	SLOUGH	X	X			X	X			X	X			X	X		X	X	X	X	X	X		OWENS RIVER
	FISH SLOUGH (AT FS DIVERSION)	SLOUGH	X	X			X				X	X			X	X		X	X	X			X		OWENS RIVER
	WETLAND NEAR PLEASANT VALLEY CAMPGROUND	RELICTUAL WETLAND	X	X			X				X	X			X	X		X	X				X	X	OWENS RIVER
	FISH SLOUGH	SLOUGH	X	X			X				X	X	X		X	X		X	X	X		X			OWENS RIVER
	MCNALLY CANALS	EPHEMERAL CANAL	X	X			X				X	X	X			X		X							OWENS RIVER
	WETLAND BETWEEN MCNALLY CANALS	WETLANDS	X	X			X				X	X	X		X			X					X	X	OWENS RIVER
	WETLAND BETWEEN MCNALLY CANALS	WETLANDS	X	X		X	X				X	X	X		X			X					X	X	OWENS RIVER
	UPPER MCNALLY CANAL WETLANDS	WETLANDS	X	X		X	X	X			X	X	X		X			X					X	X	OWENS RIVER
	BISHOP CREEK CANAL	PERENNIAL CANAL	X	X			X				X	X	X			X		X							OWENS RIVER
	RAWSON CANAL	EPHEMERAL CANAL	X	X			X				X	X	X			X		X							OWENS RIVER
	COLLINS CANAL	PERENNIAL CANAL	X				X				X	X	X			X		X							OWENS RIVER
	BUCKLEY PONDS	PONDS	X	X			X				X	X	X		X	X		X							OWENS RIVER
	BISHOP CREEK (ABOVE INTAKES)	PERENNIAL STREAM	X	X						X	X	X	X			X		X				X			INTAKE 2 RESERVOIR
	INTAKE 2 RESERVOIR	RESERVOIR	X							X	X	X	X			X		X							SOUTHERN CALIFORNIA EDISON
	BISHOP CREEK (BELOW INTAKE 2)	EPHEMERAL STREAM	X							X	X	X	X			X		X				X			POWER PLANT
	BISHOP CREEK (BELOW LAST P.H.)	PERENNIAL STREAM	X	X		X	X				X	X	X			X		X				X			OWENS RIVER
	HALLSIDE RESERVOIR	RESERVOIR	X								X	X	X			X		X							BISHOP CREEK
	NORTH LAKE	RESERVOIR	X						X		X	X	X			X		X							BISHOP CREEK
	LAKE SABRINA	RESERVOIR	X						X	X	X	X	X			X		X							BISHOP CREEK
	SOUTH LAKE	RESERVOIR	X						X	X	X	X	X		X	X		X							BISHOP CREEK
	GREEN LAKE CREEK	PERENNIAL STREAM	X								X	X	X			X		X							BISHOP CREEK
	COYOTE CREEK	PERENNIAL STREAM	X	X							X	X	X			X		X							BISHOP CREEK
	KEOUGH HOT SPRINGS	SPRINGS		X			X				X	X	X		X	X		X							OWENS RIVER
	BIG PINE CANAL	EPHEMERAL CANAL	X	X			X				X	X	X			X		X							OWENS RIVER
	BIG PINE CANAL	WETLANDS, MAINTAINED IRRIG CANAL	X	X			X	X			X	X			X			X					X	X	OWENS RIVER
	BAKER CREEK	PERENNIAL CREEK	X	X		X	X				X	X	X			X		X				X			BIG PINE CANAL
	BIRCH CREEK	PERENNIAL CREEK	X	X			X	X		X	X	X	X			X	X	X				X			TINEMAHA CREEK
	RED MOUNTAIN CREEK	PERENNIAL CREEK	X	X			X	X			X	X	X			X		X				X			TINEMAHA CREEK
	FISH SPRINGS	SPRINGS	X	X		X	X				X	X	X	X	X	X		X	X	X		X			TINEMAHA CREEK
	TINEMAHA CREEK	PERENNIAL CREEK	X	X			X				X	X	X			X		X				X			TINEMAHA RESERVOIR
	TINEMAHA RESERVOIR	RESERVOIR	X	X			X				X	X	X			X		X		X					OWENS RIVER
	MORRIS CREEK	PERENNIAL IN UPPER REACH	X	X			X				X	X	X			X		X							BENTON VALLEY GROUNDWATER
	CHALFANT VALLEY WATERSHED																								
	BARTLETT RANCH SPRINGS	SPRINGS	X	X			X				X	X	X			X		X							BENTON VALLEY GROUNDWATER
	MONTGOMERY CREEK	PERENNIAL IN UPPER REACH	X	X			X				X	X	X			X		X							BENTON VALLEY GROUNDWATER
	MARBLE CREEK	PERENNIAL IN UPPER REACH	X	X			X				X	X	X			X		X							HAMIL VALLEY GROUNDWATER
	ROCK CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							HAMIL VALLEY GROUNDWATER
	FALLS CANYON CREEK	INTERMITTENT STREAM	X	X			X				X	X	X			X		X							HAMIL VALLEY GROUNDWATER
	PELLISIER CREEK	INTERMITTENT STREAM	X	X			X				X	X	X			X		X							HAMIL VALLEY GROUNDWATER
	MIDDLE CANYON CREEK	INTERMITTENT STREAM	X	X			X				X	X	X			X		X							HAMIL VALLEY GROUNDWATER

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			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
603.20	BIRCH CREEK	INTERMITTENT STREAM	X	X			X				X	X	X			X		X							HAMIL VALLEY GROUNDWATER
	WILLOW CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			HAMIL VALLEY GROUNDWATER
	COTTONWOOD CANYON CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			HAMIL VALLEY GROUNDWATER
	LONE TREE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			HAMIL VALLEY GROUNDWATER
	MINOR STREAMS		X	X			X				X	X				X		X							
	YELLOWJACKET CANYON CREEK	INTERMITTENT STREAM	X	X			X				X	X	X			X		X							HAMIL VALLEY GROUNDWATER
	BENTON HOT SPRINGS	SPRINGS	X	X			X				X	X	X		X	X		X							HAMIL VALLEY GROUNDWATER
	MILNER CREEK	INTERMITTENT STREAM	X	X			X			X	X	X	X			X		X							CHALFANT VALLEY GW
	SILVER CANYON CREEK	PERENNIAL IN UPPER REACH	X	X			X				X	X	X			X		X							CHALFANT VALLEY GW
	WARM SPRINGS	SPRINGS	X	X			X				X	X	X		X	X		X	X	X			X		
	WETLANDS/HOUSE S. OF REDDING CYN.	WETLANDS	X	X			X				X	X			X			X					X	X	OWENS VALLEY GW
	WARM SPRINGS	SPRING	X	X			X	X			X	X			X			X	X	X			X		OWENS RIVER
	WETLANDS/1st CYN S. OF SILVER CREEK	WETLANDS/SPRINGS	X	X			X				X	X				X		X					X	X	OWENS VALLEY GW
	WETLANDS/MEADOW LEFT OF PINE CREEK RD.	WET MEADOW	X	X			X				X	X						X					X	X	PLEASANT VALLEY RESERVOIR
	PINE CREEK AT ROVANA	WETLANDS, RIPARIAN	X	X			X				X	X				X		X					X	X	OWENS R./ PLEASANT VAL. RES.
	WETLANDS/FORKS CAMPGROUND	WETLANDS	X	X			X				X	X				X		X					X	X	BISHOP CREEK
	DUTCH JOHNS MEADOWS WETLANDS	WET MEADOW	X	X			X				X	X				X		X					X	X	BISHOP CREEK
	WETLANDS/POWER STATION 3 (ELEV. 6500')	RIPARIAN	X	X		X	X				X	X				X		X					X	X	
	WETLANDS/LOWER BIRCH CREEK(HWY 168, ELEV 5700')	WETLANDS	X	X			X				X	X						X					X	X	
	WETLANDS/LOWER McGEE CREEK(ELEV 5700')	RIPARIAN, WETLANDS	X	X		X	X				X	X			X			X					X	X	BISHOP CREEK
	SHARPS MEADOW(UPPER McGEE CREEK) WETLANDS	WETLANDS/ SPRINGS	X	X			X				X	X			X	X		X					X	X	MCGEE CREEK/ BISHOP CREEK
	WELLS UPPER MEADOW WETLANDS	WET MEADOW/ WETLANDS	X	X			X				X	X						X					X	X	
	BUTTERMILK CANYON(ELEV 7800') CREEK	WETLANDS	X	X			X				X	X				X		X					X	X	
	UPPER BIRCH CREEK		X	X			X				X	X				X		X					X	X	PLEASANT VALLEY RES
	MIDDLE FORK BISHOP CREEK(ELEV.9000') WETLANDS	WET MEADOW, RIPARIAN	X				X				X	X				X		X					X	X	BISHOP CREEK
	SOUTH FORK BISHOP CREEK WETLANDS	WET MEADOW, RIPARIAN	X	X			X				X	X				X		X					X	X	BISHOP CREEK
	WARREN DRY LAKE WETLANDS	WETLANDS	X	X			X				X	X			X			X					X	X	OWENS RIVER
	WETLANDS/HALF Km. NW OF WARREN LAKE	WETLANDS, WET MEADOW	X	X			X				X	X						X					X	X	OWENS VALLEY GW
	WETLANDS/HALF Km. WEST OF WARREN LAKE	WETLANDS, WET MEADOW	X	X			X				X	X						X					X	X	OWENS VALLEY GW
	WETLANDS/WELL NORTH OF KLONDIKE LAKE	WETLANDS, WET MEADOW	X	X			X	X			X	X						X	X				X	X	OWENS RIVER
	WETLANDS/CHANNEL N OF KLONDIKE LAKE	WETLANDS, RIPARIAN	X	X			X				X	X			X			X	X				X	X	OWENS RIVER, KLONDIKE LAKE
	WETLANDS/OWENS RIVER CHANNEL N. OF KLONDIKE LK	WETLANDS, RIPARIAN	X	X			X				X	X			X			X	X				X	X	OWENS LAKE
	WETLANDS/EAST SIDE OF OWENS VALLEY, 0.5 Km N OF HWY 168	WETLANDS	X	X			X	X			X	X						X					X	X	OWENS RIVER
	WETLANDS/E. SIDE OF OWENS VALLEY	WETLANDS	X	X			X	X			X	X						X					X	X	OWENS RIVER
	BAKER CREEK, ABOVE BIG PINE	WETLANDS	X	X			X				X	X	X			X		X	X				X	X	OWENS RIVER
	UHLMEYER SPRINGS	SPRING	X	X			X				X	X						X							OWENS VALLEY GROUNDWATER
	MINOR SURFACE WATERS		X	X		X	X				X	X	X			X		X		X			X		
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
603.30	LOWER OWENS HYDROLOGIC AREA																									

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
603.30	OWENS RIVER WETLANDS	WETLANDS	X	X			X				X	X			X	X		X			X		X	X	
	OWENS LAKE WETLANDS	WETLANDS	X	X			X				X	X			X	X		X					X	X	
	OWENS RIVER (BELOW TINEMAHA RESERVOIR)	CONTROLLED RIVER	X	X			X				X	X	X			X		X		X		X			HAIWEE RES./VIA L.A. AQUEDUCT
	OWENS RIVER (BELOW INTAKE DAM)	EPHEMERAL STREAM	X	X			X	X			X	X	X		X	X		X	X	X		X			OWENS LAKE
	WETLANDS/ALKALI FLAT EAST OF OWENS RIVER, DOLOMITE	WETLANDS	X	X			X	X			X	X						X					X	X	LA AQUEDUCT
	WETLANDS/DOLOMITE	WETLANDS	X	X			X	X			X	X						X					X	X	LA AQUEDUCT
	LOWER OWENS RIVER CHANNEL WETLANDS	WETLANDS	X	X			X				X	X			X			X	X	X			X	X	LA AQUEDUCT
	TABOOSE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	GOODALE CREEK	PERENNIAL STREAM	X	X			X				X	X	X	X		X		X				X			L.A. AQUEDUCT
	DIVISION CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X	X		X		X				X			L.A. AQUEDUCT
	SAWMILL CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	THIBAUT CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	OAK CREEK CAMPGROUND WETLANDS	WETLANDS	X	X		X	X				X	X				X		X					X	X	OAK CREEK
	OAK CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X	X	X	X		X		X		X			L.A. AQUEDUCT
	NORTH FORK OAK CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			OAK CREEK
	SOUTH FORK OAK CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			OAK CREEK
	INDEPENDENCE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	PINYON CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			TRIB. TO INDEPENDENCE
	SYMMES CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	SPRING N OF SHEPHERD CREEK	SPRINGS	X	X			X				X	X	X					X	X	X					L.A. AQUEDUCT
	SHEPHERD CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	BAIRS CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			L.A. AQUEDUCT
	GEORGE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	HOGBACK CREEK	PERENNIAL STREAM	X	X			X	X			X	X	X			X		X	X	X		X	X		L.A. AQUEDUCT
	WETLANDS/EAST OF MOVIE FLAT		X			X	X				X	X						X					X	X	OWENS VALLEY GW
	WETLANDS/HWY 395	WETLANDS	X	X			X				X	X						X	X				X	X	L.A. AQUEDUCT
	WTLNDS/FAULT SCARP W OF MT WHIT CEMTRY LONE PINE	WETLANDS	X	X			X				X	X						X					X	X	OWENS RIVER
	LOWER LONE PINE CREEK WETLANDS	WETLANDS	X	X			X		X		X	X				X		X					X	X	OWENS RIVER
	SPRING SOUTH OF LONE PINE CREEK	SPRING	X	X			X				X	X			X			X					X		LONE PINE CREEK
	SEEP WEST OF HORSESHOE MEADOW ROAD	WETLANDS	X	X			X				X	X						X					X	X	LONE PINE CREEK
	WETLANDS/PHEASANT CLUB EAST OF TUTTLE CREEK RD	SPRINGS	X	X		X	X				X	X						X	X				X	X	N FORK LUBKEN CREEK
	INDIAN SPRING	SPRINGS	X	X		X	X				X	X			X			X					X		LUBKEN CREEK
	POND ON INDIAN SPRINGS ROAD	SPRINGS	X	X			X				X	X			X			X					X		DIAZ LAKE
	TUTTLE CREEK	RIPARIAN	X	X			X				X	X				X		X					X		OWENS RIVER
	SEEP NORTH OF MOVIE FLAT	SPRING	X	X			X				X	X						X							
	WETLANDS/LONE PINE NARROW GORGE ROAD	WETLANDS	X	X			X				X	X						X	X	X			X	X	LA AQUEDUCT
	LONE PINE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	TUTTLE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	DIAZ CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	DIAZ LAKE	LAKE	X	X			X		X		X	X	X		X	X		X				X			OWENS VALLEY GROUNDWATER
	NORTH FORK LUBKIN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			OWENS VALLEY GROUNDWATER

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
603.30	SOUTH FORK LUBKIN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			OWENS VALLEY GROUNDWATER
	CARROLL CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			OWENS VALLEY GROUNDWATER
	COTTONWOOD CREEK	PERENNIAL STREAM	X	X			X			X	X	X	X			X		X				X			L.A. AQUEDUCT
	COTTONWOOD LAKES (NO. 1,2,3,4,5,6)	LAKES	X				X				X	X	X			X		X				X			COTTONWOOD CREEK
	ASH CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X	X			X			HAIWEE RESERVOIR
	CARTAGO CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			HAIWEE RESERVOIR
	OLANCHA CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			HAIWEE RESERVOIR
	HAIWEE RESERVOIR WETLANDS	WETLANDS	X	X			X				X	X				X		X					X	X	
	HAIWEE RESERVOIR	RESERVOIR	X	X		X	X				X	X	X			X		X		X		X			L.A. AQUEDUCT
	SUMMIT CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	HOGBACK CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X			X		X				X			HAIWEE RESERVOIR
	WETLANDS EAST OF STEVENS CANAL	WETLANDS	X	X			X	X			X	X						X	X	X			X	X	L.A. AQUEDUCT
	WETLANDS/FORT INDEPENDENCE RD. AT HWY 395	WET MEADOW	X	X			X	X			X	X				X		X	X	X			X	X	L.A. AQUEDUCT
	FORT INDEPENDENCE INDIAN RESERVATION	WETLANDS	X	X			X				X	X						X	X	X			X	X	OAK CREEK/ LA AQUEDUCT
	WTLNDS/SPR E OF SHABBEL LN, N OF INDEPENDENCE	SPRING	X	X			X				X	X						X	X	X			X		LA AQUEDUCT
	SPRINGS S. OF KEELER	SPRINGS	X	X		X	X				X	X						X							OWENS LAKE
	CERRO GORDO SPRING	SPRINGS	X	X		X	X				X	X						X							OWENS LAKE
	DIRTY SOCKS HOT SPRING	SPRINGS	X	X			X				X	X						X							OWENS LAKE
	SPRING NE OF OLANCHA	SPRINGS	X	X			X				X	X						X							OWENS LAKE
	KEELER SPRINGS	SPRINGS	X	X		X	X	X			X	X			X	X	X	X			X				OWENS LAKE
	OWENS LAKE	INTERMITTENT LAKE									X	X	X		X	X	X	X							INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X	X		X	X				X	X	X		X	X		X		X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
603.40	**CENTENNIAL HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X	X			X	X			X	X	X		X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
604.00	**FISH LAKE HYDROLOGIC UNIT**																								
	CABIN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X					FISH LAKE VALLEY GW
	CHIATOVICH CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							FISH LAKE VALLEY GW
	INDIAN CREEK	STREAM	X	X			X				X	X	X			X		X							FISH LAKE VALLEY GW
	LEIDY CREEK	PERENNIAL STREAM	X	X			X			X	X	X	X			X		X		X					FISH LAKE VALLEY GW
	PERRY AIKEN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							FISH LAKE VALLEY GW
	MCAFEE CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X			X		X							FISH LAKE VALLEY GW
	TOLER CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							FISH LAKE VALLEY GW
	IRON CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							FISH LAKE VALLEY GW
	WILDHORSE CREEK	INTERMITTENT STREAM	X	X			X				X	X	X			X		X							FISH LAKE VALLEY GW
	FURNACE CREEK	INTERMITTENT STREAM	X	X			X				X	X	X			X		X							FISH LAKE VALLEY GW
	INDIAN GARDEN CREEK	INTERMITTENT STREAM	X	X			X				X	X	X			X		X							FISH LAKE VALLEY GW
	COTTONWOOD CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X					FISH LAKE VALLEY GW

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

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			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
604.00	MINOR SURFACE WATERS		X	X			X				X	X	X			X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X					X	X	
605.00	**DEEP SPRINGS HYDROLOGIC UNIT**																								
	WYMAN CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X			X							DEEP SPRINGS VAL. GW
	CROOKED CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X			X							TRIBUTARY TO WYMAN CREEK
	DEEP SPRINGS LAKE WETLANDS AND MARSH		X								X	X			X		X	X	X	X			X	X	
	DEEP SPRINGS LAKE	INTERMITTENT LAKE					X				X	X	X		X		X	X	X	X					DEEP SPRINGS VAL. GW
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
606.00	**EUREKA HYDROLOGIC UNIT**																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X					X	X	
606.10	**MARBLE BATH HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X					X	X	
606.20	**MARBLE CANYON HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X					X	X	
607.00	**SALINE HYDROLOGIC UNIT**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X		X	X	X						
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X	X		X	X		X					X	X	
607.10	**SALT LAKE HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X			X	X		X					X	X	
607.20	**CAMEO HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X			X	X		X					X	X	
608.00	**RACE TRACK HYDROLOGIC UNIT**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X		X	X	X	X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X	X		X	X		X					X	X	

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
608.10	**TEAKETTLE JUNCTION HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X			X	X		X					X	X	
608.20	**HIDDEN VALLEY HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X			X	X		X					X	X	
608.30	**ULIDA HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X			X	X		X					X	X	
608.40	**SAND FLAT HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X			X	X		X					X	X	
609.00	**AMARGOSA HYDROLOGIC UNIT**																								
	TECOPA WETLANDS	WETLANDS	X								X	X			X			X	X	X	X		X	X	
	COTTONBALL MARSH	WETLANDS	X								X	X			X			X	X	X			X	X	
	AMARGOSA RIVER WETLANDS	WETLANDS	X	X			X				X	X			X			X	X	X		X	X	X	
	AMARGOSA RIVER	INTERMITTENT STREAM		X			X				X	X			X		X	X	X	X		X			AMARGOSA SUBAREA GW
	SALT CREEK	PERENNIAL STREAM	X				X				X	X			X		X	X	X	X		X			DEATH VALLEY GROUNDWATER
	SARATOGA SPRINGS	SPRINGS	X	X			X				X	X			X	X		X	X	X					DEATH VALLEY GW
	SCOTTY'S RANCH SPRINGS	SPRINGS	X	X			X				X	X			X	X		X	X	X					DEATH VALLEY GW
	SCOTTY'S CASTLE SPRINGS	SPRINGS	X	X			X				X	X			X		X	X	X	X					DEATH VALLEY GW
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X		X	X				
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X	X	X			X	X	
609.10	**DEATH VALLEY HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X			X	X		X		X			X	X	
609.11	**STOVEPIPE WELLS HYDROLOGIC SUBAREA**																								
	SHEEP SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER
	AMARGOSA SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		DEATH VALLEY GW
	SCOTTYS SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA R./DEATH VALLEY GW
	TIMPAPAH SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA R./DEATH VALLEY GW
	OWL HOLE SPRINGS	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER
	SARATOGA SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER
	MANLY PEAK SPRINGS	SPRINGS	X	X			X	X			X	X			X	X		X		X			X		BUTTE VL GW/ANVIL SPG. CYN. WS
	LITTLE, SQUAW, & WILLOW SPRINGS	SPRINGS	X	X			X	X			X	X			X	X		X		X			X		ANVIL SPG. CYN WS/ DEATH VL. GW

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			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
609.11	CAVE, COTTONWOOD AND ARRASTRE SPRINGS	SPRINGS	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER, DEATH VAL. GW
	MESQUITE, LOST SPRINGS	SPRINGS	X	X			X	X			X	X			X	X		X		X			X		ANVIL SPG. CYN, AMARGOSA R.
	GRUBSTAKE SPRINGS	SPRINGS	X	X			X	X			X	X			X	X		X		X			X		WARM SPG. CYN, AMARGOSA R.
	WARM SPRINGS	SPRINGS	X	X			X	X			X	X			X			X		X			X		WARM SPG.CYN, AMARGOSA R.
	RHODES SPRINGS	SPRINGS	X	X			X	X			X	X			X	X		X		X			X		RHODES WASH, DEATH VAL GW
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.12	HARRISBURGH HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.13	WINGATE WASH HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.20	SILURIAN HILLS HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.21	AVAWATZ HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.22	RED PASS HYDROLOGIC SUBAREA																								
	RED PASS LAKE	ALKALI LAKE	X				X				X	X			X		X	X		X				X	INTERNL DRN LK/RED PASS LK GW
	NO NAME LAKE	ALKALI LAKE	X				X				X	X			X		X	X		X				X	INTERNL DRN LK/RED PASS LK GW
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.23	VALJEAN HYDROLOGIC SUBAREA																								
	SILURIAN LAKE	ALKALI LAKE	X				X				X	X			X		X	X		X					SILURIAN LK/SILURIAN VAL GW
	KINGSTON SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		SILURIAN LK/SILURIAN VAL GW
	COYOTE HOLES SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		KINGSTON W./SALT C./SILURIAN L.
	RABBIT HOLES SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		SILURIAN LAKE/SILURIAN VAL GW
	MINOR SURFACE WATERS		X	X			X	X			X	X			X	X		X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.24	SHADOW HYDROLOGIC SUBAREA																								
	COW COVE SPRINGS	FLOODPLAIN/SEEPS/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		SHADOW VALLEY GW
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
609.24	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.30	RYAN HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.31	FURNACE CREEK HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.32	GREENWATER HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.40	AMARGOSA DESERT HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.41	CALICO HYDROLOGIC SUBAREA																								
	SALSBERRY SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER
	MONTGOMERY SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER
	MINOR SURFACE WATERS		X	X			X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X					X	X	
609.42	SHOSHONE HYDROLOGIC SUBAREA																								
	WILLOW SPRING	SPRING/RIPARIAN/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER
	TECOPA HOT SPRINGS	SPRINGS	X	X			X				X	X			X			X	X	X					DEATH VALLEY GW
	TECOPA MARSHES	MARSHES/EMERGENT	X	X			X				X	X			X	X		X	X	X			X	X	DEATH VALLEY GW
	GRIMSHAM LAKE	LAKE/EMERGENT MARSHES	X	X			X				X	X			X	X		X	X	X			X	X	DEATH VALLEY GW
	SHOSHONE SPRING	SPRING/EMERGENT MARSHES/RIPARIAN	X	X			X	X			X	X			X	X		X		X			X	X	AMARGOSA RIVER
	CHAPPO SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER
	AMARGOSA RIVER/TECOPA RIPARIAN WETLANDS	RIPARIAN/EMERGENT/FLOODPLAIN	X	X			X	X			X	X			X	X		X		X			X	X	AMARGOSA RIVER
	MINOR SURFACE WATERS		X	X			X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X					X	X	
	RESTING SPRING/SPANISH TRAIL RIPARIAN WETLANDS	SPRING/RIPARIAN/EMERGENT	X	X			X	X			X	X			X	X		X		X			X	X	AMARGOSA RIVER
	SHEEPHEAD SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		AMARGOSA RIVER
	MINOR SURFACE WATERS		X	X			X	X			X	X			X	X		X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.43	CHICAGO HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X		X					

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
609.43	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X		X			X	X	
609.44	**CALIFORNIA VALLEY HYDROLOGIC SUBAREA**																								
	BECK SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		CALIFORNIA VALLEY GW
	CRYSTAL SPRING	SPRING/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		CALIFORNIA VALLEY GW
	MINOR SURFACE WATERS		X	X			X	X			X	X			X			X		X					
	MINOR SPRINGS/SEEPS/WETLANDS	SPRING/SEEPS/EMERGENT	X	X			X	X			X	X			X			X		X			X	X	CALIFORNIA VALLEY GW
610.00	**PAHRUMP HYDROLOGIC UNIT**																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X		X					
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X		X			X	X	
611.00	**MESQUITE HYDROLOGIC UNIT**																								
	MESQUITE LAKE	ALKALI LAKE	X	X			X				X	X	X		X		X	X					X		INTERNL DRN LAKE/MESQUITE --
	HORSE THIEF SPRINGS	SPRINGS/EMERGENT	X	X			X				X	X	X		X	X		X					X		MESQUITE VALLEY GW
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
612.00	**IVANPAH HYDROLOGIC UNIT**																								
	IVANPAH LAKE	ALKALI LAKE	X	X			X				X	X			X	X	X	X					X	X	INTERNL DRN LK/IVANPAH VAL GW
	IVANPAH SPRINGS	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	WILLOW SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	MINERAL SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	WHEATON SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		WHEATON WASH
	CLIFF CANYON SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	SLAUGHTERHOUSE SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	SACATON SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	CHINA SPRINGS	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		WHEATON WASH
	HARDROCK QUEEN SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		WHEATON WASH
	GROANER SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		WHEATON WASH
	JUNIPER SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		IVANPAH LAKE
	WILLOW SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		IVANPAH LAKE
	DOVE SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X		X			X		IVANPAH LAKE
	COTTONWOOD SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	LIVE OAK SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	CABIN SPRING	SPRINGS/EMERGENT	X	X			X	X			X	X			X	X		X					X		IVANPAH LAKE
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X			X	X		X					X	X	
613.00	**OWLSHEAD HYDROLOGIC UNIT**																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	RECEIVING WATER
613.10	LOST LAKE HYDROLOGIC AREA																								
	LOST LAKE	ALKALI LAKE	X				X				X	X					X	X							INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
613.20	OWL LAKE HYDROLOGIC AREA																								
	OWL LAKE	ALKALI LAKE	X				X				X	X					X	X							INTERNALLY DRAINED LAKE
	QUAIL SPRING	SPRING	X	X			X	X			X	X			X	X		X							OWL LAKE
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
614.00	LEACH HYDROLOGIC UNIT																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
615.00	GRANITE HYDROLOGIC UNIT																								
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X				X	X			X	X	X		X	X		X					X	X	
615.10	MCLEAN HYDROLOGIC AREA																								
	MCLEAN LAKE	ALKALI LAKE	X				X				X	X	X		X		X	X							INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
615.20	NELSON HYDROLOGIC AREA																								
	NELSON LAKE	ALKALI LAKE	X				X				X	X	X		X		X	X							INTERNALLY DRAINED LAKE
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
616.00	BICYCLE HYDROLOGIC UNIT																								
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
617.00	GOLDSTONE HYDROLOGIC UNIT																								
	GOLDSTONE LAKE	ALKALI LAKE	X				X				X	X			X		X	X							INTERNALLY DRAINED LAKE
	PIONEER LAKE	ALKALI LAKE	X				X				X	X			X		X	X							INTERNALLY DRAINED LAKE
	GOLDSTONE LAKE	LAKE	X								X	X			X			X							
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
618.00	**COYOTE HYDROLOGIC UNIT**																								
	PARADISE SPRINGS	SPRINGS/HOT SPRINGS	X	X			X	X			X	X			X			X					X		COYOTE LAKE GW
	JACK SPRING	SPRINGS	X	X			X	X			X	X			X	X		X							COYOTE LAKE GW
	COYOTE LAKE		X				X	X			X	X	X		X			X							COYOTE LAKE
	JACK RABBIT SPRINGS		X	X			X				X	X	X		X			X							COYOTE LAKE
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
619.00	**SUPERIOR HYDROLOGIC UNIT**																								
	SUPERIOR LAKE	LAKE	X								X	X			X			X							SUPERIOR LAKE
	INDIAN SPRINGS	SPRINGS	X	X							X	X			X			X							SUPERIOR LAKE
	UNNAMED LAKES	LAKE	X								X	X			X			X							SUPERIOR LAKE
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
619.00	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.00	**BALLARAT HYDROLOGIC UNIT**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X		X	X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.10	**WINGATE PASS HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X		X	X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.20	**WILDROSE HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X		X	X	X	X		X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.21	**WHITE SAGE HYDROLOGIC SUBAREA**																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.22	**WILD ROSE PEAK HYDROLOGIC SUBAREA**																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.30	**LEE FLAT HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.40	**SANTA ROSA FLAT HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.41	**MALPAIS MESA HYDROLOGIC SUBAREA**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.42	**RAINBOW HYDROLOGIC SUBAREA**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.43	**SILVER DOLLAR HYDROLOGIC SUBAREA**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.50	**DARWIN HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X	X		X	X				X	X	X		X	X		X	X						
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X		X	X	X			X	X	X		X	X		X					X	X	
620.60	**PANAMINT VALLEY HYDROLOGIC AREA**																								
	REDLANDS SPRING, DOWN THE FALL	SPRING, CREEK	X				X				X	X			X	X		X							PANAMINT VALLEY GW
	SOURDOUGH SPRINGS	SPRINGS	X				X				X	X			X	X		X							PANAMINT VALLEY GW
	GOLER CAN SPRINGS (UNNAMED)	SPRINGS	X				X				X	X			X	X		X							PANAMINT VALLEY GW
	MINOR SURFACE WATERS		X			X	X				X	X	X		X	X		X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X		X	X	X			X	X	X		X	X		X					X	X	
620.70	**BROWN HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X		X	X		X					X	X	
620.80	**ROBBERS HYDROLOGIC AREA**																								
	LEAD PIPE SPRINGS	SPRINGS					X				X	X			X			X							PILOT KNOB VAL, PANAMINT VAL.
	MINOR SURFACE WATERS		X				X				X	X	X		X			X							
	MINOR WETLANDS						X	X			X	X			X			X					X	X	
621.00	**TRONA HYDROLOGIC UNIT**																								
	SEARLES DRY LAKE BED	SALINE LAKE			X	X					X	X					X	X							TERMINAL DRAINED LAKE
	MINOR SURFACE WATERS		X				X				X	X			X			X	X						
	MINOR WETLANDS		X			X	X	X			X	X			X			X					X	X	
621.10	**SEARLES VALLEY HYDROLOGIC AREA**																								
	PEACH SPRINGS	SPRINGS	X				X				X	X			X			X							SEARLES VALLEY GROUNDWATER

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
621.10	UNAMED SPRINGS IN THE NE CORNER OF TRONA W. QUAD	SPRINGS	X				X				X	X			X			X							SEARLES VALLEY GW
	SPRINGS ON THE HOMEWOOD CAN QUAD	SPRINGS	X				X				X	X			X			X							SEARLES VALLEY GW
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	WETLANDS	X				X	X			X	X			X			X					X	X	
621.20	SALT WELLS HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X								X	X			X			X							
	MINOR WETLANDS		X				X	X			X	X			X			X					X	X	
621.30	PILOT KNOB HYDROLOGIC AREA																								
	SEEP SPRINGS	SPRINGS	X				X				X	X			X			X							
	GRANITE WELLS SPRINGS	SPRINGS	X				X				X	X			X			X							GRANITE WELLS
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	WETLANDS	X				X	X			X	X			X			X					X	X	
622.00	COSO HYDROLOGIC UNIT																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS		X	X			X	X			X	X			X			X					X	X	
622.10	WILD HORSE HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X			X							
	MINOR WETLANDS	WETLANDS	X	X			X				X	X			X			X					X	X	
622.20	AIRPORT HYDROLOGIC AREA																								
	AIRPORT LAKE	ALKALI LAKE	X				X				X	X			X		X	X							INTERNALLY DRAINED LAKE
	MOUNTAIN SPRINGS & UPSTREAM	SPRINGS	X				X				X	X			X			X							MT SPR CYN WSH/INDIAN WELL GW
	MINOR SURFACE WATERS		X				X				X	X			X			X							
	MINOR WETLANDS	WETLANDS	X				X	X			X	X			X			X					X	X	
623.00	UPPER CACTUS HYDROLOGIC UNIT																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	WETLANDS	X	X			X				X	X			X			X					X	X	
624.00	INDIAN WELLS HYDROLOGIC UNIT																								
	INDIAN WELLS "BRIAN WELLS"		X	X			X	X			X	X			X			X							INDIAN WELLS VALLEY GW
	MINOR SURFACE WATERS		X	X			X				X	X			X			X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
624.10	ROSE HYDROLOGIC AREA																								
	LITTLE LAKE	LAKE	X	X			X				X	X			X			X							LITTLE LAKE
	LITTLE LAKE CANYON CREEK		X	X			X				X	X			X			X							LITTLE LAKE

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
624.10	INTERMITTENT TRIBUTARY		X	X			X				X	X			X			X					X		LITTLE LAKE
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X					X		
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
624.20	**CHINA LAKE HYDROLOGIC AREA**																								
	NINE MILE CANYON CREEK	INTERMITTENT STREAM	X	X			X				X	X	X		X	X		X							INDIAN WELLS SUBUNIT GW
	LARK SEEP LAGOON	LAKE	X	X			X				X	X			X			X	X	X		X	X		INDIAN WELLS SUBUNIT GW
	G-1 SEEP	SPRINGS	X	X			X				X	X			X	X		X		X		X			LARK SEEP
	SPRING IN FREEMAN CANYON	SPRINGS	X	X			X				X	X			X	X		X							FREEMAN CREEK
	BIG SPRINGS	SPRINGS	X	X			X				X	X			X	X		X							FREEMAN CREEK
	DRY LAKE SPRINGS	SPRINGS	X	X			X				X	X			X	X		X							INDIAN WELLS VALLEY GW
	DRY LAKE'	PLAYA LAKE	X	X			X				X	X			X	X		X							LAKE BED
	MOSCOW SPRINGS (3)	SPRINGS	X	X			X				X	X			X	X		X							SWEETWTR WSH,INDIAN WLS GW
	BIG SPRINGS	SPRINGS	X	X			X				X	X			X	X		X							INDIAN WELLS VALLEY GW
	INDIAN WELLS CANYON SPRINGS	SPRINGS	X	X			X				X	X			X	X		X							INDIAN WELLS VALLEY GW
	GRAPEVINE CYN SPRINGS	SPRINGS	X	X			X				X	X			X	X		X							INDIAN WELLS VALLEY GW
	SHORT CYN SPRINGS	SPRINGS	X	X			X				X	X			X	X		X							INDIAN WELLS VALLEY GW
	CHINA LAKE		X	X			X				X	X			X			X							CHINA LAKE
	SHEEP SPRINGS	SPRINGS	X	X			X				X	X			X	X		X							INDIAN WELLS VALLEY GW
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X					X	X	
625.00	**FREMONT HYDROLOGIC UNIT**																								
	TUCKER ROAD WETLANDS	WETLANDS, PERENNIAL	X	X			X				X	X			X			X					X	X	TEACHAPI V B GW
	WETLANDS ABOVE NEW DAM	EPHEMERAL STREAM	X				X				X	X			X			X					X	X	TEACHAPI V B GW
	E MOST SPRING IN "TUCKER ROAD" TRANSECT	SPRING	X	X			X				X	X			X			X							TEACHAPI V B GW
	OAK CREEK PASS SPRINGS	SPRINGS	X	X		X	X				X	X			X			X							TEACHAPI V B GW
	WTLNDS/OAK CR. PASS, 0.5 MI DWNSTREAM FROM SPRGS	WETLANDS	X			X	X				X	X			X			X					X	X	TEACHAPI V B GW
	OAK CREEK CANYON WETLANDS	WETLANDS	X	X			X				X	X			X			X					X	X	OAK CREEK
	GREEN SPRING	SPRINGS	X	X			X				X	X			X			X							KELSO VALLEY GROUNDWATER
	QUAIL SPRING	SPRINGS	X	X			X				X	X			X			X					X		COTTONWOOD CR./KELSO VAL GW
	UPPER COTTONWOOD CREEK		X	X			X				X	X			X			X					X		COTTONWOOD CREEK
	UPPER SAND CREEK		X	X			X				X	X			X			X							CACHE CREEK
	LOWER SAND CREEK		X	X			X				X	X			X			X							
	UPPER CACHE CREEK		X	X			X				X	X			X			X							CACHE CREEK
	CACHE CREEK		X	X			X				X	X			X			X							FREMONT VALLEY
	CACHE CREEK 2		X				X				X	X			X			X							CACHE CREEK/ FREMONT VALLEY
	PROCTOR DRY LAKE, S OF HWY 58		X	X			X				X	X			X			X							PROCTOR LAKE
	SPRINGS SOUTH OF PROCTOR LAKE	SPRINGS	X	X			X				X	X			X			X							PROCTOR LAKE
	WETLANDS/CAMERON CANYON RD OFFRAMP(W BOUND)		X				X				X	X			X			X					X	X	CACHE CREEK
	LOWER CACHE CREEK		X				X				X	X			X			X							CACHE CREEK

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
625.00	SEEP SOUTH OF CAMERON CANYON		X	X			X				X	X			X			X							CACHE CREEK
	SEEP ON SLOPE S. OF CAMERON CYN RD.		X	X			X				X	X			X			X							CACHE CREEK
	SPRING W OF CAMERON CANYON RD	SPRING	X	X			X				X	X			X			X							CACHE CREEK
	TEHACHAPI WILLOW SPRINGS RD WETLANDS		X				X				X	X			X			X					X	X	
	KOEHN DRY LAKE		X	X	X	X	X				X	X			X		X	X							GROUNDWATER
	MESQUITE SPRINGS	SPRINGS	X	X			X				X	X			X			X							FREMONT VALLEY GW
	RED ROCK CANYON CREEK		X				X				X	X			X			X							FREMONT VALLEY/ KOEHN LAKE
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
625.10	**DOVE SPRINGS HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X	X			X		X		X	X			X			X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
625.20	**KELSON LANDIS HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X	X			X		X		X	X			X			X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
625.30	**EAST TEHACHAPI HYDROLOGIC AREA**																								
	MINOR SURFACE WATERS		X	X			X		X		X	X			X			X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
625.40	**KOEHN HYDROLOGIC AREA**																								
	DUCK PONDS		X				X		X		X	X			X			X							KOEHN LAKE
	KOEHN LAKE		X				X		X		X	X			X			X							KOEHN LAKE
	MESA SPRINGS, POISON SPRINGS	SPRINGS	X	X			X		X		X	X			X			X							KOEHN LAKE
	MINOR SURFACE WATERS		X	X			X		X		X	X			X			X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
626.00	**ANTELOPE HYDROLOGIC UNIT**																								
	ROGERS LAKE WETLANDS	WETLANDS	X								X	X			X		X	X					X	X	
	OAK CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X		X			X							ANTELOPE VALLEY GW
	LITTLE ROCK CREEK	INTERMITTENT STREAM	X				X				X	X	X			X		X							ANTELOPE VALLEY GW
	BIG ROCK CREEK	PERENNIAL STREAM	X	X		X	X				X	X	X			X		X				X			ANTELOPE VALLEY GW
	MESCAL CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			L.A. AQUEDUCT
	FAIRMONT RESERVOIR	RESERVOIR	X	X		X	X				X	X	X		X			X							L.A. AQUEDUCT
	HAROLD RESERVOIR	RESERVOIR	X	X		X	X				X	X	X		X			X							ANTELOPE VALLEY GW
	LITTLE ROCK RESERVOIR	RESERVOIR	X	X		X	X				X	X	X			X		X							ANTELOPE VALLEY GW
	LAKE PALMDALE	RESERVOIR	X	X			X				X	X	X			X		X							L.A. AQUEDUCT
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	

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HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
626.10	CHAFEE HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
626.20	GLOSTER HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
626.30	WILLOW SPRINGS HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
626.40	NEENACH HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
626.50	LANCASTER HYDROLOGIC AREA																								
	AMARGOSA CREEK ABOVE LACSD DISCHARGE	EPHEMERAL STREAM	X	X			X	X			X	X	X		X	X		X							LOWER AMARGOSA CREEK
	AMARGOSA CREEK BELOW LACSD DISCHARGE	EPHEMERAL STREAM		X			X	X				X			X			X							PIUTE PONDS AND WETLANDS
	PIUTE PONDS	PONDS		X			X	X				X			X			X	X	X					ROSAMOND DRY LAKE
	PIUTE PONDS WETLANDS	WETLANDS		X			X	X				X			X			X	X	X			X	X	ROSAMOND DRY LAKE
	ROSAMOND DRY LAKE[1]	PLAYA LAKE					X					X			X		X	X							TERMINAL LAKE
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
626.60	NORTH MUROC HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
626.70	BUTTES HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	
626.80	ROCK CREEK HYDROLOGIC AREA																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X					X	X	

[1] The SAL use does not apply to tributaries of Rosamond Dry Lake

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			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
627.00	**CUDDEBACK HYDROLOGIC UNIT**																								
	MINOR SURFACE WATERS		X	X			X				X	X	X		X			X							
	MINOR WETLANDS	WETLANDS	X				X	X			X	X			X			X							
628.00	**MOJAVE HYDROLOGIC UNIT**																								
628.10	**EL MIRAGE HYDROLOGIC AREA**																								
	SHEEP CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							EL MIRAGE VLY GW BASIN, EL MIRAGE DRY LK
	HEATH CANYON CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							SHEEP CREEK
	MINOR SURFACE WATERS		X	X			X	X			X	X			X			X		X					EL MIRAGE VLY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X			X		X			X	X	EL MIRAGE VLY GW BASIN
628.20	**UPPER MOJAVE HYDROLOGIC AREA**																								
	MOJAVE RIVER		X	X			X				X	X	X		X	X		X							UPPER MOJAVE R. VLY GW BASIN, SODA LK, CRONESE LAKES
	LOWER NARROWS OF MOJAVE R. WETLANDS	WETLANDS	X	X			X				X	X			X	X		X		X	X		X	X	MOJAVE RIVER, UPPER MOJAVE R. VLY GW BASIN
	TURNER SPRINGS	SPRINGS	X	X			X				X	X			X			X					X	X	MOJAVE RIVER
	WEST FORK MOJAVE RIVER	INTERMITTENT STREAM	X	X			X				X	X	X		X	X		X							SILVERWOOD LK, MOJAVE RIVER, UPPER MOJAVE R. VLY GW BASIN
	EAST FORK OF WEST FORK OF MOJAVE RIVER	PERENNIAL STREAM	X	X							X	X	X			X		X				X			SILVERWOOD LAKE
	LAKE GREGORY	LAKE	X	X			X		X		X	X	X			X		X				X			HOUSTON CREEK
	SEELEY CANYON CREEK	PERENNIAL STREAM	X	X							X	X	X			X		X							EAST FORK OF WEST FORK
	HOUSTON CREEK	PERENNIAL STREAM	X	X							X	X	X			X		X							EAST FORK OF WEST FORK
	DART CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							HOUSTON CREEK
	DEEP CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X							FORKS RESERVOIR, MOJAVE RIVER
	SAWPIT CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							WEST FORK MOJAVE
	WILLOW CREEK	INTERMITTENT STREAM	X	X							X	X	X			X		X							DEEP CREEK
	TROY CREEK	INTERMITTENT STREAM	X	X			X				X	X	X		X	X		X							DEEP CREEK
	TROY POND	INTERMITTENT POND	X	X			X				X	X	X		X	X		X							DEEP CREEK
	HOLCOMB CREEK	INTERMITTENT STREAM	X	X							X	X	X			X		X							DEEP CREEK
	LITTLE BEAR CREEK	INTERMITTENT STREAM	X	X							X	X	X			X		X							DEEP CREEK
	LAKE ARROWHEAD	LAKE	X	X			X		X		X	X	X			X		X							WILLOW CREEK
	ARROWBEAR LAKE	LAKE	X	X			X		X		X	X	X		X	X		X							DEEP CREEK
	HOOKS CREEK	PERENNIAL STREAM	X	X							X	X	X			X		X							LITTLE BEAR CREEK
	TWIN PEAKS CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							(UPPER) GRASS VALLEY CREEK
	SHAKE CREEK	PERENNIAL STREAM	X	X							X	X	X			X		X				X			DEEP CREEK
	SHEEP CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							DEEP CREEK
	CRAB CREEK	PERENNIAL STREAM	X	X							X	X	X			X		X				X			DEEP CREEK
	GREEN VALLEY LAKE	LAKE	X	X			X				X	X	X			X		X							GREEN VALLEY CREEK
	GREEN VALLEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							GREEN VALLEY LAKE, DEEP CREEK
	SILVERWOOD LAKE	RESERVOIR	X	X			X				X	X	X			X		X							WEST FORK MOJAVE RIVER, UPPER MOJAVE R. VLY GW BASIN

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Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
628.20	GRASS VALLEY LAKE	LAKE	X	X			X				X	X	X			X		X							GRASS VALLEY CREEK
	GRASS VALLEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X		X	X		X							GRASS VALLEY LAKE, WEST FORK MOJAVE RIVER
	UPPER MOJAVE RIVER, LOWER SLOUGH	WETLANDS	X	X			X				X	X			X			X					X	X	MOJAVE RIVER
	MINOR SURFACE WATERS		X	X			X			X	X	X			X	X		X							UPPER MOJAVE R VLY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	UPPER MOJAVE R VLY GW BASIN
628.30	MIDDLE MOJAVE HYDROLOGIC AREA																								
	MOJAVE RIVER		X	X			X				X	X	X		X	X		X							MIDDLE MOJAVE R VLY GW BASIN, SODA LAKE, CRONESE LAKES
	MINOR SURFACE WATERS		X	X			X			X	X	X			X	X		X							MIDDLE MOJAVE R VLY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	MIDDLE MOJAVE R VLY GW BASIN
628.40	LOCKHART HYDROLOGIC AREA																								
628.41	GRASS VALLEY HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X			X	X	X			X	X		X							HARPER VALLEY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	HARPER VALLEY GW BASIN
628.42	HARPER VALLEY HYDROLOGIC SUBAREA																								
	BIRD SPRINGS	SPRINGS	X	X			X				X	X			X	X		X					X		HARPER VALLEY GW BASIN
	HARPER LAKE	ALKALI LAKE	X	X			X				X	X			X	X		X							INTERNALLY DRAINED LAKE
	OPAL MTN. SPRINGS	SPRINGS																					X		
	HARPER LAKE WETLANDS	WETLANDS	X	X			X				X	X			X	X		X					X	X	HARPER LAKE
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							HARPER VALLEY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	HARPER VALLEY GW BASIN
628.50	LOWER MOJAVE HYDROLOGIC AREA																								
	MOJAVE RIVER		X	X			X				X	X	X		X	X		X							MIDDLE MOJAVE R VLY GW BASIN, SODA LAKE, CRONESE LAKES
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							LOWER MOJAVE R VLY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	LOWER MOJAVE R VLY GW BASIN
628.60	NEWBERRY SPRINGS HYDROLOGIC AREA																								
628.61	KANE WASH HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							KANE WASH AREA GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	KANE WASH AREA GW BASIN
628.62	TROY VALLEY HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							TROY VLY GW BASIN
628.62	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	TROY VLY GW BASIN

Designated uses have been revised for highlighted segments of the Mojave River. Please refer to pages 2 and 3 of this document for designated uses that are in effect for CWA purposes.

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
628.70	AFTON HYDROLOGIC AREA																								
628.71	CAVES HYDROLOGIC SUBAREA																								
	MOJAVE RIVER		X	X			X				X	X			X	X		X							CAVES CYN VLY GW BASIN, SODA LAKE, CRONESE LAKES
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							CAVES CYN VLY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	CAVES CYN VLY GW BASIN
628.72	CRONESE HYDROLOGIC SUBAREA																								
	BITTER SPRINGS	WETLANDS	X	X			X				X	X			X	X		X					X	X	CRONESE VALLEY GW ASIN
	CRONESE LAKES (EAST AND WEST)	WETLANDS	X	X			X				X	X			X	X		X					X	X	INTERNALLY DRAINED LAKES, CRONESE VLY GW BASIN
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							CRONESE VALLEY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	CRONESE VALLEY GW BASIN
628.73	LANGFORD HYDROLOGIC SUBAREA																								
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							LANGFORD VLY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	LANGFORD VLY GW BASIN
628.80	BAKER HYDROLOGIC AREA																								
628.81	SILVER LAKE HYDROLOGIC SUBAREA																								
	SILVER LAKE	ALKALI LAKE	X	X			X				X	X			X	X	X	X							INTRNL DRN LK/SILVER LK VLY GW BASIN
	HALLORAN SPRING	SPRING/EMERGENT	X	X			X				X	X			X	X		X							SILVER LAKE VLY GW BASIN
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							SILVER LAKE VLY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	SILVER LAKE VLY GW BASIN
628.82	SODA LAKE HYDROLOGIC SUBAREA																								
	SODA LAKE	ALKALI LAKE	X	X			X				X	X	X		X	X		X					X		INTERNALLY DRAINED LAKE, SILVER LAKE, SODA LAKE VLY GW BASIN
	ZYZYX SPRING	SPRING	X	X			X				X	X	X		X	X		X	X	X					SODA LAKE VLY GW BASIN
	MOJAVE RIVER		X	X							X	X			X	X		X							SODA LAKE, SODA LAKE VLY GW BASIN
	INDIAN SPRING	SPRING	X	X			X	X			X	X			X	X		X							SODA LAKE VLY GW BASIN
	CANE SPRING	SPRING	X	X			X	X			X	X			X	X		X							SODA LAKE VLY GW BASIN
	GRANITE SPRING	SPRING	X	X			X	X			X	X			X	X		X							SODA LAKE VLY GW BASIN
	HENRY SPRING	SPRING	X	X			X	X			X	X			X	X		X							SODA LAKE VLY GW BASIN
	MESQUITE SPRINGS	SPRINGS	X	X			X				X	X			X	X		X					X		MOJAVE RIVER SINK
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	
628.90	KELSO HYDROLOGIC AREA																								
	TOUGH NUT SPRING	SPRING/EMERGENT	X	X			X	X			X	X	X		X	X		X					X		CEDAR WASH

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
	MARL SPRING	SPRING/EMERGENT	X	X			X	X			X	X	X		X	X		X					X		KELSO WASH
	MINOR SURFACE WATERS		X	X			X				X	X			X	X		X							KELSO VLY GW BASIN
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X		X			X	X	KELSO VLY GW BASIN
629.00	BROADWELL HYDROLOGIC UNIT																								
	MINOR WETLANDS	WETLANDS	X	X			X	X			X	X			X	X		X					X	X	
	MINOR SURFACE WATERS		X	X			X				X	X	X		X	X		X							

Table 2.2
BENEFICIAL USES FOR GROUND WATERS OF THE LAHONTAN REGION

BASIN DWR NO.	BASIN NAME	BENEFICIAL USES					
		MUN	AGR	IND	FRSH	AQUA	WILD
6-1	Surprise Valley	x	x	x	x		
6-2	Madeline Plains	x	x		x		
6-3	Willow Creek Valley	x	x		x		
6-4	Honey Lake Valley	x	x	x	x		x
6-5.01	Tahoe Valley - South	x	x	x			
6-5.02	Tahoe Valley - North	x	x				
6-6	Carson Valley	x	x	x	x		
6-7	Antelope Valley (Topaz Valley)	x	x		x		
6-8	Bridgeport Valley	x	x	x	x		
6-9	Mono Valley	x	x	x	x		
6-10	Adobe Lake Valley	x	x		x		
6-11	Long Valley	x	x	x	x		
6-12	Owens Valley	x	x	x	x		x
6-13	Black Springs Valley	x	x		x		
6-14	Fish Lake Valley	x	x		x		
6-15	Deep Springs Valley	x	x		x		
6-16	Eureka Valley	x			x		
6-17	Saline Valley	x			x		
6-18	Death Valley	x	x		x		x
6-19	Wingate Valley	x	x		x		
6-20	Middle Amargosa Valley	x	x	x	x		
6-21	Lower Kingston Valley	x	x		x		
6-22	Upper Kingston Valley	x	x		x		
6-23	Riggs Valley	x	x		x		
6-24	Red Pass Valley	x	x		x		
6-25	Bicycle Valley	x		x	x		
6-26	Avawatz Valley	x	x		x		
6-27	Leach Valley	x					
6-28	Pahrump Valley	x	x		x		
6-29	Mesquite Valley	x	x		x		
6-30	Ivanpah Valley	x	x	x	x		
6-31	Kelso Valley	x	x	x	x		
6-32	Broadwell Valley	x	x		x		
6-33	Soda Lake Valley	x	x	x	x		
6-34	Silver Lake Valley	x	x	x	x		
6-35	Cronise Valley	x	x	x	x		
6-36	Langford Valley	x	x	x	x		
6-37	Coyote Lake Valley	x	x		x		
6-38	Caves Canyon Valley	x	x	x	x		
6-39	Troy Valley	x	x	x	x		
6-40	Lower Mojave River Valley	x	x	x	x	x	
6-41	Middle Mojave River Valley	x	x	x	x	x	
6-42	Upper Mojave River Valley	x	x	x	x	x	
6-43	El Mirage Valley	x	x	x	x		

Table 2.2
BENEFICIAL USES FOR GROUND WATERS OF THE LAHONTAN REGION

BASIN DWR NO.	BASIN NAME	BENEFICIAL USES					
		MUN	AGR	IND	FRSH	POND	WILD
6-44	Antelope Valley	x	x	x	x		
6-45	Tehachapi Valley East	x	x	x	x		
6-46	Fremont Valley	x	x	x	x		
6-47	Harper Valley	x	x	x	x		
6-48	Goldstone Valley	x		x	x		
6-49	Superior Valley	x					
6-50	Cuddback Valley	x	x	x	x		
6-51	Pilot Knob Valley	x	x	x	x		
6-52	Searles Valley (see note below)	x		x			
6-53	Salt Wells Valley	x		x			
6-54	Indian Wells Valley	x	x	x	x		
6-55	Coso Valley	x					
6-56	Rose Valley	x	x	x	x		
6-57	Darwin Valley	x					
6-58	Panamint Valley	x		x			
6-59	Granite Mountain Area	x	x		x		
6-60	Fish Slough Valley	x	x	x	x		
6-61	Cameo Area	x					
6-62	Race Track Valley	x					x
6-63	Hidden Valley	x					
6-64	Marble Canyon Way	x	x		x		
6-65	Cottonwood Spring Area	x	x		x		
6-66	Lee Flat	x					
6-67	Martis Valley	x	x		x		
6-68	Santa Rosa Flat	x					
6-69	Kelso Lander Valley	x	x		x		
6-70	Cactus Flat	x	x	x			
6-71	Lost Lake Valley	x					
6-72	Coles Flat	x					
6-73	Wild Horse Mesa Area	x					
6-74	Harrsiburg Flats	x					
6-75	Wildrose Canyon	x					
6-76	Brown Mountain Valley	x		x			
6-77	Grass Valley	x		x			
6-78	Denning Spring Valley	x	x		x		
6-79	California Valley	x	x	x	x		
6-80	Middle Park Canyon	x		x			
6-81	Butte Valley	x	x		x		
6-82	Spring Canyon Valley	x	x		x		
6-83	Furnace Creek Area	x					x
6-84	Greenwater Valley	x					x
6-85	Gold Valley	x	x		x		

Note: The MUN designation does not apply to ground water under the Searles Lake bed, or to the groundwater surrounding Searles Lake within the boundaries shown in Figure 2-1. The PRO (Industrial Process Supply) use applies to the ground water under the Searles Lake bed

Table 2.2
BENEFICIAL USES FOR GROUND WATERS OF THE LAHONTAN REGION

BASIN DWR NO.	BASIN NAME	BENEFICIAL USES					
		MUN	AGR	IND	FRSH	AQUA	WILD
6-86	Rhodes Hill Area	x	x		x		
6-87	Butterbread Canyon Valley	x					
6-88	Owl Lake Valley	x					
6-89	Kane Wash Area	x	x	x	x		
6-90	Cady Fault Area	x	x	x	x		
6-91	Cow Head Lake Valley	x	x		x		
6-92	Pine Creek Valley	x	x		x		
6-93	Harvey Valley	x	x		x		
6-94	Grasshopper Valley	x	x				
6-95	Dry Valley	x	x				
6-96	Eagle Lake Valley	x	x		x		
6-97	Horse Lake Valley	x	x				
6-98	Tuledad Canyon Area	x	x				
6-99	Painters Flat	x	x				
6-100	Secret Valley	x	x				
6-101	Bull Flat	x	x				
6-102	Modoc Plateau Recent Volcanic Areas	x	x				
6-103	Modoc Plateau Pleistocene Volcanic Areas	x	x				
6-104	Long Valley	x	x	x	x		
6-105	Slinkard Valley	x	x		x		
6-106	Little Antelope Valley	x	x		x		
6-107	Antelope Valley	x	x		x		
NOTE: BASIN NUMBERS 6-108 TO 6-345 ARE UN-NAMED, SEE PLATES 2A & 2B FOR LOCATION							
6-108		x					
6-109		x					
6-110		x					
6-111		x					
6-112		x					
6-113		x					
6-114		x					
6-115		x					
6-116		x					
6-117		x					
6-118		x					
6-119		x					
6-120		x					
6-121		x					
6-122		x					
6-123		x					
6-124		x					
6-125		x					
6-126		x					
6-127		x					

Table 2.2
BENEFICIAL USES FOR GROUND WATERS OF THE LAHONTAN REGION

BASIN DWR NO.	BASIN NAME	BENEFICIAL USES MUN	AGR	IND	FRSH	AQUA	WILD
6-128		x					
6-129		x					
6-130		x					
6-131		x					
6-132		x					
6-133		x					
6-134		x					
6-135		x					
6-136		x					
6-137		x					
6-138		x					
6-139		x					
6-140		x					
6-141		x					
6-142		x					
6-143		x					
6-144		x					
6-145		x					
6-146		x					
6-147		x					
6-148		x					
6-149		x					
6-150		x					
6-151		x					
6-152		x					
6-153		x					
6-154		x					
6-155		x					
6-156		x					
6-157		x					
6-158		x					
6-159		x					
6-160		x					
6-161		x					
6-162		x					
6-163		x					
6-164		x					
6-165		x					
6-166		x					
6-167		x					
6-168		x					
6-169		x					
6-170		x					

Table 2.2
BENEFICIAL USES FOR GROUND WATERS OF THE LAHONTAN REGION

BASIN DWR NO.	BASIN NAME	BENEFICIAL USES MUN	AGR	IND	FRSH	AQUA	WILD
6-171		x					
6-172		x					
6-173		x					
6-174		x					
6-175		x					
6-176		x					
6-177		x					
6-178		x					
6-179		x					
6-180		x					
6-181		x					
6-182		x					
6-183		x					
6-184		x					
6-185		x					
6-186		x					
6-187		x					
6-188		x					
6-189		x					
6-190		x					
6-191		x					
6-192		x					
6-193		x					
6-194		x					
6-195		x					
6-196		x					
6-197		x					
6-198		x					
6-199		x					
6-200		x					
6-201		x					
6-202		x					
6-203		x					
6-204		x					
6-205		x					
6-206		x					
6-207		x					
6-208		x					
6-209		x					
6-210		x					
6-211		x					
6-212		x					
6-213		x					

Table 2.2
BENEFICIAL USES FOR GROUND WATERS OF THE LAHONTAN REGION

BASIN DWR NO.	BASIN NAME	BENIFICIAL USES					
		MUN	AGR	IND	FRSH	AQUA	WILD
6-214		x					
6-215		x					
6-216-		x					
6-217		x					
6-218		x					
6-219		x					
6-220		x					
6-221		x					
6-222		x					
6-223		x					
6-224		x					
6-225		x					
6-226		x					
6-227		x					
6-228		x					
6-229		x					
6-230		x					
6-231		x					
6-232		x					
6-233		x					
6-234		x					
6-235		x					
6-236		x					
6-237		x					
6-238		x					
6-239		x					
6-240		x					
6-241		x					
6-242		x					
6-243		x					
6-244		x					
6-245		x					
6-246		x					
6-247		x					
6-248		x					
6-249		x					
6-250		x					
6-251		x					
6-252		x					
6-253		x					
6-254		x					
6-255		x					
6-256		x					

Table 2.2
BENEFICIAL USES FOR GROUND WATERS OF THE LAHONTAN REGION

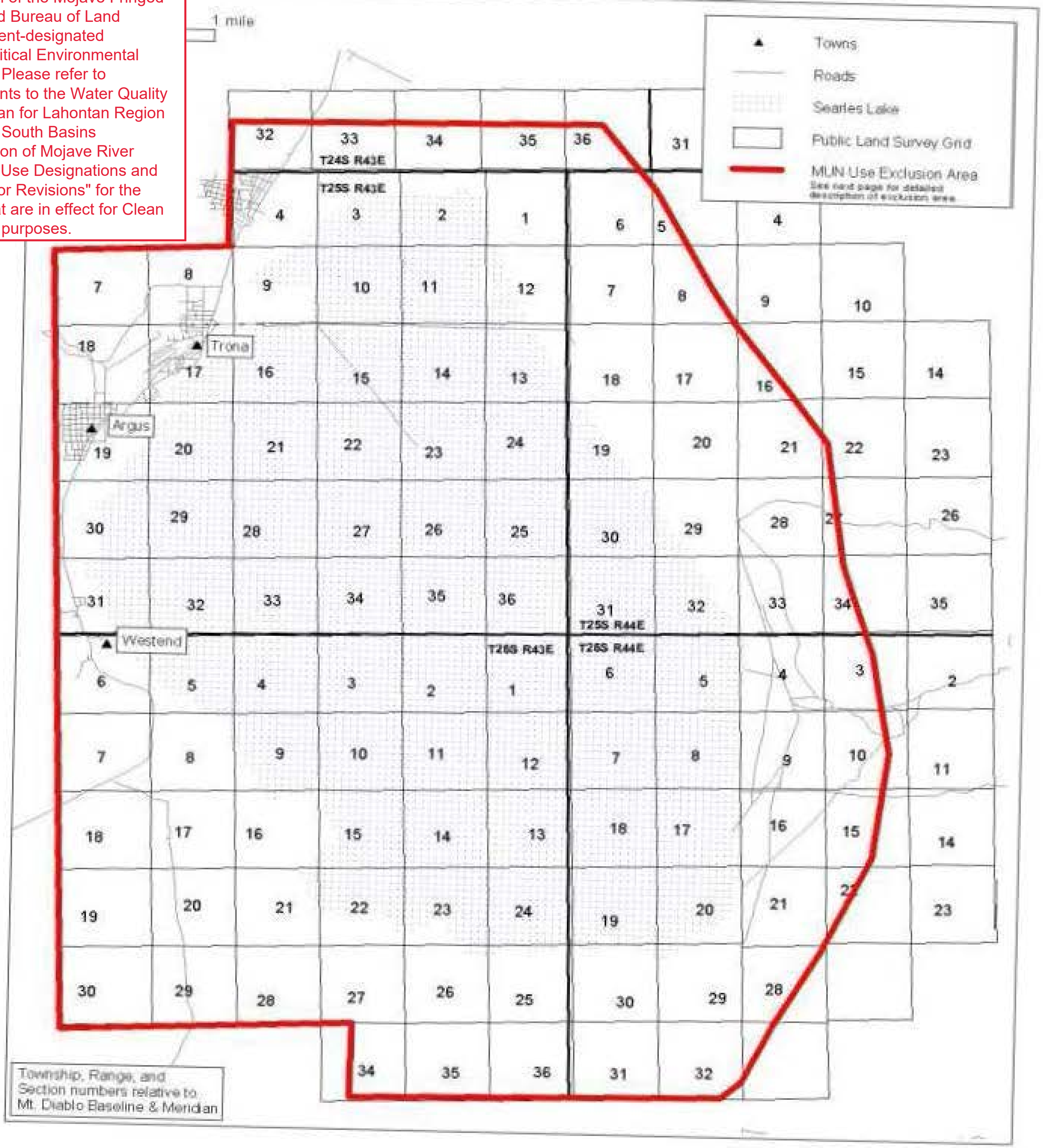
BASIN DWR NO	BASIN NAME	BENEIFICAL USES					
		MUN	AGR	IND	FRSH	AQUA	WILD
6-257		x					
6-258		x					
6-259		x					
6-260		x					
6-261		x					
6-262		x					
6-263		x					
6-264		x					
6-265		x					
6-266		x					
6-267		x					
6-268		x					
6-269		x					
6-270		x					
6-271		x					
6-272		x					
6-273		x					
6-274		x					
6-275		x					
6-276		x					
6-277		x					
6-278		x					
6-279		x					
6-280		x					
6-281		x					
6-282		x					
6-283		x					
6-284		x					
6-285		x					
6-286		x					
6-287		x					
6-288		x					
6-289		x					
6-290		x					
6-291		x					
6-292		x					
6-293		x					
6-294		x					
6-295		x					
6-296		x					
6-297		x					
6-298		x					
6-299		x					
6-300		x					

Table 2.2
BENEFICIAL USES FOR GROUND WATERS OF THE LAHONTAN REGION

BASIN DWR NO.	BASIN NAME	BENEFICIAL USES					
		MUN	AGR	IND	FRSH	AQUA	WILD
6-301		x					
6-302		x					
6-303		x					
6-304		x					
6-605		x					
6-306		x					
6-307		x					
6-308		x					
6-309		x					
6-310		x					
6-311		x					
6-312		x					
6-313		x					
6-314		x					
6-315		x					
6-316		x					
6-317		x					
6-318		x					
6-319		x					
6-320		x					
6-321		x					
6-322		x					
6-323		x					
6-324		x					
6-325		x					
6-326		x					
6-327		x					
6-328		x					
6-329		x					
6-330		x					
6-331		x					
6-332		x					
6-333		x					
6-334		x					
6-335		x					
6-336		x					
6-337		x					
6-338		x					
6-339		x					
6-340		x					
6-341		x					
6-342		x					
6-343		x					
6-344		x					
6-345		x					

Figure 2-1 was replaced with Figure 2-1.1 (Map showing locations where the COLD and WARM freshwater habitat beneficial uses apply for the Mojave River) and Figure 2-1.2 (Map showing delineation of the Mojave Fringed-toed Lizard Bureau of Land Management-designated Area of Critical Environmental Concern). Please refer to Amendments to the Water Quality Control Plan for Lahontan Region North and South Basins "Modification of Mojave River Beneficial Use Designations and Other Minor Revisions" for the figures that are in effect for Clean Water Act purposes.

FIGURE 2-1. BOUNDARY OF AREA WITHIN SEARLES VALLEY GROUND WATER BASIN WHERE MUN USE DESIGNATION DOES NOT APPLY



The area shown in Figure 2-1, within which the Municipal and Domestic Supply beneficial use does not apply to ground water, is as follows:

Beginning at the southwestern origination point of the area: southwest corner of Section 30 (T26S, R43E, MDB&M) and continuing north along the Section 30 west boundary, along the Section 19 (T26S, R43E, MDB&M) west boundary, along the Section 18 (T26S, R43E, MDB&M) west boundary, along the Section 7 (T26S, R43E, MDB&M) west boundary, along the Section 6 (T26S, R43E, MDB&M) west boundary, along the Section 31 (T25S, R43E, MDB&M) west boundary, along the Section 30 (T25S, R43E, MDB&M) west boundary, along the Section 19 (T25S, R43E, MDB&M) west boundary, along the Section 18 (T25S, R43E, MDB&M) west boundary, along the Section 7 (T25S, R43E, MDB&M) west boundary, along the Section 7 (T25S, R43E, MDB&M) north boundary, along the Section 8 (T25S, R43E, MDB&M) north boundary, along the Section 4 (T25S, R43E, MDB&M) west boundary, along the west boundary of Section 32 (T24S, R43E, MDB&M) to the west-to-east half section line which is the northwestern corner of the area.

Beginning at Section 32 on the west to east half-section line across Section 32 (T24S, R43E, MDB&M) until the boundary intersects the west boundary of Section 33, Section 32 on the west to east half-section line across Section 33 (T24S, R43E, MDB&M) until the boundary intersects the west boundary of Section 34, Section 34 on the west to east half-section line across Section 34 (T24S, R43E, MDB&M) until the boundary intersects the west boundary of Section 35, Section 35 on the west to east half-section line until the line intersects the 1,800-foot contour line on the east side of Searles Lake which is the northeast corner of the area.[1]

The east boundary of the area follows the 1,800-foot contour line for approximately 13 miles until the contour line intersects the T26S/T27S line at the southern section line in Section 32 (T26S, R44E, MDB&M), the boundary of the area follows the southern section line of Section 32 (T26S, R44E, MDB&M) until it intersects Section 31 (T26S, R44E, MDB&M), from there the boundary extends along the southern boundary of Section 31 (T26S, R44E, MDB&M), along the southern boundary of Section 36 (T26S, R43E, MDB&M), along the southern boundary of Section 35 (T26S, R43E, MDB&M), and along the southern boundary of Section 34 (T26S, R43E, MDB&M) to the north-south half-section line of this section, from this point the boundary extends along the north-south half-section line to the southern boundary of Section 27 (T26S, R43E, MDB&M); from here the boundary extends west along the southern boundary of Section 27 (T26S, R43E, MDB&M) to the intersection of the southern boundaries of Sections 27 and 28 (T26S, R43E, MDB&M), along the southern boundary of Section 28 (T26S, R43E, MDB&M), along the southern boundary of Section 29 (T26S, R43E, MDB&M), and along the boundary of Section 30 (T26S, R43E, MDB&M), and the boundary of the area closes at the southwest corner of Section 30 (T26S, R43E, MDB&M).

[1] Due to the limitations of the Geographic Information System (GIS) coverage used to create Figure 2-1, the western boundary in the figure follows the 2000-foot contour line, rather than the 1800-foot contour line. The topographic description reflects the actual boundary.

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Chapter 3
WATER QUALITY OBJECTIVES

The Porter-Cologne Water Quality Control Act defines “water quality objectives” as the allowable “limits or levels of water quality constituents or characteristics that are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.” Thus, water quality objectives are intended to protect the public health and welfare, and to maintain or enhance water quality in relation to the existing and/or potential beneficial uses of the water. The objectives, when compared to future water quality data, will also provide the basis for detecting any future trend toward degradation or enhancement of basin waters.

The water quality objectives in this Basin Plan supersede and replace those contained in:

> The 1975 *Water Quality Control Plan for the North Lahontan Basin,* as amended through 1990, and
>
> The 1975 *Water Quality Control Plan for the South Lahontan Basin,* as amended through 1990, and
>
> The 1980 *Lake Tahoe Basin Water Quality Plan*, as amended through 1989.

Water quality objectives apply to “waters of the State” and “waters of the United States.” Some of the waters of the Lahontan Region are interstate waters, flowing into either Nevada or Oregon. The Lahontan Regional Board has a responsibility to ensure that waters leaving the state meet the water quality standards of the receiving state (see the discussion of “Interstate Issues” in the Introduction to Chapter 4).

Water Quality Standards

The federal Clean Water Act defines “water quality standards” to include both “designated uses” (i.e., beneficial uses) and “water quality criteria” (i.e., water quality objectives). Thus, the beneficial uses designated in Chapter Two of this Basin Plan and the water quality objectives of this Chapter are this Region's water quality standards for purposes of the Clean Water Act.

In addition to state water quality objectives, federal water quality criteria for certain toxic “priority pollutants” promulgated by the U.S. Environmental Protection Agency under the California Toxics Rule (40 CFR 131.38) and National Toxics Rule (40 CFR 131.36) apply to surface waters of the United States within the Lahontan Region. Most federal water quality criteria are recommended, science-based thresholds for the protection of aquatic life or human health that can be used by states to set enforceable limits. The criteria in the California Toxics Rule and National Toxics Rule are enforceable and are incorporated in the State Water Board’s *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (2005)*.

Water Quality Objectives and Effluent Limits

It is important to recognize the distinction between ambient water quality objectives and “effluent limitations” or “discharge standards,” which are conditions in state and federal waste discharge permits. Effluent limitations are established in permits both to protect water for beneficial uses within the area of the discharge, and to meet or achieve water quality objectives.

Methodology For Establishing Water Quality Objectives

Water quality objectives are numerical or narrative. Narrative and numerical water quality objectives define the upper concentration or other limits that the Regional Board considers protective of beneficial uses.

The general methodology used in establishing water quality objectives involves, first, designating beneficial water uses; and second, selecting and quantifying the water quality parameters necessary to protect the most vulnerable (sensitive) beneficial uses. Because of the limited human impact on many waters of the Region, and because site-specific information is limited for many waters in the Region, many water quality objectives were established at levels better than that necessary to protect the most vulnerable beneficial use. As additional information is obtained on the quality of the Region’s waters and/or the beneficial uses of those waters, certain water quality objectives and/or beneficial uses may be updated based on the new information.

In establishing water quality objectives, factors in addition to designated beneficial uses are considered. These factors include environmental and economic considerations specific to each hydrologic unit, the need to develop and use recycled water, as well as the level of water quality that could be achieved through coordinated control of all factors that affect water quality in an area. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, and that may be reasonably controlled.

Water quality objectives can be reviewed and, if appropriate, revised by the Lahontan Regional Board. Revised water quality objectives would then be adopted as part of this Basin Plan by amendment. Opportunities for formal public review of water quality objectives will be available at a minimum of once every three years following the adoption of this Basin Plan to determine the need for further review and revision.

As a component of the State's continuing planning process, data may be collected and numerical water quality objectives may be developed for additional water bodies and/or constituents where sufficient information is presently not available for the establishment of such objectives. If appropriate, these objectives may be adopted by the Regional Board and amended to this Basin Plan. Since 1997, scientific peer review has been required for changes in regulations, including water quality objectives that require scientific justification.

Establishment of Numerical Objectives for Specific Water Bodies

Where available data were sufficient to define existing ambient levels of constituents, these levels were used in developing the numerical objectives for specific water bodies. By utilizing annual mean, 90th percentile values and flow-weighted values, the objectives are intended to be realistic within the variable conditions imposed by nature. This approach provides an opportunity to detect changes in water quality as a function of time through comparison of annual means, while still accommodating variations in the measured constituents.

Prohibited Discharges

Discharges that cause violation of any narrative or numerical water quality objective are prohibited. (See also Section 4.1, “Waste Discharge Prohibitions.”)

After application of reasonable control measures, ambient water quality shall conform to the narrative and numerical water quality objectives included in this Basin Plan. When other factors result in the degradation of water quality beyond the limits established by these water quality objectives, controllable human activities shall not cause further degradation of water quality in either surface or ground waters.

Compliance with Water Quality Objectives

The purpose of text, in italics, following certain water quality objectives is to provide specific direction on compliance with the objective. General direction on compliance with objectives is described in the last section of this Chapter. It is not feasible to cover all circumstances and conditions that could be created by all discharges. Therefore, it is within the discretion of the Regional Board to establish other, or additional, direction on compliance with objectives of this Basin Plan. The purpose of the italic text is to provide direction only, and **not** to specify method of compliance.

Antidegradation Policy

On October 28, 1968, the State Water Resources Control Board adopted Resolution No. 68-16, “Statement of Policy with Respect to Maintaining High Quality of Waters in California,” establishing an antidegradation policy for the protection of water quality. This policy requires continued maintenance of existing high quality waters. Whenever the existing quality of water is better that the quality of water established in this Basin Plan as objectives (both narrative and numerical), such existing quality shall be maintained unless appropriate findings are made under the policy. The U.S. Environmental Protection Agency, Region IX, has also issued detailed guidelines for implementation of federal antidegradation regulations for surface waters (40 CFR 131.12). For more information, see the discussion on “General Direction Regarding Compliance With Objectives” at the end of this Chapter.

As required by the federal Clean Water Act and implementing regulations, no permanent or long-term degradation is allowed in water designated as an Outstanding National Resource Water (ONRW). Lake Tahoe and Mono Lake have been designated as ONRWs; other waters in the Region may be designated as ONRWs in the future. Section 114 of the federal Clean Water Act also indicates the need to “preserve the fragile ecology of Lake Tahoe.”

Water Quality Objectives for Surface Waters

Water quality objectives for surface waters are divided into the three categories of:

1. **Water Quality Objectives That Apply to All Surface Waters.**

   Listed alphabetically below, these narrative and numerical water quality objectives apply to a**ll** surface waters (including wetlands) within the Lahontan Region:

   Ammonia
   Bacteria, Coliform
   Biostimulatory Substances
   Chemical Constituents
   Chlorine, Total Residual
   Color
   Dissolved Oxygen
   Floating Materials
   Oil and Grease
   Non-degradation of Aquatic Communities and Populations
   pH
   Radioactivity
   Sediment
   Settleable Materials
   Suspended Materials
   Taste and Odor
   Temperature
   Toxicity
   Turbidity

2. **Water Quality Objectives For Certain Water Bodies**

   Some narrative and numerical water quality objectives are directed toward protection of surface waters (including wetlands) in specific areas. To the extent of overlap, these site-specific water quality objectives supersede the "Water Quality Objectives That Apply to All Surface Waters" described above. The areas for which site-specific objectives have been adopted are listed below in order of hydrologic units (HUs) and hydrologic areas (HAs) within the Lahontan Region, in a north to south direction:

HU/HA	Figure	Table
Surprise Valley HU	3-1	3-7
Eagle Drainage HA	3-2	3-8
Susanville HU	3-3	3-9
Little Truckee River HU	3-4	3-10
Truckee River HU	3-5	3-11
Lake Tahoe HU	3-6	3-12
Fallen Leaf Lake	3-6	3-13
West Fork Carson River HU	3-7	3-14
East Fork Carson River HU	3-7	3-14
West Walker River HU	3-8	3-15
East Walker River HU	3-8	3-15
Mono HU	3-9	3-16
Owens HU	3-10	3-17
Pine Creek, Inyo Co.	3-11	3-18
Antelope HU	3-12	3-19
Mojave HU	3-13	3-20
San Bernardino Mtns. Area	3-14	3-21

3. **Water Quality Objectives for Fisheries Management Activities Using the Fish Toxicant Rotenone**

   Rotenone is a fish toxicant presently used by the California Department of Fish and Wildlife (DFW) and the United States Fish and Wildlife Service (USFWS) for fishery management purposes. (See detailed discussions later in this Chapter and in Chapter 4.) Additional water quality objectives pertinent to rotenone treatments are: Color, Chemical Constituents, and Toxicity.

Water Quality Objectives That Apply to All Surface Waters

Ammonia

The neutral, un-ionized ammonia species (NH_3) is highly toxic to freshwater fish. The fraction of toxic $NH_3$to total ammonia species (NH_4^+ + NH_3) is a function of temperature and pH. Tables 3-1 to 3-4 were derived from USEPA ammonia criteria for freshwater. Ammonia concentrations shall not exceed the values listed for the corresponding conditions in these tables. For temperature and pH values not explicitly in these tables, the most conservative value neighboring the actual value may be used or criteria can be calculated from numerical formulas developed by the USEPA. For one-hour (1h-NH_3) and four-day (4d-NH_3) unionized ammonia criteria, the following equations apply:

$$1h\text{-}NH_3 = 0.52 \div (FT \times FPH \times 2)$$

$$4d\text{-}NH_3 = 0.80 \div (FT \times FPH \times RATIO)$$

where:

$FT = 10^{[0.03(20-TCAP)]}$
for: $TCAP \leq T \leq 30$

$FT = 10^{[0.03(20-T)]}$
for: $0 \leq T \leq TCAP$

$FPH = (1+10^{(7.4-pH)}) \div 1.25$
for: $6.5 \leq pH \leq 8.0$

FPH = 1
for: $8.0 \leq pH \leq 9.0$

RATIO = $20.25 \times (10^{(7.7-pH)}) \div (1+10^{(7.4-pH)})$
for: $6.5 \leq pH \leq 7.7$

RATIO = 13.5
for: $7.7 \leq pH \leq 9.0$

and:

T = temperature in °C

TCAP = temperature cap in °C

For 1h-NH_3, TCAP is 20°C with salmonids present and 25°C with salmonids absent. For 4d-NH_3, TCAP is 15°C with salmonids present and 20 C with salmonids absent.

For interpolation of total ammonia ($NH_4^+ + NH_3$) criteria, the following equations can be used:

n_{1h} = 1h-$NH_3 \div f$, or n_{4d} = 4d-$NH_3 \div f$

where:

n_{1h} is the one-hour criteria for total ammonia species ($NH_4^+ + NH_3$)

n_{4d} is the four-day criteria for total ammonia species ($NH_4^+ + NH_3$)

$f = 1 \div (10^{(pKa-pH)}+1)$

$pKa = 0.0901821 + [2729.92 \div (T+273.15)]$

and:

pKa is the negative log of the equilibrium constant for the $NH_4^+ \rightleftharpoons NH_3 + H^+$ reaction

f is the fraction of unionized ammonia to total ammonia species: $[NH_3 \div (NH_4^+ + NH_3)]$

Values outside of the ranges 0-30°C or pH 6.5-9.0 cannot be extrapolated from these relationships. Site-specific objectives must be developed for these conditions. A microcomputer spreadsheet to calculate ammonia criteria was developed by Regional Board staff. An example of output from this program is given in Table 3-5. Contact the Regional Board if a copy is desired.

Bacteria, Coliform

Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.

The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 ml, nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml. *The log mean shall ideally be based on a minimum of not less* than *five samples collected as evenly spaced as practicable during any 30-day period. However, a log mean concentration exceeding 20/100 ml for any 30-day period shall indicate violation of this objective even if fewer than five samples were collected.*

Biostimulatory Substances

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.

Chemical Constituents

Waters designated as MUN shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 64444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges). This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Waters designated as AGR shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses (i.e., agricultural purposes).

Waters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses.

Chlorine, Total Residual

For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 mg/L or a maximum value of 0.003 mg/L. Median values shall be based on daily measurements taken within any six-month period.

Color

Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.

Dissolved Oxygen

The dissolved oxygen concentration, as percent saturation, shall not be depressed by more than 10 percent, nor shall the minimum dissolved oxygen concentration be less than 80 percent of saturation.

For waters with the beneficial uses of COLD, COLD with SPWN, WARM, and WARM with SPWN, the minimum dissolved oxygen concentration shall not be less than that specified in Table 3-6.

Floating Materials

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect the water for beneficial uses.

For natural high quality waters, the concentrations of floating material shall not be altered to the extent that such alterations are discernable at the 10 percent significance level.

Oil and Grease

Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses.

For natural high quality waters, the concentration of oils, greases, or other film or coat generating substances shall not be altered.

Nondegradation of Aquatic Communities and Populations

All wetlands shall be free from substances attributable to wastewater or other discharges that produce adverse physiological responses in humans, animals, or plants; or that lead to the presence of undesirable or nuisance aquatic life.

All wetlands shall be free from activities that would substantially impair the biological community as it naturally occurs due to physical, chemical and hydrologic processes.

pH

In fresh waters with designated beneficial uses of COLD or WARM, changes in normal ambient pH levels shall not exceed 0.5 pH units. For all other waters of the Region, the pH shall not be depressed below 6.5 nor raised above 8.5.

The Regional Board recognizes that some waters of the Region may have natural pH levels outside of the 6.5 to 8.5 range. Compliance with the pH objective for these waters will be determined on a case-by-case basis.

Radioactivity

Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

Waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations, which is incorporated by reference into this plan. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Sediment

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses.

Settleable Materials

Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or that adversely affects the water for beneficial uses. For natural high quality waters, the concentration of settleable materials shall not be raised by more than 0.1 milliliter per liter.

Suspended Materials

Waters shall not contain suspended materials in concentrations that cause nuisance or that adversely affects the water for beneficial uses.

For natural high quality waters, the concentration of total suspended materials shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Taste and Odor

Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses. For naturally high quality waters, the taste and odor shall not be altered.

Temperature

The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional

Board that such an alteration in temperature does not adversely affect the water for beneficial uses.

For waters designated WARM, water temperature shall not be altered by more than five degrees Fahrenheit (5°F) above or below the natural temperature. For waters designated COLD, the temperature shall not be altered.

Temperature objectives for COLD interstate waters and WARM interstate waters are as specified in the "Water Quality Control Plan for Control of Temperature in The Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" including any revisions. This plan is summarized in Chapter 6 (Plans and Policies), and included in Appendix B.

Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. *Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration and/or other appropriate methods as specified by the Regional Board.*

The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent with the requirements for "experimental water" as defined in *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, et al. 2012, or subsequent editions).

Turbidity

Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.

Water Quality Objectives For Certain Water Bodies

The narrative and numerical water quality objectives that follow in this section are directed toward protection of surface waters (including wetlands) in certain hydrologic units (HUs), watersheds, or water bodies within the Lahontan Region. These surface waters are listed by hydrologic unit, in a north to south direction. Specific numerical criteria are organized in a tabular format. Maps (figures) are included to illustrate the locations of surface waters listed in the tables. Figures and tables are located at the end of the Chapter.

Surprise Valley Hydrologic Unit

(See Figure 3-1 and Table 3-7 for water quality objectives for the Surprise Valley HU.)

Susanville Hydrologic Unit

(Figures 3-2 and 3-3, Tables 3-8 and 3-9)
Unless otherwise specified, the following additional water quality objectives apply to all surface waters of the ***Eagle Drainage Hydrologic Area*** (Figure 3-2):

Algal Growth Potential: The mean monthly mean of algal growth potential shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Bacteria, Fecal Coliform

The fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 20/100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 75/100 ml.

Biostimulatory Substances: The concentrations of biostimulatory substances shall not be altered in an amount that could produce an increase in aquatic biomass to the extent that such increases in aquatic biomass are discernible at the 10 percent significance level.

Chlorophyll-a: For the following Eagle Lake stations listed below and mapped in Figure 3-2, the chlorophyll-a levels, as measured in micrograms per liter on a mean of monthly mean basis, shall not exceed the following values:

Station	Chlorophyll-a
Middle Basin 4A	5.2
South Basin 11	4.5

Also, chlorophyll-a levels in Eagle Lake shall not be increased to the extent that such alterations are discernible at the 10 percent significance level.

Dissolved Oxygen: In all waters of Eagle Lake except for the hypolimnion, the dissolved oxygen concentration shall not be depressed by more than 10 percent, below 80 percent saturation, or below 7.0 mg/L at any time, whichever is more restrictive.

pH: In the hypolimnion of Eagle Lake, the pH shall not be depressed below 7.6 at any time. For all other Eagle Lake waters, changes in normal ambient pH shall not exceed 0.1 units.

Plankton Counts: For the Eagle Lake stations listed below and mapped in Figure 3-2, total phytoplankton abundance as calculated per milliliter on a mean of monthly means basis shall not exceed the following values:

Station	Plankton Count (number per mL)
Middle Basin 4A	7,400
South Basin 11	4,600

Also, for the waters of Eagle Lake, the phytoplankton abundance shall not be increased to the extent that such alterations are discernible at the 10 percent significance level.

Species Composition: Species composition of the aquatic biota shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Taste and Odor: The taste and odor shall not be altered.

Transparency: Transparency of Eagle Lake waters as measured by a secchi disk on a mean of monthly mean basis shall not fall below the following values for each of the three index stations mapped in Figure 3-2:

Station	Secchi Disk Transparency
North Basin 6B	3.1 meters
Middle Basin 4A	2.3 meters
South Basin 11	4.4 meters

Also, the secchi disk transparency of Eagle Lake waters shall not be decreased to the extent that such alterations are discernible at the 10 percent significance level.

The following additional water quality objectives apply to ***Honey Lake*** (Figure 3-3):

The average value at any given time (based on at least 3 samples from 3 different locations) shall not exceed:

Arsenic (in mg/L)
= 37,113 x (lake volume in acre-feet)$^{-0.98418}$

Boron (in mg/L)
= 836,820 x (lake volume in acre-feet)$^{-0.98133}$

Molybdenum (in mg/L)
= 16,667 x (lake volume in acre-feet)$^{-0.97658}$

The pH (based on the average of values from at least 3 samples from 3 different locations) shall not at any time be depressed below 8.0 nor raised above 10.0.

Little Truckee River Hydrologic Unit

(Figure 3-4, Table 3-10)
The following additional water quality objectives apply to all surface waters of the Little Truckee River Hydrologic Unit:

Algal Growth Potential: The mean monthly algal growth potential shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Biostimulatory Substances: The concentration of biostimulatory substances shall not be altered in an amount that could produce an increase in aquatic biomass to the extent that such increases are discernible at the 10 percent significance level.

Color: The color shall not exceed an eight (8) Platinum Cobalt Unit mean of monthly means [approximately equivalent to the State of Nevada standard of a twelve (12) Platinum Cobalt Unit sample mean].

Dissolved Oxygen: The dissolved oxygen concentration shall not be depressed by more than 10 percent, below 80 percent saturation, or below 7.0 mg/L at any time, whichever is more restrictive.

pH: Changes in normal ambient pH levels shall not exceed 0.5 unit.

Species Composition: The species composition of aquatic organisms shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Taste and Odor: The taste and odor shall not be altered.

Turbidity: The turbidity shall not be raised above 3 Nephelometric Turbidity Units (NTU) mean of monthly means. (This objective is approximately equal to the State of Nevada standard of 5 NTU sample mean.)

Truckee River Hydrologic Unit

(Figure 3-5, Table 3-11)
Unless otherwise specified, the following additional water quality objectives apply to all surface waters of the Truckee River Hydrologic Unit:

Algal Growth Potential: The mean monthly algal growth potential shall not be altered to the extent that such alterations are discernible at the 10 percent significance level. This objective does not apply to Martis Creek; however, nuisance or pollution levels of algal growth potential shall not be discernible at these stations.

Biostimulatory Substances: The concentration of biostimulatory substances shall not be altered in an amount that could produce an increase in aquatic biomass to the extent that such increases are discernible at the 10 percent significance level. This objective does not apply to Martis Creek or the Truckee River stations downstream of Martis Creek; however, no nuisance or pollution levels of algal biomass shall be discernible at these stations at any time.

Color: The color shall not exceed an eight (8) Platinum Cobalt Unit mean of monthly means (approximately equivalent to the State of Nevada standard of a twelve (12) Platinum Cobalt Unit sample mean).

Dissolved Oxygen: The dissolved oxygen concentrations shall not be depressed by more than 10 percent, below 80 percent saturation, or below 7.0 mg/L at any time, whichever is more restrictive.

pH: Changes in normal ambient pH levels shall not exceed 0.5 unit.

Species Composition: The species composition of aquatic organisms shall not be altered to the extent that such alterations are discernible at the 10 percent significance level. This objective does not apply to Martis Creek or the Truckee River stations downstream of Martis Creek; however, alterations in species composition that result in a nuisance or pollution shall not be discernible at these stations at any time.

Taste and Odor: The taste and odor shall not be altered.

Turbidity: The turbidity shall not be raised above 3 Nephelometric Turbidity Units (NTU) mean of monthly means. (This objective is approximately equal to the State of Nevada standard of 5 NTU sample mean.)

Lake Tahoe Hydrologic Unit

(Figure 3-6, Tables 3-12 and 3-13)

Unless otherwise specified, the following additional water quality objectives apply to all waters of the Lake Tahoe Hydrologic Unit:

Algal Growth Potential: For Lake Tahoe, the mean algal growth potential at any point in the Lake shall not be greater than twice the mean annual algal growth potential at the limnetic reference station. *The limnetic reference station is located in the north central portion of Lake Tahoe. It is shown on maps in annual reports of the Lake Tahoe Interagency Monitoring Program. Exact coordinates can be obtained from the U.C. Davis Tahoe Research Group.*

Biological Indicators: For Lake Tahoe, algal productivity and the biomass of phytoplankton, zooplankton, and periphyton shall not be increased beyond the levels recorded in 1967-71, based on statistical comparison of seasonal and annual means. *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.*

Clarity: For Lake Tahoe, the vertical extinction coefficient shall be less than 0.08 per meter when measured below the first meter. When water is too shallow to determine a reliable extinction coefficient, the turbidity shall not exceed 3 Nephelometric Turbidity Units (NTU). In addition, turbidity shall not exceed 1 NTU in shallow waters not directly influenced by stream discharges. *The Regional Board will determine when water is too shallow to determine a reliable vertical extinction coefficient based upon its review of standard limnological methods and on advice from the U.C. Davis Tahoe Research Group.*

Conductivity, Electrical: In Lake Tahoe, the mean annual electrical conductivity shall not exceed 95 µmhos/cm at 25°C at any location in the Lake.

pH: In Lake Tahoe, the pH shall not be depressed below 7.0 nor raised above 8.4.

Plankton Counts: For Lake Tahoe, the mean seasonal concentration of plankton organisms shall not be greater than 100 per ml and the maximum concentration shall not be greater than 500 per ml at any point in the Lake.

Suspended Sediment: Suspended sediment concentrations in streams tributary to Lake Tahoe shall not exceed a 90th percentile value of 60 mg/L. (This objective is equivalent to the Tahoe Regional Planning Agency's regional "environmental threshold carrying capacity" standard for suspended sediment in tributaries.) *The Regional Board will consider revision of this objective in the future if it proves not to be protective of beneficial uses or if review of* *monitoring data indicates that other numbers would be more appropriate for some or all streams tributary to Lake Tahoe.*

Transparency: For Lake Tahoe, the annual average deep water transparency as measured by the Secchi disk shall not be decreased below 29.7 meters, the levels recorded in 1967-71 by the University of California, Davis.

Turbidity: see “Clarity” above

West Fork Carson River Hydrologic Unit

(Figure 3-7, Table 3-14)
The following additional water quality objectives apply to all surface waters of the West Fork Carson River Hydrologic Unit:

Algal Growth Potential: The mean of monthly mean of algal growth potential shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Biostimulatory Substances: The concentrations of biostimulatory substances shall not be altered in an amount that could produce an increase in aquatic biomass to the extent that such increases in aquatic biomass are discernible at the 10 percent significance level.

Color: The color shall not exceed the 13 Platinum Cobalt Unit mean of monthly means (approximately equal to the State of Nevada standard of 13 Platinum Cobalt Unit sample mean).

Dissolved Oxygen: The dissolved oxygen concentration shall not be depressed by more than 10 percent, below 80 percent saturation or below 7.0 mg/L at any time, whichever is more restrictive.

pH: Changes in normal ambient pH levels shall not exceed 0.5 unit.

Sodium Adsorption Ratio (SAR): Water quality objectives for SAR are set to protect the irrigated agriculture component of the Agricultural Supply (AGR) beneficial use. SAR is calculated using the following equation, where Na = sodium ion concentration, Ca= calcium ion concentration, and Mg = magnesium ion concentration.

$$\boldsymbol{SAR = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}}$$

Concentrations of all chemical constituents in the equation above are expressed in milliequivalents per liter. As a ratio, SAR has no units.

The following water quality objective for SAR, as an annual average, applies to surface waters of the West Fork Carson River HU. Except as noted below, SAR objectives apply to the entire water body and its tributary surface waters in California.

Water Body	SAR (Annual Average)
West Fork Carson River	**1**

The Lahontan Regional Board recognizes that SAR may be higher than the value above in certain surface waters of the West Fork Carson River watershed due to natural sources of sodium, including geothermal sources. Where higher SAR values occur only as a result of natural sources, the affected water bodies or water body segments will not be considered to be in violation of the applicable SAR objective.

Species Composition: Species composition of the aquatic biota shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Taste and Odor: The taste and odor shall not be altered.

Turbidity: The turbidity shall not be raised above a mean of monthly means value of 2 NTU. (This objective is approximately equal to the State of Nevada standard of 2 NTU annual mean.)

East Fork Carson River Hydrologic Unit

(Figure 3-7, Table 3-14)

The following additional water quality objective applies to all surface waters of the East Fork Carson River Hydrologic Unit

Sodium Adsorption Ratio (SAR): Water quality objectives for SAR are set to protect the irrigated agriculture component of the Agricultural Supply (AGR) beneficial use.

SAR is calculated using the following equation, where Na = sodium ion concentration, Ca= calcium ion concentration, and Mg = magnesium ion concentration.

$$\boldsymbol{SAR = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}}$$

Concentrations of all chemical constituents in the equation above are expressed in milliequivalents per liter. As a ratio, SAR has no units.

The following water quality objective for SAR, as an annual average, applies to surface waters of the East Fork Carson River HU. Except as noted below, SAR objectives apply to the entire water body and its tributary surface waters in California.

Water Body SAR (Annual Average)

East Fork Carson River **2**

Bryant Creek **1**

The Lahontan Regional Board recognizes that SAR may be higher than the value above in certain surface waters of the East Fork Carson River watershed due to natural sources of sodium, including geothermal sources. Where higher SAR values occur only as a result of natural sources, the affected water bodies or water body segments will not be considered to be in violation of the applicable SAR objective.

(Figure 3-7, Table 3-14)
The following additional water quality objectives apply to all surface waters of the ***Indian Creek watershed***:

Algal Growth Potential: The mean of monthly mean of algal growth potential shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Biostimulatory Substances: The concentrations of biostimulatory substances shall not be altered in an amount that could produce an increase in aquatic biomass to the extent that such increases in aquatic biomass are discernible at the 10 percent significance level.

Color: The color shall not exceed the 13 Platinum Cobalt Unit mean of monthly means (approximately equal to the State of Nevada standard of 13 Platinum Cobalt Unit sample mean).

Dissolved Oxygen: The dissolved oxygen concentration shall not be depressed by more than 10 percent, below 80 percent saturation, or below 7.0 mg/L at any time, whichever is more restrictive.

pH: Changes in normal ambient pH levels shall not exceed 0.5 unit.

Species Composition: Species composition shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Taste and Odor: The taste and odor shall not be altered.

West Walker River Hydrologic Unit

(See Figure 3-8 and Table 3-15 for water quality objectives for the West Walker River HU.)

The following additional water quality objective applies to all surface waters of the West Walker River Hydrologic Unit

Sodium Adsorption Ratio (SAR): Water quality objectives for SAR are set to protect the irrigated agriculture component of the Agricultural Supply (AGR) beneficial use. SAR is calculated using the following equation, where Na = sodium ion concentration, Ca= calcium ion concentration, and Mg = magnesium ion concentration.

$$\boldsymbol{SAR} = \frac{\boldsymbol{Na}}{\sqrt{\frac{\boldsymbol{Ca} + \boldsymbol{Mg}}{\boldsymbol{2}}}}$$

Concentrations of all chemical constituents in the equation above are expressed in milliequivalents per liter. As a ratio, SAR has no units.

The following water quality objectives for SAR, as an annual average, apply to surface waters of the West Walker River HU. Except as noted below, SAR objectives apply to the entire water body and its tributary surface waters in California.

Water Body SAR (Annual Average)

West Walker River **2**

Topaz Lake **2**

The Lahontan Regional Board recognizes that SAR may be higher than the value above in certain surface waters of the West Walker River watershed due to natural sources of sodium, including geothermal sources. Where higher SAR values occur only as a result of natural sources, the affected water bodies or water body segments will not be considered to be in violation of the applicable SAR objective.

East Walker River Hydrologic Unit

(See Figure 3-8 and Table 3-15 for water quality objectives for the East Walker River HU.)

The following additional water quality objective applies to all surface waters of the East Walker River Hydrologic Unit

Sodium Adsorption Ratio (SAR): Water quality objectives for SAR are set to protect the irrigated agriculture component of the Agricultural Supply (AGR) beneficial use. SAR is calculated using the following equation, where Na = sodium ion concentration, Ca= calcium ion concentration, and Mg = magnesium ion concentration.

$$\boldsymbol{SAR} = \frac{\boldsymbol{Na}}{\sqrt{\frac{\boldsymbol{Ca} + \boldsymbol{Mg}}{\boldsymbol{2}}}}$$

Concentrations of all chemical constituents in the equation above are expressed in milliequivalents per liter. As a ratio, SAR has no units.

The following water quality objective for SAR, as an annual average, applies to surface waters of the West Walker River HU. Except as noted below, SAR objectives apply to the entire water body and its tributary surface waters in California.

Water Body SAR (Annual Average)
East Walker River **2**

The Lahontan Regional Board recognizes that SAR may be higher than the value above in certainsurface waters of the East Walker River watershed due to natural sources of sodium, including geothermal sources. Where higher SAR values occur only as a result of natural sources, the affected water bodies or water body segments will not be considered to be in violation of the applicable SAR objective.

Mono Hydrologic Unit

(See Figure 3-9 and Table 3-16 for water quality objectives for the Mono HU.)

Owens River Hydrologic Unit

(Figures 3-10 and 3-11, Tables 3-17 and 3-18)

The following additional water quality objectives apply to all surface waters of the ***Pine Creek watershed*** (Figure 3-11):

Ammonia, Un-ionized: The discharge of wastes shall not cause concentrations of un-ionized ammonia (NH_3^o) to exceed 0.01 mg/L (as NH_3^o) in receiving waters.

Settleable Material: The concentration of settleable material shall not be raised by more than 0.2 milliliter per liter (maximum), and by no more than an average of 0.1 milliliter per liter during any 30-day period.

Antelope Hydrologic Unit

(Figures 3-12 and 3-12a, Tables 3-19, 3-19a, and 3-19b.)

The following additional water quality objectives apply to Amargosa Creek downstream of the Los Angeles County Sanitation District No. 14 discharge point, and to the Piute Ponds and associated wetlands. The regionwide ammonia objective applies to all other surface waters of the Antelope Hydrologic Unit. (Note: the regionwide ammonia objective is derived from the USEPA's 1985 freshwater ammonia criteria, and emphasizes un-ionized ammonia. The objective below is derived from the USEPA's 1999 freshwater criteria for total ammonia.)

Ammonia, Total

The acute (1hour) ammonia toxicity limits are dependent on pH, and the chronic (30-day) limits are dependent on pH and temperature. Concentrations of total ammonia in lower Amargosa Creek and the Piute Ponds and wetlands, expressed "as Nitrogen" or "as N," shall not exceed the acute and chronic limits listed for the corresponding temperature and pH conditions in Tables 3-19a and 3-19b more often than once every three years, on the average**.** In addition, the highest four-day average concentration of total ammonia within the 30-day period shall not exceed 2.5 times the chronic toxicity limit.

The values in Table 3-19a are the USEPA's 1999 freshwater acute ammonia criteria for waters with salmonids (salmon and trout) absent and fish early life stages present. The values in Table 3-19b are the chronic ammonia criteria for waters with fish early life stages present. Salmonids are not present in lower Amargosa Creek and the Piute Ponds and wetlands. Early life stages of several warmwater fish species are present.

For temperature and pH values not explicitly in Table 3-19a and Table 3-19b, the most conservative ammonia value neighboring the actual value may be used, or the acute and chronic ammonia limits for waters with salmonids absent and chronic ammonia limits for waters with fish early life stages present can be calculated from the following formulas from the USEPA's 1999 freshwater ammonia criteria document. In these equations, T = temperature in ◦ C, and pH (the measure of acidity or alkalinity) is expressed in standard units.

Acute Toxicity. The formula for the acute toxicity limit (1-hour average) for total ammonia nitrogen (in mg N/L), for waters with salmonids absent, is:

$$\boldsymbol{Acute\ Limit} = \frac{\mathbf{0.411}}{\mathbf{1 + 10^{7.204 - pH}}} + \frac{\mathbf{58.4}}{\mathbf{1 + 10^{pH - 7.204}}}$$

Chronic Toxicity. The formula for the chronic toxicity limit (30-day average) for total ammonia nitrogen (in mg N/L), for waters with fish early life stages present is:

$$\boldsymbol{Chronic\ Limit} = \left(\frac{\mathbf{0.0577}}{\mathbf{1 + 10^{7.688-pH}}} + \frac{\mathbf{2.487}}{\mathbf{1 + 10^{pH-7.688}}}\right) * \boldsymbol{MIN}(\mathbf{2.85}, \mathbf{1.45} * \mathbf{10^{0.028*(25-T)}})$$

In the equation above, “MIN” means that the calculation should use either 2.85 or the number resulting from the second expression, whichever is lower.

Temperature and pH measurements. If receiving water samples are obtained over a period of time during which pH and/or temperature is not constant, the pH, temperature, and the concentration of total ammonia in each sample should be determined. For each sample, the toxicity limit should be determined at the pH and temperature of the sample, and then the concentration of total ammonia nitrogen in the sample should be divided by the limit to determine a quotient. The acute or chronic toxicity objective is attained if the mean of the quotients is less than 1 over the duration of the averaging period.

Mojave Hydrologic Unit

(See Figures 3-13 and 3-14, and Tables 3-20 and 3-21, for water quality objectives for the Mojave HU.)

Water Quality Objectives for Fisheries Management Activities Using the Fish Toxicant Rotenone

Rotenone is a fish toxicant presently used by the California Department of Fish and Wildlife (DFW) and the United States Fish and Wildlife Service (USFWS) for fishery management purposes. (See Chapter 4 for a more complete discussion of this topic.)

The application of rotenone and the detoxification agent potassium permanganate can cause several water quality objectives to be temporarily exceeded, both inside and outside of project boundaries. (Project boundaries are defined as encompassing the treatment area, the detoxification area, and the area downstream of the detoxification station up to a thirty-minute travel time.)

The Basin Plan (see Chapter 4) contains prohibitions against discharges of waste that result in violation of narrative or numeric water quality objectives. Conditional exemptions to these prohibitions may be granted by the Regional Board or its Executive Officer, if so delegated, for rotenone applications by the DFW or USFWS, provided that such projects comply with the conditions described below and with the criteria described in Chapter 4 under the section entitled “Exemption Criteria for Fisheries Management.” The following project-specific water quality objectives of receiving water limitations also apply to fisheries management projects using rotenone during and immediately following treatment.

Color

The characteristic purple discoloration resulting from the discharge of potassium permanganate shall not be discernible more than two miles downstream of project boundaries at any time. Twenty-four (24) hours after shutdown of the detoxification operation, no color alteration(s) resulting from the discharge of potassium permanganate shall be discernible within or downstream of project boundaries.

Chemical Constituents

Chemical residues resulting from rotenone treatment must not exceed the following limitations:

1. The concentration of naphthalene outside of project boundaries shall not exceed 25 µg/liter (ppb) at any time.

2. The concentration of rotenone, rotenolone, trichloroethylene (TCE), xylene, or acetone (or potential trace contaminants such as benzene or ethylbenzene) outside of project boundaries shall not exceed the detection levels for these respective compounds at any time. “Detection level” is defined as the minimum level that can be reasonably detected using state-of-the-art equipment and methodology.

3. After a two-week period has elapsed from the date that rotenone application was completed, no chemical residues resulting from the treatment shall be present at detectable levels within or downstream of project boundaries.

4. No chemical residues resulting from rotenone treatments shall exceed detection levels in ground water at any time.

Toxicity

Chemical residues resulting from rotenone treatment must not exceed the limitations listed above for chemical constituents.

Water Quality Objectives for Ground Water

(See also section 4.6, "Ground Water Protection and Management")

Water quality objectives for ground waters are divided into the two categories of:

1. **Water Quality Objectives That Apply to All Ground Waters.** Listed alphabetically below, these narrative and numerical water quality objectives apply to **all** ground waters within the Lahontan Region:

   Bacteria, Coliform
   Chemical Constituents
   Radioactivity
   Taste and Odor

2. **Water Quality Objectives For Specific Ground Water Basins.** Certain numerical and narrative water quality objectives are directed toward protection of specific ground water basins. These ground water basins are listed below by ground water basin name within the Lahontan Region, in a north to south direction:

   Honey Lake Valley
   Truckee River and Little Truckee River HUs
   Carson Valley
   Mojave River Valley

Water Quality Objectives That Apply to All Ground Waters

Bacteria, Coliform

In ground waters designated as MUN, the median concentration of coliform organisms over any seven-day period shall be less than 1.1/100 milliliters.

Chemical Constituents

Ground waters designated as MUN shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 64444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges). This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Waters designated as AGR shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses (i.e., agricultural purposes).

Ground waters shall not contain concentrations of chemical constituents that adversely affect the water for beneficial uses.

Radioactivity

Ground waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations, which is incorporated by reference into this plan. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Taste and Odor

Ground waters shall not contain taste or odor-producing substances in concentrations that cause nuisance or that adversely affect beneficial uses. For ground waters designated as MUN, at a minimum, concentrations shall not exceed adopted secondary maximum contaminant levels specified in Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges) of Title 22 of the California Code of Regulations, which is incorporated by reference into this plan. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Water Quality Objectives For Certain Ground Water Basins

Honey Lake Valley Basin

For ground waters under the **Eagle Drainage Hydrologic Area** (Figure 3-2), the taste and odor shall not be altered.

Truckee River and Little Truckee River HUs

For ground waters under the **Little Truckee River Hydrologic Unit** (Figure 3-4), the taste and odor shall not be altered.

For ground waters under the **Truckee River Hydrologic Unit** (Figure 3-5), the taste and odor shall not be altered.

Carson Valley Basin

For ground waters under the **Indian Creek Watershed** (Figure 3-7), the taste and odor shall not be altered.

For ground waters under the **West Fork Carson River Hydrologic Unit** (Figure 3-7), the taste and odor shall not be altered.

Mojave River Valley Basin

For certain ground waters under the Mojave Hydrologic Unit, see water quality objectives for total dissolved solids and nitrate in Table 3-20 and on Figure 3-13.

General Direction Regarding Compliance With Objectives

This section includes general direction on determining compliance with the narrative and numerical objectives described in this Chapter. (Specific direction on compliance with certain objectives is included, in italics, following the text of the objective.) It is not feasible to cover all circumstances and conditions that could be created by all discharges. Therefore, it is within the discretion of the Regional Board to establish other, or additional, direction on compliance with objectives of this Plan. Where more than one objective is applicable, the **stricter objective shall apply**. (The only exception is where a regionwide objective has been superseded by the adoption of a site-specific objective by the Regional Board.) Where objectives are not specifically designated, downstream objectives apply to upstream tributaries.

Antidegradation Policy

To implement State Board Resolution No. 68-16, the "Statement of Policy with Respect to Maintaining High Quality Waters in California," the Regional Board follows guidance such as that in the USEPA's 1993 *Water Quality Standards Handbook* and the State Board's October 7, 1987 legal memorandum titled "Federal Antidegradation Policy" (Attwater 1987). The State Board has interpreted the Resolution No. 68-16 to incorporate the federal antidegradation policy in order to ensure consistency with federal Clean Water Act requirements (see State Board Order No. WQ 86-17, pages 16-24). For detailed information on the federal antidegradation policy, see USEPA Region IX's *Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12* and USEPA's *Questions and Answers on Antidegradation*. The Regional Board's procedures for implementation of State and federal antidegradation policies are summarized below. It is important to note that the federal policy applies only to surface waters, while the State policy applies to both surface and ground waters.

Under the State Antidegradation Policy, whenever the existing quality of water is better than that needed to protect all existing and probable future beneficial uses, the existing high quality shall be maintained until or unless it has been demonstrated to the State that any change in water quality will be consistent with the maximum benefit of the people of the State, and will not unreasonably affect present and probable future beneficial uses of such water. Therefore, unless these conditions are met, background water quality concentrations (the concentrations of substances in natural waters that are unaffected by waste management practices or contamination incidents) are appropriate water quality goals to be maintained. If it is determined that some degradation is in the best interest of the people of California, some increase in pollutant level may be appropriate. However, in no case may such increases cause adverse impacts to existing or probable future beneficial uses of waters of the State.

Where the federal antidegradation policy applies, it does not absolutely prohibit any changes in water quality. The policy requires that any reductions in water quality be consistent with the three-part test established by the policy, as described below.

Part One-Instream Uses
[40 CFR § 131.12(a)(1)]

The first part of the test establishes that "existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." Reductions in water quality should not be permitted if the change in water quality would seriously harm any species found in the water (other than an aberrational species). Waters of this type are generally referred to as "Tier I" waters.

Part Two-Public Interest Balancing
[40 CFR § 131.12(a)(2)]

The second part of the test applies where water quality is higher than necessary to protect existing instream beneficial uses. This part of the test allows reductions in water quality if the state finds "that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located" **and** existing beneficial uses are protected. Waters of this type are generally referred to as "Tier II" waters.

Part Three-Outstanding National Resource Waters (ONRWs) [40 CFR § 131.12(a)(3)]

The third part of the test established by the federal policy requires that the water quality of the waters that constitute an outstanding national resource be maintained and protected. No permanent or long-term reduction in water quality is allowable in areas given special protection as Outstanding National Resource Waters (48 Fed. Reg. 51402). Waters that potentially could qualify for ONRW designation are generally classified as “Tier III” waters.

Examples of such waters include, but are not limited to, waters of National and State Parks and wildlife refuges, waters of exceptional recreational or ecological significance, and state and federally designated wild and scenic rivers. To date, the only California waters designated as ONRWs are Lake Tahoe and Mono Lake. However, other California waters would certainly qualify.

ONRWs may be designated as part of adoption or amendment of water quality control plans. It is important to note that even if no formal designation has been made, lowering of water quality should not be allowed for waters that, because of their exceptional recreational and/or ecological significance, should be given the special protection assigned to ONRWs.

Narrative and Numerical Objectives

The sections below provide additional direction on determining compliance with the narrative and numerical objectives of this Basin Plan.

Pollution and/or Nuisance

In determining compliance with narrative objectives that include the terms “pollution” and or “nuisance,” the Regional Board considers the following definitions from the Porter-Cologne Water Quality Control Act.

Pollution -- an alteration of the waters of the State by waste to the degree that unreasonably affects either of the following:

- such waters for beneficial uses.
- facilities that serve these beneficial uses.

“Pollution” may include “contamination.” Contamination means an impairment of the quality of the waters of the State by waste to a degree that creates a hazard to the public health through poisoning or through the spread of disease. Contamination includes any equivalent effect resulting from the disposal of waste, whether or not waters of the State are affected.

Nuisance -- Anything that meets all of the following requirements:

- Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
- Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
- Occurs during or as a result of the treatment or disposal of wastes.

References to Taste and Odor, Human Health and Toxicity (also see “acute toxicity” and “chronic toxicity,” below)

In determining compliance with objectives including references to Taste and Odor, Human Health or Toxicity, the Regional Board will consider as evidence relevant and scientifically valid water quality goals from sources such as drinking water standards from the California Department of Public Health (State “Action Levels”), the National Interim Drinking Water Standards, Proposition 65 Lawful Levels, National Ambient Water Quality Criteria, the National Academy of Sciences' Suggested No-Adverse-Response Levels (SNARLs), USEPA's Health and Water Quality Advisories, USEPA’s National Toxicity Rule and California Toxicity Rule, as well as other relevant and scientifically valid evidence.

References to Agriculture or AGR designations

In determining compliance with objectives including references to the AGR designated use, the Regional Board will refer to water quality goals and recommendations from sources such as the Food and Agriculture Organization of the United Nations, University of California Cooperative Extension, Committee of Experts, and McKee and Wolf's “Water Quality Criteria” (1963).

References to “Natural High Quality Waters”

The Regional Board generally considers “natural high quality water(s)” to be those waters with ambient water quality equal to, or better than, current drinking water standards. However, the Regional Board also recognizes that some waters with poor chemical quality may support important ecosystems (e.g., Mono Lake).

References to "10 Percent Significance Level"

A statistical hypothesis is a statement about a random variable's probability distribution, and a decision-making procedure about such a statement is a hypothesis test. In testing a hypothesis concerning the value of a population mean, the null hypothesis is often used. The null hypothesis is that there is no difference between the population means (e.g., the mean value of a water quality parameter after the discharge is no different than before the discharge.) First, a level of significance to be used in the test is specified, and then the regions of acceptance and rejection for evaluating the obtained sample mean are determined.

At the **10 percent significance level**, assuming normal distribution, the acceptance region (where one would correctly accept the null hypothesis) is the interval that lies under 90 percent of the area of the standard normal curve. Thus, a level of **significance of 10 percent** signifies that when the population mean is correct as specified, the sample mean will fall in the areas of rejection only 10 percent of the time.

If the hypothesis is rejected when it should be accepted, a Type I error has been made. In choosing a **10 percent level of significance**, there are 10 chances in 100 that a Type I error was made, or the hypothesis was rejected when it should have been accepted (i.e., one is 90 percent *confident* that the right decision was made.)

The **10 percent significance level** is often <u>incorrectly</u> referred to as the 90 percent significance level. As explained above, the significance level of a test should be low, and the confidence level of a confidence interval should be high.

References to "Means" (e.g., annual mean, log mean, mean of monthly means), "Medians" and "90th Percentile Values"

"Mean" is the arithmetic mean of all data. **"Annual mean"** is the arithmetic mean of all data collected in a one-year period. **"Mean of monthly means"** is the arithmetic mean of 30-day averages (arithmetic means). A logarithmic or **"log mean"** (used in determining compliance with bacteria objectives) is calculated by converting each data point into its log, then calculating the mean of these values, then taking the anti-log of this log transformed average. The **median** is the value that half of the values of the population exceed and half do not. The **average value** is the arithmetic mean of all data. For a **90th percentile value**, only 10% of data exceed this value.

Compliance determinations shall be based on available analyses for the time interval associated with the discharge. If only one sample is collected during the time period associated with the water quality objective, (e.g., monthly mean), that sample shall serve to characterize the discharge for the entire interval. Compliance based upon multiple samples shall be determined through the application of appropriate statistical methods.

Standard Analytical Methods to Determine Compliance with Objectives

Analytical methods to be used are usually specified in the monitoring requirements of the waste discharge permits. Suitable analytical methods are:

- those specified in 40 CFR Part 136, and/or
- those methods determined by the Regional Board and approved by the USEPA to be equally or more sensitive than 40 CFR Part 136 methods and appropriate for the sample matrix, and/or
- where methods are not specified in 40 CFR Part 136, those methods determined by the Regional Board to be appropriate for the sample matrix

All analytical data shall be reported uncensored with method detection limits and either practical quantitation levels or limits of quantitation identified. Acceptance of data should be based on demonstrated laboratory performance.

For **bacterial analyses**, sample dilutions should be performed so the range of values extends from 2 to 16,000. The detection method used for each analysis shall be reported with the results of the analysis. Detection methods used for coliforms (total and fecal) shall be those presented in *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association et al.), or any alternative method determined by the Regional Board to be appropriate.

For **acute toxicity**, compliance shall be determined by short-term toxicity tests on undiluted effluent using an established protocol (e.g., American Society for Testing and Materials [ASTM], American Public Health Association, USEPA, State Board).

For **chronic toxicity**, compliance shall be determined using the critical life stage (CLS) toxicity tests. At least three approved species shall be used to measure compliance with the toxicity objective. If possible, test species shall include a vertebrate, an invertebrate, and an aquatic plant. After an initial screening period, monitoring may be reduced to the most sensitive species. Dilution and control waters should be obtained from an unaffected area of the receiving waters. For rivers and streams, dilution water should be obtained immediately upstream of the discharge. Standard dilution water can be used if the above sources exhibit toxicity greater than 1.0 Chronic Toxicity Units. All test results shall be reported to the Regional Board in accordance with the "Standardized Reporting Requirements for Monitoring Chronic Toxicity" (State Board Publication No. 93-2 WQ).

Application of Narrative and Numerical Water Quality Objectives to Wetlands

Although not developed specifically for wetlands, many surface water **narrative objectives** are generally applicable to most wetland types. However, the Regional Board recognizes, as with other types of surface waters such as saline or alkaline lakes, that natural water quality characteristics of some wetlands may not be within the range for which the narrative objectives were developed. The Regional Board will consider site-specific adjustments to the objectives for wetlands (bacteria, pH, hardness, salinity, temperature, or other parameters) as necessary on a case-by-case basis.

The **numerical criteria** to protect one or more beneficial uses of surface waters, where appropriate, may directly apply to wetlands. For example, wetlands that actually are, or that recharge, municipal water supplies should meet human health criteria. The USEPA numeric criteria for protection of freshwater aquatic life, although not developed specifically for wetlands, are generally applicable to most wetland types. As with other types of surface waters, such as saline or alkaline lakes, natural water quality characteristics of some wetlands may not be within the range for which the criteria were developed. Adjustments for pH, hardness, salinity, temperature, or other parameters may be necessary. The Regional Board will consider developing site-specific objectives for wetlands on a case-by-case basis.

Variances from Water Quality Objectives

The USEPA allows states to grant variances from water quality standards under the narrow circumstances summarized below. Such variances must be "built into" the standards themselves, and thus variances cannot be granted in California without Basin Plan amendments.

According to the USEPA, variances from standards "are both discharger and pollutant specific, are time-limited, and do not forego the currently designated use." The USEPA recommends use of variances instead of removal of beneficial uses when the State believes that standards can ultimately be attained. Variances can be used with NPDES permits to ensure reasonable progress toward attainment of standards without violation of Clean Water Act Section 402(a)(1), which requires NPDES permits to meet applicable water quality standards.

The USEPA "has approved State-adopted variances in the past and will continue to do so if:

- each individual variance is included as part of the water quality standard;
- the State demonstrates that meeting the standard is unattainable based on one or more of the grounds outlined in 40 CFR 131.10 (g) for removing a designated use;
- the justification submitted by the State includes documentation that treatment more advanced than that required by sections 303(c)(2)(A) and (B) has been carefully considered, and that alternative effluent control strategies have been evaluated;
- the more stringent State criterion is maintained and is binding upon all other dischargers on the stream or stream segment;
- the discharger who is given a variance for one particular constituent is required to meet the applicable criteria for other constituents;
- the variance is granted for a specific period of time and must be rejustified upon expiration but at least every three years (Note: the 3-year limit is derived from the triennial review requirements of section 303(c) of the Act.);
- the discharger either must meet the standard upon the expiration of this time period or must make a new demonstration of "unattainability";
- reasonable progress is being made toward meeting the standards; and
- the variance was subjected to public notice, opportunity for comment, and public hearing. (See section 303(c)(1) and 40 CFR 131.20.) The public notice should contain a clear description of the impact of the variance upon

achieving water quality standards in the affected stream segment."

(The "section" references in the quoted language above are to the Clean Water Act. As used in this language, "criteria" and "criterion" are equivalent to California's "water quality objective[s]".)

Table 3-1
ONE-HOUR AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters Designated as COLD, COLD with SPWN, COLD with MIGR (Salmonids or other sensitive coldwater species present)

	Temperature, C						
pH	0	5	10	15	20	25	30
Un-ionized Ammonia (mg/liter NH_3)							
6.50	0.0091	0.0129	0.0182	0.026	0.036	0.036	0.036
6.75	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
7.00	0.023	0.033	0.046	0.066	0.093	0.093	0.093
7.25	0.034	0.048	0.068	0.095	0.135	0.135	0.135
7.50	0.045	0.064	0.091	0.128	0.181	0.181	0.181
7.75	0.056	0.080	0.113	0.159	0.22	0.22	0.22
8.00	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.25	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.50	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.75	0.065	0.092	0.130	0.184	0.26	0.26	0.26
9.00	0.065	0.092	0.130	0.184	0.26	0.26	0.26
Total Ammonia (mg/liter NH_3)							
6.50	35	33	31	30	29	20	14.3
6.75	32	30	28	27	27	18.6	13.2
7.00	28	26	25	24	23	16.4	11.6
7.25	23	22	20	19.7	19.2	13.4	9.5
7.50	17.4	16.3	15.5	14.9	14.6	10.2	7.3
7.75	12.2	11.4	10.9	10.5	10.3	7.2	5.2
8.00	8.0	7.5	7.1	6.9	6.8	4.8	3.5
8.25	4.5	4.2	4.1	4.0	3.9	2.8	2.1
8.50	2.6	2.4	2.3	2.3	2.3	1.71	1.28
8.75	1.47	1.40	1.37	1.38	1.42	1.07	0.83
9.00	0.86	0.83	0.83	0.86	0.91	0.72	0.58

1 To convert these values to mg/liter N, multiply by 0.822

2 Source: U. S. Environmental Protection Agency. 1986. Quality criteria for water, 1986. EPA 440/5-86-001.

Table 3-2
ONE-HOUR AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters designated WARM, WARM with SPWN, WARM with MIGR (Salmonids or other sensitive coldwater species absent)[3]

	Temperature, °C						
pH	0	5	10	15	20	25	30
Un-ionized Ammonia (mg/liter NH_3)							
6.50	0.0091	0.0129	0.0182	0.026	0.036	0.051	0.051
6.75	0.0149	0.021	0.030	0.042	0.059	0.084	0.084
7.00	0.023	0.033	0.046	0.066	0.093	0.131	0.093
7.25	0.034	0.048	0.068	0.095	0.135	0.190	0.190
7.50	0.045	0.064	0.091	0.128	0.181	0.26	0.26
7.75	0.056	0.080	0.113	0.159	0.22	0.32	0.32
8.00	0.065	0.092	0.130	0.184	0.26	0.37	0.37
8.25	0.065	0.092	0.130	0.184	0.26	0.37	0.37
8.50	0.065	0.092	0.130	0.184	0.26	0.37	0.37
8.75	0.065	0.092	0.130	0.184	0.26	0.37	0.37
9.00	0.065	0.092	0.130	0.184	0.26	0.37	0.37
Total Ammonia (mg/liter NH_3)							
6.50	35	33	31	30	29	29	20
6.75	32	30	28	27	27	26	18.6
7.00	28	26	25	24	23	23	16.4
7.25	23	22	20	19.7	19.2	19.0	13.5
7.50	17.4	16.3	15.5	14.9	14.6	14.5	10.3
7.75	12.2	11.4	10.9	10.5	10.3	10.2	7.3
8.00	8.0	7.5	7.1	6.9	6.8	6.8	4.9
8.25	4.5	4.2	4.1	4.0	3.9	4.0	2.9
8.50	2.6	2.4	2.3	2.3	2.3	2.4	1.81
8.75	1.47	1.40	1.37	1.38	1.42	1.52	1.18
9.00	0.86	0.83	0.83	0.86	0.91	1.01	0.82

1 To convert these values to mg/liter, multiply by 0.822

2 Source: U. S. Environmental Protection Agency. 1986. Quality criteria for water, 1986. EPA 440/5-86-001.

3 These values may be conservative, however, if a more refined criterion is desired, USEPA recommends a site-specific criteria modification.

Table 3-3
FOUR DAY AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters Designated as COLD, COLD with SPWN, COLD with MIGR (Salmonids or other sensitive coldwater species present)

	Temperature, °C						
pH	0	5	10	15	20	25	30
Un-ionized Ammonia (mg/liter NH_3)							
6.50	0.0008	0.0011	0.0016	0.0022	0.0022	0.0022	0.0022
6.75	0.0014	0.0020	0.0028	0.0039	0.0039	0.0039	0.0039
7.00	0.0025	0.0035	0.0049	0.0070	0.0070	0.0070	0.0070
7.25	0.0044	0.0062	0.0088	0.0124	0.0124	0.0124	0.0124
7.50	0.0078	0.0111	0.0156	0.022	0.022	0.022	0.022
7.75	0.0129	0.0182	0.026	0.036	0.036	0.036	0.036
8.00	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.25	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.50	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.75	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
9.00	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
Total Ammonia (mg/liter NH_3)							
6.50	3.0	2.8	2.7	2.5	1.76	1.23	0.87
6.75	3.0	2.8	2.7	2.6	1.76	1.23	0.87
7.00	3.0	2.8	2.7	2.6	1.76	1.23	0.87
7.25	3.0	2.8	2.7	2.6	1.77	1.24	0.88
7.50	3.0	2.8	2.7	2.6	1.78	1.25	0.89
7.75	2.8	2.6	2.5	2.4	1.66	1.17	0.84
8.00	1.82	1.70	1.62	1.57	1.10	0.78	0.56
8.25	1.03	0.97	0.93	0.90	0.64	0.46	0.33
8.50	0.58	0.55	0.53	0.53	0.38	0.28	0.21
8.75	0.34	0.32	0.31	0.31	0.23	0.173	0.135
9.00	0.195	0.189	0.189	0.195	0.148	0.116	0.094

1 To convert these values to mg/liter N, multiply by 0.822.

2 Source: U. S. Environmental Protection Agency. 1992. Revised tables for determining average freshwater ammonia concentrations. USEPA Office of Water Memorandum, July 30, 1992.

Table 3-4
FOUR DAY AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters designated WARM, WARM with SPWN, WARM with MIGR (Salmonids or other sensitive coldwater species absent)[3]

	Temperature, °C						
pH	0	5	10	15	20	25	30
Un-ionized Ammonia (mg/liter NH_3)							
6.50	0.0008	0.0011	0.0016	0.0022	0.0031	0.0031	0.0031
6.75	0.0014	0.0020	0.0028	0.0039	0.0055	0.0055	0.0055
7.00	0.0025	0.0035	0.0049	0.0070	0.0099	0.0099	0.0099
7.25	0.0044	0.0062	0.0088	0.0124	0.0175	0.0175	0.0175
7.00	0.0078	0.0111	0.0156	0.022	0.031	0031	0.031
7.75	0.0129	0.0182	0.026	0.036	0.051	0.051	0.051
8.00	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
8.25	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
8.50	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
8.75	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
9.00	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
Total Ammonia (mg/liter NH_3)							
6.50	3.0	2.8	2.7	2.5	2.5	1.73	1.23
6.75	3.0	2.8	2.7	2.6	2.5	1.74	1.23
7.00	3.0	2.8	2.7	2.6	2.5	1.74	1.23
7.25	3.0	2.8	2.7	2.6	2.5	1.75	1.24
7.50	3.0	2.8	2.7	2.6	2.5	1.76	1.25
7.75	2.8	2.6	2.5	2.4	2.3	1.65	1.18
8.00	1.82	1.70	1.62	1.57	1.55	1.10	0.79
8.25	1.03	0.97	0.93	0.90	0.90	0.64	0.47
8.50	0.58	0.55	0.53	0.53	0.53	0.39	0.29
8.75	0.34	0.32	0.31	0.31	0.32	0.24	0.190
9.00	0.195	0.189	0.189	0.195	0.21	0.163	0.133

1 To convert these values to mg/liter N, multiply by 0.822.

2 Source: U. S. Environmental Protection Agency. 1992. Revised tables for determining average freshwater ammonia concentrations. USEPA Office of Water Memorandum, July 30, 1992.

3 These values may be conservative, however, if a more refined criterion is desired, USEPA recommends a site-specific criteria modification.

Table 3-5
EXAMPLE AMMONIA SPREADSHEET OUTPUT
(USEPA AMMONIA CRITERIA CALCULATOR*)

Required user inputs: 1-h Temp. Cap = 20°; 4-d Temp. Cap = 15°; Temp., °C = 10; pH = 7.0

One-hour criteria not to exceed, mg/L as NH_3

	0<T<TCAP			TCAP<T<30		
Parameter	6.5<pH<7.7	7.7<pH<8.0	8.0<pH<9.0	6.5<pH<7.7	7.7<pH<8.0	8.0<pH<9.0
FT	1.995	1.995	1.995	1.000	1.000	1.000
FPH	2.810	2.810	1.000	2.810	2.810	1.000
Unionized NH_3	0.0464	0.0464	0.1303	0.0925	0.0925	0.2600
Total NH_3+NH_4	25.0369	25.0369	70.3414	49.9552	49.9552	140.3495

Four-day criteria not to exceed, mg/L as NH_3

	0<T<TCAP			TCAP<T<30		
Parameter	6.5<pH<7.7	7.7<pH<8.0	8.0<pH<9.0	6.5<pH<7.7	7.7<pH<8.0	8.0<pH<9.0
FT	1.995	1.995	1.995	1.413	1.413	1.413
FPH	2.810	2.810	1.000	2.810	2.810	1.000
RATIO	28.899	13.500	13.500	28.899	13.500	13.500
Unionized NH_3	0.0049	0.0106	0.0297	0.0070	0.0149	0.0420
Total NH_3+NH_4	2.6657	5.7064	16.0322	3.7654	8.0605	22.6461

Chemical thermodynamic constants**
pKa = 9.731432321
f = 0.001852518

* A Microsoft Excel spreadsheet
Use only that temperature and pH column which applies to the input data
T = Temperature, °C; TCAP = Temperature Cap, °C

** pKa: -log K; K is equilibrium constant for ammonium
f is the fraction of unionized NH_3/(Total NH_3+NH_4)

Table 3-6
WATER QUALITY CRITERIA FOR
AMBIENT DISSOLVED OXYGEN CONCENTRATION[1,2]

	Beneficial Use Class			
	COLD & SPWN[3]	COLD	WARM & SPWN[3]	WARM
30 Day Mean	NA[4]	6.5	NA	5.5
7 Day Mean	9.5 (6.5)	NA	6.0	NA
7 Day Mean Minimum	NA	5.0	NA	4.0
1 Day Minimum[5,6]	8.0 (5.0)	4.0	5.0	3.0

1 From: USEPA. 1986. Ambient water quality criteria for dissolved oxygen. Values are in mg/L.

2 These are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column (SPWN), the figures in parentheses apply.

3 Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching (SPWN).

4 NA (Not Applicable).

5 For highly manipulatable discharges, further restrictions apply.

6 All minima should be considered as instantaneous concentrations to be achieved at all times.

Table 3-7
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SURPRISE VALLEY HYDROLOGIC UNIT

See Fig. 3-1	Surface Water	Objective (mg/L)[1,2]			
		TDS	Cl	B	Total N
1	Bidwell Creek	55	1.0	0.05	0.2
2	Mill Creek	70	0.8	0.02	0.2
3	Cedar Creek	100	1.0	0.03	0.2
4	Eagle Creek	60	0.5	0.02	0.1
5	Emerson Creek	90	0.8	0.01	0.2
6	Bear Creek	110	0.6	0.02	0.1

[1] Annual Average Value

[2] Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
N	Nitrogen, Total
TDS	Total Dissolved Solids (Total Filterable Residue)

Figure 3-1
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SURPRISE VALLEY HYDROLOGIC UNIT

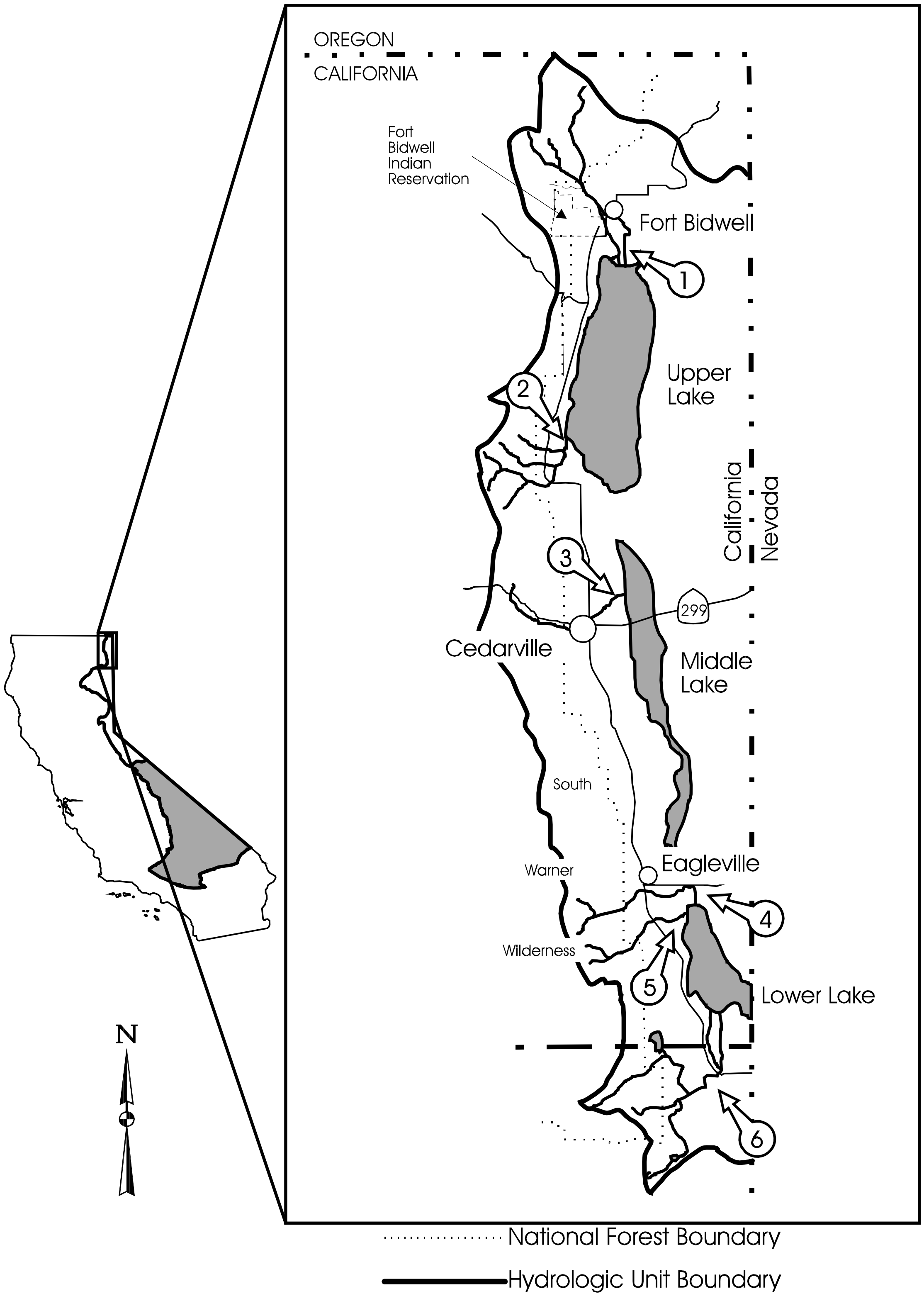

Table 3-8
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES SUSANVILLE HU, EAGLE DRAINAGE HA

See Fig. 3-2	Surface Waters	Objective (mg/L except as noted)[1,4]										
		TDS	Cl	SO_4	NO_3-N	TKN	N	P	B	PO_4	SAR	ALK
1	Eagle Lake: North (Index Stn. 6b)	535	14.0	0.9	0.01	1.0	1.0	0.04 0.30[2]	0.08	0.01 0.20[2]	5.49	445 500[3]
2	Eagle Lake: Middle (Index Stn. 4A)	500	14.0	0.9	0.01	1.0	1.0	0.04 0.30[2]	0.08	0.01 0.20[2]	5.49	430 500[3]
3	Eagle Lake: South (Index Stn. 11)	800	14.0	0.9	0.02	1.3	1.3	0.04 0.30[2]	0.08	0.01 0.20[2]	5.49	470 500[3]
4	Pine Creek	-	0.1	0.9	0.04	0.3	0.4	0.06	0.01	0.02	0.30	-
5	Merrill Creek	-	0.2	0.5	0.02	0.1	0.1	0.02	0.01	0.01	0.23	-
6	Papoose Creek	-	0.1	0.5	0.01	0.3	0.4	0.03	0.01	0.01	0.45	-
7	Grasshopper Creek	-	2.6	-	0.01	0.4	0.4	0.22	0.01	0.06	-	-

1 Calculated and stipulated in terms of mean of monthly mean for the period of record values, unless otherwise specified.
2 Maximum for hypolimnetic waters.
3 Maximum value.
4 Objectives are defined as follows:

ALK	Alkalinity, Total as $CaCO_3$
B	Boron
Cl	Chloride
N	Nitrogen, Total
NO_3-N	Nitrate as Nitrogen
TKN	Total Kjeldahl Nitrogen
PO_4	Orthophosphate, Dissolved
P	Phosphorus, Total
SO_4	Sulfate
TDS	Total Dissolved Solids (Total Filterable Residue)
SAR	Sodium Adsorption Ratio: (Na, Ca, Mg expressed as meq/L concentrations)

$$\frac{Na}{\sqrt{\frac{1}{2}x(Ca+Mg)}} = SAR$$

Figure 3-2
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SUSANVILLE HU, EAGLE DRAINAGE HA

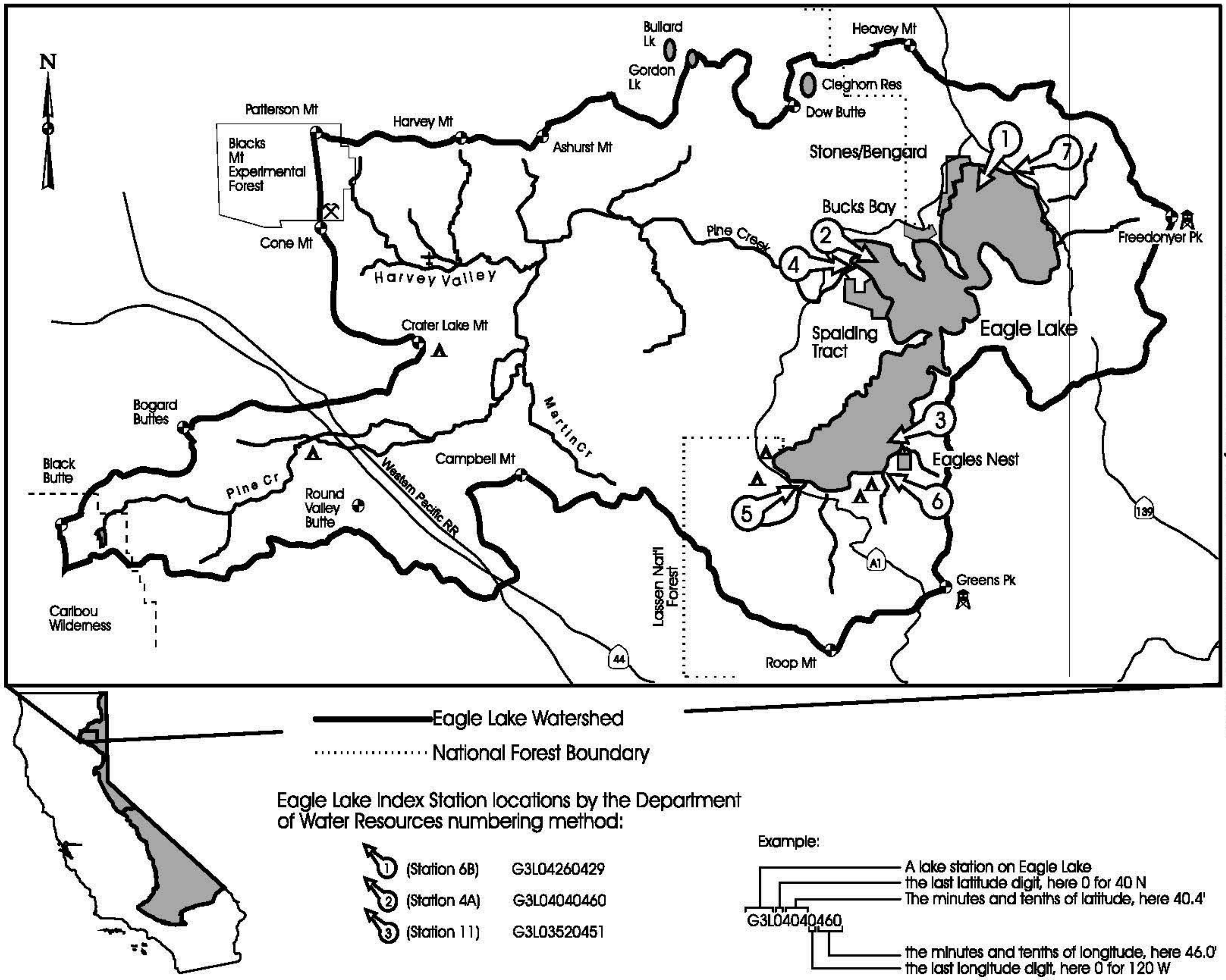

Table 3-9
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SUSANVILLE HYDROLOGIC UNIT

See Fig. 3-3	Surface Waters	Objective (mg/L except as noted)[1,2]						
		TDS	Cl	SO_4	ASAR[3]	B	N	P
1	Willow Creek at Merrilville Rd	310 335	9.5 10.0	0.4 0.5	-	0.01 -	0.7 0.8	0.10 0.11
2	Willow Creek at Co. Road 216	200 230	6.6 -	-	-	0.01 -	0.6 -	0.05 -
3	Willard Creek	40 45	1.2 1.5	-	-	0.01 -	0.01 -	0.03 -
4	Cheney Creek	70 75	0.01 -	-	-	0.01 -	0.01 -	0.03 -
5	Susan River above Willard Creek	60 75	0.7 1.0	1.0 -	-	0.01 -	0.2 0.3	0.06 -
6	Susan River at Lassen Street	95 105	2.0 5.0	2.0 -	0.3 -	0.01 0.10	0.30 0.40	0.15 0.25
7	Susan River near Litchfield at Hwy. 395	185 250	8.0 -	25 40	2.5 -	0.1 0.2	0.65 0.80	0.25 0.30
8	Piute Creek	135 155	1.0 1.2	0.6 0.8	-	0.01 -	0.5 0.6	0.14 0.15
9	Gold Run Creek	40 50	0.2 -	-	-	0.01 -	0.1 -	0.02 -
10	Lassen Creek	65 80	0.01 -	-	-	0.01 -	0.4 -	0.2 -
11	Baxter Creek	70 75	0.4 -	-	-	0.01 -	0.5 -	0.12 -

[1] Annual average value/90th percentile value.

[2] Objectives are as mg/L and are defined as follows:
- TDS Total Dissolved Solids (Total Filterable Residue)
- Cl Chloride
- SO_4 Sulfate
- B Boron (maximum)
- N Nitrogen, Total
- P Phosphorus, Total

[3] ASAR Adjusted Sodium Adsorption Ratio:

$$\frac{Na}{\sqrt{\frac{(Ca+Mg)}{2}}}\times(1+(8.4-pHc))$$

Where concentrations are in milliequivalents per liter and pH_c can be calculated using a Table found in Appendix E.

Figure 3-3
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SUSANVILLE HYDROLOGIC UNIT

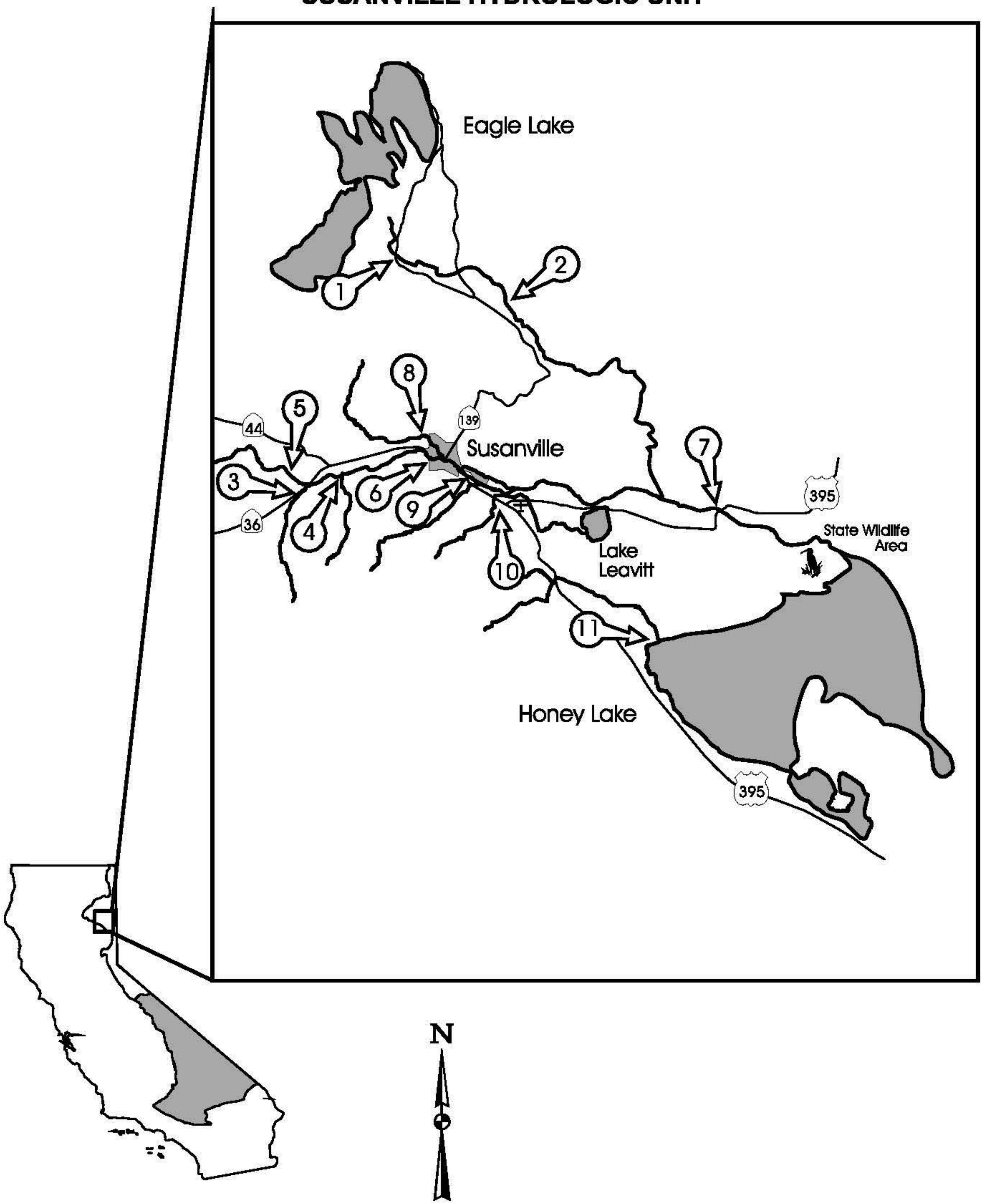

Table 3-10
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LITTLE TRUCKEE RIVER HYDROLOGIC UNIT

See Fig. 3-4	Surface Waters	Objective (mg/L)[1,2]							
		TDS	Cl	SO_4	Fe	NO_3-N	TKN	Total N	Total P
1	Little Truckee River below Boca Reservoir	60	1.0	1.0	.30	0.08	0.32	0.40	0.05
2	Little Truckee River below Independence Creek	45	1.0	1.0	0.13	0.05	0.40	0.45	0.03
3	Independence Lake	35	1.0	1.0	0.10	0.03	0.71	0.74	0.05
4	Independence Cr at Mouth	40	1.0	1.0	0.10	0.03	0.17	0.20	0.03
5	Little Truckee River above Independence Creek	45	1.0	1.0	0.10	0.07	0.35	0.42	0.04

[1] Values are mean of monthly means

[2] Objectives are as mg/L and defined as follows:

Cl	Chloride
Fe	Iron, Total
N	Nitrogen, Total
NO_3-N	Nitrate as Nitrogen
TKN	Total Kjeldahl Nitrogen
P	Phosphorus, Total
SO_4	Sulfate
TDS	Total Dissolved Solids (Total Filterable Residue)

Figure 3-4
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LITTLE TRUCKEE RIVER HYDROLOGIC UNIT

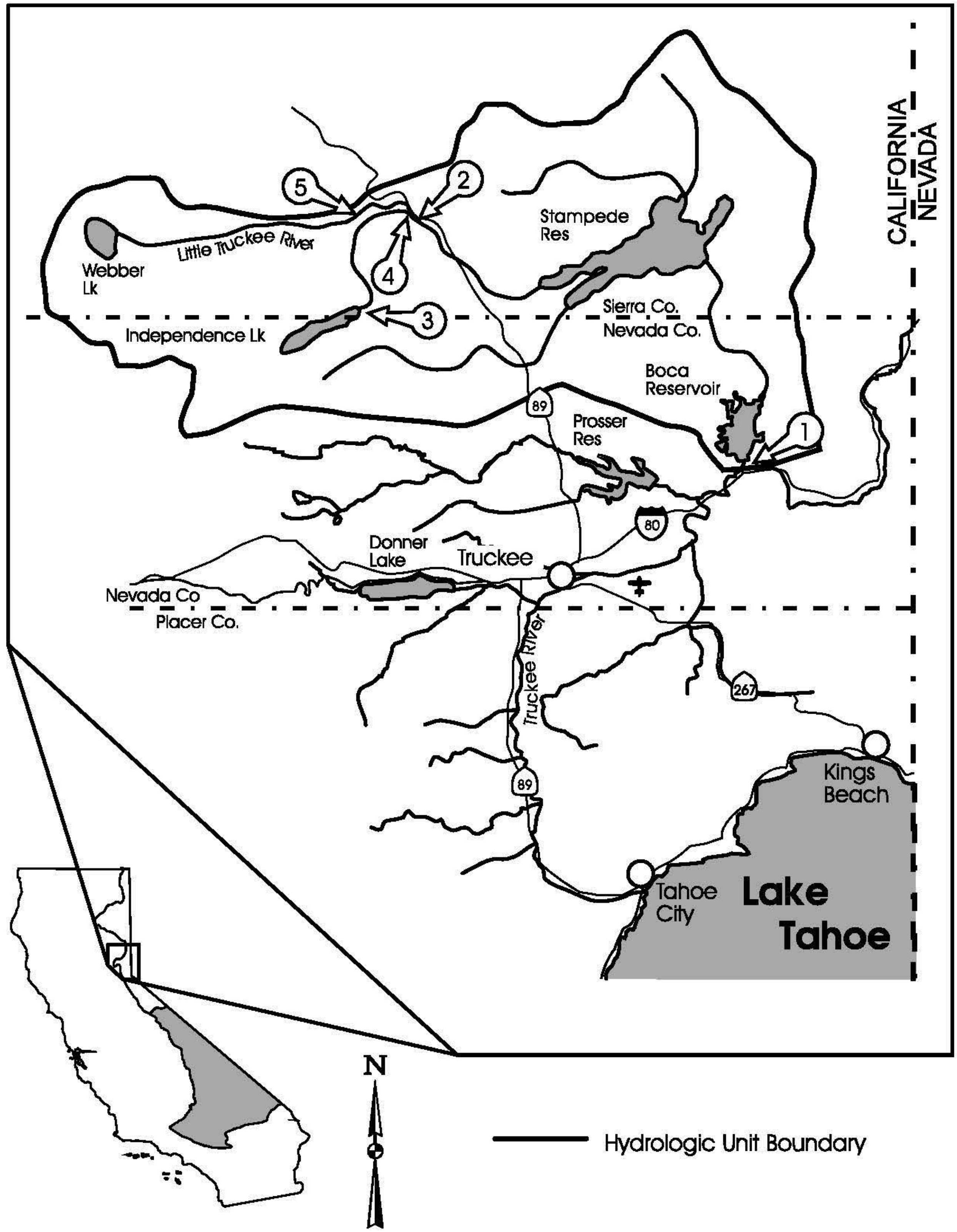

Table 3-11
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
TRUCKEE RIVER HYDROLOGIC UNIT

See Fig. 3-5	Surface Waters	Objective (mg/L)[1,2]								
		TDS	Cl	SO_4	P	B	NO_3-N	N	TKN	Fe
1	Truckee River at Stateline	75	8.0	5.0	0.05	1.0	0.08	0.40	0.32	0.30
2	Truckee River below Little Truckee River	75	9.0	5.0	0.05	-	0.10	0.40	0.30	0.30
3	Truckee River below Prosser Creek	75	10.0	5.0	0.05	-	0.14	0.40	0.26	0.30
4	Truckee River below Martis Creek	80	10.0	5.0	0.05	-	0.20	0.40	0.20	0.29
5	Truckee River below Donner Creek	70	3.0	3.5	0.05	-	0.06	0.41	0.35	0.29
6	Martis Creek at Mouth	150	25.0	8.0	0.05	-	1.00	1.45	0.45	0.40
7	Trout Creek at Mouth	70	3.0	3.5	0.04	-	0.05	0.15	0.10	0.18
8	Squaw Creek at Mouth	85	3.0	25.0	0.02	-	0.05	0.18	0.13	0.13
9	Truckee River above Squaw Creek	65	2.0	2.0	0.03	-	0.06	0.22	0.16	0.13
10	Truckee River below Bear Cr.	65	2.0	2.0	0.03	-	0.05	0.21	0.16	0.13
11	Bear Creek at Mouth	65	2.0	2.0	0.02	-	0.05	0.15	0.10	0.10
	continued...									

Table 3-11 (continued)
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
TRUCKEE RIVER HYDROLOGIC UNIT

See Fig. 3-5	Surface Waters	Objective (mg/L)[1,2]								
		TDS	Cl	SO_4	P	B	NO_3-N	N	TKN	Fe
12	Truckee River above Bear Creek	65	2.0	2.0	0.02	-	0.04	0.19	0.15	0.10
13	Truckee River at Lake Tahoe Outlet	65	2.0	2.0	0.01	-	0.02	0.12	0.10	0.03

[1] Values shown are mean of monthly mean for the period of record.

[2] Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
Fe	Iron, Total
N	Nitrogen, Total
NO_3-N	Nitrate as Nitrogen
TKN	Total Kjeldahl Nitrogen
P	Phosphorus, Total
SO_4	Sulfate
TDS	Total Dissolved Solids (Total Filterable Residue)

Figure 3-5
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
TRUCKEE RIVER HYDROLOGIC UNIT

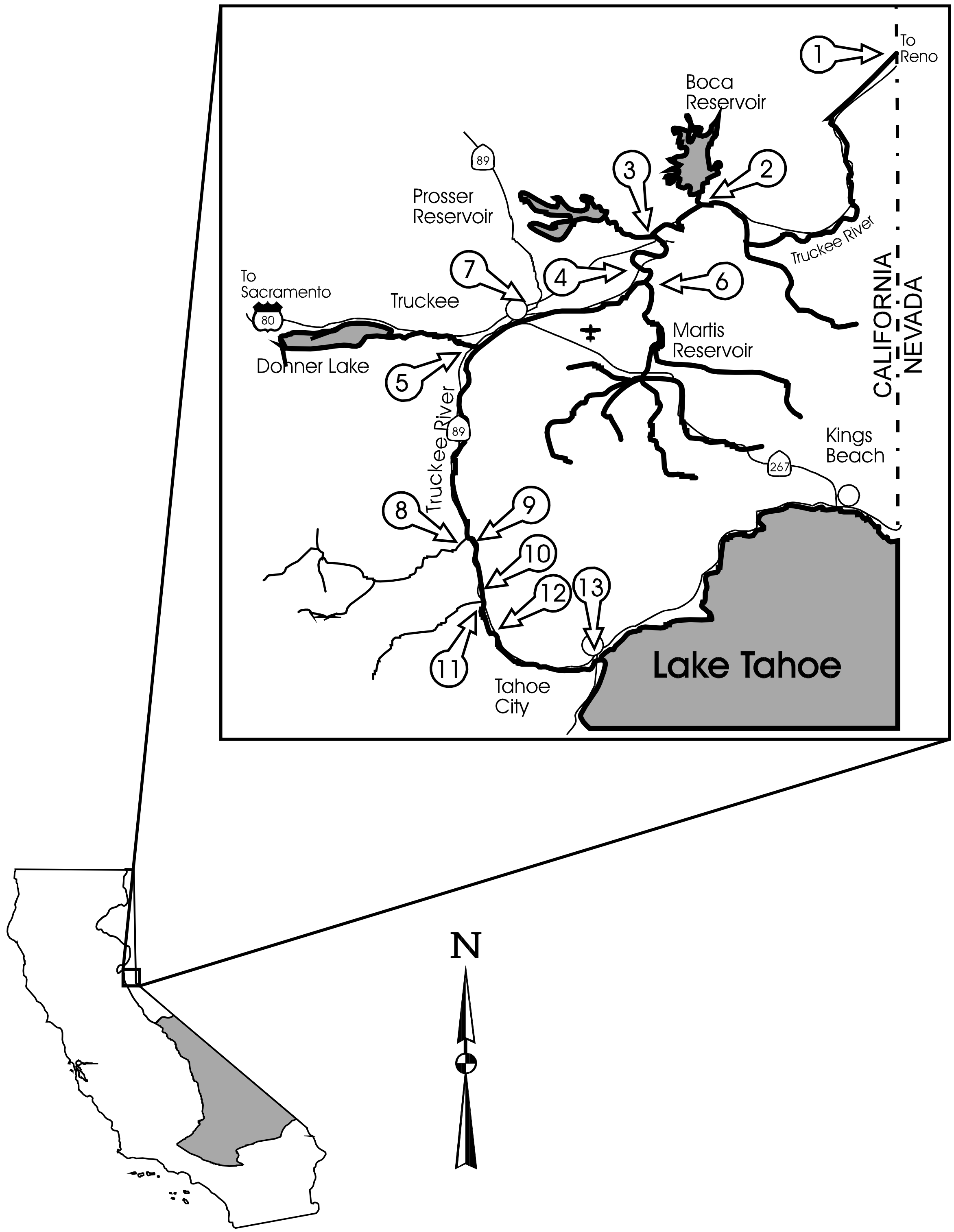

Table 3-12
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LAKE TAHOE HYDROLOGIC UNIT

See Fig. 3-6	Surface Waters	Objective (mg/L except as noted) [1,2]						
		TDS	Cl	SO_4	B	N	P	Fe
1	Lake Tahoe	60 65	3.0 4.0	1.0 2.0	0.01 -	0.15 -	0.008 -	--
2	Fallen Leaf Lake	50 -	0.30 0.50	1.3 1.4	0.01 0.02	See Table 3-13 for additional objectives		
3	Griff Creek	80 -	0.40 -	--	--	0.19 -	0.010 -	0.03 -
4	Carnelian Bay Creek	80 -	0.40 -	--	--	0.19 -	0.015 -	0.03 -
5	Watson Creek	80 -	0.35 -	--	--	0.22 -	0.015 -	0.04 -
6	Dollar Creek	80 -	0.30 -	--	--	0.16 -	0.030 -	0.03 -
7	Burton Creek	90 -	0.30 -	--	--	0.16 -	0.015 -	0.03 -
8	Ward Creek	70 85	0.30 0.50	1.4 2.8	--	0.15 -	0.015 -	0.03 -
9	Blackwood Creek	70 90	0.30 -	--	--	0.19 -	0.015 -	0.03 -
10	Madden Creek	60 -	0.10 0.20	--	--	0.18 -	0.015 -	0.015 -
11	McKinney Creek	55 -	0.40 0.50	--	--	0.19 -	0.015 -	0.03 -
12	General Creek	50 90	1.0 1.5	0.4 0.5	--	0.15 -	0.015 -	0.03 -
13	Meeks Creek	45 -	0.40 -	--	--	0.23 -	0.010 -	0.07 -
14	Lonely Gulch Creek	45 -	0.30 -	--	--	0.19 -	0.015 -	0.03 -
	continued...							

Table 3-12 (continued)
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LAKE TAHOE HYDROLOGIC UNIT

See Fig. 3-6	Surface Waters	Objective (mg/L except as noted) [1,2]						
		TDS	Cl	SO_4	B	N	P	Fe
15	Eagle Creek	35 -	0.30 -	--	--	0.20 -	0.010 -	0.03 -
16	Cascade Creek	30 -	0.40 -	--	--	0.21 -	0.005 -	0.01 -
17	Tallac Creek	60 -	0.40 -	--	--	0.19 -	0.015 -	0.03 -
18	Taylor Creek	35 -	0.40 0.50	--	--	0.17 -	0.010 -	0.02 -
19	Upper Truckee River	55 75	4.0 5.5	1.0 2.0		0.19 -	0.015 -	0.03 -
20	Trout Creek	50 60	0.15 0.20	--	--	0.19 -	0.015 -	0.03 -

[1] Annual average value/90th percentile value.

[2] Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
SO_4	Sulfate
Fe	Iron, Total
N	Nitrogen, Total
P	Phosphorus, Total
TDS	Total Dissolved Solids (Total Filterable Residues)

Table 3-13
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
FALLEN LEAF LAKE, LAKE TAHOE HYDROLOGIC UNIT

Constituent	Objective (See Fig. 3-6, location 2)
pH[a]	6.5 - 7.9
Temperature[b]	Hypolimnion - □15 C Bottom (105m) - □7.5 C at no time shall water be increased by more than 2.8 C (5 F).
Dissolved oxygen[c]	% saturation above 80% and DO >7 mg/L except if saturation exceeds 80% DO at bottom (105m) > 6mg/L
Total nitrogen[d]	0.087[e]/0.114[f]/0.210[g]
Dissolved inorganic - N[h]	0.007 / 0.010 / 0.023
Total phosphorus	0.008 / 0.010 / 0.018
Soluble reactive - P	0.001 / 0.002 / 0.009
Soluble reactive iron	0.004 / 0.005 / 0.012
Total reactive iron	0.005 / 0.007 / 0.030
Chlorophyll-a [ij]	0.6 / 0.9 / 1.5
Clarity - Secchi depth[k] - Vertical extinction coefficient	 18.5 / 16.0[l] / 13.6[m] 0.146 / 0.154 / 0.177[n]
Phytoplankton cell counts[o]	219 / 280 / 450

[a] 0.5 units above and 0.5 units below 1991 maximum and minimum values. Also reflects stability of this constituent throughout the year.

[b] Based on 1991 data. Indicates that if temperature in the hypolimnion during the summer exceeds 15^{o}C or if the water at 105m exceeds 7.5^{o}C this would constitute a significant change from existing conditions. Unless there is a anthropogenic source of thermal effluent, which does not currently exist, changes in water temperature in Fallen Leaf Lake are natural. Objectives apply at any time during the defining period.

[c] Based on coldwater habitat protection and 1991 data base. The need for an objective for the bottom (105m) results from the desire to control primary productivity and deposition of organic matter on the bottom. A decline in bottom DO to below 6 mg/L would indicate a fundamental shift in the trophic state of Fallen Leaf Lake.

[d] Because of the similarity between the mid-lake and nearshore sites, Fallen Leaf Lake objectives for N, P and Fe are based on the combined mid-lake 8 m and 45 m, and nearshore 8 m concentrations. Units are mg N/L, mg P/L and mg Fe/L.

[e] Mean annual concentration (May - October) unless otherwise noted.

[f] 90th percentile value unless otherwise noted.

[g] Maximum allowable value; 1.5 times the maximum 1991 value. No single measurement should exceed this value unless otherwise noted.

[h] DIN = NO_3+NO_2+NH_4

[i] Corrected for phaeophytin degradation pigments.

[j] Units are µg chl-a/L.

[k] Units are meters.

[l] 10th percentile since clarity increases with increasing Secchi depth.

[m] Represents 15% loss of clarity from 10th or 90th percentile value.

[n] Calculated in the photic zone between 1 m below surface to 35 m. Units are per meter.

[o] Units are cells per milliliter.

Figure 3-6
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LAKE TAHOE HYDROLOGIC UNIT

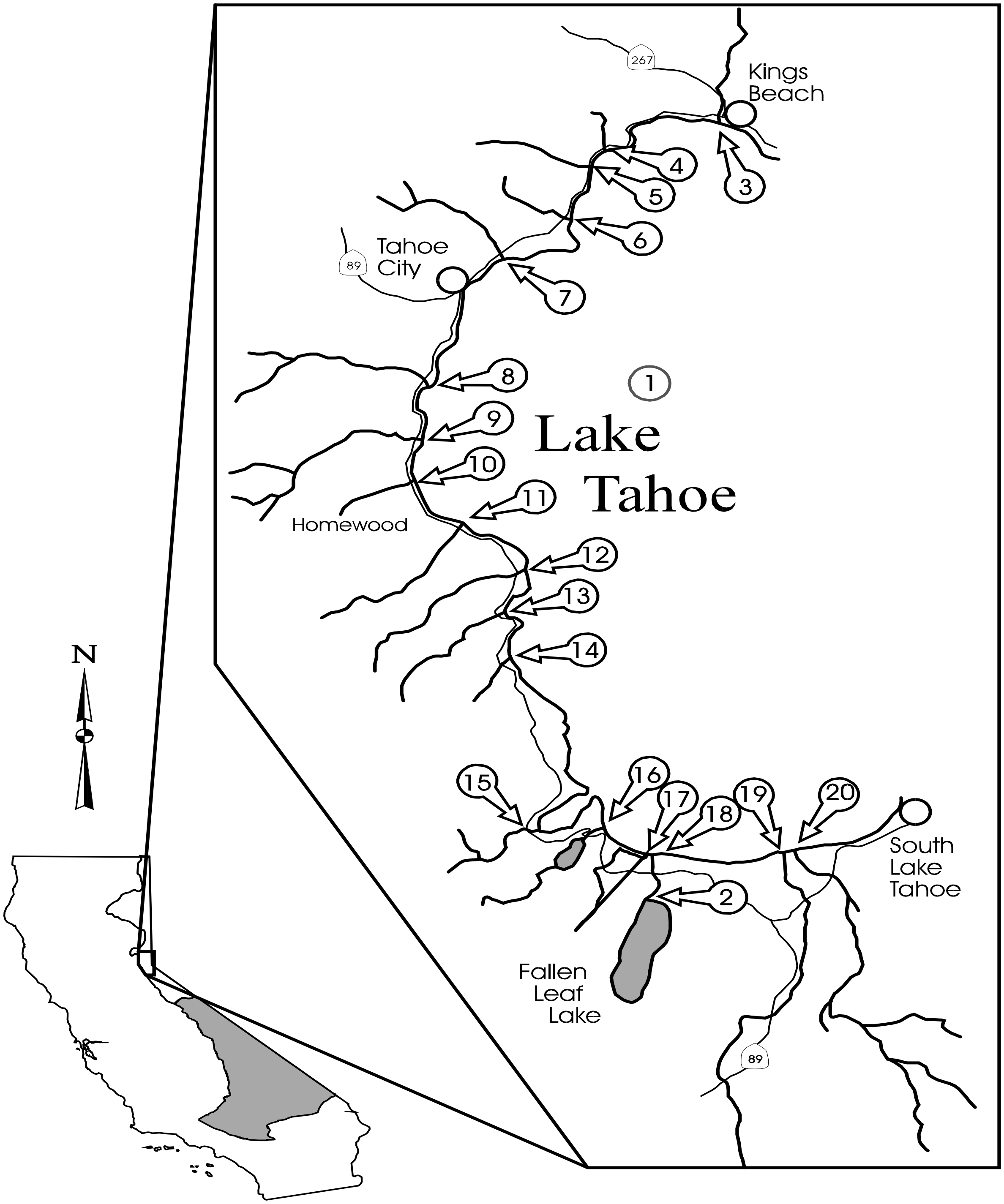

Table 3-14
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
EAST & WEST FORK CARSON RIVER HYDROLOGIC UNITS

See Fig. 3-7	Surface Waters	Objective (mg/L except as noted)[4]							
		TDS	Cl	SO_4	Total P	B	Total N	TKN	NO_3-N
1	West Fork Carson River at Woodfords[1]	55	1.0	2.0	0.02	0.02	0.15	0.13	0.02
2	West Fork Carson River at Stateline[1]	70	2.5	2.0	0.03	0.02	0.25	0.22	0.03
3	Indian Creek Res.[1]	305	24	-	0.04	-	4.0	-	-
4	East Fork Carson River[2]	80/100	4.0/6.0	4.0/8.0	0.02/0.03	0.12/0.25	0.20/0.30	-	-
5	Bryant Creek Basin[2,3]	140/200	15/25	35/50	0.02/0.03	0.20/0.50	0.20/0.30	-	-

1 Values shown are mean of monthly mean for the period of record.
2 Annual average value/90th percentile value.
3 In addition, the following numerical water quality objectives shall apply specifically to surface waters of the Bryant Creek Basin:

Parameter	Maximum Value (mg/l except as noted)
Turbidity (NTU)	15
Alkalinity, total as $CaCO_3$	70 (minimum)
Acidity, total as $CaCO_3$	10
Iron, dissolved	0.5
Manganese, total	0.5
Color, PCu	15
Aluminum, total	0.1

4 Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
N	Nitrogen, Total
SO_4	Sulfate
TDS	Total Dissolved Solids (Total Filterable Residue)
NO_3-N	Nitrate as Nitrogen
TKN	Total Kjeldahl Nitrogen
P	Phosphorus, Total

Figure 3-7
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
CARSON RIVER HYDROLOGIC UNITS

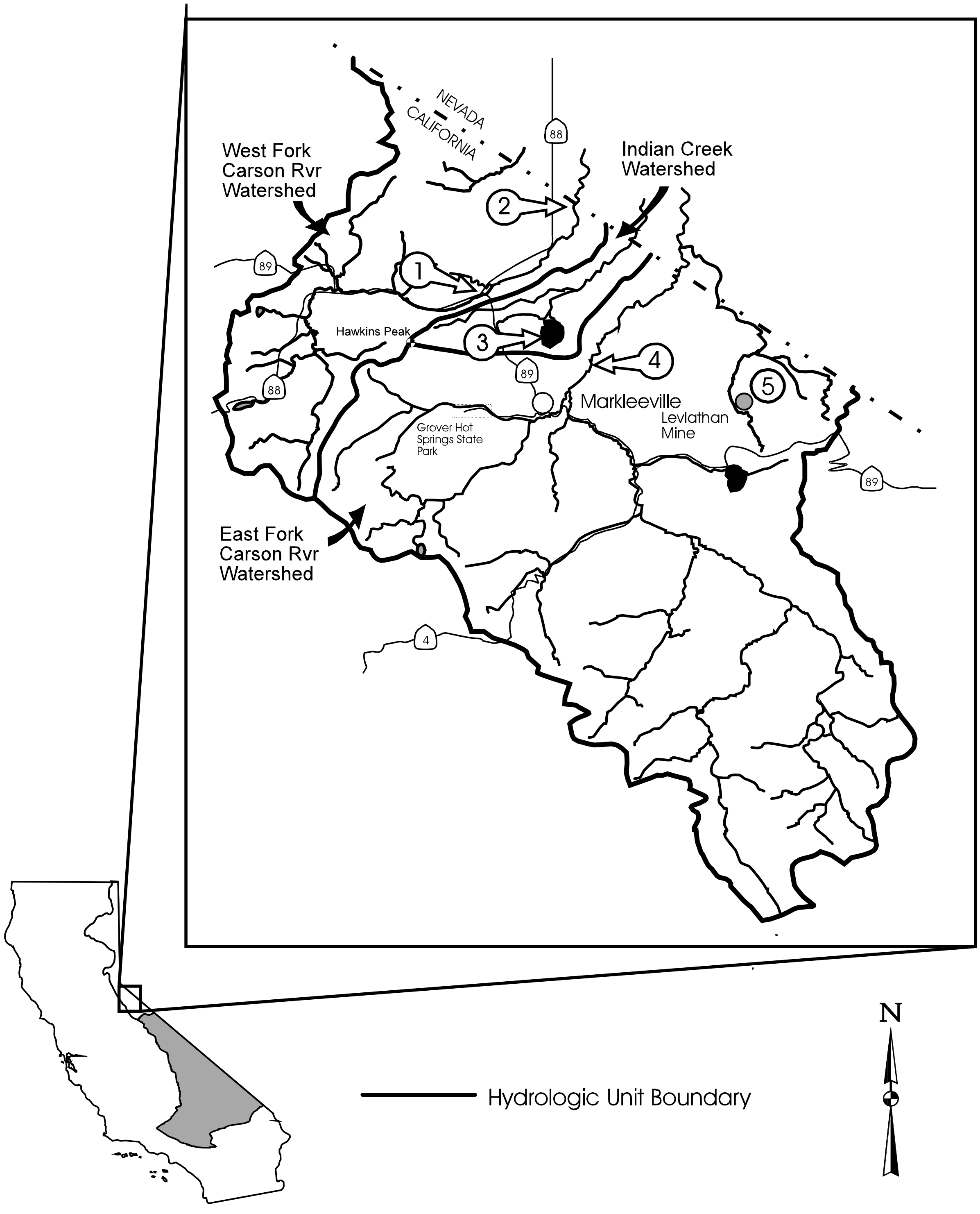

Table 3-15
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
WEST & EAST WALKER RIVER HYDROLOGIC UNITS

See Fig. 3-8	Surface Waters	Objective (mg/L)[1,2]				
		TDS	Cl	B	Total N	Total P
1	Topaz Lake	90 105	4 7	0.10 0.20	0.10 0.30	0.05 0.10
2	West Walker River at Coleville	60 75	3.0 5.0	0.10 0.20	0.20 0.40	0.01 0.02
3	East Walker River at Bridgeport	145 160	4.0 8.0	0.12 0.25	0.50 0.80	0.06 0.10
4&5	Robinson Creek & all other tributaries above Bridgeport Valley	45 70	2.0 4.0	-	0.05 0.10	0.02 0.03

1 Annual Average value/90th Percentile Value

2 Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
N	Nitrogen, Total
P	Phosphorus, Total
TDS	Total Dissolved Solids (Total Filterable Residue)

Figure 3-8
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
WALKER RIVER HYDROLOGIC UNITS

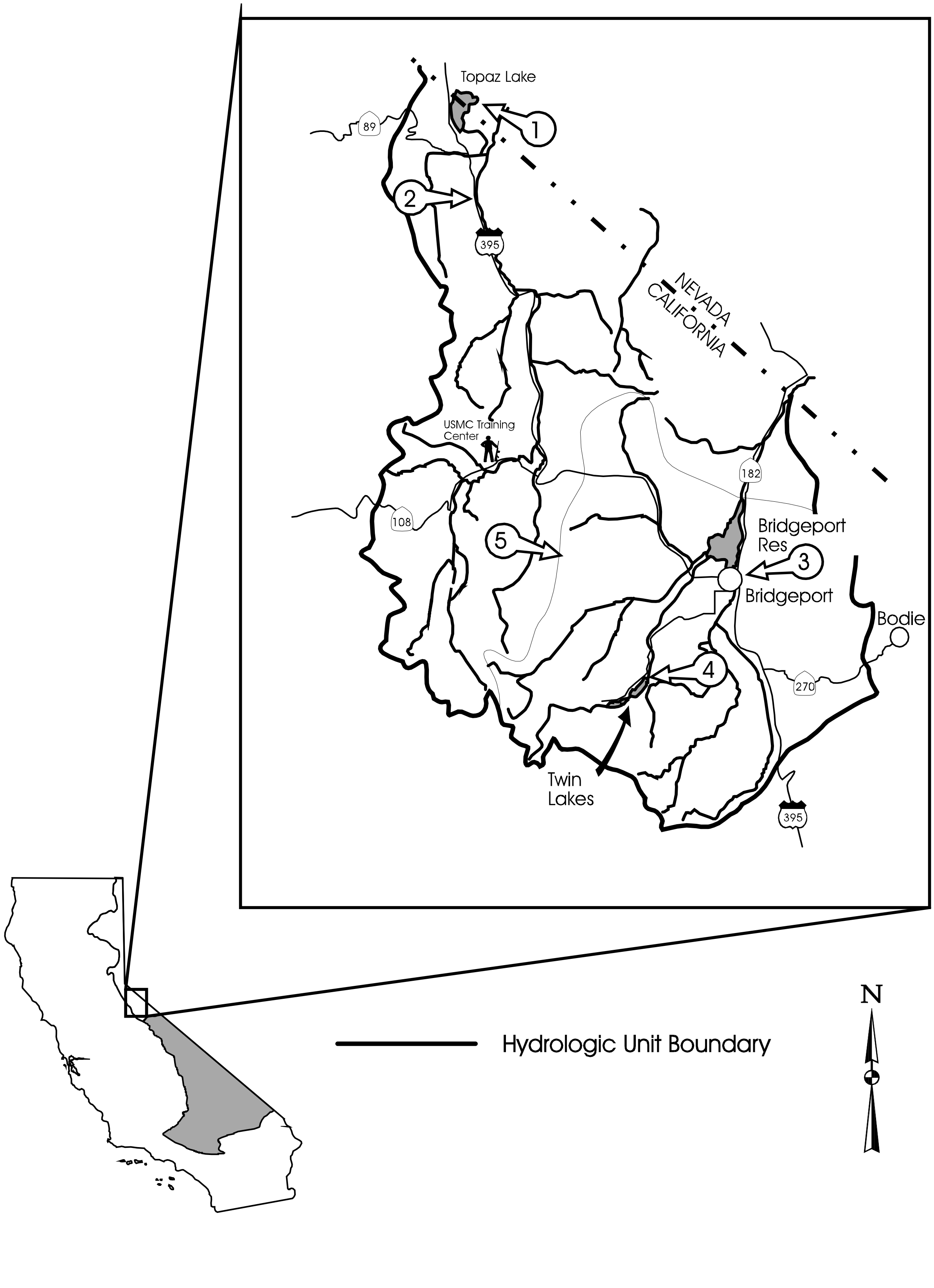

Table 3-16
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
MONO HYDROLOGIC UNIT

See Fig. 3-9	Surface Waters	Objective (mg/L)[1,2]							
		TDS	Cl	SO_4	F	B	NO_3-N	Total N	PO_4
1	Mono Lake	76,000 80,700	17,700 18,000	11,000 12,000	48 52	348 355	37 47	-	66 75
2	June Lake	200 225	-	-	-	-	-	0.3 0.5	0.06 0.08
3	Reversed Creek (Gull Lake Inlet)	130 160	-	-	-	-	0.1 0.1	0.4 1.0	0.24 0.34
4	Gull Lake	120 140	-	-	-	-	-	0.3 0.8	0.11 0.17
5	Reversed Creek (Silver Lake inlet)	100 130	-	-	-	-	0.1 0.1	0.2 0.4	0.16 0.35
6	Rush Creek (S.C.E. inlet)	41 60	-	-	-	-	0.1 0.1	0.1 0.2	0.02 0.07
7	Silver Lake	45 60	-	-	-	-	-	0.1 0.2	0.06 0.09
8	Rush Creek (Grant Lake inlet)	58 70	-	-	-	-	0.1 0.1	0.2 0.2	0.07 0.09
9	Grant Lake	37 46	2.0 4.0	4.0 8.0	0.10 0.20	0.05 0.08	-	0.4 0.9	0.07 0.15

[1] Annual average value/90th Percentile Value

[2] Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
F	Fluoride
N	Nitrogen, Total
NO_3-N	Nitrate as Nitrogen
SO_4	Sulfate
PO_4	Orthophosphate, Dissolved
TDS	Total Dissolved Solids (Total Filterable Residue)

Figure 3-9
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
MONO HYDROLOGIC UNIT

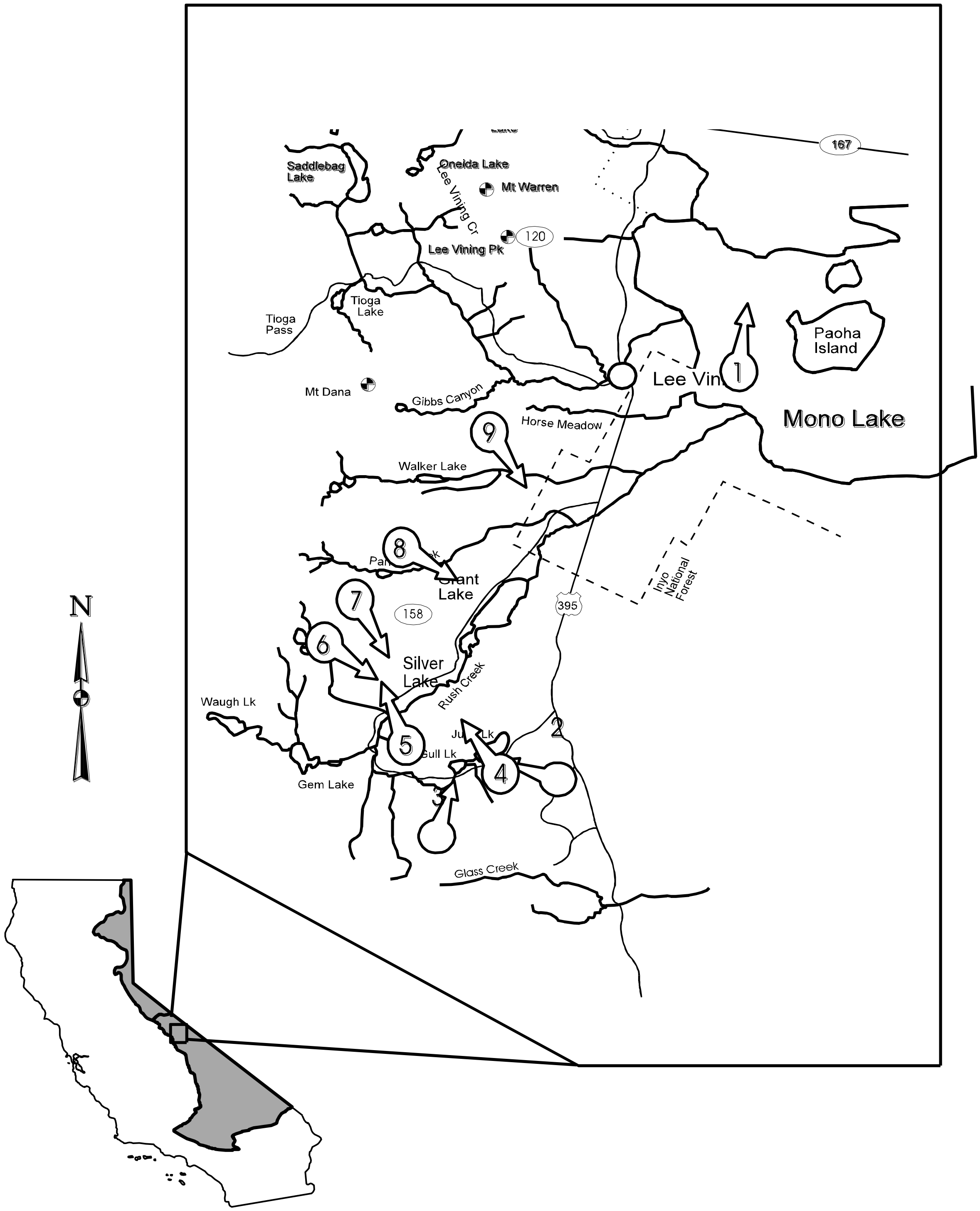

Table 3-17
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
OWENS HYDROLOGIC UNIT

See Fig. 3-10	Surface Waters	Objective (mg/L)[1,2]							
		TDS	Cl	SO_4	F	B	NO_3-N	Total N	PO_4
1	Owens River (above East Portal)	110 200	11.0 16.0	5.0 8.0	0.40 0.80	0.40 0.80	0.1 0.1	0.2 0.5	0.90 3.75
2	Owens River (below East Portal)	100 150	6.0 12.0	6.0 16.0	0.30 0.60	0.20 0.40	0.5 1.0	0.6 1.5	0.73 0.94
3	Coldwater Creek	35 40	0.7 1.4	-	-	-	0.5 1.0	0.5 1.0	0.02 0.03
4	Mammoth Creek (Twin Lakes Bridge)	60 90	0.6 1.0	-	-	-	0.4 0.8	0.5 1.0	0.03 0.05
5	Mammoth Creek (Old Mammoth Road)	85 115	0.8 1.4	-	-	-	0.4 0.8	0.6 1.0	0.27 0.50
6	Mammoth Creek (at Hwy. 395)	75 100	1.0 1.4	6.0 11.0	0.10 0.30	0.03 0.05	0.4 0.8	0.6 1.0	0.11 0.22
7	Sherwin Creek	22 26	0.5 0.7	-	-	-	0.4 0.6	0.5 0.7	0.05 0.08
8	Hot Creek (at County Rd)	275 380	41.0 60.0	24.0 35.0	1.80 2.80	1.80 2.60	0.2 0.4	0.3 1.5	0.65 1.22
9	Convict Creek	85 95	1.5 3.0	11.0 14.0	0.05 0.15	0.02 0.06	0.2 0.4	0.3 0.5	0.03 0.05
10	McGee Creek	78 92	1.1 3.6	12.0 16.0	0.07 0.20	0.02 0.08	0.3 0.4	0.4 0.5	0.02 0.03
11	Hilton Creek	28 34	0.8 2.0	3.0 5.0	0.05 0.10	0.02 0.04	0.3 0.5	0.5 0.6	0.03 0.05
12	Owens River	215 290	20.0 33.0	14.0 24.0	0.73 1.10	0.76 1.26	0.7 1.4	1.0 2.3	0.56 0.70
13	Rock Creek (Mosquito Flat)	10 11	1.0 2.0	-	0.05 0.05	0.03 0.03	0.2 0.3	0.2 0.4	0.04 0.07
14	Rock Creek (above diversion)	21 23	1.2 2.0	-	0.05 0.05	0.06 0.06	0.3 0.5	0.4 0.7	0.01 0.01
15	Rock Creek (Round Valley)	48 70	1.8 4.0	5.0 7.0	0.16 0.30	0.03 0.06	0.4 0.5	0.6 0.7	0.15 0.28
16	SEE TABLE 3-18 FOR PINE CREEK OBJECTIVES								
17	Lake Sabrina	10 17	2.0 3.0	-	0.10 0.10	0.05 0.05	0.2 0.3	0.3 0.6	0.03 0.05
	continued...								

Table 3-17 (continued)
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
OWENS HYDROLOGIC UNIT

See Fig. 3-10	Surface Waters	Objective (mg/L)[1,2]							
		TDS	Cl	SO_4	F	B	NO_3-N	Total N	PO_4
18	South Lake	12	3.7	-	0.10	0.02	0.1	0.2	0.03
		20	4.3		0.10	0.02	0.1	0.4	0.04
19	Bishop Creek (Intake 2)	27	1.9	-	0.15	0.02	0.1	0.1	0.05
		29	3.0		0.15	0.02	0.2	0.4	0.09
20	Bishop Creek (at Hwy 395)	59	2.4	7.2	0.12	0.04	0.5	0.7	0.09
		105	6.0	12.0	0.30	0.10	0.9	1.0	0.18
21	Big Pine Creek (at Hwy395)	55	2.0	6.0	0.06	0.03	0.6	0.7	0.03
		93	4.0	10.0	0.20	0.07	0.9	1.0	0.04
22	Fish Springs (above Hatchery)	174	-	-	-	-	0.7	0.8	0.17
		219					0.8	1.0	0.23
23	Owens River (Tinemaha Reservoir Outlet)	207	17.9	26.8	0.57	0.61	0.6	0.9	0.32
		343	42.0	59.0	0.90	1.50	1.1	1.5	0.56
24	Black Rock Springs	114	6.3	24.0	0.54	0.11	0.2	0.7	0.13
		123	8.0	27.0	0.60	0.14	0.4	0.9	0.20
25	Oak Creek (above hatchery)	72	1.8	-	0.14	0.06	0.1	0.2	0.08
		88	1.8		0.14	0.06	0.2	0.4	0.12
26	Independence Creek (gaging station)	80	6.5	15.0	0.10	0.12	0.4	0.6	0.05
		114	11.0	23.0	0.20	0.26	0.8	1.0	0.09
27	Hogback Creek	45	2.5	-	0.10	0.03	0.2	0.4	0.02
		48	3.6		0.10	0.06	0.3	0.6	0.04
28	Lone Pine Creek (Whitney Portal)	22	0.5	-	0.10	0.05	0.3	0.4	0.02
		25	1.1		0.10	0.07	0.5	0.6	0.04
29	Lone Pine Creek (at gaging station)	56	4.0	4.6	0.12	0.06	0.3	0.4	0.01
		81	8.0	7.0	0.20	0.11	0.4	0.5	0.01
30	Cottonwood Creek (Los Angeles Aqueduct)	66	1.9	7.4	0.20	0.05	0.1	0.4	0.11
		91	4.0	11.0	0.40	0.10	0.4	0.6	0.17
31	South Haiwee Reservoir (outlet)	215	19.5	27.0	0.60	0.56	0.5	0.8	0.23
		315	38.0	62.0	0.90	0.91	1.0	1.5	0.36

[1] Annual average value/90th Percentile Value.

[2] Objectives are as mg/L and are defined as follows:

B	Boron	NO_3-N	Nitrate as Nitrogen
Cl	Chloride	SO_4	Sulfate
F	Fluoride	PO_4	Orthophosphate, Dissolved
N	Nitrogen, Total	TDS	Total Dissolved Solids (Total Filterable Residue)

FIGURE 3-10. WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
OWENS HYDROLOGIC UNIT

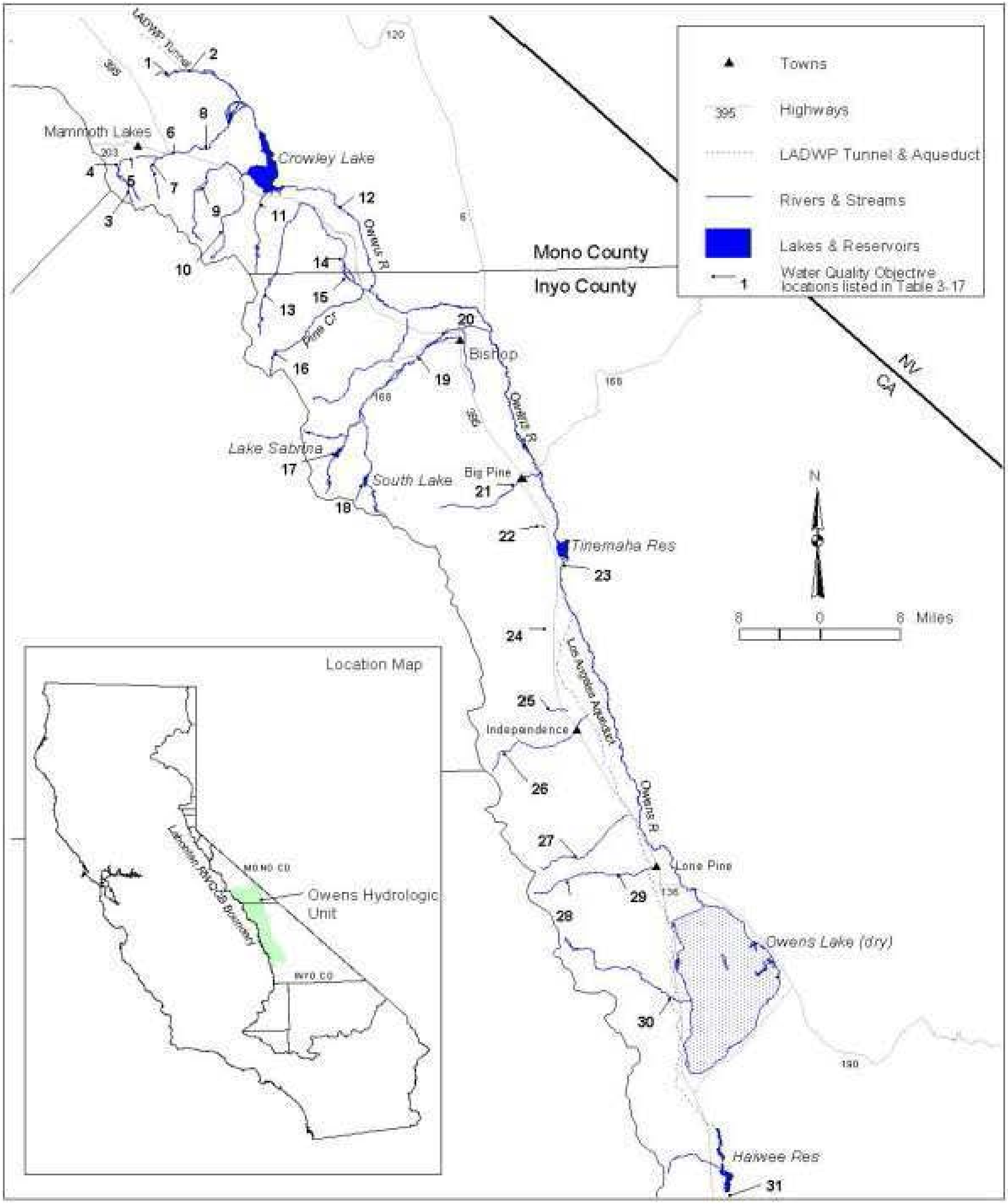

Table 3-18
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
PINE CREEK, INYO COUNTY

Fig. 3-11	Surface Waters	Objective (mg/L)[1,2]								
		TDS	Cl	SO_4	F	B	NO_3-N	N	NH_3	P
1	R-1 (above US Tungsten Corp Mine	50	3	13	-	-	0.3	0.9	0.01	0.04
2	R-5 (at LADWP weir above Rovana)	200	7	100	1.25	0.1	0.5	1.5	0.01	0.04

[1] Values shown are mean of monthly mean for the period of record.
[2] Objectives are as mg/L and are defined as follows:

B Boron
Cl Chloride
F Fluoride
N Nitrogen, Total
NH_3 Ammonia, Un-ionized
NO_3-N Nitrate as Nitrogen
P Phosphorus, Total
SO_4 Sulfate
TDS Total Dissolved Solids (Total Filterable Residue)

Figure 3-11
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
PINE CREEK, INYO COUNTY

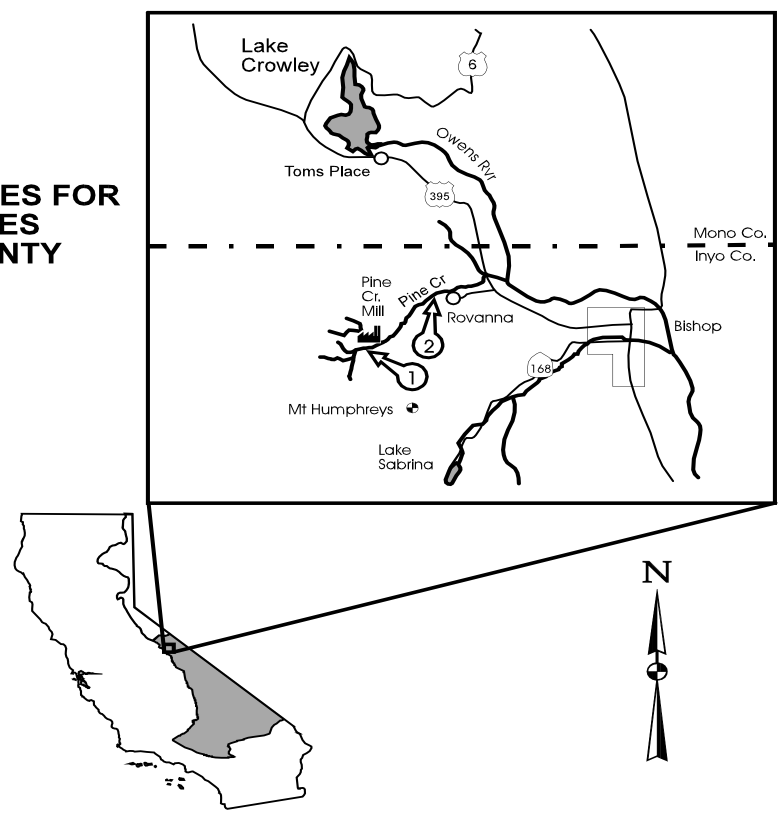

Table 3-19
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
ANTELOPE HYDROLOGIC UNIT

Fig. 3-12	Surface Waters	Objective (mg/L)[1,2]					
		TDS	Cl	SO_4	F	B	NO_3-N
1	Lake Palmdale	460 585	50.0 68.0	100.0 121.0	0.80 1.00	0.13 0.15	-
2	Little Rock Reservoir	176 180	12.5 20.0	16.5 19.0	0.29 0.38	0.03 0.05	0.4 0.7

1 Annual average value/90th Percentile Value

2 Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
F	Fluoride
NO_3-N	Nitrate as Nitrogen
SO_4	Sulfate

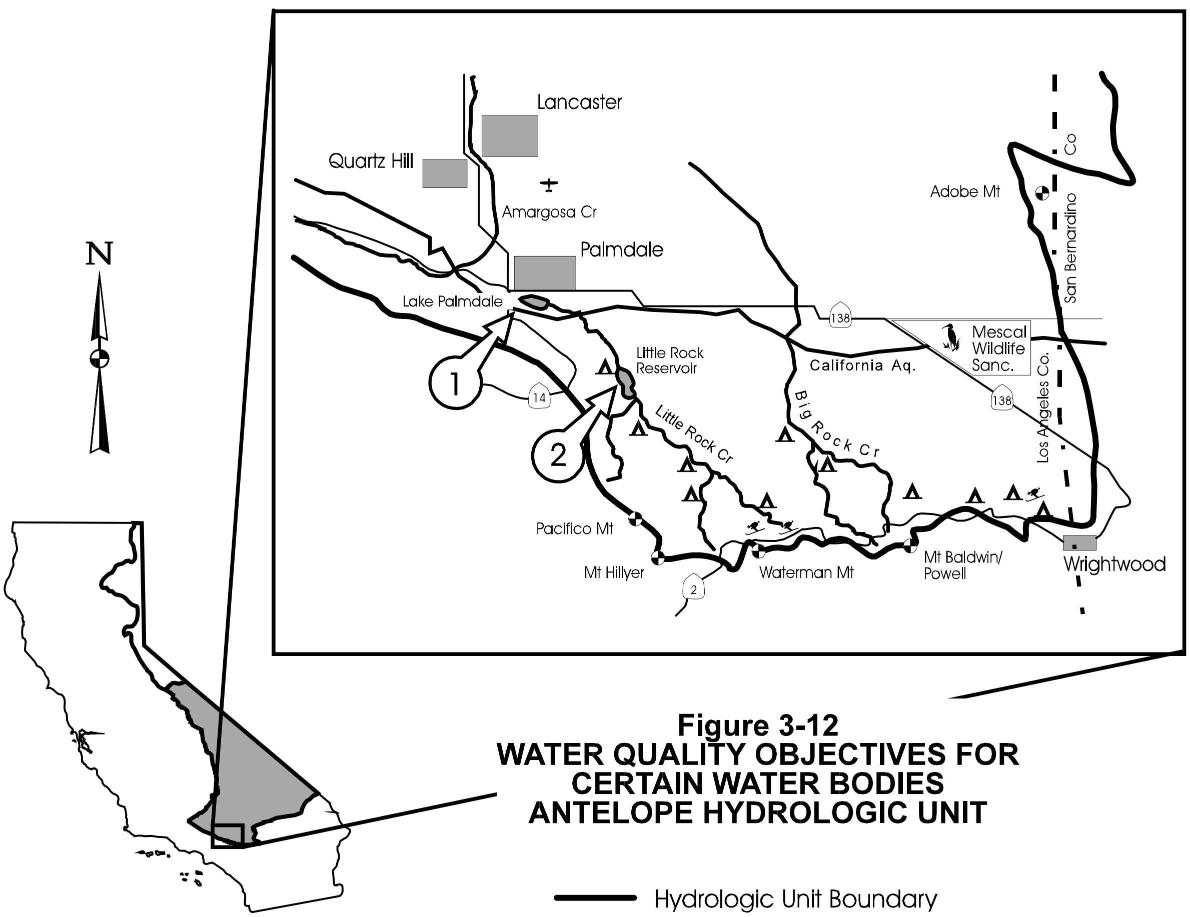

Figure 3-12
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES ANTELOPE HYDROLOGIC UNIT

Table 3-19a.
pH DEPENDENT VALUES OF THE ACUTE AMMONIA TOXICITY OBJECTIVE FOR LOWER AMARGOSA CREEK AND THE PIUTE PONDS AND WETLANDS

pH	One-Hour Average Total Ammonia Concentration (mg N/L)
6.5	48.8
6.6	46.8
6.7	44.6
6.8	42.0
6.9	39.1
7.0	36.1
7.1	32.8
7.2	29.5
7.3	26.2
7.4	23.0
7.5	19.9
7.6	17.0
7.7	14.4
7.8	12.1
7.9	10.1
8.0	8.40
8.1	6.95
8.2	5.72
8.3	4.71
8.4	3.88
8.5	3.20
8.6	2.65
8.7	2.20
8.8	1.84
8.9	1.56
9.0	1.32

Figure 3-12a.
WATER QUALITY OBJECTIVES FOR
LOWER AMARGOSA CREEK AND PIUTE PONDS

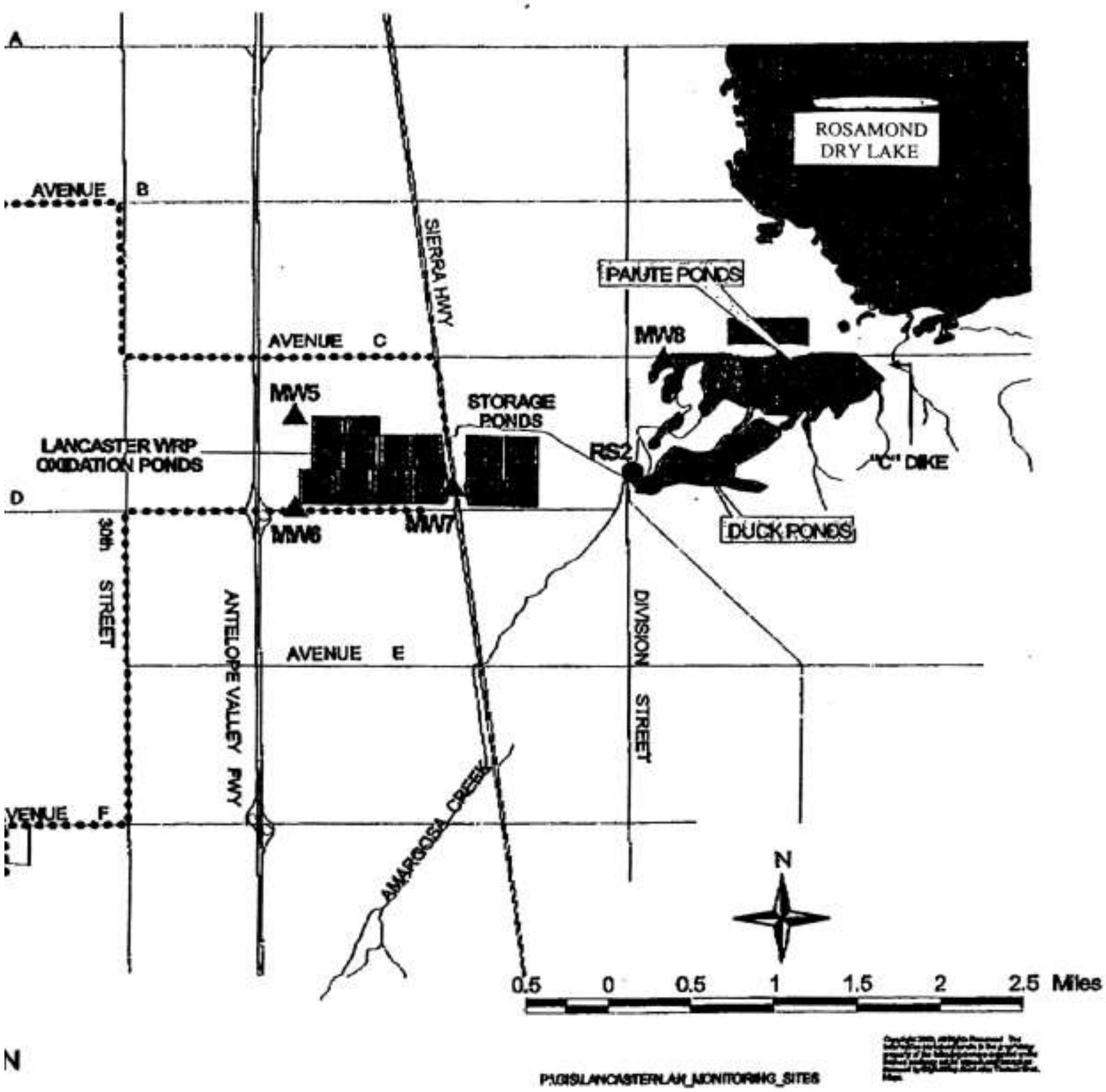

Table 3-19b.
Temperature and pH-Dependent Values of the Chronic (30-Day Average) Ammonia Toxicity Objective for Lower Amargosa Creek and the Piute Ponds and Wetlands (Total Ammonia, mg N/L)

	Temperature °C									
pH	0°	14°	16°	18°	20°	22°	24°	26°	28°	30°
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.486	0.486	0.442	0.389	0.342	0.300	0.264	0.232	0.204	0.179

Table 3-20
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
MOJAVE HYDROLOGIC UNIT

See Fig. 3-13	Surface Waters (Station 2) Ground Waters (Stations 1, 3, 4, 5, & 6)	Objective (mg/L)(Maximum)	
		TDS	NO_3 as NO_3
1[b]	West Fork Mojave River	245	6
2[a]	Mojave River (at Lower Narrows)	312	5
3[b]	Mojave River (at Barstow)	445	6
4[b]	Mojave River (upstream side of Waterman Fault)	560	11
5[b]	Mojave River (upstream side of Calico-Newberry Fault)	340	4
6[b]	Mojave River (just upstream of Camp Cady Ranch Building Complex)	300	1

[a] ~~Objectives for reaches of the Mojave River which normally flow underground, but under high flow conditions will surface.~~

[b] Objectives for reaches of the Mojave River which flow underground in a confined channel.

Footnote a language has been revised to read "Objectives for reaches of the Mojave River which normally flow above ground."

NO_3 as NO_3 Nitrate as Nitrate
TDS Total Dissolved Solids (Total Filterable Residue)

Figure 3-13 has been replaced to correctly depict the locations cited in Table 3-20, specifically site number 4. Please refer to the figure that appears in Chapter 2 on the regional board 6 website for the figure that is in effect for CWA purposes.

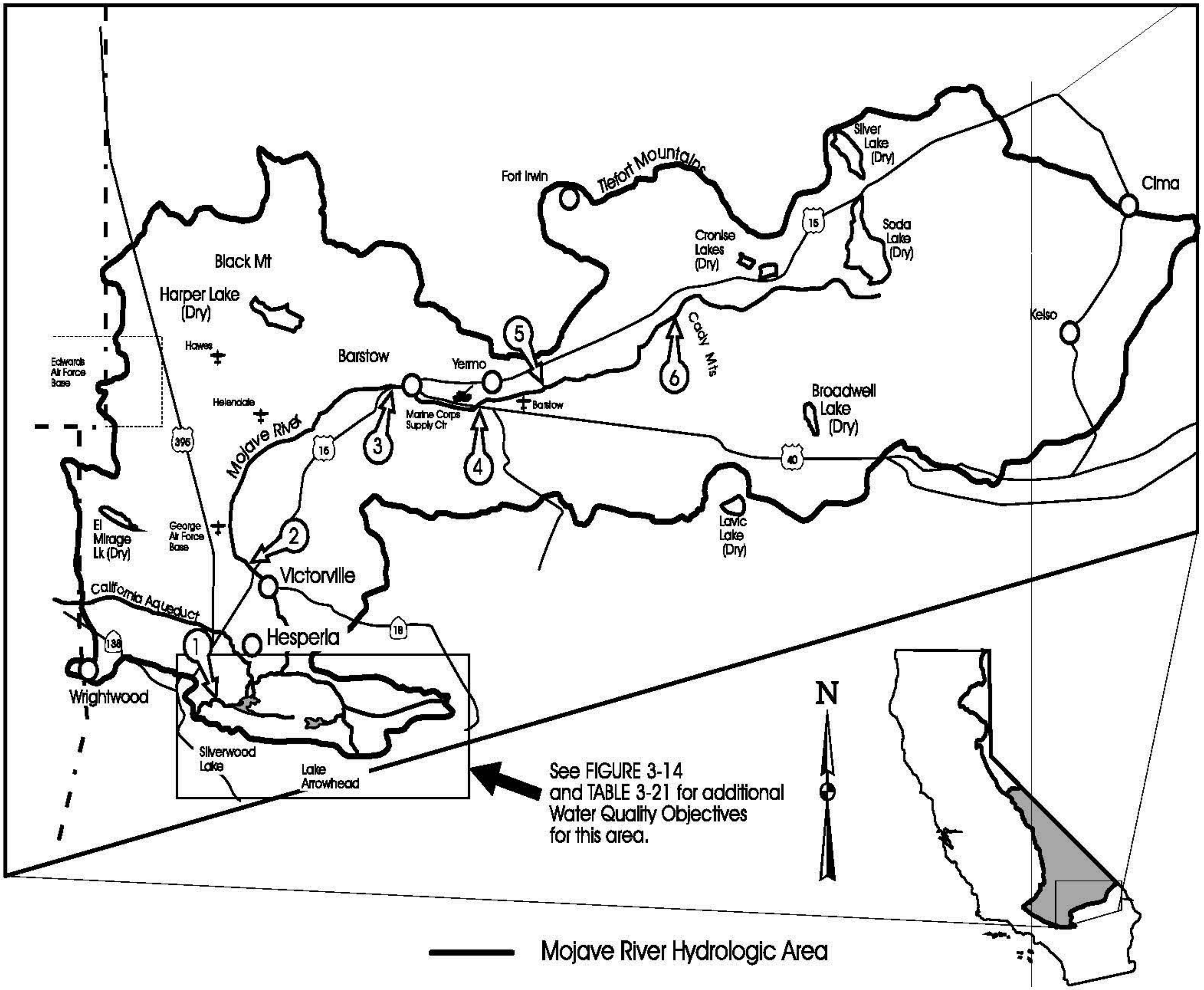

Figure 3-13
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
MOJAVE HYDROLOGIC UNIT

Table 3-21
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SAN BERNARDINO MOUNTAINS AREA, MOJAVE HYDROLOGIC UNIT

See Fig. 3-14	Surface Waters	Objective (mg/L)[1,2]							
		TDS	Cl	SO_4	F	B	NO_3-N	N	PO_4
1	Arrowbear Lake	81 139	6.2 10.0	3.9 8.1	0.12 0.21	0.12 0.25	-	1.0 2.0	0.13 0.14
2	Green Valley Lake	100 134	9.0 12.0	3.5 5.8	0.12 0.20	0.07 0.14	-	1.0 2.0	0.11 0.16
3	Lake Arrowhead	78 107	7.7 9.1	2.4 3.0	0.21 0.40	0.04 0.05	-	-	-
4	Hooks Creek	83 127	6.0 10.0	5.6 13.0	0.12 0.17	0.03 0.06	0.8 2.5	-	0.04 0.05
5	Deep Creek (below Lake)	83 123	9.1 16.0	1.3 4.9	0.10 0.19	0.05 0.07	0.2 0.6	0.3 0.7	0.05 0.13
6	Deep Creek (at Forks Dam)	184 265	10.6 16.0	31.3 55.0	1.66 2.60	0.10 0.19	0.6 2.0	-	-
7	Twin Peaks Creek	86 100	20.4 33.0	5.6 6.0	0.07 0.09	0.02 0.03	0.3 0.4	-	-
8	Grass Valley Creek (above Lake)	103 136	11.1 15.0	4.6 8.1	0.12 0.26	0.02 0.04	0.6 1.8	-	-
9	Sheep Creek (at Allison Ranch)	56 72	6.0 7.8	3.4 6.9	0.13 0.22	0.01 0.02	0.3 1.3	-	-
10	Seeley Creek (Valley of Enchantment)	112 141	21.1 25.0	10.5 13.0	0.17 0.28	0.04 0.07	-	-	-
11	Houston Creek (above Dart Creek)	153 170	13.0 15.0	-	-	-	-	-	-
12	Dart Creek (below Moon Lake)	120 159	10.9 14.0	4.0 7.0	0.16 0.25	0.07 0.15	-	-	-
13	Lake Gregory	87 95	11.0 12.0	5.3 7.7	0.17 0.30	0.30 0.30	-	-	-
14	Sawpit Creek	114 145	7.9 9.0	9.1 13.0	0.17 0.22	0.01 0.03	-	-	-
15	W.F. Mojave (above Silverwood Lake)	219 336	8.4 13.0	34.0 53.0	0.26 0.40	0.02 0.05	-	-	-

Table 3-21(continued)
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SAN BERNARDINO MOUNTAINS AREA, MOJAVE HYDROLOGIC UNIT

See Fig. 3-14	Surface Waters	Objective (mg/L)[1,2]							
		TDS	Cl	SO_4	F	B	NO_3-N	N	PO_4
16	E.F. of W.F. Mojave	140 200	12.7 22.0	10.7 17.0	0.23 0.40	0.06 0.10	-	-	-
17	Silverwood Reservoir	220 440	55 110	20 110	-	-	-	-	-
18	Mojave River (at Forks)	-	55 100	35 100	1.5 2.5	0.2 0.3	-	-	-
19	Mojave River (at Victorville)	-	75 100	40 100	0.2 1.5	0.2 0.3	-	-	-

[1] Annual average value/90th Percentile Value

[2] Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
F	Fluoride
N	Nitrogen, Total
NO_3-N	Nitrate as Nitrogen
SO_4	Sulfate
PO_4	Orthophosphate, Dissolved
TDS	Total Dissolved Solids (Total Filterable Residue)

Chapter 4
IMPLEMENTATION

Introduction

A program of implementation to protect beneficial uses and to achieve water quality objectives is an integral component of this Basin Plan. The program of implementation is required to include, but is not limited to:

- A description of the nature of actions that are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private.
- A time schedule for the actions to be taken.
- A description of surveillance to be undertaken to determine compliance with objectives.

(CA Water Code § 13242)

The surveillance activities needed to determine compliance with objectives are described in Chapter 7, "Monitoring and Assessment." The remaining requirements are fulfilled by this Chapter.

This Chapter includes discussions of general control actions and related issues, a description of the Region's Nonpoint Source Program, and discussions of specific types of activities and their related water quality problems, control actions and time schedules for the actions to be taken. Control actions specific to the Lake Tahoe Basin are included in Chapter 5 of this Plan.

General Control Actions and Related Issues

The Regional Board regulates the sources of water quality related problems that could result in actual, or potential, impairments of beneficial uses or degradations of water quality. The Regional Board regulates both point and nonpoint source discharge activities. A point source discharge generally originates from a single, identifiable source, while a nonpoint source discharge comes from diffuse sources. To regulate the point and nonpoint sources, control actions are required for effective water quality protection and management. Such control actions are set forth for implementation by the State Board, by other agencies with water quality or related authority, and by the Regional Board.

Control Actions under State Board Authority

The State Board has adopted several statewide or areawide water quality plans and policies that complement or may supersede portions of this Basin Plan. These plans and policies may include specific control measures. Some State Board plans and policies do not affect waters of the Lahontan Region. See Chapter 6, "Plans and Policies," for summaries of the most significant State Board plans and policies that do affect the Lahontan Region.

Control Actions to be Implemented by Other Agencies with Water Quality or Related Authority

Water quality management plans prepared under Section 208 of the Federal Water Pollution Control Act (Clean Water Act) have been completed by various public agencies. These Section 208 plans, as well as other plans adopted by federal, state, and local agencies, may affect the Regional Board's water quality management and control activities. A summary of relevant water quality management plans is included in Chapter 6, "Plans and Policies." The Regional Board can also be party to official agreements with other agencies, such as memoranda of understanding (MOUs) or management agency agreements (MAAs) that recognize and rely on the water quality authority of other agencies.

Control Actions under Regional Board Authority

Control measures implemented by the Regional Board must provide for the attainment of this Basin Plan's beneficial uses and water quality objectives (see Chapter 2, "Beneficial Uses," and Chapter 3, "Water Quality Objectives"). In addition, the control measures must be consistent with State Board and Regional Board plans, policies, agreements, prohibitions, guidance and other restrictions and requirements. The most significant Regional Board policies are described in Chapter 6, "Plans and Policies."

To prevent water quality problems, waste discharge restrictions are often used. The waste discharge restrictions can be implemented through Water Quality Certification, National Pollutant Discharge Elimination System (NPDES) permits, waste discharge requirements/permits (WDRs), conditional waivers of WDRs, discharge prohibitions, enforcement actions, and special designations.

Water Quality Certification

Clean Water Act Section 401 Water Quality Certification (Water Quality Certification) gives the Regional Board extremely broad authority to review proposed activities in and/or affecting the Region's waters. The Regional Board can then recommend to the State Board that it grant, deny, or condition certification of federal permits or licenses that may result in a discharge to “waters of the United States.”

National Pollutant Discharge Elimination System (NPDES)

NPDES permits are issued to regulate discharges of waste to “waters of the nation” including discharges of storm water from urban separate storm sewer systems and certain categories of industrial activity. Waters of the nation are surface waters such as rivers, lakes, bays, estuaries, oceans, etc. The permits are authorized by Section 402 of the federal Clean Water Act and Section 13370 of the California Water Code. The permit content and the issuance process are contained in the Code of Federal Regulations (40 CFR Part 122) and Chapter 9 of the California Code of Regulations. Regional Water Boards are authorized to take a variety of enforcement actions to obtain compliance with a NPDES permit. Enforcement may be only a simple order requiring the discharger to take corrective action to comply with the terms of its permit or may be an order prescribing civil monetary penalties.

NPDES permits are required to prescribe conditions of discharge that will ensure protection of beneficial uses of the receiving water as described in this Basin Plan, water quality control plans adopted by the State Water Board for inland surface waters, enclosed bays and estuaries, the ocean, and water quality control policies adopted by the State Water Board for specific types of discharges or uses of waste water.

In addition to regulating discharges of waste water to surface waters, NPDES permits also require municipal sewage treatment systems to conduct pretreatment programs if their design capacity is greater than 5 million gallons per day. Smaller municipal treatment systems may be required to conduct pretreatment programs if there are significant industrial users of their systems. The pretreatment programs must comply with the federal regulations at 40 CFR Part 403.

The U.S. Environmental Protection Agency has approved the State's program to regulate discharges of waste water to “waters of the nation.” The State, through the Regional Water Boards, issues the NPDES permits, reviews discharger self-monitoring reports, performs independent compliance checking, and takes enforcement actions as needed. State authority to issue compliance schedules for effluent limitations in NPDES permits is summarized below in the section on “Compliance Schedules in NPDES Permits.”

Waste Discharge Requirements (WDRs)

The California Water Code authorizes Regional Water Boards to regulate discharges to land to protect water quality. Regional Water Boards issue WDRs in accordance with Section 13263 of the California Water Code. Regional Water Boards are authorized to review WDRs periodically. Regional Water Boards issue WDRs, review self-monitoring reports submitted by the discharger, perform independent compliance checking, and take necessary enforcement action. The California Water Code authorizes the Regional Water Boards to issue enforcement actions (see below) ranging from orders requiring relatively simple corrective action to monetary penalties in order to obtain compliance with WDRs.

Waivers of WDRs

Regional Water Boards may waive the requirement for filing a report of waste discharge or for issuance of WDRs pursuant to CA Water Code § 13269 if the Regional Water Board determines, after any necessary state board or regional board meeting, that such waiver is consistent with any applicable state or regional water quality control plan and is in the public interest. WDRs and report filing requirements can be waived for a specific discharge or types of discharges. Such waivers may also be issued by the State Board. A waiver is conditional and may be terminated at any time by the State or Regional Board and must be renewed after no more than five years to remain in legal effect.

Mixing Zones

The State Board has adopted conditions for use of mixing zones and dilution credits for toxic priority pollutants in the “Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California Policy” (State Board Res. No. 2005-0019). This policy is commonly referred to as the “State Implementation Policy” or SIP. A copy of the SIP is included in Appendix B of this Basin Plan. The standards implemented through the SIP are those promulgated by the USEPA in the National

Toxics Rule and California Toxics Rule, and the narrative water quality objectives for toxicity in Basin Plans.

The Regional Board may grant mixing zones and dilution credits in NPDES permits for toxic priority pollutants in accordance with the SIP. The Regional Board may grant mixing zones and dilution credits in NPDES permits for pollutants not covered by the SIP and may grant mixing zones and dilution credits in WDRs for toxic (including priority pollutants), conventional (as defined by Clean Water Act section 304(a)(4)), and non-conventional (other than toxic or conventional) pollutants under any of the following conditions.

A mixing zone shall be as small as practicable. The following conditions must be met in allowing a mixing zone:

A. A mixing zone shall not:

(1) compromise the integrity of the entire water body;

(2) cause acutely toxic conditions to aquatic life passing through the mixing zone;

(3) restrict the passage of aquatic life;

(4) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;

(5) produce undesirable or nuisance aquatic life;

(6) result in floating debris, oil, or scum;

(7) produce objectionable color, odor, taste, or turbidity;

(8) cause objectionable bottom deposits;

(9) cause nuisance;

(10) dominate the receiving water body or overlap a mixing zone from different outfalls; or

(11) be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water pursuant to the Sources of Drinking Water Policy (State Board Res. No. 88-63).

B. The Regional Board shall deny or significantly limit a mixing zone and dilution credit as necessary to protect beneficial uses or comply with other regulatory requirements. Such situations may exist based upon the quality of the discharge, hydraulics of the water body, or the overall discharge environment (including water column chemistry, organism health, and potential for bioaccumulation).

If the Regional Board allows a mixing zone and dilution credit, the permit or WDR shall specify the method by which the mixing zone was derived, the dilution credit granted, and the point(s) in the receiving water where the applicable criteria/ objectives must be met. The application for the permit or WDR shall include, to the extent feasible, the information needed by the Regional Board to make a determination on allowing a mixing zone, including the calculations for deriving the appropriate receiving water and effluent flows, and/or the results of a mixing zone study. If the results of the mixing zone study are unavailable by the time of permit or WDR issuance/reissuance, the Regional Board may establish interim requirements.

Prohibitions and Exemptions from Prohibitions

The Regional Board has the authority to “specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted” (CA Water Code § 13243). These discharge prohibitions may be adopted, revised, or rescinded as necessary. The Regional Board has adopted both regionwide and watershed-specific discharge prohibitions that are described in Sections 4.1 and 5.2 of this Basin Plan. For certain discharges and activities, the Regional Board may grant exemptions from certain prohibitions. Prohibition exemptions are discretionary actions of the Regional Board, are conditional, and are allowed under the circumstances described in Sections 4.1 and 5.2. Chapter 6 of this Basin Plan also identifies State and Regional Board plans and policies that include exemptions from waste discharge prohibitions.

Enforcement Actions

To facilitate remediation of water quality problems, or in instances where waste discharge restrictions or other provisions of this Basin Plan are violated, the Regional Board can use different types of enforcement measures. These measures can include:

- A written **Notice to Comply** can be issued for minor violations during field inspections by Regional Board staff, at the discretion of the inspector. The Notice is issued to a representative of the facility being inspected, and states the nature of the alleged violation, a means to comply, and a time limit for compliance (not to exceed 30 days). The violator must sign and return the notice to the Regional Board within five working days of achieving compliance. If compliance is achieved within the stated time limits, and if the case is not subject to a fine under federal law, the violation is not subject to civil penalties. (The law establishing the authority for the Notice to Comply does not limit the Regional Board's authority for criminal enforcement or its ability to cooperate in criminal enforcement proceedings.) The Regional Board may take other enforcement actions upon failure to comply or if necessary to prevent harm to public health or the environment. A Notice to Comply cannot be used for a knowing, willful, or intentional violation, for a case where the violator benefits economically for noncompliance, for chronic violations, or a recalcitrant violator, or for violations that cannot be corrected within 30 days.

- A **Notice of Violation** or NOV is a letter formally advising a discharger in noncompliance that additional enforcement actions may be necessary if appropriate corrective actions are not taken.

- A **Time Schedule Order** or TSO (CA Water Code § 13300) is a time schedule for specific actions a discharger shall take to correct or prevent violations of requirements. A TSO is issued by the Regional Board for situations in which the Board is reasonably confident that the problem will be corrected.

- A **Stipulated Penalty Order** (CA Water Code § 13308) is an order that specifies a time schedule for compliance with another enforcement order and prescribes civil penalties that are due if compliance is not achieved in accordance with that schedule. The amount of the civil penalty shall be based upon the amount reasonably necessary to achieve compliance.

- A **Cleanup and Abatement Order** or CAO (CA Water Code § 13304) is an order requiring a discharger to clean up a waste or abate its effects or, in the case of a threatened pollution or nuisance, take other necessary remedial action. A CAO can be issued by the Regional Board or by the Regional Board Executive Officer for situations when immediate action is needed on an urgent problem from regulated or unregulated discharges that are creating or threatening to create a condition of pollution or nuisance.

- A **Cease and Desist Order** or CDO (CA Water Code § 13301) is an order requiring a discharge to comply with WDRs or prohibitions according to a time schedule, or if the violation is threatening, to take appropriate remedial or preventative action. A CDO is issued by the Regional Board when violations of requirements or prohibitions are threatened, are occurring, or have occurred and probably will continue in the future. Issuance of a CDO requires a public hearing.

Monetary liabilities or fines (**administrative civil liabilities** or ACLs) may also be imposed administratively by the Regional Board. Under certain circumstances, enforcement actions are referred to the State Attorney General or District Attorney.

State Water Resources Control Board Resolution 92-49, as amended, includes statewide policies and procedures for investigation and cleanup and abatement of discharges under Water Code Section 13304. The statewide Water Quality Enforcement Policy (State Board Resolution 2009-0083) provides direction on types of violations that shall be brought to the attention of Regional Boards by staff, on procedures for coordination and cooperation with other agencies, and on setting amounts for ACLs. Copies of both of these policies are included in Appendix B to this Basin Plan.

Special Designations

Some water bodies have special designations and related narrative discharge restrictions. Examples of special designations are Outstanding National Resource Water, Sole-source Aquifer, Wild and Scenic River, and Water Quality Limited Segment. Applicable special designations and discharge restrictions are described the "Resources Management and Restoration" section of this Chapter.

Implementation Schedules

The Porter-Cologne Act (CA Water Code § 13242[b]) requires a Basin Plan's program of implementation for achieving water quality objectives to include a "time schedule for the actions to be taken." Because of the lack of ambient water quality monitoring data for most of the water bodies of the Lahontan Region (see Chapter 7), it is not possible to state whether or not these waters are in achievement of all water quality objectives, or to set compliance schedules for achievement. The Regional Board periodically reviews available information on attainment of objectives and support of beneficial uses as part of the Water Quality Assessment (ongoing), Section 305(b) reporting (every six years), and Triennial Review (every three years) processes. These reviews may result in

Basin Plan amendments and/or the issuance of new or revised waste discharge permits that may include specific compliance schedules for particular dischargers or for all discharges affecting particular water bodies. The Regional Board is also required to prioritize impaired water bodies listed as “Water Quality Limited” under Section 303(d) of the Clean Water Act for the development of “Total Maximum Daily Loads” (TMDLs) of pollutants to be used in setting wasteload allocations for dischargers, in order to ensure attainment of standards. See Section 4.13 of this chapter for more information on TMDLs.

Some of the water quality control programs for the Lahontan Region do have specific compliance deadlines that are discussed later in this Basin Plan. For example, the Lake Tahoe TMDL includes 5-year load reduction requirements for the four major pollutant source categories. Some of the waste discharge prohibitions discussed later in this Chapter also include specific compliance dates.

Compliance schedules may be included in WDRs, waivers of WDRs, CAOs, CDOs, TSOs, stipulated penalty orders pursuant to Water Code section 13308, and investigative orders pursuant to Water Code sections 13267 and 13383. However, NPDES permits for existing discharges may include compliance schedules only under limited circumstances, as described below.

Compliance Schedules in NPDES Permits

Section 301(b) (1)(c) of the Clean Water Act requires NPDES permits to include effluent limitations as stringent as needed to attain water quality standards. Compliance schedules for attainment of effluent limitations may be included in NPDES permits for implementation of new, revised, or newly interpreted standards under specific circumstances, if the state has authority to issue such schedules.

The State Board has adopted a “Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits” (Resolution No. 2008-0025). A copy of this policy is included in Appendix B. The policy applies to all NPDES permits that are modified or reissued after its effective date (December 17, 2008). It authorizes the Regional Boards to include a compliance schedule in a permit for an existing discharger for attainment of an effluent limitation for a new, revised or newly interpreted water quality objective or criterion, when the Regional Board determines that the discharger needs additional time to implement actions to comply with the limitation. Compliance schedules are **not** authorized in permits for new dischargers. See the policy for definitions and additional details on provisions related to National Toxics Rule and California Toxics Rule standards, and circumstances under which compliance schedules are or are not authorized in NPDES permits.

Innovative Technology and Demonstration Projects

The Regional Board occasionally receives proposals for the use of innovative technology, either as part of projects or activities that it regulates, or as a water quality mitigation measure. Examples include the use of bacteria as ice nucleating agents for snowmaking at ski areas, and bioremediation technology for cleanup of toxic substance leaks and spills in ground water. Regional Board staff will evaluate such proposals on a case-by-case basis in relation to applicable water quality standards, discharge prohibitions, effluent limitations, and the risk of adverse water quality impacts from the specific technology. Because of the high resource value and extreme sensitivity of some of the waters of the Lahontan Region, some types of demonstration projects using new technology should be carried out within other watersheds.

Interstate Issues

The Lahontan Region includes most of California’s common boundary with Nevada, and a small common boundary with Oregon. There are a number of interstate lakes, streams, and ground water basins. Section 518 of the federal Clean Water Act allows Indian tribes to apply to the USEPA to be treated as states for purposes of setting and implementing water quality standards under Sections 303 and 401 of the Act. At least one tribe within the Lahontan Region had been granted such status.

Historically, interstate water quantity issues have been of greater concern than water quality issues. (See the discussion of water quantity issues in the “Resources Management” section of this Chapter). However, the requirement for efforts by both California and Nevada to protect Lake Tahoe led to the development of the bi-state Tahoe Regional Planning Agency and a bi-state *Water Quality Management Plan for the Lake Tahoe Region* under Section 208 of the Clean Water Act (see Chapter 5). Impacts of pumping in Nevada on ground water supplies in Death Valley, and impacts of radioactivity from the Nevada Test Site on ground water quality in Death Valley, are also of concern. Utility scale solar and wind power plants near the

California-Nevada border may also affect surface and/or ground waters in the Lahontan Region.

In both planning and regulatory activities for interstate waters, Regional Board staff considers the applicable water quality standards of the other state. Regional Board staff request the opportunity to review and comment on revisions of other state's water quality plans for waters shared with the Lahontan Region, and provides these states with similar opportunities to comment on Basin Plan revisions. If Regional Board Basin Plan amendments or waste discharge permits appear to create a possibility of conflict with another state's standards, Regional Board staff consults with water quality staff of the other state to attempt to resolve the conflict. Because most water quality objectives for Lahontan Region waters are based on historical water quality and antidegradation considerations, water quality permits that ensure compliance with California standards generally should be adequate to prevent violation of another state's standards.

Nonpoint Source Program

Nonpoint sources of pollution are generally defined as sources that are diffuse and/or not subject to regulation under the federal National Pollutant Discharge Elimination System (for surface water discharges). Nonpoint sources include agriculture, grazing, silviculture, abandoned mines, construction, stormwater runoff, etc. Nonpoint sources have been identified as a major cause of water pollution in California according to the State Board's 1990 *Water Quality Assessment* report and 1988 *Nonpoint Source Problem Inventory for Surface Waters.*

The federal Clean Water Act (CWA) is the principal federal water quality protection statute. For point source discharges to surface waters, the CWA establishes a permit system. However, nonpoint sources are exempt from federal permitting requirements, as are discharges to ground water. The CWA was amended in 1987 to include a new Section 319 entitled "Nonpoint Source Management Programs." Section 319 requires states to develop Assessment Reports and Management Programs describing the states' nonpoint source problems. The State Board's November 1988 *Nonpoint Source Problem Inventory for Surface Waters* and its current nonpoint source program plan and policy, and water quality assessment procedures respond to this requirement.

The State Board first adopted a statewide *Nonpoint Source Management Plan* in 1988. In 2000, this plan was replaced by the *Plan for California's Nonpoint Source Pollution Control Program.* In 2004, the State Board adopted a "Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program" (State Board Res. No. 2004-0030). This policy summarizes the authority of the State and Regional Boards to control nonpoint source discharges under the Porter-Cologne Act.

All current and proposed nonpoint source discharges that could affect the quality of waters of the state should be regulated under WDRs, waivers of WDRs, waste discharge prohibitions, other orders of the Regional Board or State Board or some combination of these regulatory tools. The State and Regional Boards also implement a broad program of outreach, education, technical assistance and financial incentives. This program is supplemented by collaborative activities with other agencies and non-governmental organizations to facilitate control of nonpoint sources.

Best Management Practices

Property owners, managers or other dischargers may implement "Best Management Practices" (BMPs) to protect water quality. The term "Best Management Practices" used in reference to control measures for nonpoint source water pollutants is analogous to the terms "Best Available Technology/Best Control Technology" (BAT/BCT) used for control of point source pollutants. The USEPA (40 CFR § 103.2[m]) defines BMPs as follows:

"Methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include, but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during and after pollution producing activities to reduce or eliminate the introduction of pollutants into receiving waters."

USEPA regulations (40 CFR § 130.6 [b][4][i]) provide that Basin Plans:

"shall describe the regulatory and nonregulatory programs, activities, and BMPs which the agency has selected as the means to control nonpoint source pollution where necessary to protect or achieve approved water uses. Economic, institutional, and technical factors shall be considered in a continuing process of identifying control needs and evaluating and modifying the BMPs as necessary to achieve water quality goals."

BMPs fall into two general categories:

- **Source controls** that prevent a discharge or threatened discharge. These may include measures such as recycling of used motor oil, fencing streambanks to prevent livestock entry, fertilizer management, street cleaning, revegetation and other erosion controls, and limits on total impervious surface coverage. Because the effectiveness of treatment BMPs is often uncertain, source control is generally preferable to treatment. It is also often less expensive.

- **Treatment controls** that remove pollutants from stormwater before it reaches surface or ground waters. These include infiltration facilities, oil/water separators, and constructed wetlands.

BMPs for development projects can be applied both to new project construction, and, through “retrofitting,” to existing structures, roads, parking lots, and similar facilities. It may be possible to carry out an areawide retrofit program as part of a local government redevelopment project.

Several important points about BMPs must be emphasized at the outset:

- The use of BMPs does **not** necessarily ensure compliance with effluent limitations or with receiving water objectives. Because nonpoint source control has been a priority only since the 1970s, the long-term effectiveness of some BMPs has not yet been documented. Some source control BMPs (e.g., waste motor oil recycling) may be 100 percent effective if implemented properly. Information to date indicates that treatment control BMPs are **not** 100 percent effective, even if maintained and operated properly. Monitoring and evaluation of BMP effectiveness is an important part of nonpoint source control programs.

- The selection of individual BMPs must take into account site-specific conditions (e.g., depth to ground water, quality of runoff, infiltration rates). Not all BMPs are applicable at every location. High ground water levels may preclude the use of runoff infiltration facilities, while steep slopes may limit the use of wet ponds.

- To be effective, most BMPs must be implemented on a long-term basis. Structural BMPs (e.g., wet ponds and infiltration trenches) require periodic maintenance, and may eventually require replacement.

- The “state-of-the-art” for BMP design and implementation is expected to change over time.

To date, the greatest attention has been given to development of BMPs for erosion and stormwater control in connection with construction projects, urban runoff, and timber harvest activities. BMPs are now being developed for control of a number of other nonpoint sources, including range livestock grazing and agricultural runoff.

General information on recommended nonpoint source management practices is provided under different water quality problem categories throughout this Chapter and in Chapter 5 on the Lake Tahoe Basin. For detailed information on the design, implementation, and effectiveness of specific BMPs, the reader should consult the appropriate BMP Handbook for the project type or location.

Specific Types of Activities and Their Related Water Quality Problems, Control Actions, and Time Schedules for the Actions to be Taken

This Plan considers specific types of problem-related activities with their water quality impacts, control actions and time schedules under the thirteen categories of:

4.1 Waste Discharge Prohibitions

4.2 Spills, Leaks, Complaint Investigations, and Cleanups

4.3 Stormwater Runoff, Erosion, and Sedimentation

4.4 Wastewater—Treatment, Disposal and Reclamation

4.5 Solid and Liquid Waste Disposal to Land

4.6 Ground Water Protection and Management

4.7 Mining, Industry, and Energy Production

4.8 Land Development

4.9 Resources Management and Restoration

4.10 Agriculture

4.11 Recreation

4.12 Military Installations

4.13 Total Maximum Daily Loads

General water quality impacts from each category of activities are first described, followed by details specific to the types of activities in each category.

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4.1 WASTE DISCHARGE PROHIBITIONS

Section 13243 of the Water Code gives Regional Boards, in Basin Plans or waste discharge requirements, authority to “specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted.” Regional Boards may take enforcement action for violations of waste discharge prohibitions. The Water Code may also contain waste discharge prohibitions that are applicable in the Lahontan Region.

This section of the Basin Plan contains waste discharge prohibitions that apply to the entire Lahontan Region and waste discharge prohibitions that apply to specific watersheds (hydrologic units (HUs) or hydrologic areas (HAs)). Watershed-specific prohibitions are listed by watershed in geographical order from north to south. Prohibitions that apply to the entire Region are listed first.

Waste discharge prohibitions in this chapter and Chapter 5 (Water Quality Control Standards for the Lake Tahoe Basin) do not apply to discharges of stormwater when wastes in the discharge are controlled through the application of management practices or other means and the discharge does not cause a violation of water quality objectives. For existing discharges, waste discharge requirements, including, if authorized, NPDES permits, may contain a time schedule for the application of control measures and compliance with water quality objectives. In general, the Regional Board expects that control measures will be implemented in an iterative manner as needed to meet applicable receiving water quality objectives.

Exemptions to Waste Discharge Prohibitions

The Basin Plan allows exemptions to certain waste discharge prohibitions if the applicable criteria are met, as described further, below. Exemptions are generally provided on a case-by-case basis, although the Regional Board may find that certain types of discharges are exempt from certain or all applicable waste discharge prohibitions. Exemptions to regionwide, hydrologic unit, and hydrologic area prohibitions may be granted as specified in this chapter and Chapter 5 for the Lake Tahoe Hydrologic Unit.

Section 13223 of the Water Code allows Regional Boards to delegate many of their powers to their Executive Officers. This section also provides that, whenever any reference is made in the Porter-Cologne Water Quality Control Act to an action that may be taken by a Regional Board, such reference includes such action by its Executive Officer pursuant to powers and duties delegated by the Regional Board., except as limited by section 13223(a).

A discharger seeking an exemption from a waste discharge prohibition must file project information sufficient to demonstrate that it meets the applicable criteria. Discharges subject to a prohibition cannot commence until such time as the Regional Board has provided written concurrence that the applicable criteria are met. In addition to the exemption, the discharger must obtain all other relevant and appropriate Regional Board permits or authorizations for the project or activity (e.g., water quality certification under Section 401 of the Clean Water Act). Except in emergency situations, the Executive Officer will notify the Regional Board and interested members of the public 10 days in advance of the intent to grant an exemption to allow for public comment on whether the exemption proposal meets the applicable criteria. Such notification may be provided by electronic notification, including Internet posting.

Regionwide Prohibitions

1. The discharge of waste that causes violation of any narrative or numeric water quality objective contained in this Plan is prohibited.

2. Where any numeric or narrative water quality objective contained in this Plan is already being violated, the discharge of waste that causes further degradation or pollution is prohibited.

3. The discharge of waste that could affect the quality of waters of the state that is not authorized by the State or Regional Board through waste discharge requirements, waiver of waste discharge requirements, NPDES permit, cease and desist order, certification of water quality compliance pursuant to Clean Water Act section 401, or other appropriate regulatory mechanism is prohibited.

4. The discharge of untreated sewage, garbage, or other solid wastes into surface waters of the Region is prohibited. (For the purposes of this prohibition, “untreated sewage” is that which exceeds secondary treatment standards of the Federal Water Pollution Control Act, which are incorporated in this plan in Section 4.4 under “Surface Water Disposal of Sewage Effluent.”).

5. The discharge of pesticides to surface or ground waters is prohibited[1].

Exemptions to prohibition 5 may be allowed subject to the criteria below detailed in the section titled "Exemption Criteria for Aquatic Pesticide Use."

For purposes of the Basin Plan, pesticides are defined in Food and Agriculture Code section 12753 to include any spray adjuvant or any substance, or mixture of substances which is intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, as defined in Section 12754.5, which may infest or be detrimental to vegetation, man, animals, or households, or be present in any agricultural or nonagricultural environment whatsoever.

As defined in section 12754.5 of the Food and Agriculture Code, a pest is any of the following that is, or is liable to become, dangerous or detrimental to the agricultural or nonagricultural environment of the state:

(a) Any insect, predatory animal, rodent, nematode, or weed.

(b) Any form of terrestrial, aquatic, or aerial plant or animal, virus, fungus, bacteria, or other microorganism (except viruses, fungi, bacteria, or other microorganisms on or in living man or other living animals).

(c) Anything that the director of the Department of Food and Agriculture, by regulation, declares to be a pest.

"Aquatic pesticides" are pesticides registered by the California Department of Pesticide Regulation (DPR) and formulated for use in water to control aquatic animal or plant pests. An aquatic pesticide is any substance (including biological agents) applied in, on, or over the waters of the State or in such a way as to enter those waters for the purpose of inhibiting the growth or controlling the existence of any plant or animal in those waters.

Aquatic pesticides, for purposes of this Regionwide Prohibition, also include adulticides which are applied by spraying, either by ground or aerial application, at, over, or near water to control adult mosquitoes. During adulticide applications, a portion of the pesticide will unavoidably be deposited to surface waters in order to effectively target the adult mosquitoes.

Exemptions to Regionwide Prohibitions

An exemption to prohibitions 1 and 2, above, may be granted whenever the Regional Board finds all of the following:

a. The discharge of waste will not, individually or collectively, directly or indirectly, adversely affect beneficial uses, *and*

b. There is no reasonable alternative to the waste discharge, *and*

c. All applicable and practicable control and mitigation measures have been incorporated to minimize potential adverse impacts to water quality and beneficial uses.

Exemptions for Emergency Projects

The Regional Board recognizes that emergency projects may require the discharge of waste to water as part of actions to address the emergency. Due to the exigencies of the emergency situation, normal public noticing and Regional Board action on granting prohibition exemptions may not be possible. For waste discharged as a result of emergency projects, exemptions to all prohibitions contained in this Basin Plan may be granted by the Regional Board's Executive Officer for the following projects:

1. Projects to maintain, repair, restore, demolish, or replace property or facilities damaged or destroyed as a result of a disaster in a disaster stricken area in which a state of emergency has been proclaimed by the Governor pursuant to the California Emergency Services Act, commencing with Section 8550 of the Government Code.

[1] Compliance with this prohibition will be assessed or measured by evidence of pesticide application to liquid water or by analyzing water samples (from either surface or ground waters) for the presence of pesticides. Therefore, proper application of terrestrial pesticides directly to plants or animals located in a surface water (as defined by the Water Code) under dry conditions or directly to land adjacent to a surface water should not (1) result in a violation of the prohibition, (2) require the project proponent to submit an exemption request to the Regional Board, nor (3) require the Regional Board to consider exemptions to the prohibition.

Dry condition example: The application of terrestrial pesticides to the dry stream beds of ephemeral streams would not require a prohibition exemption since this situation involves pesticide application under a dry condition (i.e., no liquid water is present in the ephemeral stream).

Adjacent to surface water example: The application of terrestrial pesticides along a canal to kill weeds and help maintain structural stability would not require a prohibition exemption since this situation involves pesticide application to land, not liquid water.

2. Emergency repairs to publicly or privately owned service facilities necessary to maintain service essential to the public health, safety or welfare.

3. Specific actions necessary to prevent or mitigate an emergency. *This does not include long-term projects undertaken for the purpose of preventing or mitigating a situation that has a low probability of occurrence in the short-term.*

Exemptions to all waste discharge prohibitions for emergency projects meeting the above qualifications may be granted whenever the Executive Officer finds that a specific project meets all of the following criteria:

a. There is no feasible alternative to the project that would comply with the Basin Plan prohibitions, *and*

b. All applicable control and mitigation measures that are practicable have been incorporated to minimize potential adverse impacts to water quality and beneficial uses.

Exempted Low Threat Discharges

The Regional Board has determined that the discharges listed in Table 4.1-1 are exempt from applicable regionwide and hydrologic unit/area waste discharge prohibitions subject to all the conditions set forth below and the discharge-specific conditions in Table 4.1-1.

1. For proposed discharges to surface water, the applicant must provide information supporting why discharge to land is not practicable.

2. The discharge must not adversely affect the beneficial uses of the receiving water.

3. The discharge must comply with all applicable water quality objectives.

4. Best practicable treatment or control of the discharge shall be implemented to ensure that pollution or nuisance will not occur.

Exemption Criteria for Aquatic Pesticide Use

Purpose and Need for Exemption

The Regional Board recognizes that certain activities involving the application of pesticides (defined above) may be in the public interest because they protect public health and safety or provide ecological preservation. Under some circumstances the Regional Board may grant an exemption to the prohibition and allow a direct application of pesticides to water. This exempted action will constitute a discharge of pollutants into waters of the United States or waters of the State and require coverage under an appropriate permit. Circumstances eligible for a prohibition exemption involve the use of aquatic pesticides for purposes of vector control, fisheries management, and control of aquatic invasive species or other harmful organisms under emergency or non-emergency situations (e.g., control of harmful cyanobacteria blooms affecting a drinking water supply, control of aquatic invasive species interfering with safe navigation).

If an exemption to the prohibition is granted, waters of exceptional quality within the treatment area[2] may be temporarily degraded due to the application of aquatic pesticides.

Pursuant to the State Board's "Statement of Policy with Respect to Maintaining High Quality of Waters in California" (Resolution No. 68-16), any degradation of high quality water is only permissible if the Regional Board finds that such a lowering of the existing water quality will be consistent with the maximum benefit to people of the State. Similarly, the federal Antidegradation Policy (40 CFR 131.12) dictates that water quality shall be preserved unless it is determined that the lowering of water quality is necessary to accommodate important economic or social development. Additionally, it requires that water quality be adequate to protect existing uses fully.

The prohibition exemption criteria require that degradation of existing high water quality is limited to the shortest possible time and confined to the smallest area necessary for project success. The spatial extent of the treatment area and the duration of the treatment event will vary from project to project and will be proposed by the project proponent and accepted or modified by the Regional Board and specified in the final project plans, exemption conditions, and appropriate permit.

The project proponent shall work with Water Board staff to propose numeric limits for each aquatic pesticide project, which will be incorporated as exemption conditions in the Water Board's resolution granting the prohibition exemption and/ or requirements of the appropriate permit. Permit requirements and/or conditions of the exemption may include, but not be limited to, discharge limits

[2] The treatment area is the area being targeted to receive lethal doses of aquatic pesticides to control a specific pest. Within the treatment area, a spatial zone of impact exists in which water quality and beneficial uses are temporarily not protected.

for application rates, receiving water limitations for pesticide residue levels, limits on the temporal and spatial extent (areal and depth) of the treatment area, and recovery time expectations and biotic metrics to assess restoration of affected non-target species.

These project specific requirements issued by the Water Board will ensure project design and implementation will not unreasonably affect beneficial uses. The Water Board will evaluate the exemption request and determine if it satisfies exemption criteria that require project plans to incorporate best management practices to limit adverse impacts to the shortest time possible while achieving project success.

To verify compliance with water quality objectives and discharge requirements, project proponents will implement compliance monitoring. Monitoring will commence no more than one week after the application event[3]. The time frame in which a project must achieve compliance with water quality objectives with the exception of the biocriteria objectives[4], will vary by project depending on the type of pesticide proposed, site specific conditions, and temporal extent of treatment event. Reasonable compliance times will be assigned based on the duration of the treatment event and will be included in the Water Board's resolution to grant exemption. The duration of the treatment event will be determined by whether the pesticide in use is a fast-acting chemical or a slow-release systemic compound and by considering site-specific conditions (flow, target species, water chemistry). For fast-acting pesticides it may be possible to achieve compliance with water quality objectives within a week of the application event. Fast-acting pesticides degrade quickly, usually within a week of application, and so are applied at high concentrations to be effective before degrading. Slower acting pesticides are effective at lower concentrations less toxic to non-target species, but degrade more slowly and require a longer treatment event before complying with water quality objectives.

The receiving water is defined as water outside of the treatment area. Outside the treatment area, compliance with water quality objectives is required within the receiving water at all times during and after the treatment event (Figure 1). During aquatic pesticide applications, an intentional lethal concentration of chemical is applied to water to control pests. The addition of the chemical results in a lowering of existing water quality. For effective treatment, a spatial and temporal zone of impact[5] corresponding to the treatment area is required, and the Regional Board acknowledges that existing uses and the level of water quality necessary to maintain those uses will not be protected within this zone during the treatment event[6].

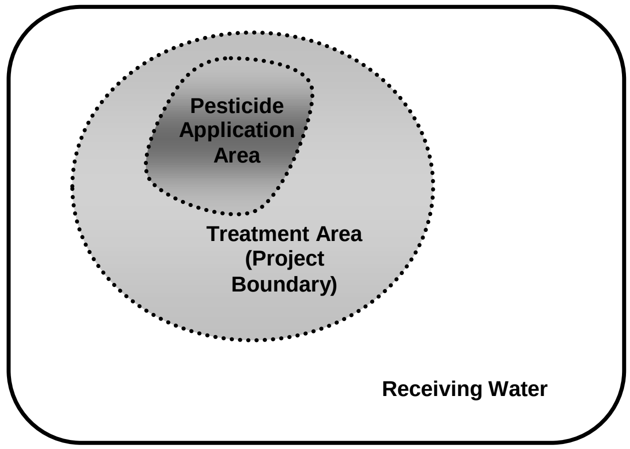


Figure 1.

If an aquatic pesticide project is allowed to occur, the Regional Board must find that the discharge complies with the antidegradation policies, and water quality objectives are restored within the treatment area, within the shortest time reasonably possible after the application event, and within the receiving water during and after the treatment event.

The Regional Board acknowledges that water quality degradation may occur outside of the treatment area if pesticide residues escape the treatment area. While the presence of these residues may temporarily degrade the existing high water quality, the impact is not expected, nor will it

[3] The application event is the time that the pesticide is directly introduced into the treatment area, and not the length of time that the introduced pesticide releases active or inert ingredients into the environment.

[4] Biocriteria objectives include species composition, non-degradation of aquatic communities, and any future biocriteria objectives adopted by the State or Regional Board.

[5] The Zone of Impact is a spatial and temporal zone that exists during, and is targeted by, aquatic pesticide treatments in which existing uses and the level of water quality necessary to maintain those uses will not be protected. The Zone of Impact ceases to exist once the treatment event is completed.

[6] The treatment event is the period during which the aquatic application is actively killing or controlling the target pest within the treatment area. It starts upon initiation of the application event and proceeds until the concentration of the aquatic pesticide is below that which can kill the target pest. During the treatment event, a spatial and temporal zone of impact exists in which water quality and beneficial uses are temporarily not protected.

be allowed, to violate water quality objectives that are established at levels protective of beneficial uses. Any water quality degradation within the receiving water is expected to be temporary, since pesticide residues escaping the treatment area breakdown through degradation mechanisms (volatilization, photolysis, etc.) and is not expected to persist beyond hours or days. Appropriate protection measures (application methods, compliance with pesticide label instructions, implementation of best management practices (BMPs)) shall be implemented during the project to ensure that any lowering of water quality is limited to the shortest possible time.

The Regional Board limits pesticide applications subject to the exemption to those conducted for purposes that serve the public interest (e.g., to restore natural resources or protect public health and safety or beneficial uses). State and federal regulations including the (1) Endangered Species Act, (2) Health and Safety Code, (3) Safe Drinking Water Act, and (4) Nonindigenous Aquatic Nuisance Prevention and Control Act compel state and federal agencies and public entities to (a) restore and preserve threatened and endangered species, (b) protect public health from disease-carrying vectors, (c) protect municipal drinking supplies, and (d) prevent damage to valuable aquatic habitats by controlling the spread of aquatic invasive species. Accomplishing these tasks effectively may require treating surface waters with aquatic pesticides.

Discharges of pesticide concentrations needed for effective resource management may cause waters to temporarily exceed established narrative or numeric water quality objectives (e.g., color, chemical constituents, toxicity, species composition). When an exemption to the prohibition on pesticide use in water is granted, a short-term or seasonal exemption to the prohibition on violating narrative or numeric water quality objectives may also be granted for specific water quality objectives. A longer-term exemption to the species composition objective may be granted on a project-by-project basis.

Provided aquatic pesticides are applied under the circumstances listed below, projects subject to this exemption will be considered consistent with the state antidegradation policy incorporated into this Basin Plan because such projects provide the maximum benefit to people of the State and are necessary to accommodate important economic or social development. Additionally, any degradation of water quality associated with the proposed aquatic pesticide use would only be temporary in nature and protective of beneficial uses provided the project complies with the exemption criteria specified below.

Findings Necessary to Grant Exemption

An exemption to the waste discharge prohibition for aquatic pesticide use may be granted by the Regional Board if all the following findings are made:

(a) The project is an eligible circumstance as described below.

(b) The project satisfies all the applicable exemption criteria.

Granting an exemption is at the discretion of the Regional Board. The Regional Board may deny an exemption request even though the project meets all the necessary project conditions and criteria. For example, this may occur as the Regional Board is considering the tradeoffs between use of pesticides and the actual and/or potential environmental impacts of an invasive species infestation. For instance, when considering a repeated application of an herbicide to address an infestation of aquatic invasive vegetation, the Regional Board may determine that it would be less harmful to let the infestation continue than to repeatedly apply pesticides.

Circumstances Eligible for Prohibition Exemption

Requests for exemption to this prohibition will be considered for the following circumstances:

Vector Control

Prohibition exemptions will be considered for the purposes of “Vector Control” where the proposed project is conducted to protect public health by eliminating pests with the direct application of larvicides to surface waters or aerial spraying of adulticides that have the potential to drift to surface waters.

Government agencies (e.g., local and county vector control districts) that apply aquatic pesticides for vector control to protect public health, must be a signatory to a Cooperative Agreement with the California Department of Public Health (DPH) pursuant to Section 116180 of the Health and Safety Code. (There are situations where vector control agencies contract their applications to private applicators. For these scenarios, the private applicators must be covered under the terms of the Cooperative Agreement and work under the authority and guidance of the vector control district.)

Individuals applying larvicides or adulticides must be either (1) a government agency employee (or authorized contractor) certified by DPH as a public health pesticide applicator or (2) a private applicator protecting public health on private lands who can provide documentation that he or she is licensed or certified, if required, by the County Agricultural Commissioner (CAC), or Director of DPR when there is no CAC.

Fisheries Management

Prohibition exemptions will be considered for "Fisheries Management" if the project proponent is the California Department of Fish and Wildlife (DFW) or United States Fish and Wildlife Service (USFWS).

Aquatic pesticide applications implemented by the USFWS and the DFW for Fisheries Management may be considered for an exemption if the pesticide use is proposed to (1) restore and protect of threatened or endangered species, (2) control of fish diseases where the failure to treat could result in significant damage to fisheries resources or aquatic habitat, or (3) elimination of species (as defined in CA Fish and Wildlife Code § 2118), where competition or predation from such species threatens native fish populations, or populations of other organisms (includes rare, unique, sensitive, or candidates for listing as endangered or threatened species).

The Regional Board may, on a project-by-project basis, grant an exemption for the use of fish toxicants in other kinds of fisheries management activities, when the DFW or the USFWS can provide the necessary justification for allowing a temporary lowering of water quality consistent with the provisions of the federal Antidegradation Policy (contained in 40 CFR § 131.12) and State Board Resolution No. 68-16.

Controlling Aquatic Invasive Species (AIS) or Other Harmful Species

Prohibition exemptions will be considered for "Controlling AIS or Other Harmful Species" if the use of aquatic pesticides is to protect public health and safety, the environment, or for other situations described below. Projects proposed for these circumstances will have different criteria depending on whether the projects are considered as emergency, time sensitive, or projects that are neither emergencies nor time sensitive.

<u>Emergency Projects.</u> Emergency Projects are those undertaken in response to an emergency as set forth in Public Resource Code section 21060.3; or projects that meet the CEQA definition of Emergency Projects set forth in CEQA Guidelines 15269(a)(b)(c) and require immediate action to control the pest of concern.

<u>Time Sensitive Projects.</u> For Time Sensitive Projects proposed for purposes of AIS control, the project proponent must demonstrate that the decision to apply aquatic pesticides is in compliance with an adopted Aquatic Invasive Species Management Plan. The AIS of concern must be affecting a water body where that species is not already established. The AIS must be recognized as a species of concern by the Aquatic Nuisance Species Task Force, listed as a Restricted Animal in California Administrative Code Title 14, section 671, listed as an Injurious Wildlife Species in the Lacey Act (50 CFR 16.11-16.15), addressed in the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, listed as a Noxious Weed Species in either Title 3, Section 4500 of the California Department of Food and Agriculture, Federal Noxious Weed Act. P.L. 93-629, or is a dreissenid mussel as addressed in section 2301 of the Fish and Game code. The project proponent must be a state or federal agency with the legal authority to control aquatic invasive species as identified in the January 2008 (as amended) California Aquatic Invasive Species Management Plan, Appendices B and C.

For Time Sensitive Projects proposed to protect drinking water supplies, water distribution systems, and flood control channels, or otherwise proposed to serve public interest, the project proponent must be (1) the public agency mandated to protect such facilities, or (2) a private entity (e.g., a homeowners association, private water utility) that has control over the financing for, or the decision to perform, aquatic pesticide applications.

For non-Emergency and non-Time Sensitive projects proposed for purposes of protecting drinking water supplies, water distribution systems, navigation, agricultural irrigation, flood control channels, control of AIS, or for purposes that otherwise serve the public interest, the project proponent must be (1) a state, federal, or public agency (local or regional) with legal authority to manage the affected resources or protect such facilities, or (2) private entity (e.g., a homeowners association, private water utility) that has control over the financing for, of the decision to perform, aquatic pesticide applications. For projects proposed for purposes of AIS control, the project proponent must demonstrate that the decision to apply aquatic pesticides is consistent with an adopted Aquatic Invasive Species Control Management Plan.

Exemption Criteria for Aquatic Pesticide Use

Aquatic pesticide use proposed under the circumstances listed above may be considered for an exemption to the waste discharge prohibition for aquatic pesticides. Project proponents that receive a prohibition exemption must obtain coverage under an applicable permit, such as an individual or general NPDES permit or WDRs, or a waiver of WDRs issued by the State or Regional Water Board. Project proponents that receive a prohibition exemption must apply pesticides consistent with label instructions approved by the United States Environmental Protection Agency (USEPA) under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and any Use Permits issued by the CAC which incorporate permit conditions recommended by the Department of Pesticide Regulation and the California Department of Public Health.

Project implementation, with its associated control measures and compliance monitoring, must demonstrate compliance with Basin Plan Water Quality objectives, effluent limitations, and receiving water limitations, which must be maintained (a) in the receiving water at all times during and after the treatment event, and (b) within the treatment area after completion of the aquatic pesticide treatment event. (Exemptions to the prohibition on violating narrative or numeric water quality objectives may be granted for specific water quality objectives. See Chapter 3 for project-specific water quality objectives or receiving water limitations that apply to fisheries management projects using rotenone.)

An exemption request must be submitted to the Water Board and contain the following information acceptable to the Regional Board. [7]

1. Project Information to include:

    a. Project description including, but not limited to, proposed schedule, duration, name of pesticide, method and rate of application, spatial extent, water body, control/mitigation measures to be used, contact information.

    b. Purpose and need for project.

    c. The chemical composition of the pesticide to be used, including inert ingredients if available from the manufacturer.

    d. Communication and notification plan to be implemented before, during and after the project. The plan will include documented measures to notify potentially affected parties who may use the potentially affected water for any beneficial use. The notification plan must include any associated water use restrictions or precautions. Project proponents will provide potable drinking water where necessary and shall obtain any necessary permits from CDPH and NDEP for supply of potable drinking water.

        For projects conducted in an ONRW (e.g. Lake Tahoe) the following additional requirements apply to project proponents:

        i. Provide via certified mail, or equivalent, notice of the proposed pesticide project to water purveyors whose source water relies on the surface water and/or groundwater wells designated under the direct influence of the surface water.

        ii. Provide to the Regional Board comments written from, and written responses to, the water purveyors notified pursuant to d.i., above.

        iii. An estimate of the maximum foreseeable concentrations of pesticide components in any surface water intake used for drinking water supplies.

        Public notification requirements may be waived where project proponent is an agency signatory to Cooperative Agreement with DPH and evidence is provided of notification exemption.

    e. Spill contingency plan to address proper transport, storage, spill prevention and cleanup.

2. Notice of Intent for coverage under the appropriate State Board or Regional Board permit or a report of waste discharge for pesticides or pesticide use not covered under an existing State Board or Regional Board NPDES General Permit for aquatic pesticide discharges.

3. California Environmental Quality Act (CEQA) Documentation. The lead agency is required to

[7] The Regional Board will consult with the Nevada Division of Environmental Protection (NDEP) when a project affects interstate waters that exist within, or flow to, the State of Nevada. The Regional Board will consult with the California Department of Public Health (CDPH) when reviewing exemption requests that may affect surface drinking water intakes.

conduct the appropriate environmental analysis and the project proponent shall submit the certified environmental document with the exemption request. If the project lead is a federal agency then it must prepare a CEQA equivalent document.

4. Information to comply with section 5.3 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California (State Implementation Plan or SIP). This information is **only** required if the proposed application of aquatic pesticides contains priority pollutants. Projects involving discharges that contain priority pollutants require a short-term or seasonal exception from meeting the priority pollutant criteria/objectives prior to treatment of surface waters with aquatic pesticides. Section 5.3 of the SIP allows the Regional Board, on a case-by-case basis, to consider and grant such short-term or seasonal exceptions.)

5. Information (evidence the project will benefit people of California, a management plan detailing control measures to avoid and mitigate adverse impacts, compliance with use restrictions, etc.) that allows the Regional Board to find that the proposed aquatic pesticide application complies with federal and state antidegradation policies. (This request for information is waived for Vector Control projects and for projects proposed in response to an emergency as defined by Public Resources Code 21060.3. because these project types underwent antidegradation analysis for adoption of the exemption criteria into the Basin Plan.)

6. Information that the project satisfies the additional exemption criteria for the particular circumstance as specified below.

Exemption Criteria for Vector Control

The Regional Board herein grants an exemption to the prohibition on discharge of pesticides to surface or ground waters where the project proponent can verify that the project meets the following criteria, which must be submitted with an exemption request to the Regional Board. The Regional Board finds that Vector Control projects comply with state and federal antidegradation policies, since (1) these projects are implemented in the best interest of people of California for the purposes of the protection of public health, and (2) these projects limit water quality impacts and provide reasonable protection of beneficial uses by satisfying the below-listed exemption criteria nos. 1 and 2.

1. The planned treatment will result in the minimum discharge of chemical substances that can reasonably be expected for an effective treatment.

2. Aquatic pesticide applications must minimize impacts to beneficial uses by implementing BMPs to limit the effects of the pesticide to the shortest time and within the smallest area necessary for project success.

Exemption Criteria for Fisheries Management

Project proponents seeking a prohibition exemption to use aquatic pesticides for “Fisheries Management” must satisfy the criteria listed in Chapter 4, section 4.9 titled Control Measures for Rotenone Use and Other Fish Toxicants” and must submit this information with an exemption request to the Regional Board.

Exemption Criteria for Controlling Aquatic Invasive Species (AIS) and Other Harmful Species

Emergency Projects. The Regional Board herein grants an exemption to the prohibition on discharge of pesticides to surface or ground waters where the project proponent can verify that (1) the project meets the following criterion, which must be submitted with an exemption request, and (2) a Notice of Exemption (NOE) has been filed, as required under CEQA. Coverage under the appropriate permit must be sought by the project proponent within 30 days after the NOE is filed.

For projects implemented by state or local agencies, the agency must demonstrate that the project meets the CEQA Emergency Project definition set forth in Public Resource Code section 21060.3 (same as CEQA Guidelines section 15359); or that the project meets the CEQA definition of Emergency Projects set forth in CEQA Guidelines 15269(a)(b)(c). For these state or local agency projects the state or local agency will file the NOE. If a federal agency, such as USFWS, is the project proponent, the federal agency must provide evidence that the pesticide application meets the CEQA emergency definition. For these federal projects, the Regional Board will file the NOE.

The Regional Board retains authority to require project and post-project monitoring and reporting and retains authority to take enforcement action where appropriate to restore/recover water quality or beneficial uses.

Time Sensitive Projects. In the exemption request, the project proponent must demonstrate to the Regional Board the time sensitive nature of the project by demonstrating the existing or imminent deleterious effects of an infestation and the importance of an expedited action. The Regional Board will respond within ten days. The Regional Board may then grant the prohibition exemption where the project proponent can verify the project meets the following criteria, which must be submitted with the exemption request. (The Regional Board may expedite granting of the exemption and require that compliance with criteria be demonstrated within ten days of the prohibition exemption being granted.)

1. Demonstration that non-chemical measures were evaluated and found inappropriate/ ineffective to achieve the project goals. (Alternatives to pesticide use must be thoroughly evaluated and implemented when feasible (as defined in CEQA Guideline 15364: "Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.)

2. A plan detailing mitigation and management measures must be submitted and implemented. The Plan must incorporate control measures to limit adverse impacts to the shortest time necessary for project success. The Plan should include measures to remove and dispose of dead biomass which are adequate to protect water quality and beneficial uses. (Removal of biomass may not be necessary in situations where recovering the dead biomass creates a greater potential to impact water quality.)

3. The planned treatment protocol will result in the minimum discharge of chemical substances that can reasonably be expected for an effective treatment.

4. Monitoring and reporting program must be submitted and implemented to evaluate impacts and verify restoration of water quality in the treatment area. The program must be sufficient to determine compliance with criterion No. 3.

   The project monitoring program must include pre- and post-project sampling of water, sediment, and biota to determine if toxicity persists as a result of project implementation. At the discretion of the Regional Board, due to the urgency of Time Sensitive projects, the collection and analysis of sediment and biological samples may be waived and/or a reference site may be used to represent pre-project conditions.

   Unless waived by the Regional Board, the project proponent shall develop a biological monitoring program to evaluate (a) the magnitude and extent of potential impacts to, and (b) the post-project recovery of non-target organisms and rare/threatened or endangered species. The biological monitoring program must be based on an appropriate study design, metrics, and performance criteria to evaluate restoration of aquatic life as specified below in criterion no. 7. This requirement may be waived at the discretion of the Regional Board where the Regional Board finds that there is no significant threat to non-target aquatic organisms.

Projects That Are Neither Emergencies Nor Time Sensitive. An exemption to the prohibition on discharge of pesticides to surface or ground waters may be granted by the Regional Board for Projects That Are Neither Emergencies or Time Sensitive where the project proponent can verify that the project meets both the above-listed criteria nos. 1 through 4 and the following additional criteria, which must be submitted with the exemption request.

5. Purpose and Goals statement that (a) demonstrates that the target organism is a primary cause of the problem being addressed, and (b) provides evidence that the proposed application of pesticides will accomplish the project goals.

6. A description of the failure of non-chemical measures to effectively address the target organisms. The description will include either (1) evidence that non-chemical efforts failed to address target organisms or (2) justification, accepted by Regional Board, of why non-chemical measures were not employed or are not feasible (CEQA Guideline 15364) to achieve the treatment goals.

7. A monitoring and reporting program accepted by the Regional Board, will be followed to assess the effects of treatment on surface and ground waters, and on bottom sediments if specified by the Regional Board. The monitoring and reporting program must include, but not be limited to, monitoring sites, analytes, methods, frequencies, schedule, quality assurance, and measurable objectives to determine if the project goals were achieved (e.g., acreage treated, reduction in biomass of

target species, improved water quality). The monitoring plan must identify a dedicated budget and specify the entity/person(s) responsible for the monitoring.

The pre-project biological monitoring program and the monitoring, reporting, and mitigation program[8] for non-target communities shall be peer-reviewed[9] by independent experts. The peer reviewers shall be proposed by project proponent(s) and shall be mutually agreeable to both the project proponent(s) and the Regional Board.

The biological monitoring program must be based on an appropriate study design, metrics, and performance criteria to evaluate restoration of non-target biological life potentially affected by the pesticide application. Monitoring of biota should include appropriate indicators (e.g., macroinvertebrates, aquatic plants). The indices used in the assessment must be commonly accepted by the scientific community and accepted by the Regional Board.

For projects with the goal of removing an invasive species community, project proponent shall consider using a reference site to gauge restoration of the non-target species to desired conditions or establish project goals and objectives. The recovery target will be measured using appropriate indicators (e.g., macroinvertebrates, aquatic plants) that demonstrate restoration of non-target species to levels equal to or better than pre-treatment conditions (a reference site may be used to represent pre-project conditions).

When applicable, biological monitoring shall be designed, and conducted as long as needed, no less than annually, to effectively demonstrate that non-target macroinvertebrate populations have been fully restored. Fully restored means that the structure and function of non-target macroinvertebrate communities have returned to conditions that reflect pre-project conditions. Function will be judged by metrics and indices related to trophic levels (e.g., functional feeding groups) and productivity (e.g., abundance, biomass). Structure will be judged based on metrics and indices related to richness and diversity (e.g., taxa richness, multivariate O/E (observed/expected) model predictions, multivariate ordinations) and presence of sensitive and rare taxa. This definition of "fully restored" shall be provided to the peer reviewers prior to peer review of the monitoring and reporting program, with instructions to determine whether the monitoring design is capable of determining whether full restoration has been achieved.

Within two years of the last treatment for a specific project, a qualified biologist(s) representing the project proponent must assess the restoration of non-target aquatic life and benthic communities within the treated waters, and if, based on the monitoring data, the evidence demonstrates, certify in writing that all affected non-target biological communities have been fully restored. The certification shall be accompanied by a report detailing the pre-project and post-project monitoring, including detailed explanation of the assessment methods used and the rationale for the certification. Macroinvertebrates shall be identified and classified, and data provided in electronic formats using conventions acceptable to the Regional Board.

If non-target biological communities are not fully restored after two years, the project proponent must conduct continued annual monitoring and implement the proposed mitigation measures until the Regional Board accepts the certification.

The Regional Board acknowledges that projects may occur where the non-target communities do not fully recover to pre-project levels. After five years of annual post-project monitoring, the project proponent may petition the Regional Board to release it from annual monitoring and reporting and mitigation obligations. Such petitions must include: (1) results of mitigation efforts, (2) monitoring trends demonstrating maturity of an asymptotic recovery, and (3) evidence that the ability to attain full recovery has been significantly affected by natural environmental factors (e.g., fires, floods, drought) or catastrophic events (e.g., chemical spills) during the years of monitoring. Annual monitoring shall

[8] The mitigation program must examine potential measures to facilitate the restoration of non-target species to pre-project abundance and diversity. The mitigation program must include a discussion of mitigation measures included and those that were considered but rejected. The project proponent must justify why these measures were rejected as feasible mitigation measures. The requirement to implement mitigation measures may be waived during post-project recovery at the discretion of the Regional Board.

[9] The Regional Board can exempt project proponents from the requirement of preparing an externally peer reviewed monitoring and reporting, and mitigation program (e.g., project applicant proposes the use of standardized peer reviewed monitoring protocols).

continue unless and until the Regional Board rescinds the monitoring requirements.

Exemption Criteria for Restoration Projects

The Regional Board encourages restoration projects that are intended to reduce or mitigate existing sources of soil erosion, water pollution, or impairment of beneficial uses. For waste earthen materials discharged as a result of restoration projects, exemptions to the above prohibitions, and all other prohibitions contained in this Basin Plan, may be granted by the Regional Board's Executive Officer whenever a specific project meets all of the following criteria:

1. The project will eliminate, reduce or mitigate existing sources of soil erosion, water pollution, and/or impairment of beneficial uses of water, *and*

2. There is no feasible alternative to the project that would comply with the Basin Plan prohibitions, *and*

3. All applicable and practicable control and mitigation measures have been incorporated into the project to minimize land disturbance, soil erosion, discharges of turbid water, and other potential adverse impacts to water quality and beneficial uses to the minimum necessary to complete the project.

TABLE 4.1-1. LOW THREAT DISCHARGES THAT ARE CONDITIONALLY EXEMPT FROM WASTE DISCHARGE PROHIBITIONS

The exempt waste discharges must meet general conditions in Basin Plan section on Limited Threat Discharges, enumerated below, in addition to meeting the applicable specific conditions for discharge categories.

General Conditions for Exemption:

1. For proposed discharges to surface water, the applicant must provide information supporting why discharge to land is not practicable.
2. The discharge must not adversely affect the beneficial uses of the receiving water.
3. The discharge must comply with all applicable water quality objectives.
4. Best practicable treatment or control of the discharge must be implemented to ensure that pollution or nuisance will not occur.

Specific Conditions for Exemption:

Discharge Category	Conditions for Exemption
Atmospheric condensate from refrigeration and air conditioning systems	Must not contain chemicals or materials that would adversely affect water quality.
Groundwater from foundation drains, crawl-space pumps, and footing drains	Must not contain chemicals or materials that would adversely affect water quality.
Water main, storage tank, fire hydrant flushing	Water discharged must consist of potable water. Must use best management practices to reduce soil erosion from discharged water to a level of insignificance.
Incidental runoff from landscape irrigation	Must not contain fertilizers or pesticides. For recycled water used for irrigation, must discharge to land.
Non-contact cooling water	Must not contain biocides, anti-scalants or other additives.
Aquifer or pump testing water	Must not be in an area of known groundwater contamination. If discharged to surface water, the quality of the discharge must be substantially similar to the quality of the receiving water.
Construction dewatering	Must not be in an area of known soil or groundwater contamination where that contamination could adversely affect the discharge and/or the receiving water.
Utility vault and conduit flushing and draining	Must not contain chemicals or materials that would adversely affect water quality.
Hydrostatic testing, maintenance, repair and disinfection of potable water supply pipelines	Water discharged must consist of potable water. Must use best management practices to reduce soil erosion from discharged water to an insignificant level.

TABLE 4.1-1. LOW THREAT DISCHARGES THAT ARE CONDITIONALLY EXEMPT FROM WASTE DISCHARGE PROHIBITIONS

Specific Conditions for Exemption (continued):

Discharge Category	Conditions for Exemption
Hydrostatic testing of newly constructed pipelines, tanks, reservoirs, etc., used for purposes other than potable water supply (e.g., gas, oil, reclaimed water, etc.)	Potable water must be used in the hydrostatic test. Must not contain chemicals or materials that would adversely affect water quality. Must use best management practices to reduce soil erosion from discharged water to an insignificant level.
Disposal of treated groundwater	Treatment must remove contaminants of concern to non-detectable levels.
Pier pilings (driven), **except** for piers in Lake Tahoe in significant fish spawning habitat or in areas immediately offshore of stream inlets	Piles must be driven. Where the lakebed contains clayey or silty substrate, caissons, turbidity curtains, or other best management practices must be used to limit generated turbidity to smallest area practicable.
Buoys and aids to navigation	Must not contain chemicals or materials that would adversely affect water quality.
Scientific instrumentation for water quality or resources study	Must meet the general conditions for exemption.

Considerations for Water Recycling Projects

The State Board adopted a Recycled Water Policy (Res. No. 2009-0011, amended by Res. No. 2013-0003) that indicates the State and Regional Boards will exercise their authorities to the fullest extent to encourage the use of recycled water, consistent with state and federal water quality laws. The Regional Board encourages the reuse of treated domestic wastewater, and desires to facilitate its reuse (see Section 4.4 of this Chapter). The need to develop and use recycled water is one factor the Regional Board will evaluate when considering exemption requests to waste discharge prohibitions. Other considerations, including potential impacts of nutrients in recycled water on aquatic life and the assimilative capacity of groundwater basins for salts and nutrients, will also apply.

Unit/Area-Specific Prohibitions

Figures depicting specific prohibition areas are located at the end of this Section. Figure 4.1-1 provides an overview of the Lahontan Region with the approximate location of all prohibition areas. Area- specific prohibitions are grouped by watersheds, which are discussed in a north to south order.

Susanville Hydrologic Unit

(Figure 4.1-2)

1. The discharge of waste within the following described area (referred to as the Cady Springs Prohibition Area) from leaching or percolation systems installed after August 17, 1995 is prohibited: The Cady Springs Prohibition Area is defined as follows and is shown for information in Fig. 4.1-2:

   U.S.G.S. Map (7.5 Minute Series), Susanville Quadrangle:

   T.30.N. and R.11.E., Including:

   Sections 1 through 18, 20 through 28, and portions of Sections 19, 29, 33, 34, 35, and 36. The boundary defining the portions of Sections 19, 29, 33, and 34 is based on the surface water divide between Piute Creek and Susan River drainages and the fault trace F1 as described in the Cady Springs Water Quality Phase I Report (DWR 1993); the portions of those Sections within the Piute Creek drainage and north of the fault are included in the prohibition area. Areas north of the Susan River in Section 36 are included in the prohibition area. **Excluding:** Sections 30, 31 and 32.

   T.29.N. and R.11.E., Including:

   Areas north of the Susan River in Sections 2 and 3. **Excluding:** Section 1, and Sections 4 through 36.

Projects that satisfy the following criteria shall be exempt from the above-stated prohibition:

a. The discharge is composed of domestic wastewater only; *and*

b. The proposed disposal system satisfies the Regional Board's criteria for individual waste disposal systems (minimum distances, percolation rates, soil characteristics, depth to ground water, ground slope, expansion area), as prescribed in Section 4.4 of this Chapter; *and*

c. One of the following:

   i. The proposed project is residential, inside an “Existing Land Development,” the net lot area is 15,000 square feet or more, and the wastewater discharge will not exceed one equivalent dwelling unit (EDU) per net lot area per day. This criterion is based on existing septic density requirements, as prescribed in Chapter 4.4 of this Water Quality Plan. The net lot area is that contained inside the boundaries set forth in the legal lot description; or

   ii. The proposed project is non-residential or of mixed occupancy, inside an “Existing Land Development,” the net lot area is 15,000 square feet or more, and the wastewater discharge does not exceed one EDU per net lot area per day, as determined using the estimated waste/sewage flow rates in the Uniform Plumbing Code.

For proposed projects in “Existing Land Development” that do not satisfy the above-stated exemption criteria, an exemption to the prohibition may nonetheless be granted by the Regional Board's Executive Officer after submittal by the proposed discharger of a Report of Waste Discharge that includes geologic and hydrologic evidence and an acceptable engineering design that sufficiently demonstrate that the use of the proposed leaching system will not, of itself or in conjunction with the use of other systems in the area, result in a pollution or nuisance, or other adverse effects to water quality or beneficial uses. (Guidance for preparing a Report of Waste Discharge may be obtained by contacting the office of the Regional Board.)

For purposes of the above-stated exemption criteria, “Existing Land Development” is defined as subdivisions or individual parcels that have legal lot descriptions approved by local agencies prior to April 21, 1995.

The Regional Board will not issue discharge permits for proposed leaching or percolation systems on “new lots” inside the prohibition area. For purposes of this prohibition, “new lots” are defined as lots created for development after April 21, 1995 by means of parcel splits and/or land divisions. An exemption may be granted by the Regional Board for projects on “new lots,” provided the project is necessary for public health and safety, or other necessary public services that, by their inherent nature, must be located in close geographic proximity to the served public. Examples of such public services would be schools and post offices. To obtain an exemption, the proposed discharger must submit a Report of Waste Discharge that includes geologic and hydrologic evidence and an acceptable engineering design demonstrating that the use of the proposed leaching system will not, of itself or in conjunction with the use of other systems in the area, result in a pollution or nuisance, or other adverse effects to water quality or beneficial uses.

Eagle Drainage Hydrologic Area

(Figure 4.1-3)

1. New discharge of waste within the Spalding Tract and Stones-Bengard subdivisions is prohibited after March 30, 1987. For the purposes of this prohibition, new discharge of waste is the installation of new septic systems, or expansion of existing septic systems.

2. The discharge of waste containing nutrients from the Spalding Tract or Stones-Bengard subdivisions to any surface waters or ground waters in the Eagle Drainage Hydrologic Area is prohibited after September 14, 1989.

3. The discharge of waste from septic systems within the Eagle's Nest Tract for more than a single five-consecutive-month period each calendar year is prohibited.

4. The discharge of phosphates to onsite wastewater treatment (septic) systems is prohibited in Eagle's Nest Tract.

5. The maximum development density for new development that discharges wastes to subsurface disposal systems shall be one single family dwelling equivalent per 20 acres. For non-residential development, and/or where pre-discharge nutrient removal is provided, single family dwelling equivalence shall be based on mean total nitrogen discharge or mean total phosphorus discharge to the subsurface disposal system(s), whichever is more restrictive. Approval by the Regional Board's Executive Officer is required for each system prior to discharge from the system. Before granting such approval, the Executive Officer must find (based on evidence presented by the proposed discharger) that soils have good phosphorus removal capability, and that the system will comply with all other applicable criteria contained in this Plan.

   For purposes of the above prohibition, “new development” is defined as any subdivision of land in any area other than the existing Spalding Tract, Stones-Bengard and Eagle's Nest Tract subdivisions.

6. The discharge of wastes containing nutrients from wastewater treatment facilities on lands administered by the U.S. Forest Service, Lassen National Forest, to surface waters or ground waters in the Eagle Drainage Hydrologic Area is prohibited.

7. The discharge of wastes containing nutrients from the Bald Hills Campground to surface waters or ground waters in the Eagle Drainage Hydrologic Area is prohibited.

8. The discharge of wastes containing nutrients from any new recreational facility or use area to surface waters or ground waters in the Eagle Drainage Hydrologic Area is prohibited. For purposes of this prohibition any new or increased discharge of waste from any recreational facility or use area other than that discharged as of July 15, 1985 is prohibited unless the nutrient discharge equivalent is less than or equal to one single family dwelling per 20 acres.

9. The discharge of wastes containing nutrients from any subsurface disposal system on a lotwith an elevation of less than 5130 feet is prohibited.

Truckee River and Little Truckee River Hydrologic Units

(Figures 4.1-4 through 4.1-6)

1. The discharge, attributable to human activities, of any waste or deleterious material to surface waters of the Truckee River HU or Little Truckee River HU is prohibited.

   The Regional Board may grant an exemption to this prohibition when the Regional Board finds that all of the following criteria are met:

   a. The discharge of waste will not, individually or collectively, directly or indirectly, adversely affect beneficial uses, *and*

   b. There is no reasonable alternative to the waste discharge, *and*

   c. All applicable and practicable control and mitigation measures have been incorporated to minimize potential adverse impacts to water quality and beneficial uses.

2. The discharge or threatened discharge, attributable to human activities, of waste to lands within the 100-year floodplain of the Truckee River, Little Truckee River, and their tributaries is prohibited.

   a. The Regional Board may grant exemptions to this prohibition for the repair, replacement, or relocation of existing structures, provided that the repair, replacement or relocation does not reduce or adversely affect the existing floodplain function[10]. Prior to granting any such exemption, the Regional Board shall require demonstration by the proposed discharger that all applicable and practicable control and mitigation measures have been incorporated into the project such that potential adverse impacts to water quality and beneficial uses are the minimum necessary to complete the project.

   b. The Regional Board may grant exemptions to this prohibition for the discharge from existing and replacement onsite wastewater treatment systems, such as septic systems, within the 100-year floodplain when the Regional Board finds all of the following:

      (1) the discharge will not adversely affect the beneficial uses of surface or ground waters, *and*

      (2) the system is properly functioning or is being replaced with a properly functioning system, *and*

      (3) the system is in compliance with septic system requirements in this Basin Plan, the State Water Board's Onsite Wastewater Treatment System Policy, or an approved Local Agency Management Program.

   c. The Regional Board may grant exemptions to this prohibition for the

[10] Floodplain function includes the conveyance of floodwaters along with other hydrologic, geomorphic, biological and ecological processes such as groundwater recharge, floodwater filtration, sediment transport, spawning gravel replenishment, seed dispersal, and riparian vegetation maintenance.

following categories of new projects within the 100-year floodplain[11]:

(1) Projects intended to reduce or mitigate existing sources of erosion or water pollution, or to restore or improve the floodplain function.

(2) Projects and activities essential for transportation, including stream crossings, 100-year floodplain crossings and associated facilities such as bridge abutments and approaches, installation and maintenance of storm drains and storm water treatment facilities, and road and highway maintenance activities. This category includes stream crossings in approved state or federal timber harvest plans or when consistent with State or Regional Board regulation, and discharge of gravel, rock, or other suitable material for stream crossings on un-surfaced roads for erosion control.

Projects and activities necessary to protect public health or safety or to provide essential public services, including, but not limited to, utilities such as water and sewer lines, forest management activities to reduce the risk and severity of wildfires, and projects needed to protect the health and safety of occupants of existing structures.

(3) Private piers or projects necessary for public recreation, including providing access to water-dependent recreational opportunities, such as installation of public boat ramps.

(4) Projects for monitoring or scientific research related to natural resources and environmental quality. This category includes equipment or structure installation for basic data collection, research, experimental management and resource evaluation activities that do not result in a significant adverse effect on water quality or beneficial uses.

An exemption to prohibition 2, above, may be allowed for a specific new project only when the Regional Board makes all of the following findings:

i. The project is included in one or more of the categories listed above.

ii. There is no reasonable alternative that avoids or reduces the extent of encroachment by the project within the 100-year floodplain.

iii. For private pier and public recreation projects, the project, by its very nature, must be located within the 100-year floodplain. (This finding is not required for those portions of outdoor public recreation projects to be located in areas that were substantially altered by grading and/or filling activities before June 26, 1975.) The determination of whether a project, by its very nature, must be located in a 100-year floodplain shall be based on the kind of project proposed, not the particular site proposed. Exemptions for projects such as recreational facility parking lots and visitor centers, which by their very nature do not have to be located in a 100-year floodplain, will not be allowed in areas that were not substantially altered by grading and/or filling prior to June 26, 1975.

iv. All applicable and practicable control and mitigation measures have been incorporated such that potential adverse impacts to water quality are the minimum necessary to complete the project and beneficial uses are protected.

v. The project will not reduce or adversely affect the existing floodplain function. This shall be ensured by restoration of previously disturbed areas within the 100-year floodplain within the project site, or by improvement of floodplain function within or

[11] The use of the term "project" within the exemption criteria applies to an element or elements of an overall project where that element or those elements are within the 100-year floodplain. Exemption criteria are to be assessed for those project elements within the 100-year floodplain.

as close as practical to the project site. The restored or improved 100-year floodplain function must more than offset the floodplain function lost by construction of the project. This finding will not be required for: (1) essential public health or safety projects, (2) projects to provide essential public services that the Regional Board finds such mitigation measures to be infeasible because the financial resources of the entity proposing the project are severely limited, or (3) monitoring or scientific research projects where the Board finds the floodplain function will not be significantly reduced.

3. Discharge in the Truckee River and Little Truckee Hydrologic Units of wastewater or wastewater effluent resulting in an average total nitrogen concentration in the (undiluted) wastewater exceeding 9 mg-N/liter entering the Truckee River or any of its tributaries above the Boca Reservoir outlet confluence is prohibited (Figure 4.1-6).

4. Discharge in the Truckee River and Little Truckee River Hydrologic Units of domestic wastewater to individual facilities such as septic tank-leachfield systems is prohibited for any subdivisions (as defined by the Subdivision Map Act, Government Code 66424) that did not discharge prior to October 16, 1980. This prohibition shall apply to all areas where underlying ground waters are tributary to the Truckee River or any of its tributaries above the confluence of the Boca Reservoir outlet and the Truckee River (Figure 4.1-6).

   An exemption to this prohibition may be granted whenever the Regional Board finds (based on geologic and hydrologic evidence presented by the proposed discharger) that operation of individual domestic wastewater facilities in a particular area will not unreasonably affect water quality or beneficial uses.

   Exclusion of certain existing septic tank subdivisions from the site-specific waste discharge prohibitions above is not a mandate for build-out of all such subdivisions, and it is assumed that a large portion of existing lots currently approved for septic tank systems will eventually be sewered to the Tahoe-Truckee Sanitation Agency (TTSA).

5. Once sewer lines are installed in a subdivision or area, within the Little Truckee River or Truckee River Hydrologic Units, the discharge of wastes or wastewater to individual systems (such as septic tank-leachfield systems) from all new dwellings constructed or installed within 200 feet of the sewer line is prohibited.

6. Continued onsite discharge of septic tank effluent from structures within 200 feet of any existing sewer line connecting to TTSA, including the Truckee River Interceptor, where a septic tank-leachfield system is found to function improperly at any time, and/or where septic tank-leachfield construction is found to be in violation of the minimum criteria listed in this Plan, is prohibited.

   An exemption to this prohibition may be granted whenever the Regional Board finds (based on geologic and hydrologic evidence presented by the proposed discharger) all of the following:

   (1) that operation of individual domestic wastewater facilities in such an area will not adversely affect beneficial uses,

   (2) that connecting to the sewer system would have a damaging effect on the environment, and

   (3) that, if the onsite wastewater treatment system is not functioning properly, the system is repaired or replaced such that it will function properly.

Lake Tahoe Hydrologic Unit

This Basin Plan contains a separate chapter (Chapter 5) concerning Lake Tahoe and its watershed. Waste discharge prohibitions and applicable prohibition exemptions in effect for the Lake Tahoe HU are included in that chapter. Regionwide waste discharge prohibitions (and applicable prohibition exemptions) also apply in the Lake Tahoe HU in addition to the Lake Tahoe-specific prohibitions.

Carson River Hydrologic Units

(Figure 4.1-7)

1. The discharge, attributable to human

activities, of any waste or deleterious material to surface waters of the East Fork Carson River HU or West Fork Carson River HU is prohibited.

The Regional Board may grant an exemption to this prohibition when the Regional Board finds that all of the following criteria are met:

a. The discharge of waste will not, individually or collectively, directly or indirectly, adversely affect beneficial uses, *and*

b. There is no reasonable alternative to the waste discharge, *and*

c. All applicable and practicable control and mitigation measures have been incorporated to minimize potential adverse impacts to water quality and beneficial uses.

Walker River Hydrologic Units

(Figure 4.1-8)

1. The discharge, attributable to human activities, of any waste or deleterious material to surface waters of the East Walker River HU or West Walker HU is prohibited.

   The Regional Board may grant an exemption to this prohibition when the Regional Board finds that all of the following criteria are met:

   a. The discharge of waste will not, individually or collectively, directly or indirectly, adversely affect beneficial uses, and

   b. There is no reasonable alternative to the waste discharge, and

   c. All applicable and practicable control and mitigation measures have been incorporated to minimize potential adverse impacts to water quality and beneficial uses.

Mono and Owens Hydrologic Units

(Figures 4.1-9 through 4.1-13)

1. The discharge of waste to surface water, including sewage or sewage effluent, is prohibited in the following locations:

   (a) Mill Creek and Lee Vining Creek watersheds (Figure 4.1-9).

   (b) Rush Creek watershed above the outlet from Grant Lake (Figure 4.1-9).

   (c) The Owens River and its tributaries upstream of Crowley Lake above elevation 7,200 feet (Figure 4.1-10).

   (d) The Owens River and its tributaries downstream of Crowley Lake above elevation 5,000 feet (Figure 4.1-11).

   An exemption to this prohibition may be granted whenever the Regional Board finds (based on geologic and hydrologic evidence presented by the proposed discharger) that the discharge of waste to surface waters will not, individually or collectively, directly or indirectly, adversely affect water quality or beneficial uses.

2. The discharge of waste from existing leaching or percolation systems is prohibited in the following areas:

   (a) Rush Creek watershed above the outlet of Grant Lake (Figure 4.1-9).

   (b) Mammoth Creek watershed above elevation 7,650 feet, including the drainage area of the community of Mammoth Lakes (Figure 4.1-12).

   An exemption to this prohibition may be granted whenever the Regional Board's Executive Officer finds (based on geologic and hydrologic evidence presented by the proposed discharger) that the continued operation of septic tanks, cesspools, or other means of waste disposal in a specific area will not, individually or collectively, directly or indirectly, adversely affect water quality or beneficial uses, and that the sewering of such area would have a damaging effect upon the environment.

3. The discharge of waste is prohibited within the following portions of Inyo County Service Area No. 1:

   (a) Assessment District No. 1 (Fig. 4.1-13).

   (b) Assessment District No. 2 (Fig. 4.1-14).

   (c) City of Bishop (Fig. 4.1-13).

An exemption to this prohibition may be granted whenever the Regional Board's Executive Officer finds (based on geologic and hydrologic evidence presented by the proposed discharger) that the continued operation of septic tanks, cesspools, or other means of waste disposal in a specific area will not, individually or collectively, directly or indirectly, adversely affect water quality or the water for beneficial uses, and that the sewering of such area would have a damaging effect upon the environment.

An exemption to this prohibition may be granted whenever the Regional Board finds that a solid waste disposal site operated in accordance with an approved solid waste disposal plan will not, directly or indirectly, adversely affect water quality or beneficial uses.

4. The discharge of waste from new leaching and percolation systems is prohibited in the following areas (for this prohibition, new systems are any installed after May 15, 1975):

   (a) Rush Creek watershed above the outlet from Grant Lake (Figure 4.1-9).

   (b) The following portions of Inyo County Service Area No. 1:

      (1) Assessment District No. 1 (Figure 4.1-13).

      (2) Assessment District No. 2 (Figure 4.1-14).

      (3) Rocking K Subdivision (Fig. 4.1-13)

      (4) City of Bishop (Fig. 4.1-13).

   (c) Mammoth Creek watershed, including the drainage area of the community of Mammoth Lakes, and the Sherwin Creek watershed upstream of the confluence of Sherwin and Mammoth Creeks (Figure 4.1-12).

   An exemption to this prohibition may be granted whenever the Regional Board's Executive Officer finds (based on geologic and hydrologic evidence presented by the proposed discharger) that leaching system disposal will not, directly or indirectly, individually or collectively, result in a pollution or nuisance, or other adverse effects to water quality or beneficial uses.

5. The discharge of waste within the following described area from new or existing leaching or percolation systems is prohibited (for this prohibition, new systems are any installed after May 15, 1975):

   The area commonly known as the Hilton Creek/Crowley Lake communities included within the W/2, SW/4, Section 25, E/2, SE/4 and the SW/4, SE/4 and the S/2, SW/4 of Section 26, N/2, NE/4, NE/4, Section 34, N/2, NW/4 and the N/2, SE/4, NW/4 and the W/2, NE/4, Section 35, T4S, R29E, MDB&M (Figure 4.1-15).

   An exemption to the prohibition against discharge of waste from new septic/leaching systems may be granted by the Regional Board's Executive Officer after presentation by the proposed discharger of geologic and hydrologic evidence and an acceptable engineering design which sufficiently demonstrate that the use of the proposed leaching system will not, of itself or in conjunction with the use of other systems in the area, result in a pollution or nuisance, or other adverse effects to water quality or beneficial uses.

   An exemption to the prohibition against discharge of waste from existing septic/leaching systems may be granted by the Regional Board's Executive Officer after presentation by the discharger of geologic and hydrologic evidence that the continued use of an existing leaching disposal system will not, individually or collectively, result in a pollution or nuisance, or other adverse effects to water quality or beneficial uses.

Antelope Hydrologic Unit

(Figure 4.1-16)

1. The discharge of waste to surface water is prohibited above elevation 3,500 feet.

   An exemption to this prohibition may be granted whenever the Regional Board finds that the discharge of waste to surface waters will not, individually or collectively, directly or indirectly, adversely affect water quality or beneficial uses.

Mojave Hydrologic Unit

(Figure 4.1-17 and 4.1-18)

1. The discharge of waste to surface water in the Mojave Hydrologic Unit that is tributary to the West Fork Mojave River or Deep Creek, above elevation 3,200 feet (approximate elevation of Mojave Forks Dam), is prohibited. This prohibition does not apply to stormwater discharges unless such discharges create a condition of pollution or nuisance. (Figure 4.1-17)

   An exemption to this prohibition may be granted by the Regional Board whenever the Regional Board finds that the discharge of waste will not, individually or collectively, directly or indirectly, result in exceeding the water quality objectives or unreasonably affect the water for its beneficial uses.

2. The discharge of waste to land or water within the following areas is prohibited (Figure 4.1-17):

   (a) The Silverwood Lake watershed.

   (b) The Deep Creek watershed above elevation 3,200 feet.

   (c) The Grass Valley Creek watershed above elevation 3,200 feet.

   This prohibition does not apply to stormwater discharges unless such discharges create a condition of pollution or nuisance.

   An exemption to this prohibition may be granted by the Regional Board whenever the Regional Board finds that the discharge of waste will not, individually or collectively, directly or indirectly, result in exceeding the water quality objectives or unreasonably affect the water for its beneficial uses.

3. The discharge of waste from new leaching or percolation systems is prohibited in the following areas (Figure 4.1-17):

   (a) The Silverwood Lake watershed.

   (b) Deep Creek and Grass Valley Creek watersheds above elevation 3,200 feet.

   For this prohibition, “new” systems are any installed after May 15, 1975.

   An exemption to this prohibition may be granted whenever the Regional Board's Executive Officer finds that the operation of septic tanks, cesspools, or other means of waste disposal in a particular area will not, individually or collectively, directly or indirectly, adversely affect water quality or beneficial uses, and that the sewering of such area would have a damaging effect upon the environment.

4. The discharge of wastes of sewage-bearing origin to surface waters in the Mojave Hydrologic Unit upstream of the Lower Narrows at Victorville is prohibited. (Figure 4.1-18)

   An exemption to this prohibition may be granted by the Regional Board whenever the Regional Board finds that the discharge of waste will not, individually or collectively, directly or indirectly, result in exceeding the water quality objectives or unreasonably affect the water for its beneficial uses.

Figure 4.1-1
LAHONTAN BASIN PROHIBITION AREAS

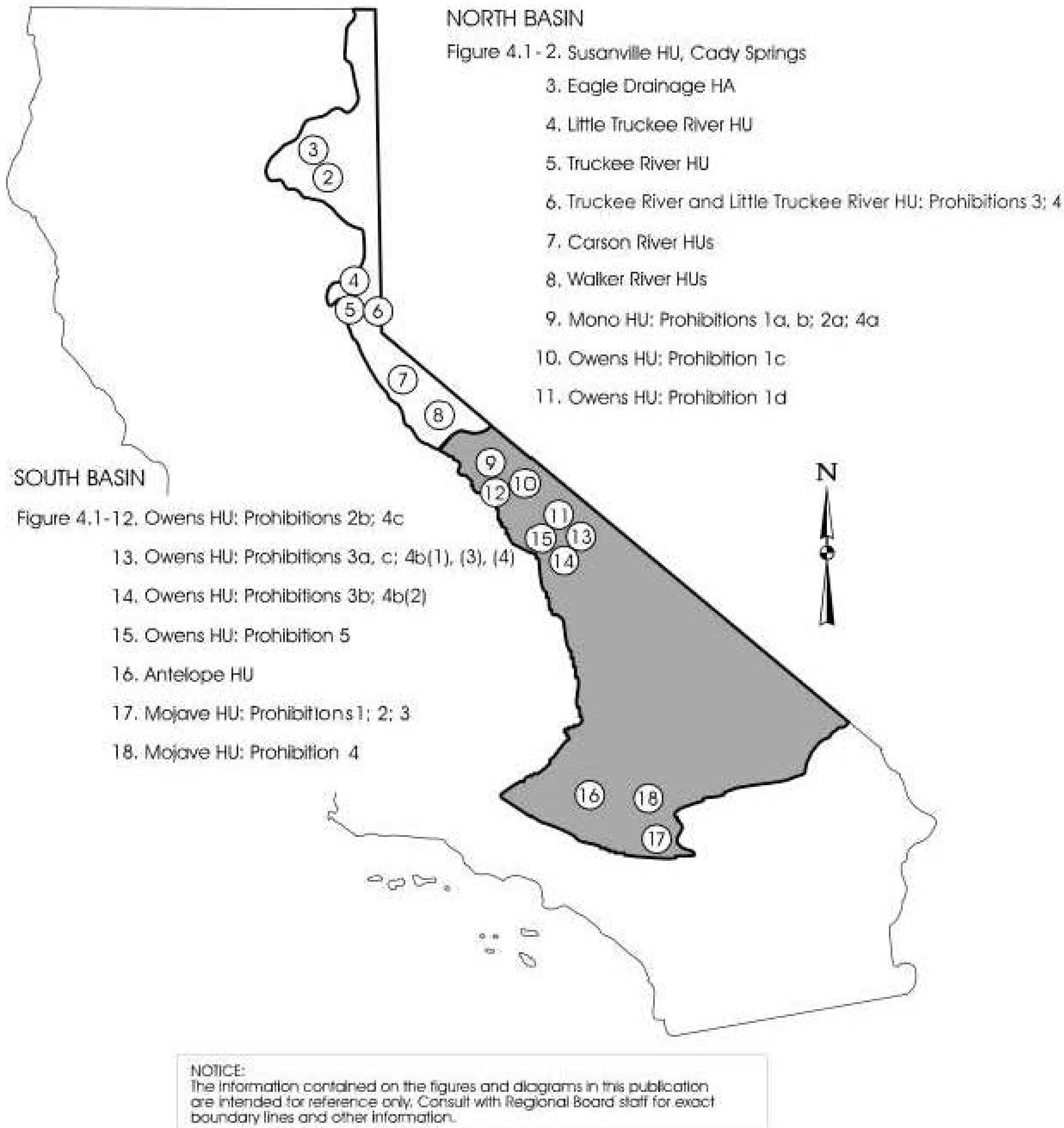


Figure 4.1-2
SUSANVILLE HYDROLOGIC UNIT
CADY SPRINGS

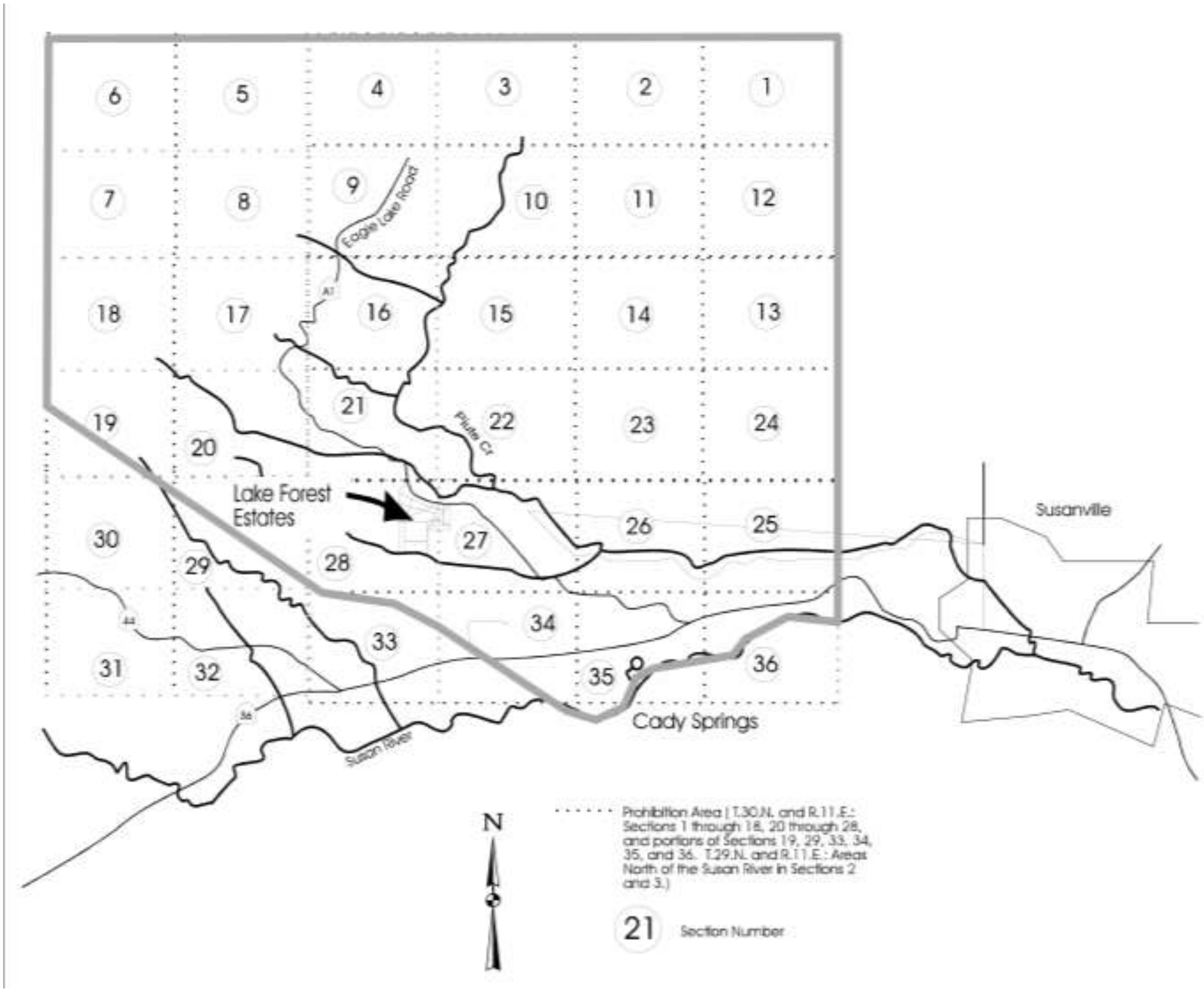


Figure 4.1-3
EAGLE DRAINAGE HYDROLOGIC AREA

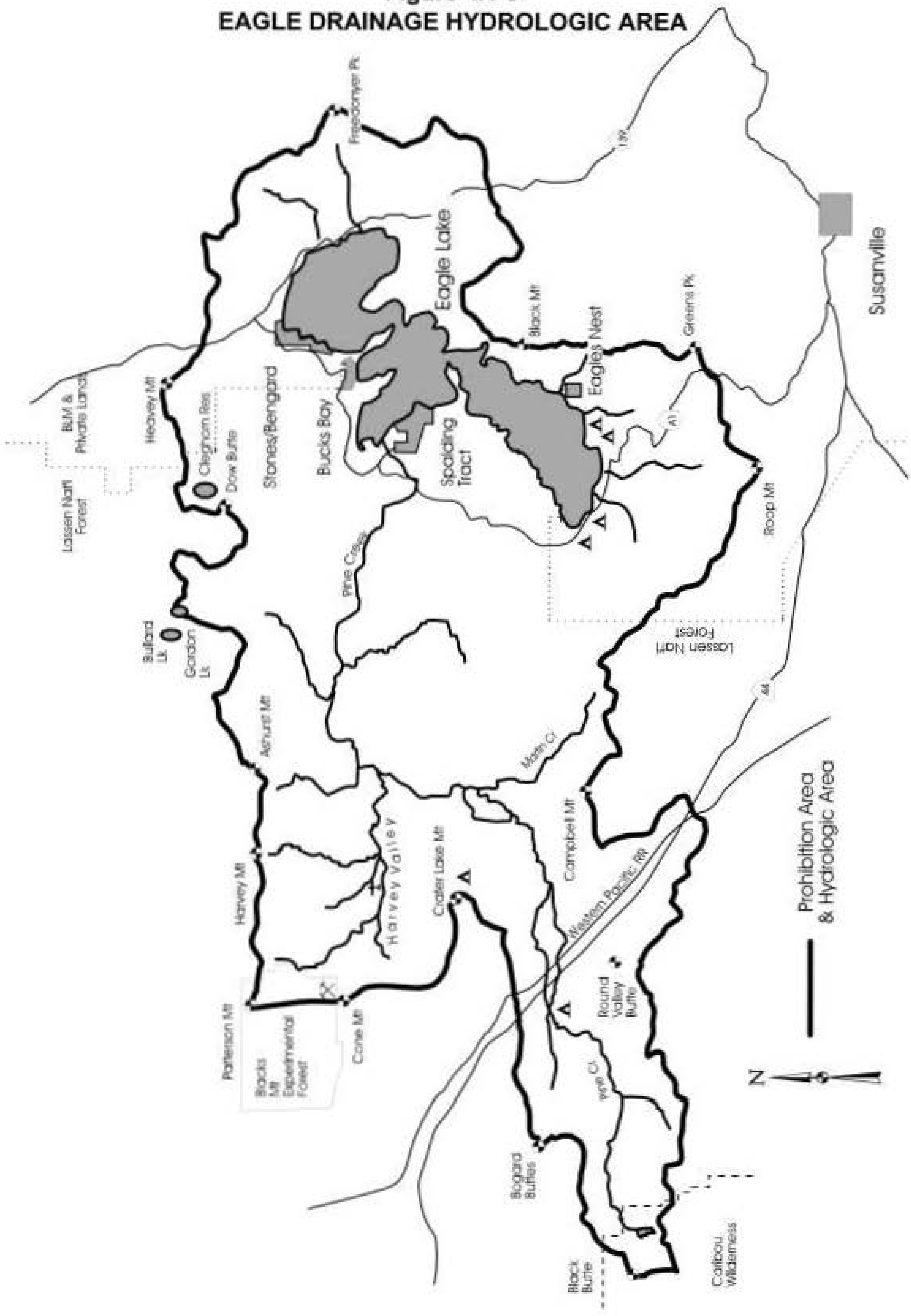


Figure 4.1-4
LITTLE TRUCKEE RIVER HYDROLOGIC UNIT

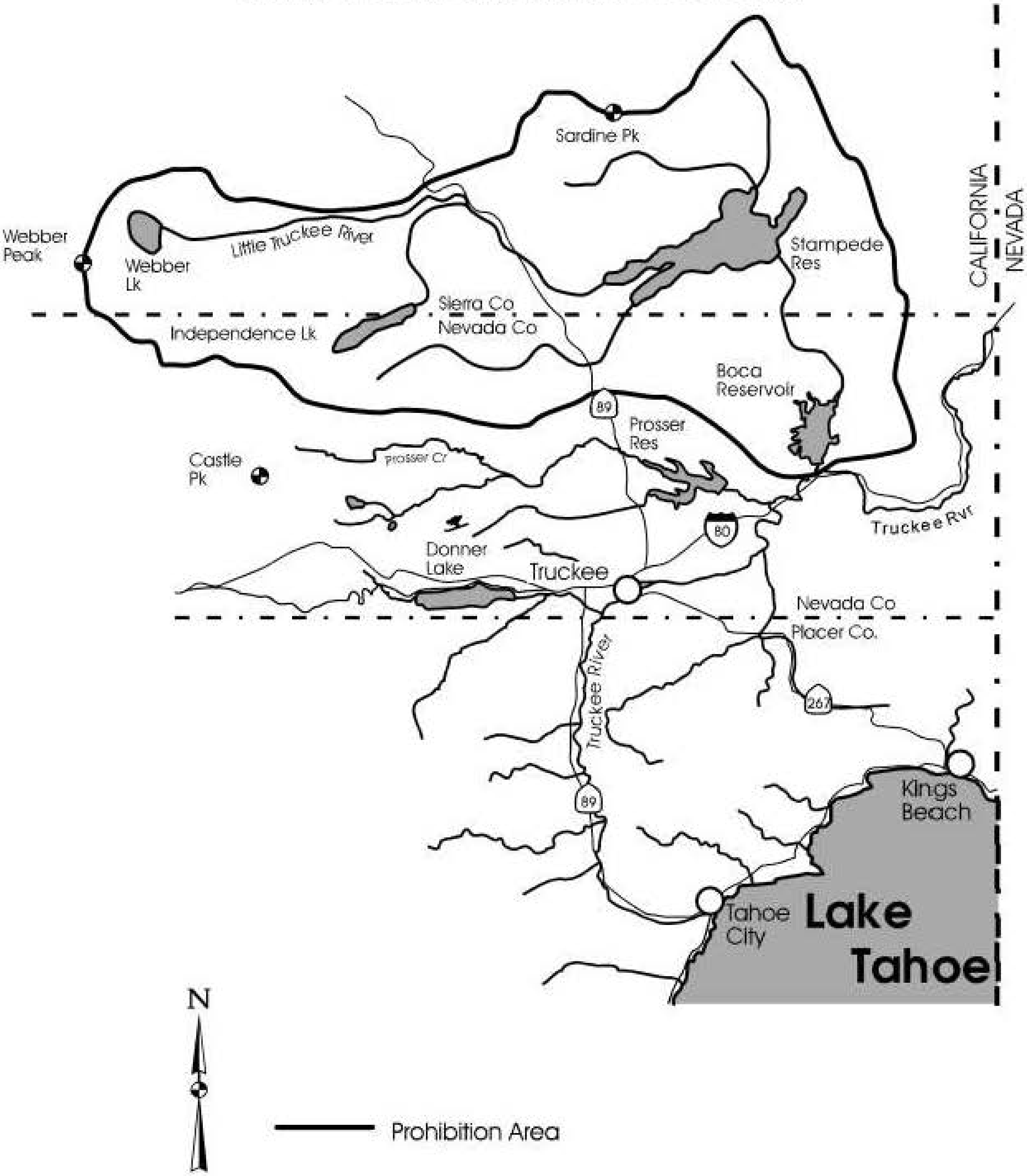


Figure 4.1-5
TRUCKEE RIVER HYDROLOGIC UNIT

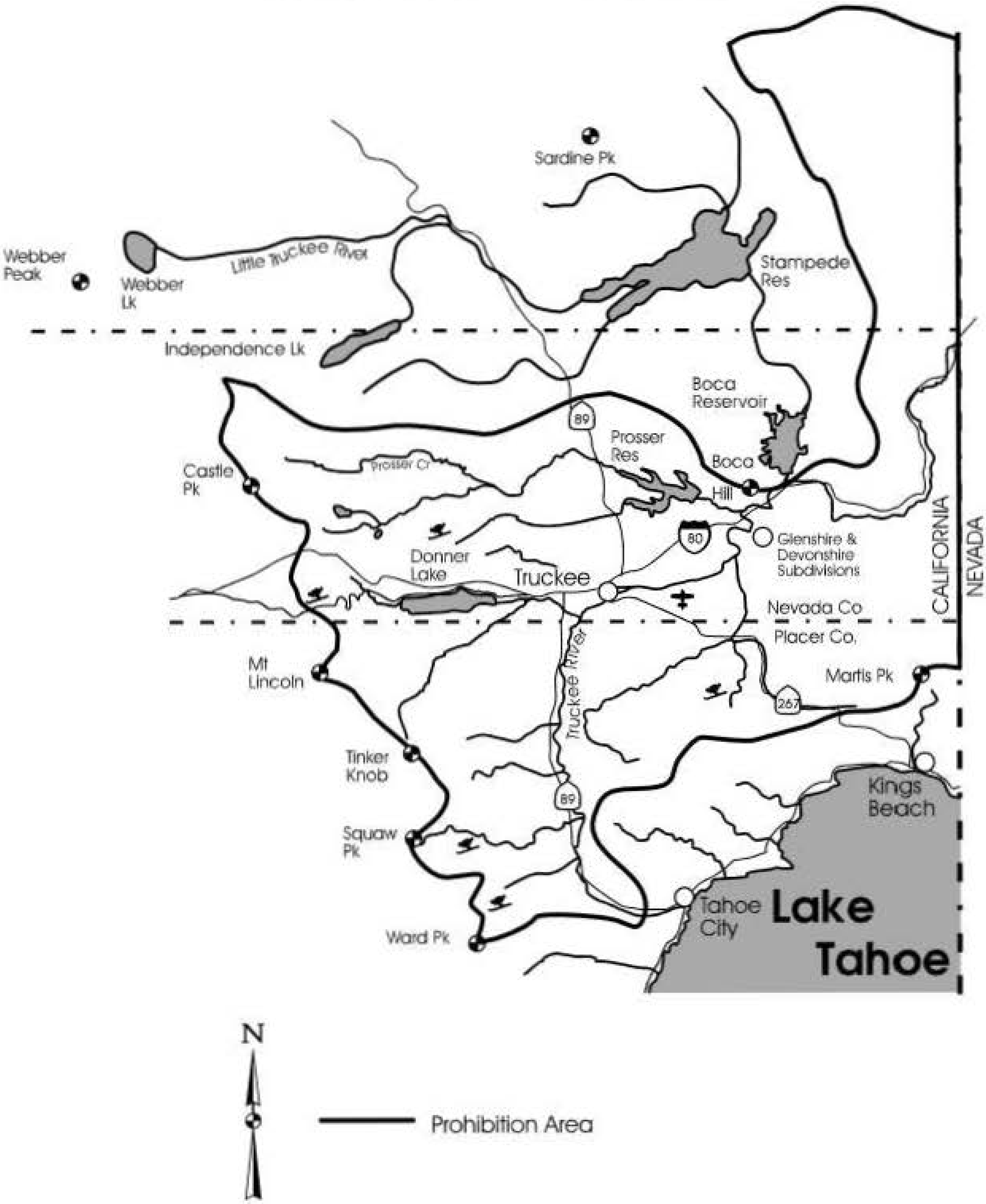


Figure 4.1-6
TRUCKEE RIVER AND LITTLE TRUCKEE RIVER HYDROLOGIC UNITS UPSTREAM OF CONFLUENCE
Prohibitions 3 and 4

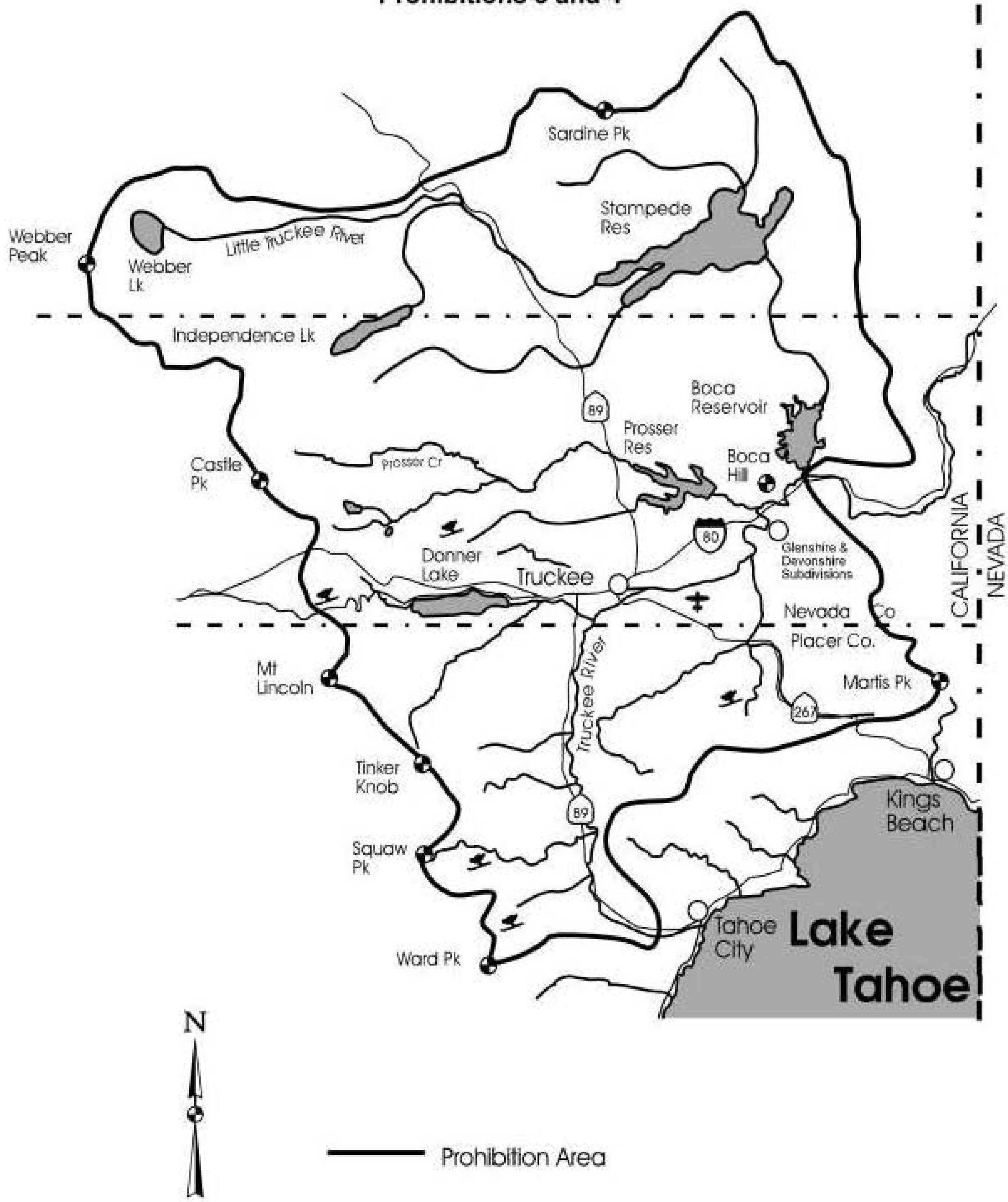


Figure 4.1-7
CARSON RIVER HYDROLOGIC UNITS
EAST & WEST FORKS

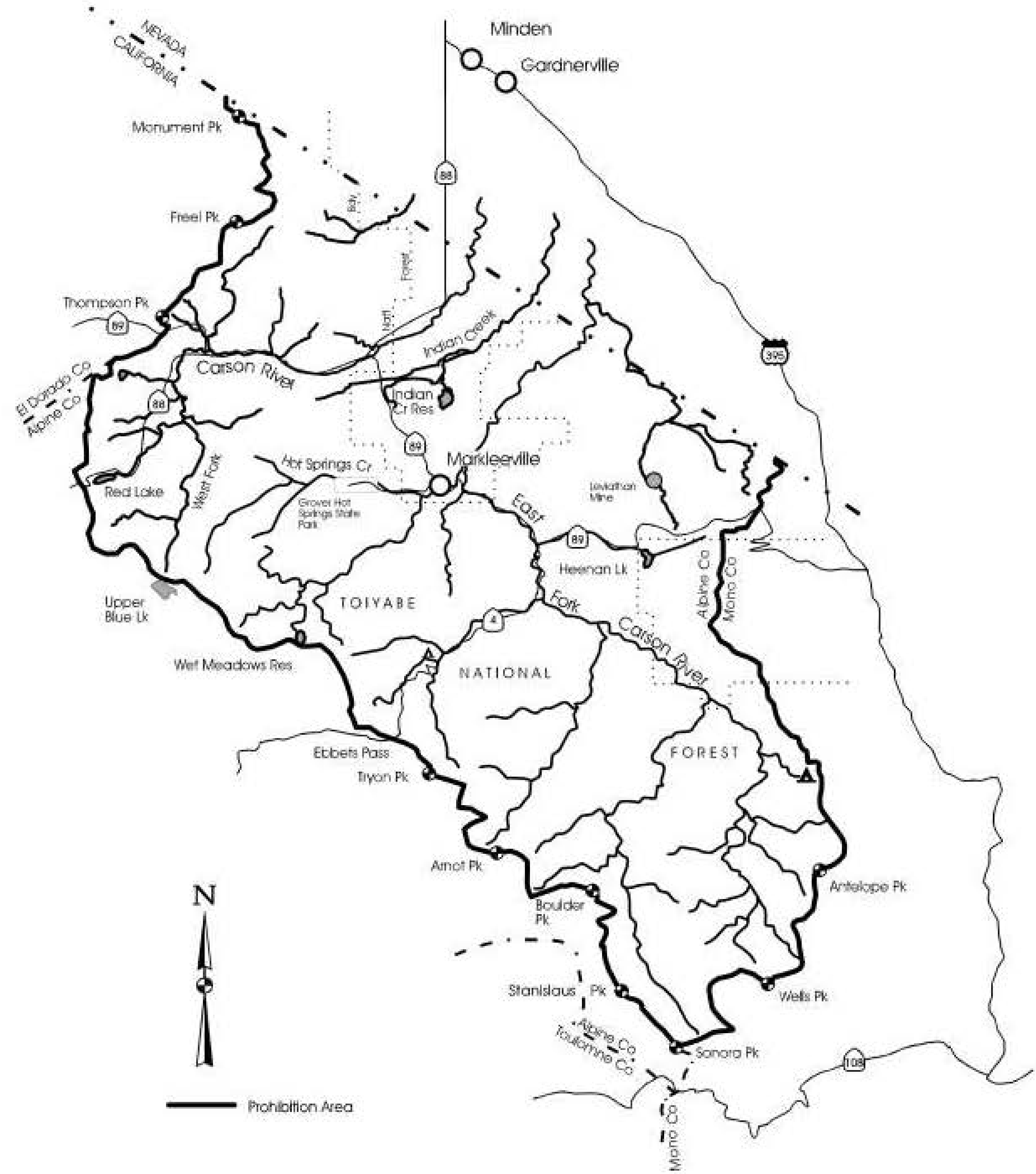


Figure 4.1-8
WALKER RIVER HYDROLOGIC UNITS
EAST & WEST FORKS

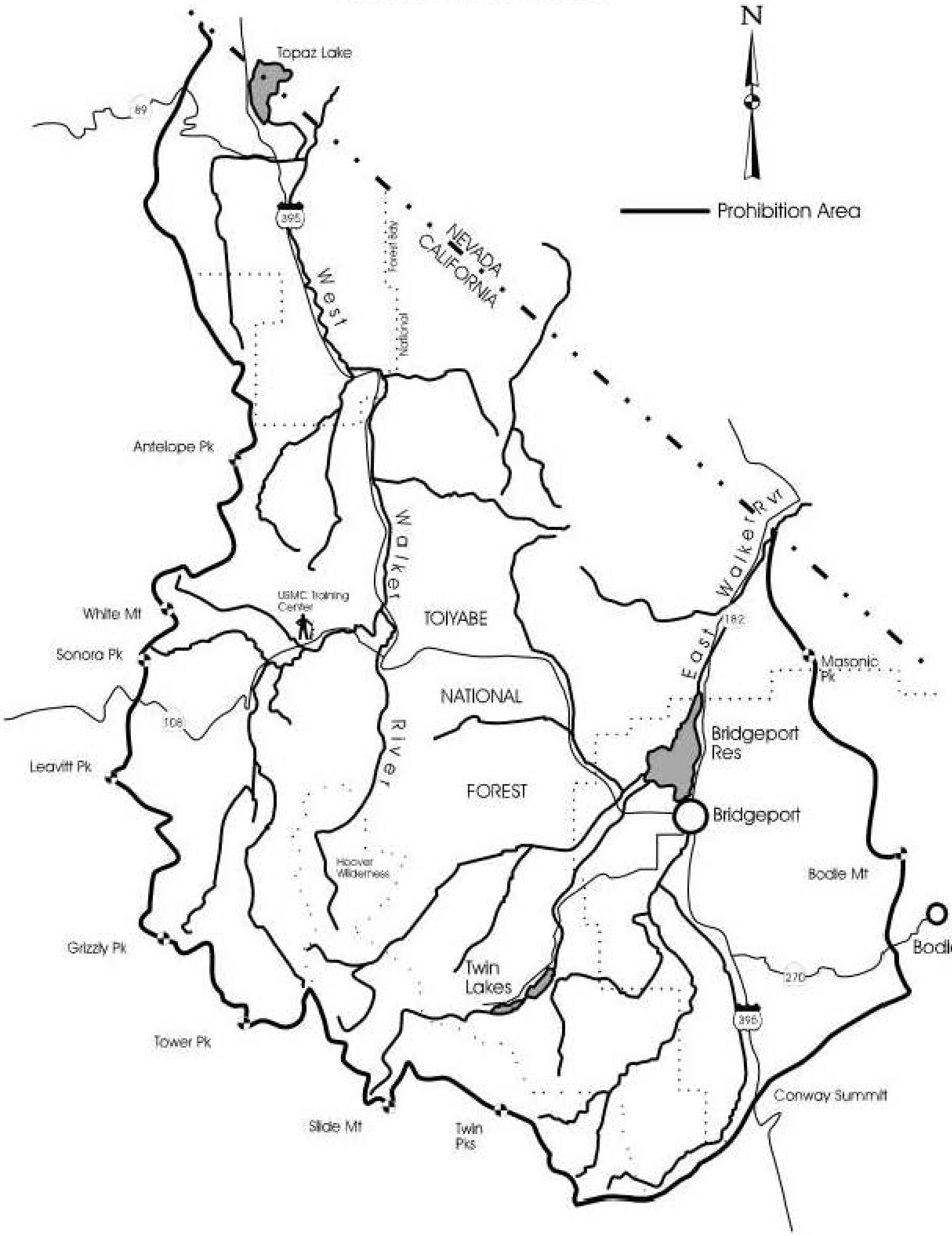


Figure 4.1-9
MONO HYDROLOGIC UNIT
Prohibitions 1a; 1b; 2a; 4a

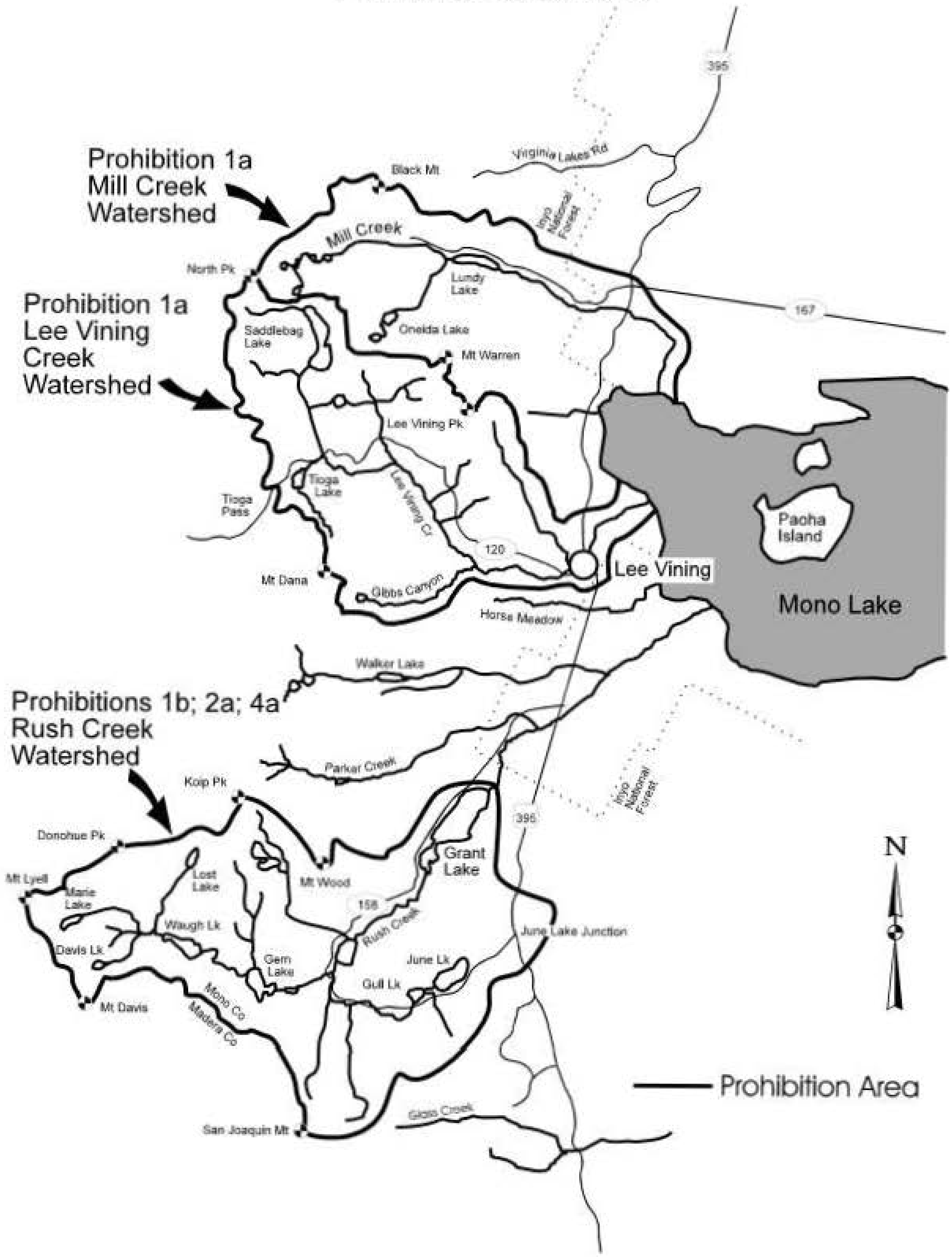


Figure 4.1-10
OWENS HYDROLOGICAL UNIT
Prohibition C

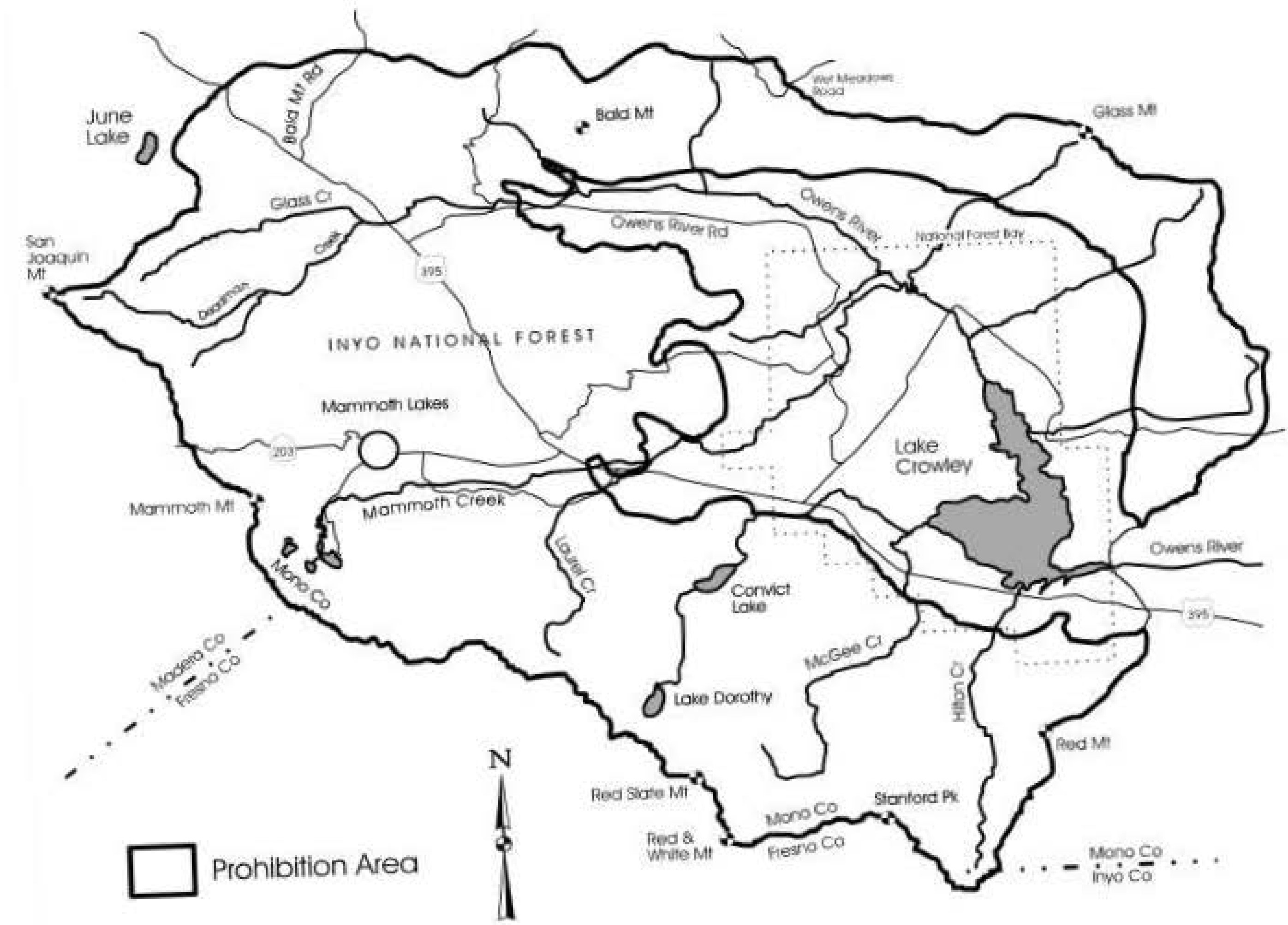


Figure 4.1-11
OWENS HYDROLOGIC UNIT
Prohibition 1d

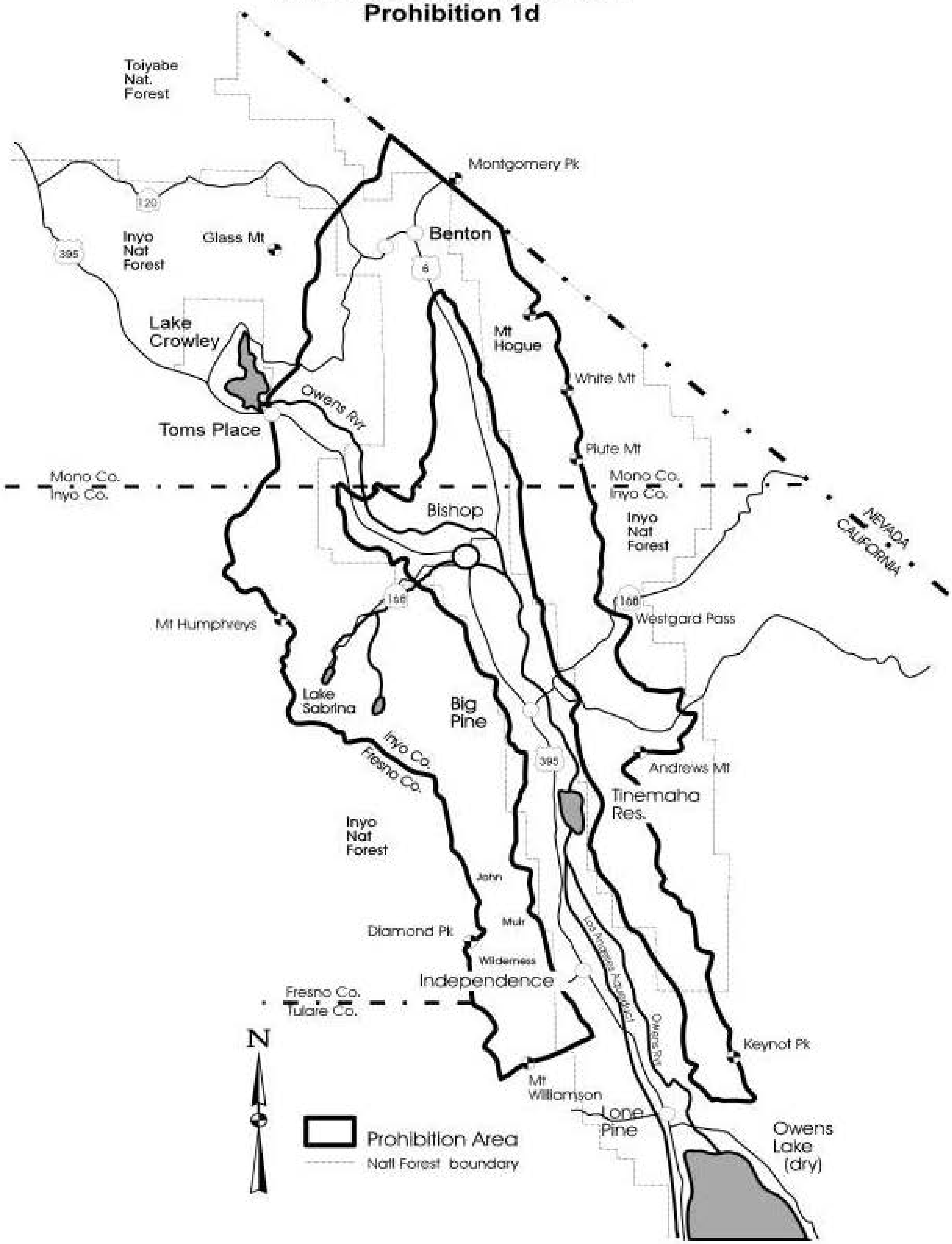


Figure 4.1-12
OWENS HYDROLOGIC UNIT
Prohibitions 2b; 4c

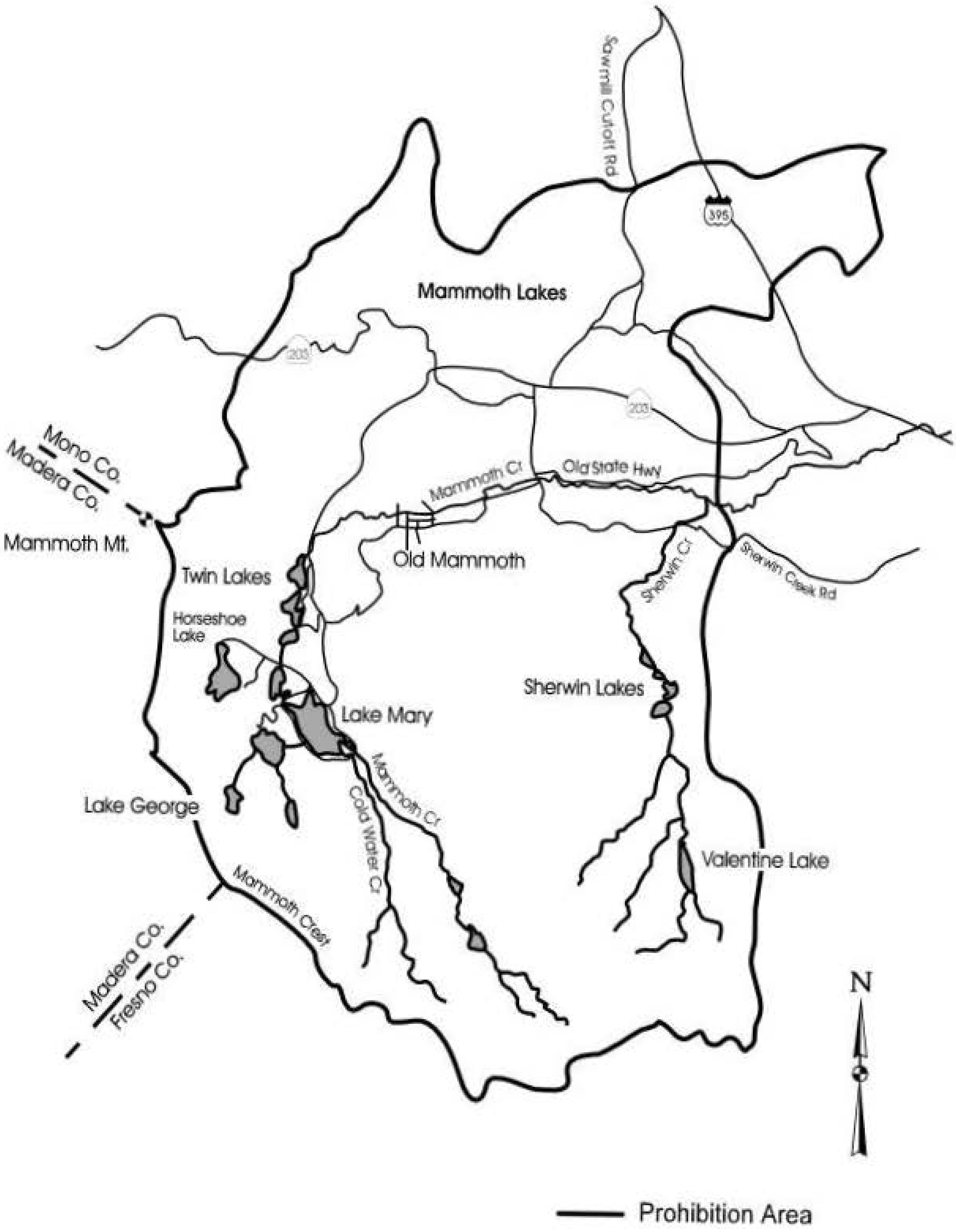


Figure 4.1-13
OWENS HYDROLOGIC UNIT
Prohibitions 3a, 3c; 4b(1), 4b(3), 4b(4)

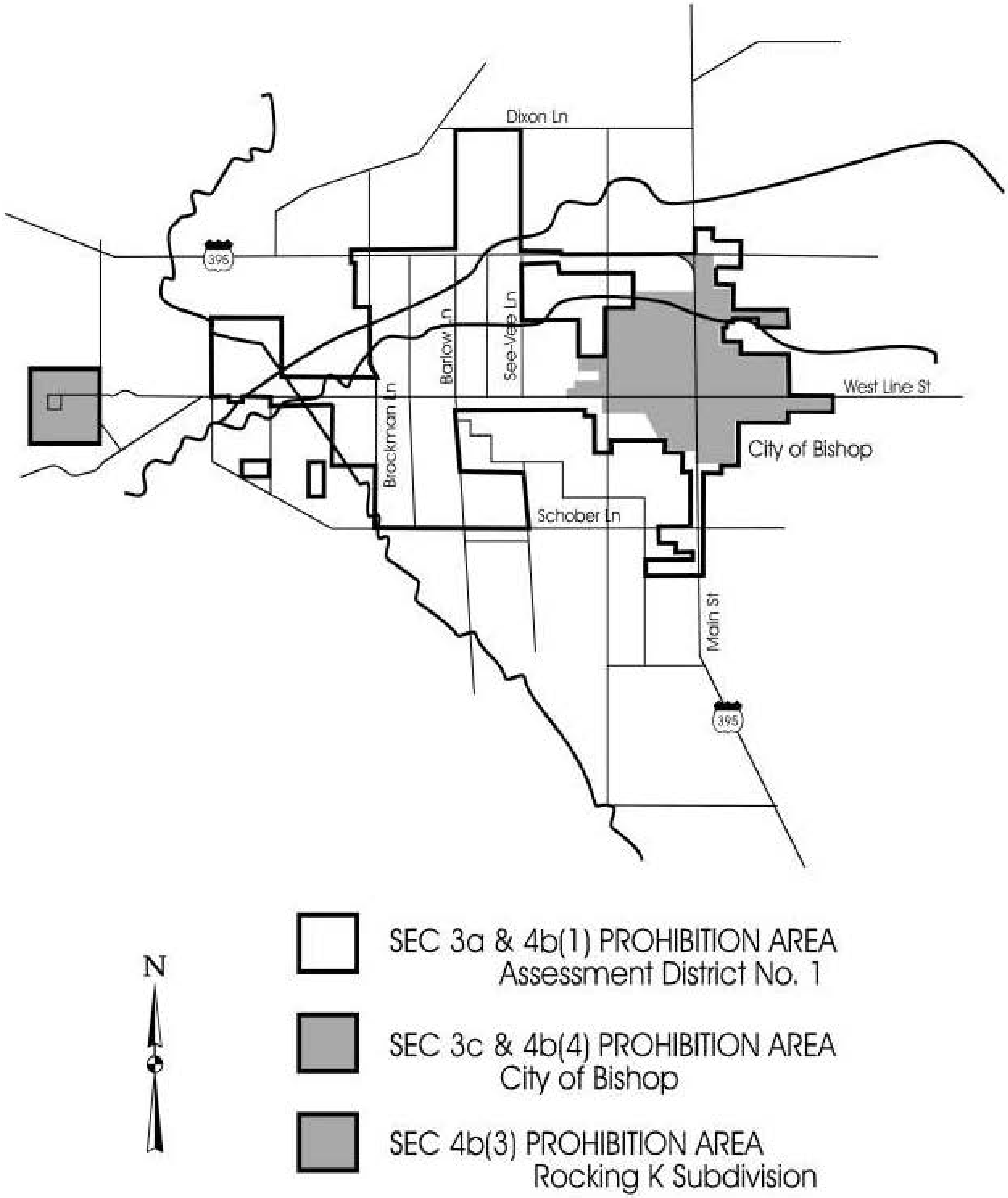


Figure 4.1-14
OWENS HYDROLOGIC UNIT
Prohibitions 3b; 4b(2)

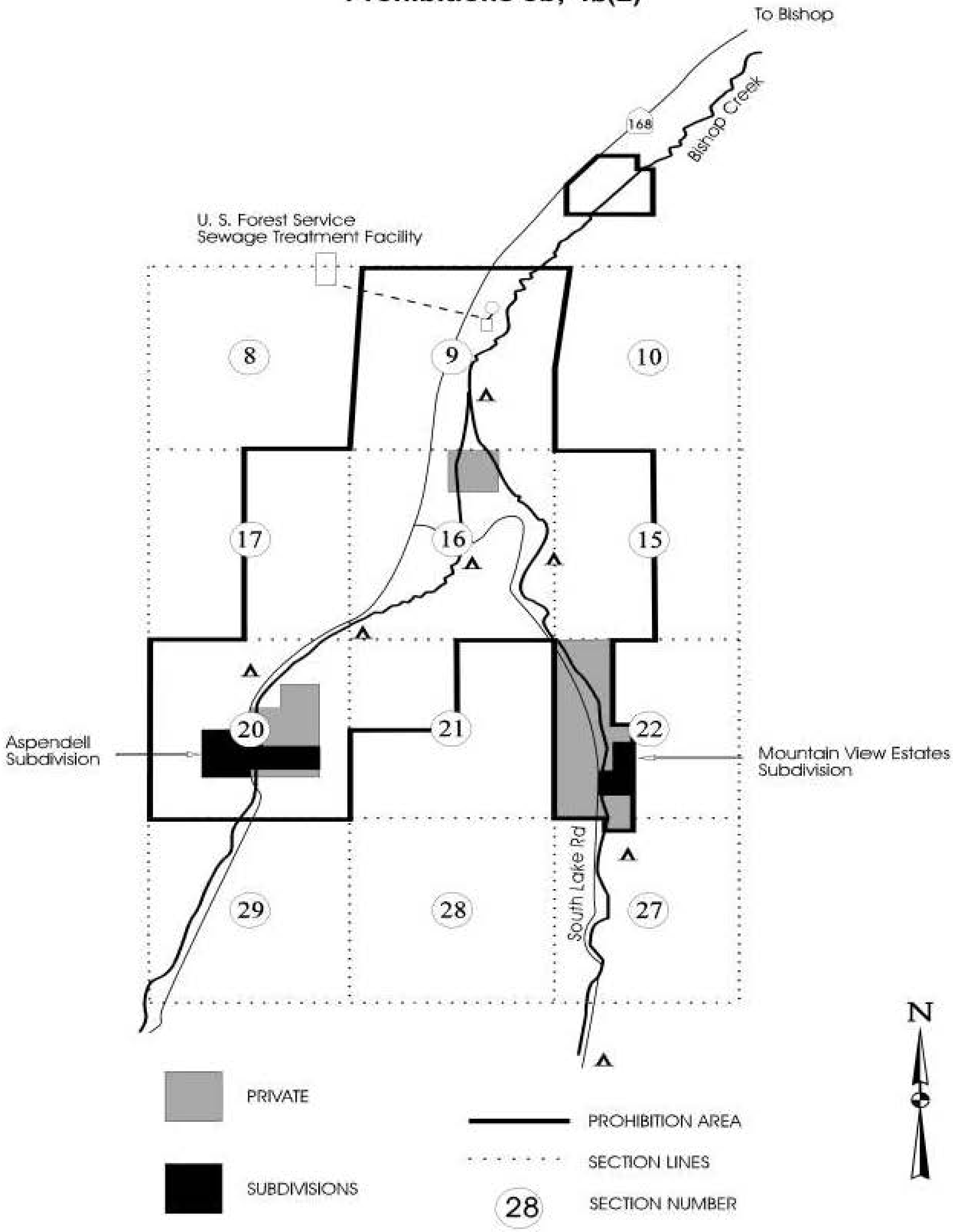


Figure 4.1-15
OWENS HYDROLOGIC UNIT
Prohibition 5

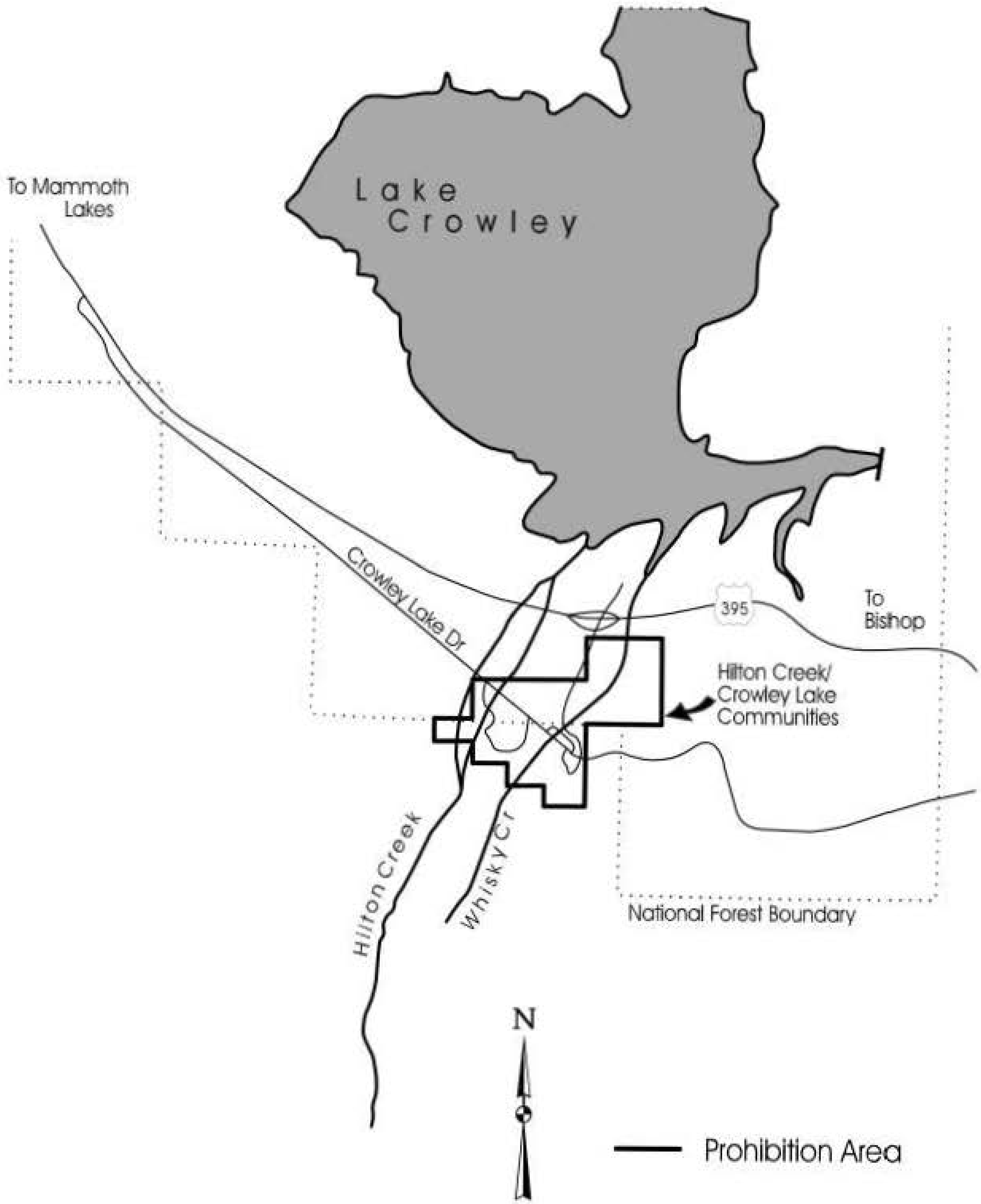


Figure 4.1-16
ANTELOPE HYDROLOGIC UNIT

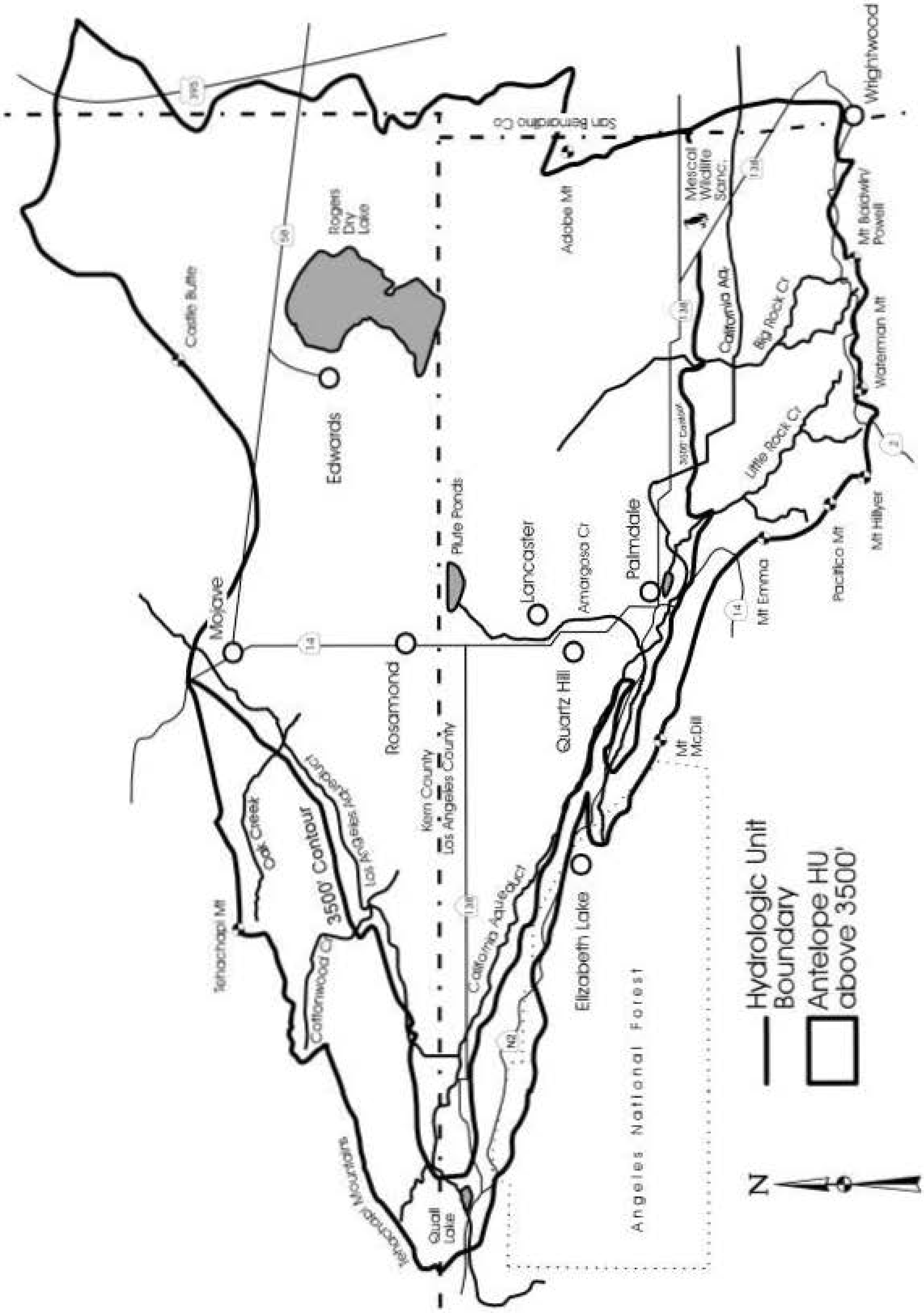


Figure 4.1-17
MOJAVE HYDROLOGIC UNIT
Prohibitions 1; 2; 3

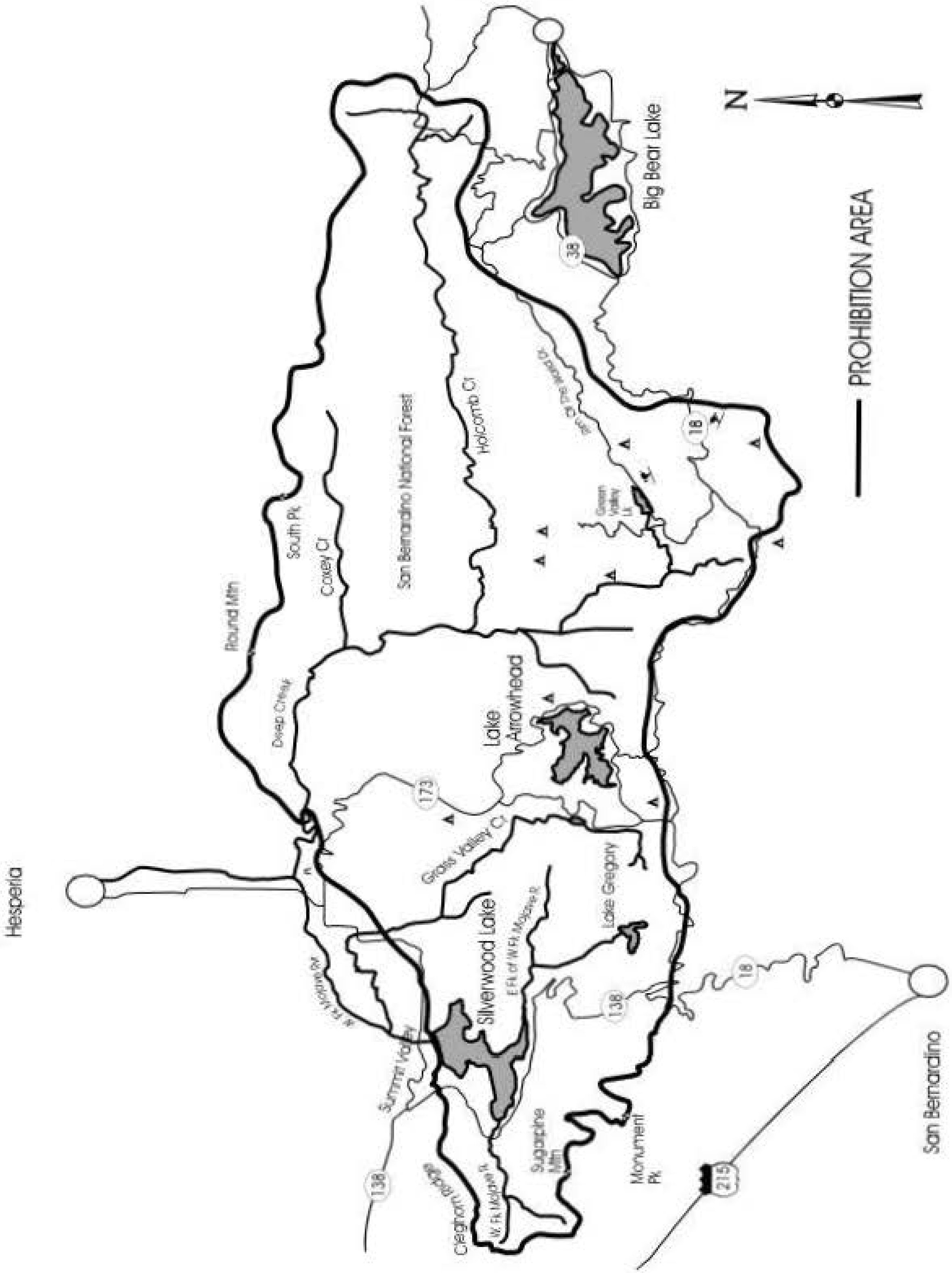
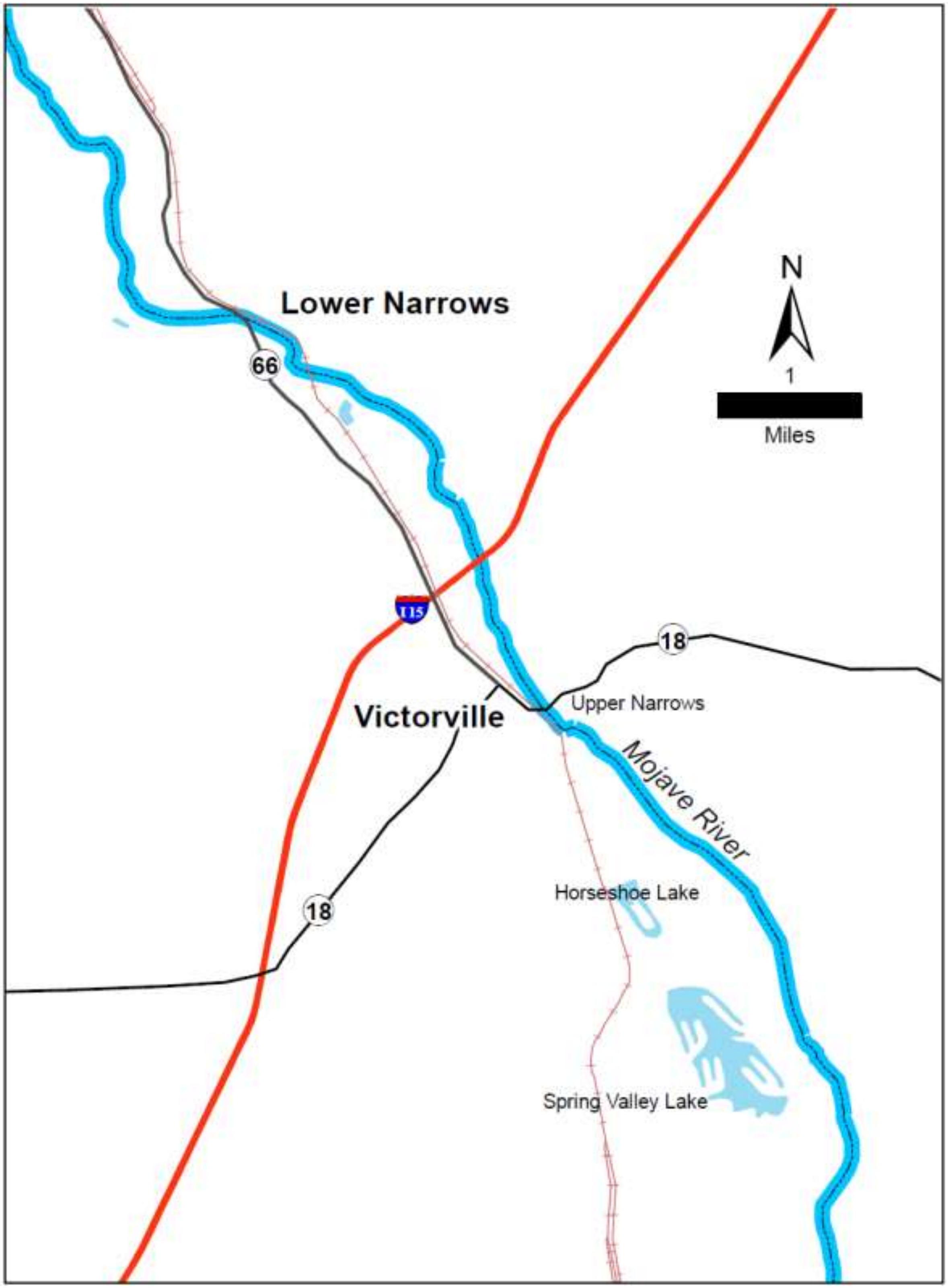


Figure 4.1-18
MOJAVE HYDROLOGIC UNIT
Prohibition 4



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4.2 SPILLS, LEAKS, COMPLAINT INVESTIGATIONS, AND CLEANUPS

The Regional Board receives complaints of discharges through verbal or written notification from the public to staff at either of the Regional Board offices. The Regional Board responds to complaints of discharges (such as spills, leaks, intentional dumping, etc.) of substances which may impact water quality. It is the policy of the Regional Board to ensure that responses to all complaints involving threats to water quality be made in an expeditious manner. Proper response includes the following components:

- Thorough documentation of complaints.
- Appropriate follow-up, including: site inspections, referral to (or notification of) other regulatory agencies, corrective actions, enforcement actions, etc.
- Notification to complainant, as appropriate, of findings and subsequent actions.

Subsequent follow-up actions include determination of responsible party, enforcement, or issuance of waste discharge requirements.

The Regional Board notifies other responsible agencies (e.g., local public health, law enforcement, and fire officials, and/or the State Departments of Toxic Substances Control, Fish and Game, Pesticide Regulation, Integrated Waste Management Board, etc.) whenever the content of a complaint falls within another agency's jurisdiction.

Except for a discharge in compliance with waste discharge requirements, any person who causes or permits any reportable quantity of hazardous substance or sewage to be discharged in or on any waters of the State, or discharged or deposited where it is or probably will be discharged in or on any waters of the State, shall, as soon as possible, notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan. The person shall also immediately notify the State Board or the appropriate Regional Board of the discharge (CA Water Code § 13271).

Similarly, any person who discharges any oil or petroleum product under the above stated conditions shall, as soon as possible, notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State oil spill contingency plan. Immediate notification of an appropriate agency of the federal government, or of the appropriate Regional Board (in accordance with the reporting requirements set under CA Water Code § 13267 or 13383) shall satisfy the oil spill notification requirements of this paragraph (CA Water Code § 13272).

Major Hazardous Spills

The Regional Board staff will respond to assist local agencies and work cooperatively at large-scale hazardous material releases resulting from surface transportation accidents. The Regional Board staff's role is primarily to provide immediate, onsite technical assistance concerning water quality in order to minimize the potential damage to the public health and safety, and the environment. Regional Board staff will interact with local authorities in an organized and predictable manner in accordance with the California Office of Emergency Services Railroad Accident Prevention and Immediate Deployment Plan, or RAPID (Public Utilities Code Section 7718). Regional Board staff activities include: (1) providing information on existing downstream beneficial uses and potential impacts from the substance being released, (2) providing toxicity information about the substance, (3) setting up a water and sediment monitoring program, (4) collecting samples or requesting that a local agency equipped to enter a hazardous area take samples for the Regional Board, and (5) coordinating available resources (lab support, vehicles, sampling equipment).

Reportable Quantities Of Hazardous Waste And Sewage Discharges

Water Code Section 13271 requires that the State Board and the Department of Toxic Substances Control adopt regulations establishing reportable quantities for substances listed as hazardous wastes or hazardous materials pursuant to Section 25140 of the Health and Safety Code. Reportable quantities are those which should be reported because they may pose a risk to public health or the environment if discharged to ground or surface water.

Similarly, the State Board was required to adopt regulations establishing reportable quantities for sewage. These requirements for reporting the discharge of sewage and hazardous materials do not supersede waste discharge requirements or water quality objectives.

The regulations for reporting spills of hazardous materials are given in Sections 2701, 2703, and 2705 of Chapter 2, Subchapter 3, of Title 19 of the California Code of Regulations and are incorporated by reference into this plan. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

The Water Code (Section 13272.1) requires Regional Boards to publish and distribute quarterly reports on methyl tert butyl ether (MTBE) discharges to public water system operators within their jurisdictions. The reports must list MTBE discharges which occurred within the quarter and locations where MTBE was detected in groundwater within the region.

Proposition 65 Program

The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65), became effective January 1, 1987. Proposition 65 (CA Health and Safety Code § 25249.5, et seq.) prohibits discharges of any chemical "known to the State to cause cancer or reproductive toxicity" to a potential source of drinking water, with certain exceptions. It also requires "clear and reasonable warnings," with certain exceptions, to be provided prior to an exposure to any of the listed chemicals (list is described below). Implementation of the Proposition specifies certain actions for designated governmental employees and for private parties.

Designated Governmental Employees

Health and Safety Code Section 25180.7 requires designated governmental employees to disclose specific information to a local Board of Supervisors and a local health officer in the event of a hazardous discharge or threatened hazardous discharge (as defined below). A designated employee is an employee so identified by his or her (state or local) government agency who is required to sign a conflict of interest statement. A list of designated employee positions for the State and Regional Boards is available from the State Board's Office of the Chief Counsel.

Any designated employee who knowingly and intentionally fails to report information, as required by Proposition 65, shall be subject to imprisonment (not more than 3 years), fines ($5,000 to $25,000), and upon felony conviction, forfeit state employment.

There is no liability for designated employees who, in good faith, report hazardous waste discharges to the counties that are later determined not to be a substantial threat to the public health and safety.

Section 25180.7 of the Health and Safety Code states: "Any designated government employee who obtains information in the course of his official duties revealing the illegal discharge or threatened illegal discharge of a hazardous waste within the geographical area of his jurisdiction and who knows that such discharge or threatened discharge is likely to cause substantial injury to the public health or safety must, within seventy-two hours, disclose such information to the local Board of Supervisors and to the local health officer." The information is disclosed via a Proposition 65 Notification Report, which includes the following information:

- discharge type
- how the discharge was discovered
- location of discharge
- probable discharger
- possible contacts
- concentration of contaminant in soil and/or water

Private Party Responsibilities

Private parties must examine workplace chemicals, facilities emissions and products to determine if chemicals subject to the Proposition are present. If the chemicals are determined to be present at levels which cause significant risks, the private parties must provide precautionary warnings as specified by the Proposition. The attorney general, or any district attorney or city attorney may initiate enforcement actions against a violator. Also, any person or organization may bring an action in the public interest if the above officials are notified and fail to diligently prosecute the violation within 60 days. Exceptions to these warning requirements and discharge prohibitions are included in the Proposition.

Proposition 65 List

The Proposition requires the State Governor to publish a list of chemicals known to cause cancer or reproductive toxicity, and revise and republish the list with any new information at least once per year. The first list was published in February 1989. More than 400 chemicals and substances have been listed as carcinogens, and more than 200 for reproductive toxicity, as of May 1998. The list is included in the California Code of Regulations (22 Cal. Code of Regs. § 12000[b-c]). Subsection (b) lists the chemicals known to cause cancer; Subsection (c) lists the chemicals known to cause reproductive toxicity.

Requirements for Site Investigation and Remediation

The State Board adopted State Board Resolution No. 92-49 "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304" in June of 1992, and amended it in April, 1994 and October, 1996. The Resolution contains the policies and procedures which all Regional Boards shall follow for the oversight and regulation of investigations and cleanup and abatement activities for all types of discharge or threat of discharge subject to Section 13304 of the Water Code. (CA Water Code § 13304 requires that any person who has discharged or discharges waste into waters of the State in violation of any waste discharge requirement or other order or prohibition issued by a Regional Board or the State Board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into waters of the State and creates, or threatens to create, a condition of pollution or nuisance may be required to clean up the discharge and abate the effects thereof. This Section authorizes the Regional Board to require complete cleanup of all waste discharged and restoration of affected water to background conditions, i.e., to the water quality that existed before the discharge.)

Thus, the Regional Board will follow State Board Resolution No. 92-49 for determining:

- when an investigation is required;
- scope of phased investigations necessary to define the nature and extent of contamination or pollution;
- cost-effective procedures to detect, clean up or abate contamination;
- reasonable schedules for investigation cleanup, abatement, or any other remedial action at a site.

State Board Resolution No. 92-49 outlines the five basic elements of a site investigation. Any or all elements of an investigation may proceed concurrently, rather than sequentially, in order to expedite cleanup and abatement of a discharge, provided that the overall cleanup goals and abatement are not compromised. State Board Resolution No. 92-49 investigation and cleanup and abatement activity components are as follows:

- **Preliminary site assessment:** To confirm the discharge and identity of dischargers; to identify affected or threatened waters of the State and their beneficial uses; and to develop preliminary information of the nature, and horizontal and vertical extent of the discharge;
- **Soil and water investigation:** To determine the source, nature and extent of the discharge with sufficient detail to provide the basis for decisions regarding subsequent cleanup and abatement actions, if any are determined by the Regional Board to be necessary;
- **Proposal and selection of cleanup action:** To evaluate feasible and effective cleanup and abatement actions, and to develop preferred cleanup and abatement alternatives;
- **Implementation of cleanup action:** To implement the selected alternative and verify progress via monitoring; and
- **Monitoring:** To confirm short- and long-term effectiveness of cleanup and abatement.

State Board Resolution No. 92-49 directs the Regional Board to ensure that the discharger is aware of and considers techniques which provide a cost-effective basis for initial assessment of a discharge such as use of current and historical photographs and site records, soil gas surveys, shallow geophysical surveys, and remote sensing techniques, as well as standard site assessment techniques (e.g., sampling and analyses of surface water, sediment, aquatic biota, ground water, and/or soil).

As directed by State Board Resolution No. 92-49, the Regional Board will also ensure that the discharger is aware of and considers the following cleanup and abatement methods or combinations thereof, to the extent that they may be applicable to the discharge or threat thereof:

- Source removal and/or isolation
- In-place treatment of soil or water (bioremediation, aeration, fixation)
- Excavation or extraction of soil, water, or gas for on-site or off-site treatment (techniques include bioremediation, thermal destruction, aeration,

sorption, precipitation, flocculation, sedimentation, filtration, fixation, evaporation)

- Excavation or extraction of soil, water, or gas for appropriate recycling, re-use, or disposal.

In every case, effluent discharged to waters of the Region shall contain essentially none of the following substances:

- Chlorinated hydrocarbons
- Toxic substances
- Harmful substances that may bio-concentrate or bioaccumulate
- Excessive heat
- Radioactive substances
- Grease, oil, and phenolic compounds
- Excessively acidic and basic substances
- Heavy metals such as lead, copper, zinc, mercury, etc.
- Other deleterious substances

In addition, the following general discharge requirements are also applicable to discharges to waters of the Region:

a. Neither the treatment nor the discharge shall cause a nuisance.

b. The discharge of wastewater except to the designated disposal site is prohibited.

c. All facilities used for collection, transport, treatment, or disposal of waste shall be adequately protected against overflow, washout, and flooding from a 100-year flood.

d. A monitoring program shall be required. The monitoring program and reports shall include items and a time schedule to be determined by the Regional Board considering the needs and benefits to be obtained (CA Water Code § 13267).

Cleanup Levels

State Board Resolution No. 92-49 also requires conformance with State Board Resolution No. 68-16 and applicable provisions of the California Code of Regulations, Title 23, Chapter 15, to the extent feasible. State Board Resolution No. 92-49 directs the Regional Board to ensure that dischargers are required to clean up and to abate the effect of discharges. This cleanup and abatement shall be done in a manner that promotes attainment of background water quality, or the highest water quality which is reasonable if background levels of water quality cannot be restored. The determination of what is reasonable shall consider all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible, and intangible. Any cleanup less stringent than background shall be consistent with maximum benefit to the people of the State and shall not unreasonably affect present and anticipated beneficial uses of such water.

Where cleanup to background is infeasible, cleanup standards will be set:

- at the lowest concentrations for the individual pollutants which are technically and economically achievable;
- so as not to exceed the maximum concentrations allowable under applicable statutes and regulations for individual pollutants (including water quality standards in State and Regional Board water quality control plans and policies);
- so as not to pose a hazard to health or to the environment; and,
- so that theoretical risks from chemicals associated with the release are considered additive across all media of exposure and are considered additive for those pollutants which cause similar toxicologic effects and for those which are carcinogens.

Ground Water Cleanup Levels

The overall cleanup level established for a waterbody is based upon its most sensitive beneficial use. In all cases, the Regional Board first considers high quality or naturally occurring “background” concentration objectives as the cleanup levels for polluted ground water and the factors listed above in “Cleanup Levels.” Generally, compliance with approved cleanup levels must occur at all points within the plume of pollutants.

Ground water cleanup levels are approved on a case-by-case basis by the Regional Board, following the guidance and criteria found in the State Board's Resolution 92-49. Approved cleanup levels will consider the mobility, toxicity, and volume of pollutants. Further guidance for cleanup feasibility may be found in Subpart E of the National Oil and Hazardous Substances Pollution Contingency Plan

(40 CFR Part 300); Section 25356.1(c) of the California Health and Safety Code; and USEPA's guidance documents on the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Soil Cleanup Levels

The Regional Board will determine soil cleanup levels for the unsaturated zone based upon threat to water quality. In its determination, the Regional Board will use guidance from the USEPA, and Cal/EPA's Office of Health Hazard Assessment, and Department of Toxic Substances Control.

If it is unreasonable to clean up soils to background concentration levels, the Regional Board may consider site-specific recommendations for soil cleanup levels above background provided that applicable ground water quality objectives are met and health risks from surface or subsurface exposure meet current guidelines. The Regional Board may require follow-up ground water monitoring to verify that ground water is not polluted by chemicals remaining in the soil. The Regional Board may require that soils with remaining pollutants are covered and managed to minimize pollution of surface waters and/or exposure to the public. If significant amounts of waste remain onsite, the Regional Board may implement provisions contained in the California Code of Regulations, Title 23, Chapter 15 to the extent applicable.

Spills, Leaks, Investigations, and Cleanups (SLIC Program)

The SLIC Program was established by the State Board so that Regional Boards could oversee cleanup of illegal discharges, contaminated properties, and other unregulated releases adversely impacting the State's waters but not covered by another program.

Sites managed within the SLIC Program include sites with pollution from recent or historic spills, subsurface releases (e.g., pipelines, sumps), complaint investigations, and all other unauthorized discharges that pollute or threaten to pollute surface and/or ground waters. Investigation, remediation, and cleanup at SLIC sites proceed as directed in State Board Resolution No. 92-49 as described above.

Use of the Cleanup and Abatement Account to Fund Cleanups

The State Water Resources Control Board manages the Cleanup and Abatement Account (CAA) Fund. The CAA receives funds statewide as a result of court judgments from civil and criminal actions and from administrative civil liabilities.

The California Water Code provides for the disbursement of funds from the CAA to:

- Public agencies with the authority to clean up waste or abate its effects; and
- Regional Boards attempting to remedy an actual or potential water pollution problem for which adequate resources have not been budgeted.

The State Board has the authority to approve funding. Applicants do not have a right to these funds.

The Regional Board's Executive Officer, his/her designee, or a public agency may request emergency funds orally for amounts up to $50,000. These requests are to be directed to the Chief Counsel. In the absence of that individual, other designated staff should be called in the order listed: the Executive Director, the Chief Deputy Director, or the Administrative Services Division Chief. Any of these four individuals may review and approve the request. Within one week following the oral request, the requesting agency shall submit the terms in writing. Non-emergency requests must be written to be considered by the State Board, and must include a specific Regional Board Resolution.

The agency or Regional Board receiving the funds shall notify the Office of Chief Counsel (OCC) upon project completion and submit a follow-up report. This report must describe the work accomplished and fund recoupment. OCC will review the report to verify that the agency performed the work.

OCC shall pursue the recovery of CAA funds expended for cleanup and abatement when a discharger refuses to perform or pay for the work.

Any funds not committed or expended within 12 months of encumbrance or approved project end date (whichever is later) shall be disencumbered. The agency has 90 days to submit a bill. The Executive Director may grant a time extension if no additional funding is required. Disencumbered funds become available for other projects.

If additional funding is required, approval must be given by the State Board or the designated approval authority (for emergency requests).

Federal Superfund Program

The federal “Superfund” program was established in 1980 with the passage of the Comprehensive

Environmental Response, Compensation and Liability Act (CERCLA). The CERCLA provided funding and guidelines for the cleanup of the most threatening hazardous waste sites in the nation. High priority sites scheduled for cleanup under this program are placed on the National Priority List (see Section 4.12, “Military Installations”)

Risk Assessment

In site-specific risk assessments, cleanup levels must be set to maintain the excess upperbound lifetime cancer risk to an individual less than 1 in 10,000 (10^{-4}) or a cumulative toxicological effect as measured by the Hazard Index of less than one. For all sites performing risk assessments, an alternative with an excess cancer risk 1 in 1,000,000 (10^{-6}) or less must also be considered. Risk assessment procedures are found in the USEPA's “Risk Assessment Guidance for Superfund” (Volume I, Parts A, B, C, and Supplemental Guidance, 1989). Additional information may be found in Cal/EPA's Office of Environmental Health Hazard Assessment guidelines.

4.3 STORMWATER RUNOFF, EROSION, AND SEDIMENTATION

Water quality problems related to stormwater discharges, erosion and sedimentation are among the most frequent and widespread water quality problems in portions of the Lahontan Region which receive significant amounts of precipitation. Such problems are interrelated because eroded sediment is often carried to surface waters in stormwater. However, wind erosion and deposition are also locally important problems. Erosion and surface runoff are considered the most critical controllable sources of nutrient loading to Lake Tahoe (see Chapter 5). The following are general discussions of stormwater and erosion problems and relevant control measures. More specific information is included in subsequent sections on specific sources such as land development, agriculture, and resources management activities.

Stormwater Problems and Control Measures

The term "stormwater" includes surface runoff resulting from rainfall and snowmelt. It is essentially synonymous with "urban runoff," "highway runoff," and "surface runoff" (as used in Chapter 5 of this Plan which deals with the Lake Tahoe Basin).

Under natural conditions, most rainfall and snowmelt is absorbed by soils and taken up by vegetation, and very little surface runoff occurs. Air pollutants in precipitation are largely removed by soils and vegetation before they reach surface waters. (Natural surface runoff events can be significant in the case of desert flash floods, and where soils and vegetation have been disturbed by natural events such as wildfires.) Human activities in watersheds, especially the creation of large amounts of impervious surface (e.g., roads, parking lots, and buildings) can greatly increase the potential for surface runoff, reduce the potential for soil/vegetation treatment of chemicals in rain and snow, and add a large variety of contaminants to the runoff discharge.

Human development of a watershed affects surface runoff quality by increasing the intensity of peak discharges, the volume of runoff per storm, the velocity of runoff during the storm, and the frequency and severity of flooding. These changes can lead to increases in stream bedload sediment transport and streambank erosion, and to consequent degradation of aquatic habitat.

Urban runoff quality varies to some extent with land use (industrial vs. commercial vs. residential). Stormwater constituents of concern include sediment (from construction sites and unstabilized areas); other particulate matter (including glass and plastics); nutrients (from sediment, fertilizer, and animal wastes); and petroleum products, solvents, wood preservatives, paints, and heavy metals from wear and tear on roads, buildings, and vehicle parts. Organic matter (e.g., from animal wastes and fallen leaves) can give stormwater a significant biochemical oxygen demand (BOD). Coliform bacteria (from soils, animal excrement, and sewage spills) can also be present. Toxic "priority pollutants" in urban runoff include lead, zinc, copper, arsenic, chromium, cadmium, nickel, cyanide, and asbestos. In mountainous areas of the Lahontan Region, runoff containing salt and other deicing chemicals used on roads and parking lots during the winter is of concern (see the "Land Development" section of this Chapter). High intensity stormwater flows reaching surface waters can also raise stream temperatures, scour streambeds, and damage aquatic habitat, particularly fish spawning habitat.

Stormwater quality also varies with time. In California, which generally has dry summers and wet winters, pollutants can accumulate on pavement over the summer and can be flushed into surface waters in high concentrations by the first significant fall rainstorm. These high "first flush" concentrations may be especially stressful to aquatic organisms. Runoff from later storms may have lower pollutant concentrations. Spring snowmelt may also provide a flush of accumulated atmospheric acids and nutrients, including nitrogen, into surface waters (see the discussion of atmospheric deposition in the "Resources Management and Restoration" section of this Chapter). Flushing by desert flash floods and by summer thunderstorms in mountainous portions of the Lahontan Region are both of concern.

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.

Although stormwater quality (particularly that of urban and highway runoff) has not been well studied elsewhere in the Lahontan Region, many communities and highways are located near surface waters. Stormwater runoff of metals, deicing agents, and petroleum products from paved surfaces may be contributing to water quality problems. Even in desert areas, infrequent flood events may flush pollutants from urban surfaces and lead to surface and/or ground water quality problems.

Surface water “in systems designed or modified to collect or treat...storm water runoff” is not considered a “source of drinking water” under State Board Resolution 88-63 (Appendix B), “provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards.” The “source of drinking water” designation affects the implementation of Proposition 65 (see “Spills, Leaks, Complaint Investigations, and Cleanups” section of this Chapter) in relation to toxic substances in stormwater. However, most surface and ground waters in the Lahontan Region which receive treated or untreated stormwater **are** designated sources of drinking water. Protection of these sources is a major consideration in the Regional Board's regulatory process.

Stormwater Control Measures

Implementation of control measures for the different types of nonpoint sources which are discussed throughout this Chapter will help to prevent water quality problems related to stormwater. Erosion control is particularly important.

Much of the information below is taken from the “State of California Stormwater Best Management Practices Handbooks,” prepared by the American Public Works Association Storm Water Task Force (APWA Task Force 1993). Also, see the general discussion of Best Management Practices (BMPs) in the introduction to this Chapter.

This Basin Plan does not include detailed discussion of specific stormwater BMPs. Such detail is provided in a variety of BMP Handbooks (e.g., TRPA 1988, APWA Task Force 1993, USEPA 1993). Different types of controls for stormwater may be justified in different locations depending upon the type of development and the sensitivity of the affected waters.

Examples of source control BMPs for stormwater problems include control of air pollutants (see “Resources Management and Restoration” section on atmospheric deposition), enforcement of anti-litter ordinances, educational programs (to limit fertilizer and pesticide use by home gardeners and dumping of waste motor oil in storm drains), street and storm drain maintenance practices, spill prevention and cleanup, and BMPs for erosion control. Ultimately, nationwide efforts to redesign pollutant sources, comparable to the phaseout of leaded gasoline, may be necessary to reduce or eliminate some urban runoff constituents (e.g., zinc from tire wear and asbestos from brake linings).

Land use controls can also function as stormwater source controls. Protection and restoration of natural vegetation, soils and the duff layer, particularly in steep headwater areas, and in wetlands, floodplains, and riparian areas, preserves natural infiltration and nutrient uptake capabilities, as does limitation of impervious surface coverage. Naturally functioning soil/vegetation systems, particularly wetland systems, can act as buffers between urban areas and surface waters.

Examples of treatment control BMPs for stormwater include infiltration, wet ponds, extended detention basins, biofilters (such as grassy swales), media filtration (e.g., a settling basin followed by a sand filter), oil/water separators, and constructed wetlands. Because of differences in efficiency among BMPs, combinations of different methods often provide the best treatment.

The following are important considerations in the choice of treatment control BMPs:

- Because treatment methods are not 100 percent efficient, and the efficiency of treatment is difficult to predict, the highest priority should be given to source control. Source control is often less expensive than treatment.

- The type of pollutants to be treated (dissolved vs. particulate, nutrients vs. toxics, or combinations of pollutants) and the variability of pollutant concentrations among storms and/or snowmelt events will affect the efficiency of treatment.

- Many treatment BMPs using vegetation were developed in states with wetter climates than California's, where vegetation can be maintained without irrigation. The need for irrigation of vegetation in stormwater treatment systems during the summer is an important factor in the Lahontan Region. The long-term performance of vegetative treatment systems under the harsh winter climates of the mountainous portions of the Lahontan Region has also not been well documented.

- Treatment BMP measures often require frequent visual inspections and periodic maintenance to ensure operation at maximum efficiency.

- The "design storm" for sizing of treatment facilities varies with local precipitation regimes. The design storm for Lake Tahoe facilities is specified in the local BMP handbook (TRPA 1988, Vol. II). The Regional Board may specify design storms for other areas in stormwater permits.

- Treatment BMPs may have both extra environmental benefits (passive recreation opportunities, wildlife habitat, ground water recharge) and adverse environmental side effects (potential drowning and mosquito breeding hazards in ponds, ground water contamination by infiltration).

"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). In some states, wastewater treatment plants similar to those used for domestic wastewater have been constructed to treat stormwater.

Utilization 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 California. The utilization 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).

Natural wetlands in the Lahontan Region are waters of the State and of the United States. They have designated beneficial uses and are subject to all of the water quality objectives in Chapter 3 of this Basin Plan, including nondegradation objectives for water quality and for biological communities and populations. Because the long-term impacts of urban, highway, and mine stormwater discharges on beneficial uses of natural wetlands are unknown (particularly in terms of bioaccumulation and bioconcentration of toxic trace metals), such wetlands should ideally be used only for final dissolved nutrient removal after pretreatment by other means has removed oil and grease, sediment, and sediment-bound metals. The quality of stormwater discharged to natural wetlands should be fully protective of designated beneficial uses. Long-term monitoring of stormwater impacts, especially biological impacts, on wetland ecosystems in the Lahontan Region is needed to support future Regional Board decisions on protection and utilization of such systems.

Artificial, or constructed wetlands, may be built specifically for the purposes of treating stormwater runoff. If not created as mitigation for the loss of natural wetlands, constructed wetlands need not attempt to replicate all of the functions (e.g., wildlife habitat) of natural wetlands. The Regional Board will not generally designate beneficial uses for or assign water quality objectives to wetlands created solely for the purpose of stormwater treatment. Such wetlands may be as simple as a gravel bed planted with cattails, or they may include pretreatment devices such as forebays or detention ponds, to reduce sediment loading and thus improve their efficiency.

Important considerations for those constructing artificial wetlands for the treatment of stormwater include:

- Wetlands can act as "sinks" for pollutants. If pollutants accumulate to levels that become toxic, remedial action(s) may be required.

- The efficiency of pollutant removal will vary with the seasons. Winter temperatures and ice formation will reduce or halt pollutant removal by plants and microorganisms. Nutrients may be released from the wetland seasonally as vegetation decays. Over a 12-month period, a constructed wetland may be no more effective than a wet pond.

- The ability of a constructed wetland to treat certain pollutants such as phosphorus may decline over time as soils become saturated with the pollutant and plants reach maximum density. Cleanout of accumulated sediments, harvesting and replanting of wetland vegetation, or other maintenance activities may be necessary to preserve the stormwater treatment function. A qualified wetland ecologist should be involved in the design and installation of wetland vegetation. Constructed wetlands should be designed to facilitate access for maintenance. (As of 1992, constructed wetlands were exempt from the requirement to obtain a Section 404 permit for the removal of accumulated material.)

Because the ability of constructed wetlands to meet effluent limitations for discharges to other waters has not been demonstrated over the long-term under the environmental conditions within the Lahontan Region, it is important for wetland proponents to consult with Regional Board staff during the planning phase.

NPDES Permits

The 1987 amendments to the federal Clean Water Act mandated the issuance of NPDES permits for stormwater discharges from certain types of municipalities, industries, and construction sites. The State and Regional Boards are administering the stormwater NPDES program in California. The State Board interprets federal stormwater control regulations to “include the use of BMPs to control and eliminate sources of pollutants and limitations which prohibit the discharge of non-storm water.” A set of statewide BMP handbooks has been prepared to provide guidance for dischargers on compliance with the NPDES permits (APWA Task Force 1993).

BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce pollution. For industrial stormwater discharges, BMPs also include treatment devices, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste removal, or drainage from raw material storage (APWA Task Force 1993).

The statewide permits prohibit most non-stormwater discharges. Certain non-stormwater discharges, such as discharges from firefighting, fire hydrant flushing, and uncontaminated ground water resulting from dewatering activities, may be permitted if they do not cause significant pollution problems. However, all direct waste discharges to surface waters are prohibited in many parts of the Lahontan Region; these prohibitions would supersede the exceptions in the general permits.

Municipal NPDES Stormwater Permits

Municipal stormwater NPDES permits are required for municipalities with populations over 100,000, for drainage systems interconnected with the drainage systems of such municipalities, and for municipalities which are determined to be significant contributors of pollutants. The collective populations of the portions of Los Angeles and San Bernardino Counties within the Lahontan Region may warrant the issuance of municipal stormwater NPDES permits (the coastal portions of these Counties already have such permits). 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.

Municipal stormwater NPDES permits require the development of a management program for construction activities within the permittee's jurisdiction. The program must: (1) address appropriate planning and construction procedures, (2) ensure BMP implementation at, and inspection and monitoring of, construction sites which discharge into municipal storm sewers, and (3) provide for education or training for construction site operators. The factors that should be addressed in a municipal stormwater management program are as follows:

For Residential/Commercial Activities:

- Roadway and drainage facility operations and maintenance programs
- BMP planning for new development and redevelopment projects
- Retrofitting existing or proposed flood control projects with BMPs
- Municipal waste handling and disposal operations
- Pesticide, herbicide, and fertilizer use controls

For Improper Discharge Activities:

- Prevention, detection, and removal program for illegal connections to storm drains
- Spill prevention, containment, and response program
- Program to promote proper use and disposal of toxic materials
- Reduction of stormwater contamination by leaking/overflowing separate sanitary sewers

For Industrial Activities:

- Inspection and control prioritization and procedures
- Monitoring of significant industrial discharges

For Construction and Land Development Activities:

- Water quality and BMP assessments during site planning
- Site inspection and enforcement procedures
- Training for developers and contractors

Source: APWA Task Force (1993)

The municipal and statewide NPDES construction permit programs interact. The municipality sets construction policies and standards, and is expected to enforce all local stormwater ordinances, floodplain management regulations, and local standards for grading and erosion control. Post-construction control measures required under the statewide construction permit (such as final site grading, and maintenance of erosion and drainage control measures) will be subject to municipal review and approval through existing procedures.

Because municipal stormwater permits have been in place in California for only a short time, the details of financing and implementation of control programs are still being worked out. In other states, areawide "stormwater utilities" have taken responsibility for construction, operation and maintenance of facilities.

Construction NPDES Stormwater Permit

The USEPA's guidance for the issuance of stormwater NPDES permits (USEPA 1993), treats construction projects as a subset of industrial discharges. The State Board treats industrial and construction discharges separately, and has issued a statewide construction NPDES permit. The permit applies to construction projects resulting in land disturbance of five acres or greater; the area requirement affects both one-time disturbances and phased projects which cumulatively disturb more than five acres. (A court decision may result in application of the NPDES program to smaller projects, but guidance is not yet available.) The permit does not apply to routine or emergency maintenance work sponsored by public agencies, to dredging and/or filling permitted by the U.S. Army Corps of Engineers, or to projects on Indian lands or within the Lake Tahoe Basin.

Project proponents are required to: (1) prepare a Stormwater Pollution Prevention Plan (SWPPP) before construction begins, (2) file a Notice of Intent (NOI) with the State Board before construction begins, and (3) file a Notice of Termination with the State Board once construction is complete. These requirements are summarized as follows:

- The NOI certifies that the applicant will comply with conditions in the statewide general NPDES permit. It is not a permit application and does not require approval, although an annual fee must be submitted with it.
- The SWPPP is directed toward construction staff; it describes erosion and runoff control measures to be used during and after construction, and a plan to inspect and maintain these control measures. The SWPPP may be revised during construction in response to changed conditions, or if the properly installed BMPs are ineffective in preventing sediment transport off the site. Revisions to the SWPPP are also required if there are changes in activities which could result in a significant amount of pollutants discharged in stormwater.
- The State Board must be notified (via a Notice of Termination form) once construction is complete. It must also be notified if a change of ownership occurs during construction. In this case, a revised NOI must be submitted, and the SWPPP must be revised by the new owner to reflect any changes in construction conditions. The general construction permit requires that the project owner arrange for maintenance of drainage/stormwater control facilities after project completion; maintenance may be done by private parties or by a public agency such as a community service district. Municipalities may require maintenance agreements.

Construction project proponents may request to be placed under individual NPDES permits rather than the general permit. The Regional Board may issue individual stormwater NPDES permits to construction projects when more stringent controls are necessary to protect water quality. As noted above, individual construction projects may also be regulated under a municipality's NPDES management program.

Industrial NPDES Stormwater Permits

The State Board has adopted a statewide general industrial NPDES permit which applies to facilities which discharge stormwater to surface waters either directly or through a storm drain system. The general permit does not apply to facilities which discharge stormwater to a municipal sanitary sewer system, or to facilities which discharge to evaporation ponds, percolation ponds, or dry wells (ground water injection wells) where there is no discharge to surface waters under any circumstances. The general industrial permit applies to the following types of facilities:

- “heavy” manufacturing facilities
- certain other types of manufacturing facilities if materials are exposed to stormwater
- active and inactive mining and oil and gas facilities
- recycling facilities
- transportation facilities (including marinas)
- facilities subject to the requirements of 40 CFR Subchapter N (facilities subject to USEPA-promulgated stormwater effluent limitation guidelines, new source performance standards, or toxic pollutant effluent standards)
- hazardous waste treatment, storage, or disposal facilities
- landfills, land application sites, and open dumps
- steam electric generating facilities
- wastewater treatment plants with design flows greater than 1 million gallons per day.

The list above is a general summary from the draft statewide BMP handbook for industrial permits (APWA Task Force 1993). Some specific facilities within the categories above may not necessarily require NPDES permits. More detailed lists of specific industries requiring permits are contained in the statewide industrial NPDES permit, which is included as an appendix to the handbook.

For facilities such as wastewater treatment plants which discharge both stormwater and a primary industrial effluent to surface waters, both the general industrial stormwater NPDES permit and an individual NPDES permit for the primary effluent discharge would apply.

In addition to the stormwater industrial general permit, Regional Boards may, at their discretion, issue an industry-specific general permit. Industries may request individual NPDES permits instead of the general permit. Because the process is expensive and time-consuming, Regional Boards may chose **not** to issue an individual permit. Regional Boards are only expected to consider individual permits where individual facilities have unique characteristics or pose significant threats to water quality.

There is relatively little manufacturing industry in the Lahontan Region. Industrial facilities of concern include mines and mineral processing operations, energy production plants, automobile junkyards and repair shops, lumberyards, corporation yards, concrete batch plants, metal plating shops, carpet and steam cleaners, airports, and marinas.

Industrial stormwater discharges must meet the requirements of Clean Water Act Sections 301 and 402, which mandate the use of best available technology economically available (BAT) and best conventional pollution control technology (BCT) to reduce pollutants, and any more stringent controls necessary to meet water quality standards. Compliance with the requirements of a variety of other laws and regulations for the control of hazardous materials and hazardous wastes may help to reduce potential stormwater pollutants. Such programs include state and local laws to control toxic air pollutants, hazardous material storage and emergency response planning, the workers' right-to-know program, and hazardous waste source reduction and management review.

The industrial general permit process involves submittal of a Notice of Intent to the State Board, and preparation of a Storm Water Pollution Prevention Plan (SWPPP) and monitoring program. Requirements for NOIs and SWPPPs are similar to those discussed above for construction permits; they are discussed in detail in the BMP handbook (APWA Task Force 1993). The stormwater management programs developed by municipalities under NPDES permits (above) may include regulation of stormwater discharges from industries to municipal storm drain systems. Industries should check with local stormwater management authorities to identify applicable requirements. Other considerations in industrial stormwater control include possible needs for stormwater control facilities to comply with state and local air quality regulations, fire code requirements, and local sewer district requirements for discharges to a sanitary sewer.

Waste Discharge Requirements

The Regional Board issues waste discharge requirements (WDRs) addressing both stormwater and erosion control, rather than NPDES permits, to smaller construction projects in sensitive areas such as the Lake Tahoe, Truckee River, and Eagle Lake

Basins, and the Mammoth Lakes area. As noted in Chapter 5, a set of general WDRs has been adopted for small construction projects in the Lake Tahoe Basin. For smaller projects in less sensitive areas, waivers of WDRs may be appropriate. Waivers are best used to regulate small, short-term projects which do not present a threat to water quality. Specific types of projects for which waivers of stormwater WDRs may be considered are identified in the Regional Board's current waiver policy (see Chapter 6).

When reviewing environmental documents for projects which may be placed under WDRs, Regional Board staff should give special attention to stormwater control needs in relation to receiving water objectives, particularly the non-degradation and toxics objectives contained in this Basin Plan and the USEPA's National Toxics Rule.

WDRs should address inspection, operation, and maintenance of stormwater control facilities, as well as their installation.

Requirements for use of stormwater BMPs in connection with new construction should be distinguished from requirements for “retrofit” of BMPs to existing development. The most active retrofit program in the Lahontan Region is being implemented in the Lake Tahoe Basin (see Chapter 5). Retrofit is being addressed in WDRs for some dischargers elsewhere, such as ski resorts in the Truckee River HU. However, the Regional Board may issue WDRs, including requirements for stormwater control, for any discharge which causes or threatens to cause water quality problems.

Regional Board staff should continue to evaluate the need for municipal stormwater permits for communities outside of the Lake Tahoe Basin, particularly in sensitive watersheds such as the Truckee River, June Lakes, and Mammoth/Hot Creek areas. As part of this evaluation, staff should investigate needs for retrofit of stormwater BMPs. As an alternative to a municipal permit, WDRs could be issued to facilities with large areas of impervious surface (e.g., existing shopping centers, convention centers, sports stadiums, etc.) which do not fall under one of the other NPDES categories. If local governments independently adopt requirements for the application of BMPs and for treatment of stormwater to ensure attainment of standards, municipal permits may not be necessary for communities with fewer than 100,000 residents.

There are a large number of inactive mines in the Lahontan Region (see “Mining, Industry, and Energy Development” section of this Chapter). Limited biological and ambient water quality monitoring to date indicates that erosion and stormwater from these mines may be contributing to impairment of beneficial uses of surface waters, particularly in the Owens HU. Under the State Board's Toxic Substances Monitoring Program (see Chapter 7) elevated levels of metals have been detected in the tissues of fish from a number of water bodies with inactive mines in their watersheds. Regional Board staff should continue to review Industrial NPDES permit NOIs for these mines and should determine the need for individual permits. Monitoring programs should be adopted where appropriate to document impacts of mine stormwater on water and sediment quality and on aquatic biota. (The USEPA is proposing to develop and issue a general stormwater permit for inactive mines on federal lands.)

Through the Section 319 outreach program, Regional Board staff should continue to provide information to other agencies, dischargers, and the public about stormwater problems, permitting requirements, and voluntary BMP implementation.

Very little information is available on the quality of stormwater in most parts of the Lahontan Region, or on its impacts on beneficial uses. The Regional Board should encourage Caltrans, local governments, road maintenance entities, and university researchers to conduct additional studies of stormwater quality and impacts.

Stormwater Control Measures Implemented by Other Agencies

The U.S. Forest Service and Bureau of Land Management jurisdictions in California, and the California Department of Transportation, have adopted statewide plans under Section 208 of the Clean Water Act which include commitments to implement BMPs for erosion and surface runoff control in connection with their activities. The Regional Board reviews the activities of these agencies under Memoranda of Understanding and Management Agency Agreements. (See the summaries of these plans in Chapter 6, and the discussions of impacts in the “Resources Management,” “Land Development,” and “Recreation” sections of this Chapter.) Stormwater controls are being implemented (usually together with erosion controls) in watershed restoration activities under a number of Coordinated Resource Management Plans (CRMPs; see “Range Management” in Section 4.9 of this Chapter). These plans often involve cooperation among federal and state agencies, and private landowners.

The Regional Board may issue waste discharge requirements to Caltrans and to local governments to control the impacts of stormwater from road construction and maintenance activities (see “Land Development” section of this Chapter). Caltrans developed a statewide Section 208 plan which was approved by the State Board in 1979; it contains a commitment to implement BMPs but does not include great detail on the BMPs themselves. The State Board should encourage Caltrans to update its 208 plan to provide such detail, with particular attention to:

- stormwater and erosion control along existing highways
- erosion control during highway construction and maintenance
- reduction of direct discharges (e.g., through culverts)
- reduction of runoff velocity
- infiltration, detention and retention practices
- management of deicing compounds, fertilizer, and herbicide use
- spill cleanup measures
- treatment of toxic stormwater pollutants

Since Caltrans' contractors are responsible for most BMP implementation on highways, the selection of qualified contractors and the ongoing education of construction and maintenance personnel are particularly important.

Caltrans is required to obtain a municipal NPDES stormwater permit for discharges of stormwater from state-owned roads located in geographic areas for which municipal stormwater NPDES permits have been issued. Caltrans may be issued an individual stormwater permit which is separate from the permit issued to the municipality, or the Regional Board may require Caltrans to join as a co-permittee with the local agency which has jurisdiction over disposal of stormwater.

Local governments, whether or not they are under municipal stormwater NPDES permits, have authority to control stormwater discharges. A number of State laws and regulations affecting local governments have important implications for stormwater control. These include the General Plan Act, the California Environmental Quality Act, and the Subdivision Map Act. Local Governments may adopt zoning ordinances, flood control and drainage ordinances, and sewer use ordinances. As a result of the “non-designated” Section 208 planning process in the 1970s, some local governments in the Lahontan Region evaluated stormwater-related problems and strengthened their grading ordinances to prevent erosion and sedimentation. A BMP handbook was developed for the high elevation portions of Placer and Nevada Counties, although the BMPs were never formally certified.

All local governments within the Lahontan Region should consider the prevention and control of stormwater problems as high priorities in zoning for, and design of, new development and redevelopment. Needs for retrofit of stormwater controls to existing development should be considered on an areawide basis through periodic general plan updates. Local governments are strongly encouraged to apply for federal grant funds under Sections 205(j), 314, and 319 of the Clean Water Act for studies of stormwater problems and implementation of control measures.

Flood control agencies should consider the water quality impacts of flood management programs as well as flood control objectives. Flood control facilities should be designed, operated and maintained to reduce pollutant concentrations in stormwater discharges.

The Tahoe Regional Planning Agency implements land use controls and sets conditions in its permits for construction projects which serve to control stormwater discharges in the Lake Tahoe Basin (see Chapter 5 of this Basin Plan).

Voluntary implementation of stormwater control BMPs by private parties (including retrofit to existing development) will be an important factor in achieving complete control of this pollution source. Public education programs, including newsletters distributed to homeowners, extension and “master gardener” programs, BMP demonstration sites, school curricula, videos, electronic bulletin boards, etc., are being developed and implemented by a variety of public agencies, schools and colleges, and environmental and citizens groups. Better coordination of these programs is desirable to make information widely available and to avoid duplication of effort.

Erosion and Sedimentation

Erosion has been defined as: “The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep,” and sedimentation as: “The process by which mineral or organic matter is removed from its site of origin, transported, and deposited by wind, water or gravity" (California Resources Agency 1978).

Erosion is a natural process, which generally proceeds at a slow rate unless large-scale vegetation disturbance occurs (e.g., as a result of wildfire or intentional land clearing activities). Human activities in a watershed can greatly accelerate the rate and amount of erosion.

The potential for erosion is determined by soil characteristics (such as particle size and gradation, organic content, soil structure, and soil permeability), vegetative cover, topography (slope length and steepness), and the frequency, intensity, and duration of precipitation. Many parts of the Lahontan Region are characterized by highly erodible soils, steep slopes, and harsh climates which limit the reestablishment of vegetation after disturbance.

Wind erosion, transport and deposition of sediment and toxic trace elements (such as arsenic) into downwind surface waters are problems in some desert areas of the Lahontan Region. Although wind erosion from desert playa lakebeds is a natural process, water diversions from tributaries of other desert lakes have partly or completely dried them up, increasing the likelihood of wind erosion. In some cases, human activities such as agriculture, mining, and illegal dumping, have increased the levels of pollutants subject to wind erosion. Owens Lake has been estimated to contribute five percent of all the particulate air pollution in North America (Polakovic 1993). Windblown arsenic concentrations from Mono Lake pose a human cancer risk of 1:10,000, which is one hundred times more dangerous than toxic factory emissions (Polakovic 1993). During drought years, windblown dust from the bed of Honey Lake in Lassen County can be carried about 40 miles to the Reno, Nevada area.

Sedimentation of surface waters affects beneficial uses by increasing turbidity, and physically altering streambed and lakebed habitat. Sediment affects prey capture by sight-feeding predators, clogs gills and filters of fish and aquatic invertebrates, covers and impairs fish spawning substrates, reduces survival of juvenile fish, reduces angling success, and smothers bottom dwelling plants and animals. Nutrients (such as phosphorus) and trace metals are often associated with sediment. Suspended sediment particles can act as substrates for the growth of bacteria which can concentrate dissolved nutrients from the water column. Toxic pollutants in stormwater have been found to concentrate in sediments. Sediment-bound pollutants can be remobilized under suitable environmental conditions.

Sediment can reduce the hydraulic capacity of stream channels, causing an increase in flood crests and flood damage. It can fill drainage channels, especially along roads, plug culverts and storm drainage systems, and increase the frequency and cost of maintenance.

Sedimentation can decrease the useful lifetime of a reservoir by reducing storage capacity for municipal supplies and increasing treatment costs to remove turbidity. Sedimentation of harbors and drainage systems results in higher maintenance costs and potential problems associated with disposal of removed material. The accumulation of sediment in recreational lakes affects boating activity in the shorezone, and can lead to demands for dredging to deepen marinas and channels.

Farmers are generally aware that soil loss is an economic as well as an environmental problem. Homeowners may not be aware of this unless their homes and neighborhood streets are damaged by mudslides or streambank or lakeshore erosion.

Understanding the cumulative impacts of all past, present, and proposed human activities in a watershed is important in predicting the impacts of erosion on surface waters. Various sediment loading models have been developed. The U.S. Forest Service, Pacific Southwest Region has developed a "Cumulative Watershed Effects" methodology to predict sediment loading from timber harvests. This method has been adapted in the Lake Tahoe Basin for the evaluation of the impacts of new ski resort construction and the effectiveness of offsetting watershed restoration projects (see "Recreation" section of this Chapter).

Erosion and Sedimentation Control Measures

Erosion and sedimentation control measures are discussed in detail later in this Chapter in connection with a variety of problem types. They may be summarized as follows:

- Avoidance or limitation of disturbance of soils and vegetation, especially during the wet season.

- Use of structural and/or vegetative Best Management Practices (BMPs) to stabilize soils during and after activities which involve soil disturbance. Erosion control BMPs may require maintenance and possibly eventual replacement.

- Retrofit of BMPs, implementation of remedial erosion control projects, and watershed restoration projects to correct problems from past soil-disturbing activities.

Erosion and Sedimentation Control Measures Implemented by the Regional Board

Eroded sediment and other earthen materials which reach surface waters as a result of human activities are considered waste discharges under the Porter-Cologne Water Quality Control Act. Such discharges are subject to the prohibitions discussed elsewhere in this Chapter.

Under the State Board's 1988 Nonpoint Source Management Plan, the general approach to erosion control is to rely on voluntary implementation of BMPs, and to use regulatory controls if necessary. Because of the sensitivity of the Lahontan Region's waters and the high erodibility of its soils, the Regional Board takes a regulatory approach to erosion control for many types of new development in the mountainous parts of the Region (see the sections on “Land Development” and “Recreation” in this Chapter).

Statewide municipal, industrial, and construction NPDES permits can involve the implementation of erosion control measures. The Regional Board can issue waste discharge requirements or conditional waivers for construction projects and activities which do not fall under these statewide permits, or to projects which pose special threats to water quality, in order to prevent or mitigate the impacts of erosion and sedimentation.

As described elsewhere in this Chapter, the Regional Board works with other agencies and private landowners, often under Management Agency Agreements, to ensure that BMPs for erosion control are implemented in connection with timber harvesting and other silvicultural activities, mining, agriculture, range management, and recreational activities on public and private lands. In cooperation with the Tahoe Regional Planning Agency, the Regional Board implements a comprehensive erosion control program in the Lake Tahoe Basin (see Chapter 5). Specific erosion control guidelines have also been adopted for the Mammoth area; they are included in the “Land Development” section of this Chapter.

Erosion and Sedimentation Control Measures Implemented by Other Agencies

Some of the most erosion-sensitive lands in the Lahontan Region are protected from major watershed disturbance because they are under public ownership and are being managed for wilderness or low intensity, undeveloped recreation uses. Acquisition of other sensitive lands by public agencies such as the Wildlife Conservation Board and by private land trust and conservancy agencies can further reduce the risk of erosion and sedimentation problems. Public land acquisition programs are an important factor in reducing sedimentation to Lake Tahoe.

The U.S. Forest Service, U.S. Bureau of Land Management, and California Department of Transportation adopted statewide “208 plans” in the 1970s which include commitments to implement BMPs for erosion control. The USFS has developed a detailed BMP handbook (USFS 1979). The California Department of Forestry and Fire Protection's Forest Practice Rules also address erosion control, and its “Urban Forestry Program” provides advice and assistance to owners of smaller private forest parcels.

The U.S. Soil Conservation Service, in cooperation with Resource Conservation Districts, provides advice on agricultural erosion control. In some areas, such as the Tahoe Basin, the Resource Conservation Districts can assist homeowners in design of BMPs. University Extension offices also provide assistance on erosion control.

Local governments, through their planning and zoning authority, have the ability to direct new development to areas where it will cause the fewest erosion problems. Grading ordinances can limit the extent of grading without a permit, require erosion and sediment control plans which meet specific standards, and require posting of performance bonds to ensure proper implementation of erosion control measures. The State has developed a model grading ordinance (California Resources Agency 1978). Many of the local governments within the Lahontan Region strengthened their grading ordinances as a result of the “208 planning” process in the 1970s. These ordinances should be updated from time to time as the “state-of-the-art” in erosion control evolves. Local governments with municipal NPDES stormwater control permits are now required to address erosion control as part of their stormwater management planning process.

The Tahoe Regional Planning Agency has recognized the importance of 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 off-road 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.

Remedial erosion control projects to correct problems associated with past land disturbance activities are being implemented throughout the Lahontan Region by public agencies such as the U.S. Forest Service and Caltrans, and by public/private cooperative efforts such Coordinated Resource Management Plans (CRMPs). Such efforts should be continued and expanded wherever feasible. See the discussion of watershed restoration programs in “Resources Management and Restoration” section of this Chapter.

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4.4 MUNICIPAL AND DOMESTIC WASTEWATER: TREATMENT, DISPOSAL, AND RECLAMATION

Municipal and domestic wastewater[1] discharges can cause chemical, bacteriological and toxic contamination to both ground and surface waters. Ground and/or surface water contamination can also occur from poor disposal practices, such as discharging wastes into unlined ponds, pits or sumps. Such waste discharges are regulated by the Regional Board or a designated agency with proper authority. Municipal wastewater, individual waste disposal systems, effluent limitations and policies under Regional Board authority are discussed below. Most of these requirements and policies are implemented through the Regional Board permitting process. However, some requirements may be implemented by local agencies. Methods used to determine compliance with limitations and requirements are further discussed in this Section.

Waste discharge prohibitions concerning sewage are listed in Section 4.1, "Waste Discharge Prohibitions." Effluent limitations and treatment policies concerning wastewater treatment and disposal are set forth below.

Effluent Limitations

Effluent limitations for disposal of treated point source wastes to surface waters are developed for individual point sources and included in waste discharge requirements or NPDES permits. They are numeric and narrative limits placed on the quality and quantity of the waste discharge or effluent. Effluent limitations are based on water quality objectives for the area of effluent disposal and applicable state and federal policies and effluent limits. Numeric and narrative water quality objectives and policies are based on beneficial uses established for the receiving waters.

Treatment process selection is discussed in general for wastewater discharges and more specifically for two types of disposal: surface water disposal and land disposal. Waste discharge prohibitions related to treated point source wastes also determine methods of treatment and disposal. Prohibitions concerning wastewater are contained in the Waste Discharge Prohibitions section, above. Treatment policies, including pretreatment, unlined sewage ponds, constructed wetlands, package treatment plants and wastewater reclamation, are discussed under "Treatment Policies" below.

In the past, federal water quality control programs for surface water protection emphasized a "technology-based" approach to regulation of waste disposal. The current emphasis is on "water quality based controls." States have been directed to identify "Water Quality Limited Segments," which are surface water bodies that are not attaining water quality objectives or protection of beneficial uses and are not expected to do so even with technology-based controls. For these waters, states must conduct point and nonpoint source wasteload allocations, and establish Total Maximum Daily Loads (TMDLs) of pollutants that can be permitted from each discharger to ensure attainment and maintenance of water quality objectives and protection of beneficial uses. TMDLs are used, together with a margin of safety, to set effluent limitations in discharge permits. Additions to and deletions from the Lahontan Region's list of Water Quality Limited Segments are considered every two years as part of the water quality assessment process (Chapter 7). Priorities for developing TMDLs for listed waters are also updated through this process. Section 4.13 of this Basin Plan includes approved TMDLs for specific surface waters.

Because the Lahontan Region has many high quality water bodies where state and federal antidegradation policies and regulations apply, effluent limitations are set to prevent degradation of water quality. Special considerations in effluent limitations for particular treatment plants (such as the Tahoe-Truckee Sanitation Agency) are discussed in the "Facilities Discussion" below.

General Requirements

Discharge requirements are prescribed for each discharger on a case-by-case basis; however, in every case, industrial and municipal effluent

[1] **Note:** "Municipal and domestic wastewater" is defined as sewage or a mixture of predominantly sewage and other waste from districts, municipalities, communities, hospitals, schools, and publicly or privately owned wastewater systems.

discharged to waters of the Region shall contain essentially none of the following substances:

- Chlorinated hydrocarbons
- Toxic substances
- Harmful substances that may bioconcentrate or bioaccumulate
- Excessive heat
- Radioactive substances
- Grease, oil, and phenolic compounds
- Excessively acidic and basic substances
- Heavy metals such as lead, copper, zinc, mercury, etc.
- Other deleterious substances

Furthermore, any person who is discharging or proposes to discharge waste, other than into a community sewer system, must file a Report of Waste Discharge (RWD) with the Regional Board unless this requirement is waived by the Regional Board. Upon receipt of the RWD, the Regional Board, with information and comments received from state agencies and the public, will prescribe discharge requirements including any appropriate limitations on biological and mineral constituents, as well as toxic or other deleterious substances. Additionally, revised waste discharge reports may be required prior to additions of waste, changes in treatment methods, changes in disposal area or increases in effluent flow.

Discharge requirements will be established that are consistent with the water quality objectives for the receiving water (see Chapter 3 of this Plan), including wasteload allocations or Total Maximum Daily Loads (TMDLs) established for the discharge, the State Board's “antidegradation” policy, the federal antidegradation and anti-backsliding regulations, and the principle of obtaining the optimum beneficial use of the Basin's water resources.

Land Disposal of Sewage Effluent

Land disposal of sewage effluent is conditionally exempt from the land disposal requirements contained in the California Code of Regulations, Title 27 (see section 20090). Land disposal of sewage effluent includes disposal to evaporation-percolation basins, irrigation of land, disposal to constructed wetlands, drying ponds or beds for municipal effluent sludge, and disposal to lined evaporation ponds.

Principal factors affecting treatment process selection for land disposal are the nature of soils and groundwaters in the disposal areas and, where irrigation is involved, the nature of crops (see Wastewater Reclamation Policy and Recycled Water Policy). Wastewater characteristics of particular concern are total salt content, nitrate, boron, pathogenic organisms, and toxic chemicals. Where percolation alone is considered, the nature of underlying groundwaters is of particular concern. Treatment processes should be tailored to ensure that local groundwaters are not unreasonably degraded. U.S. Environmental Protection Agency (USEPA) guidelines for secondary treatment (based on the federal Clean Water Act, Section 301) do not apply to land disposal cases. However, municipal treatment facilities must provide effective solids removal and some soluble organics removal for percolation bed operations and for reduction of nuisance in wastewater effluent irrigation operations. Disinfection requirements are dictated by the disposal method. Oxidation ponds may be cost-effective in some remote locations and may be equivalent to secondary treatment. The exact constituents and limitations must be established on a case-by-case basis. Nitrate removal is required in some cases where percolating waste may impact beneficial uses of groundwater due to increased nitrate levels. Percolation basins operated in alternating wet and dry cycles may provide significant nitrogen removal through nitrification/denitrification processes in the soil column. Finer textured soils are more effective in removing nitrogen than coarse soils. Monitoring in the immediate vicinity of the disposal site may be required in either case. Where the need for nitrate removal is not clear, removal could be considered at a possible future stage depending on monitoring results.

The closed hydrologic systems of the Lahontan Region allow the accumulation of minerals in groundwater. Therefore, discharge requirements for wastewater may generally specify a maximum limit for mineral constituents in order to meet the water quality objectives established for the receiving groundwater. In areas where insufficient data preclude the establishment of objectives, and as an interim measure until such data are available, effluent limits may specify a reasonable incremental increase for constituents above the level contained in the underlying groundwater. These limits may be superseded by more stringent requirements where necessary for effective water quality management of the receiving water. In all cases, groundwaters of the Region are specified as a source of drinking water unless the Regional Board has granted an exemption in accordance with the Sources of Drinking Water Policy (see Chapter 6, Plans and Policies). Therefore, effluent discharged to land must not adversely impact an underlying aquifer that is a designated drinking water supply, except as allowed by the Regional Board pursuant to the State Board's antidegradation policy, Resolution 68-16.

Surface Water Disposal of Sewage Effluent

The general purpose of sewage treatment is to provide a stable effluent that can be disposed of without hazard or actual damage to the environment, that will commingle with and remain a part of the usable water supply, and that will not impair the quality of the receiving water for present and probable future beneficial uses. Surface water disposal is prohibited in some watersheds; see Sections 4.1 and 5.2, Waste Discharge Prohibitions.

Primary factors governing treatment process selection for disposal to surface waters are federal and state effluent limits, state public health regulations, and water quality objectives for beneficial use protection. At a minimum, discharges of sewage to surface waters shall meet effluent limitations in accordance with the USEPA standards for secondary treatment as presently established for the particular method of treatment. The current USEPA standards for minimum level of effluent quality attainable by secondary treatment (40 CFR § 133.102) are as follows:

Constituent[1]	30-Day Arithmetic Mean	7-Day Arithmetic Mean
20°C BOD_5 (mg/L)	30	45
Suspended Solids (mg/L)	30	45

pH: The effluent values for pH shall remain within the limits of 6.0 to 9.0

Where water contact recreational use is to be protected, the California Department of Public Health (DPH) requires coagulation, filtration, and disinfection providing a median coliform Most Probable Number (MPN) of 2.2/100 ml or less in receiving waters. Detoxification is required where fishery protection is a concern. Detoxification would include effluent limits for identified toxicants, pursuant to Section 307 of the Clean Water Act. Source control of specific toxicants may be necessary to comply with the Act. Acute and/or chronic biological toxicity testing is required to ensure compliance with all applicable state and federal toxicity standards. Additional effluent limitations and waste discharge prohibitions may be specified in accordance with appropriate plans or policies of the State or Regional Boards (see Chapter 6, Plans and Policies).

[1] **Note:** The arithmetic mean of the values for effluent samples collected for 20°C BOD_5 and Suspended Solids in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

Septage and Sludge Disposal

Septage is generated from the use of holding tanks and septic tanks (see discussion of "Onsite Wastewater Treatment Systems" later in this section). Sludge is the semi-solid material which settles out or is filtered out of sewage or water during the wastewater or drinking water treatment process. Septage and sludge may contain any substance that may be poured down a drain or flushed down a toilet. Metals, acids, alkalies, and pesticides may be present in small quantities. High levels of ammonia, coliforms, and BOD will almost certainly be found. Wastewater treatment sludge will also contain any substances used by the treatment plant to cause the solids to settle out of the liquid wastewater during the treatment process. Drinking water treatment sludge may have low levels of substances found in wastewater treatment sludge. Because of the concentrated nature of any percolate from sludge and septage, any percolate to ground or surface waters can seriously impact beneficial uses. Since municipal wastewater sludge is considered solid waste, disposal is regulated under Title 27. Sewage sludge, also known as biosolids, are also regulated under federal law (Code of Federal Regulations, Title 40, Part 503).

Septage is generated from numerous sources including residential septic tanks, holding tanks for recreational vehicle waste dumping, marina and individual vessel holding tanks, and commercial and industrial septic tanks. Because of the various sources, the quality of septage is also highly variable. It is desirable to have septage pumped and transported to either lined evaporation ponds or a sewage treatment plant where treatment of septage can be accomplished rather than direct disposal to a lined impoundment. Treatment of such concentrated waste, however, poses a problem for many smaller or at-capacity wastewater treatment plants in the Region. Not all wastewater treatment plants in the Lahontan Region accept septage from waste haulers who pump out septic tanks and holding tanks. The Regional Board will encourage that local officials review all proposals for new holding tanks or septic tanks to ensure that adequate septage disposal capacity is available. If necessary, the Regional Board will consider making adequate septage disposal a condition of permitting new holding tanks or septic tanks. Proposals for new holding tanks or septic tanks that may be accepting industrial waste or chemical toilet wastes should be reviewed carefully by local agencies and Regional Board staff to ensure that proper treatment and final disposal of the septage generated can be accomplished without detriment to water quality. If septage is not commingled with wastewater for treatment at an approved wastewater treatment facility, septage must be placed in a Class II surface impoundment (lined containment structure, preventing the septage from contacting either surface or groundwater) (see California Code of Regulations, Title 27, Division 2, “Solid Waste”).

The Regional Board specifically prohibits the unauthorized discharge of waste, including from boats and marinas, to surface waters (see “Waste Discharge Prohibitions”). Floating latrines are one possible way of reducing discharges of sewage from boats into lakes. Floating latrines will generally be of benefit, however, only for lakes that are so large that boaters in mid-lake find it inconvenient to return to shore to make use of on-shore facilities. Proposals for installation of floating latrines will be reviewed by the Regional Board on a case-by-case basis. Floating latrines should be vandalism-proof, and good maintenance agreements will be required. Boater surveys are recommended prior to installation, to verify that such facilities will actually be used by boaters.

Treatment Policies

Pretreatment Policy

It is the responsibility of the State and Regional Boards to implement and administer the federal Pretreatment Program for controlling the discharge of toxic and hazardous pollutants by industrial users into publicly-owned treatment works (POTWs) with capacity of 5 million gallons per day (mgd) or greater and for facilities under 5 mgd when industrial users could discharge toxic constituents that pass through or interfere with the facility. The Pretreatment Program is typically administered through the National Pollutant Discharge Elimination System (NPDES), although it may be administered through Waste Discharge Requirements for facilities that discharge to land. The Pretreatment Program is administered by the State through a Memorandum of Agreement (MOA) between the USEPA and the State Board. Regional Board responsibilities are summarized below.

- Enforce national pretreatment standards prohibiting discharges (40 CFR § 403.5).
- Enforce national categorical pretreatment standards (40 CFR, Subchapter N, Effluent Guidelines and Standards).
- Review, approve or deny POTW pretreatment programs (40 CFR § 403.8, 403.9 and 403.11).
- Require POTWs to develop and enforce local discharge limits [40 CFR § 403.5(c)].
- Oversee POTW pretreatment programs to ensure compliance with 40 CFR § 403.8, and with other pretreatment requirements in the POTW's waste discharge permits or NPDES permit.
- Perform POTW audits, compliance inspections, and review of quarterly and annual reports to assure POTW compliance with pretreatment requirements.
- Provide the State Board and USEPA, upon request, with copies of all notices received from POTWs that relate to new or changed introduction of pollutants to the POTW or other pertinent information.
- Review and approve POTW requests for authority to modify categorical pretreatment standards to reflect removal of pollutants by a POTW (40 CFR § 403.7, 403.9 and 403.11).
- Apply all other pretreatment requirements as required by 40 CFR Part 403.

Few municipal wastewater treatment plants in the Lahontan Region are large enough (greater than 5 mgd) to require pretreatment of commercial and industrial wastewater under the federal regulations. However, there is increasing concern for all wastewater facilities regarding the impacts of not only industrial, but also household chemicals on effluent quality.

Unlined Sewage Ponds

There are numerous unlined sewage ponds throughout the Region that are believed to be a threat to groundwater quality because they allow the percolation of inadequately treated sewage to underlying groundwater. Some of these facilities are owned by either private parties or small public entities that have very limited financial resources.

There is typically no groundwater monitoring associated with these small facilities, so their actual impact on groundwater is unknown. To require that all of these facilities be immediately upgraded to where they produce a secondary level effluent would create, in most cases, a significant financial burden to the owners of the ponds. Such an approach may also result in upgraded facilities that are not needed to protect groundwater quality. Although it can also be expensive, groundwater monitoring at most of these facilities is needed to determine whether they are degrading the groundwater. If it is determined that the discharge from an unlined pond is impacting groundwater, action will be taken to require either elimination or improved treatment of the wastewater discharge. The requirement for upgrading treatment (or elimination of the discharge by placing it in a lined evaporation pond) should be made with provisions allowing for the improvements to be made within two years.

Recommended Control Actions to Address Unlined Sewage Ponds

1. Inventory all unlined ponds in the Region that are receiving sewage that has not received at least secondary-level treatment.

2. Prioritize the ponds by their threat to water quality, taking into account factors such as: (a) the volume of waste discharged, (b) the quality and existing beneficial uses of the receiving waters and (c) the likelihood of the sewage containing any industrial wastes.

3. Beginning with the highest priority facilities, revise waste discharge requirements to require the installation of at least three groundwater monitoring wells within two years.

4. If degradation of the groundwater is detected at any time after the first two years of semi-annual groundwater monitoring, waste discharge requirements will be revised to require that treatment of the discharge be upgraded to a secondary level or that the ponds be lined within two years. If no degradation (either actual or predicted violations of water quality objectives) is detected, the discharge will be allowed to continue with ongoing sampling of the groundwater monitoring wells.

   An exemption to the groundwater monitoring well requirement may be obtained if the discharger submits evidence that demonstrates to the satisfaction of the Regional Board's Executive Officer that the underlying groundwater will not be unreasonably affected or impermissibly degraded by any discharge from the pond.

Solar Biosolids Dewatering Beds

Some municipal treatment agencies that separate biosolids in their treatment processes have selected solar drying beds to dewater biosolids. The bed floors include synthetic liners, concrete, asphaltic-concrete, and sand. A few beds have drainage collection systems that collect infiltrating water and convey the water to the facility headworks.

Water from dewatered biosolids is typically high in dissolved solids and nutrients. Percolation of this water in solar drying beds may be contributing to the salt and nutrient loading in the receiving groundwater basin. Large facilities with solar dewatering are urged to line the drying beds or change to mechanical dewatering to avoid unnecessary loading of salts and nutrients to groundwater. Where groundwater may be threatened by discharges from solar dewatering, facilities should ensure their solar drying beds are lined to prevent percolating contaminants to groundwater.

Constructed Wetlands

The use of constructed wetlands as a method to provide final treatment and disposal for municipal wastewater continues to grow throughout the country and may be proposed for use in the Lahontan Region. Constructed wetlands are generally of two types: (1) free water surface wetland and, (2) subsurface flow wetlands. Both types of constructed wetlands consist of shallow beds or channels utilizing the roots and rhizosphere of aquatic plants as the surface media for bacteriological activity. Free water surface wetlands also use the chemical uptake by the emergent vegetation and, sometimes floating vegetation (duckweed or water hyacinth) and zooplankters (daphnia) for treatment. Treatment of wastewater through constructed wetlands often achieves effluent of better than secondary treatment quality. Concerns over the use of constructed wetlands in the Lahontan Region include harsh climatic conditions (from excessive heat to excessive cold) that may significantly alter the plants' ability to grow, disposal/harvesting of plant material, and high operation and maintenance costs. At a minimum, constructed wetlands should be designed and constructed using guidelines contained in the USEPA's 1988 manual entitled “Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment.” Some constructed wetlands are currently in use in the Lake Tahoe Basin for treatment of stormwater (see sections on Stormwater and Wetlands Policy). Constructed wetlands are also being considered for treatment of acid mine drainage (see section on Mining). Data gathered from these constructed wetlands will provide useful information for future applications of constructed wetlands.

Package Treatment Plant Policy

Commercially available prefabricated treatment plants, known as package treatment plants, were originally designed to serve areas that could not be easily connected to an existing municipal sewage treatment plant. Such areas include the subdivisions constructed in the once remote areas surrounding the major desert communities in the southern portion of the Lahontan Basin and commercial establishments such as restaurants, motels, and RV parks. More recently, package plants have increased to a size that can serve small municipalities. Many plants employing biological treatment were installed with the idea that the plants would operate themselves and therefore, could be turned on and forgotten. However, to meet the current pollution discharge regulations, these plants require daily attention by a knowledgeable, conscientious and certified operator. Without proper maintenance and sludge disposal practices, waste discharges from these plants may cause unacceptable odor and nuisance conditions, and/or violate water quality objectives and waste discharge requirements.

The Regional Board encourages persons to connect new developments to community sewer systems in lieu of the installation and use of package treatment plants. If community sewer systems are not available, and the area and development are unsuitable for individual waste disposal systems because:

1) the density of the subdivision or commercial development is greater than allowable for individual waste disposal systems, ***or***

2) the nitrate as nitrogen concentration of the underlying groundwater equals or exceeds 10 mg/L, then

the Regional Board will likely approve the use of package plants for treating waste discharges from the development. In areas with condition No. 2 above, the effluent from the package treatment plants will be required to meet a total nitrogen limitation of 10 milligrams per liter.

Package Treatment Plant Criteria

a. Design should be based on peak daily flow estimates. A flow equalization chamber at the headworks may be appropriate for some applications so as not to overload the treatment capacity of the plant.

b. Measures to control odor and/or eliminate nearby odor receptors must be included in the design and proposal.

c. Package plants must include adequate storage and/or treatment (digestion) area for waste sludge. Proposed sludge disposal measures must be included in the project plan.

d. For commercial, institutional or industrial systems, pretreatment may be necessary if the chemical composition of the wastewater is significantly different from domestic wastewater.

e. Package plants should contain duplicate equipment components for components subject to failure. If equipment is not on-site, the manufacturer should have the ability to provide replacement equipment to the operator so that a replacement component can be installed within forty-eight hours of failure.

f. Package treatment plants that rely on soil absorption for treatment and/or disposal of any of the wastewater generated will be required to meet the criteria established for individual waste disposal systems (see “Onsite Wastewater Treatment Systems” in this Chapter) applicable to soil absorption and groundwater protection (soils, depth to groundwater, slope of disposal field).

g. Effluent from package treatment plants must meet all current Regional Board criteria. In addition, to be used for reclamation purposes, it must meet all current regulations of the Regional Board and the Department of Public Health regarding reclamation of wastewater (see Wastewater Reclamation Policy, below).

Package Treatment Plant Responsible Entity

The package treatment plant should be owned or controlled by a public agency or a private entity with adequate financial and legal resources to assume responsibility for waste discharges. The owner is ultimately legally and administratively responsible for the performance of the treatment plant. The owner is also responsible for adding capacity and/or renovations to the treatment plant when needed, controlling sewer construction practices in the services area, keeping supplies at the plant, and supervising the operator. The operator of the plant shall be certified in the State of California with the appropriate classification for the specific treatment processes and effluent quality required of the plant.

Additionally, the owner should provide for outside help for special problems which may arise in the operation of the package treatment plant. The outside help may be a consulting engineer, or an operator of a larger treatment plant in a nearby town. The owner shall notify the Regional Board of the certified operator at the plant.

Package Treatment Plant Permitting

The Regional Board will consider the adoption of individual waste discharge requirements (WDRs) or general WDRs for all package treatment plants. WDRs will contain specific effluent limitations (see section on effluent limitations, above). WDRs will also include monitoring and reporting requirements. Monitoring of the effluent may include analyses for the following parameters: flow, biological and/or chemical oxygen demand (BOD/COD), total dissolved solids, suspended solids, total and fecal coliform bacteria, nitrate, total nitrogen, total phosphorus, methylene blue active substances (MBAS), and purgeable halocarbons and aromatics. Monitoring requirements may also include monitoring of the receiving water, including the underlying groundwater. Normally, four groundwater monitoring wells will be required; the Regional Board's Executive Officer may waive the requirement for groundwater monitoring based on site-specific conditions.

Wastewater Recycling

Parts of the Lahontan Region, like California in general, are experiencing an increasing water shortage. In the southern portions of the Lahontan Region, for instance, the Antelope Valley and the Mojave Groundwater Basins are possibly overdrafted due to increased pumping to meet the water demands of the growing Victor Valley, Lancaster and Palmdale areas. In light of this increasing statewide water shortage, development of water supply alternatives is important. For many uses, recycled wastewater is a viable alternative water supply and sales of recycled water can sometimes be used to offset the costs of treating wastewater. (The terms "recycled water" and "water recycling" are now used in the California Water Code in place of the formerly used terms "reclaimed water" and "water reclamation".) Residential graywater use decreases residential water demand and is discussed below in "Onsite Wastewater Treatment Systems."

Recycled water has a wide variety of applications. The applications include agricultural irrigation, landscape irrigation (including highway landscape, parks and golf courses), impoundments for landscape, recreational and/or wildlife uses, wetland and wildlife enhancement, industrial processes (e.g., cooling water, process water, wash water, dust control), construction activities and groundwater recharge.

Wastewater recycling is an important component of wastewater management in the Lahontan Region.

Recycled water in the Lahontan Region is used for golf course, alfalfa and other fodder crops, tree and other agricultural irrigation, and landscape irrigation, as well as for soil compaction and dust control. Some recycled water from the Lancaster Water Reclamation Plant is used for wildlife habitat enhancement at Piute Ponds and to supply a recreational lake at Apollo Lake County Park. Other uses of recycled water, such as for snow making in areas of Lake Arrowhead and Mammoth Lakes, have been proposed to the Regional Board. (See Waste Discharge Prohibitions Section for Mojave River HU for exemption language concerning reclaimed wastewater.)

The State Board adopted the "Policy with Respect to Water Reclamation in California" and the related "Action Plan for Water Reclamation in California" in 1977 (State Board Resolution No. 77-1). This policy specifies actions to be implemented by the State and Regional Boards, as well as other agencies, in relation to reclaimed water use. The policy directs the State and Regional Boards to encourage reclamation and reuse of water, and to promote water reclamation projects which preserve, restore, or enhance instream beneficial uses. The policy also states that the State and Regional Boards recognize the need to protect public health and the environment in the implementation of reclamation projects.

The State Board adopted the "Recycled Water Policy" in 2009 (State Board Resolution No. 2009-0011) and amended the policy in 2013 (Resolution No. 2013-0003). This policy provides direction to the Regional Boards regarding criteria to be used in issuing permits for recycled water projects. The criteria are intended to streamline the permitting of the vast majority of recycled water projects. The policy also requires the development of salt/nutrient management plans to protect groundwater basins.

The Water Code requires Regional Boards to consider the need to develop and use recycled water when establishing water quality objectives. The Water Code also requires the State Department of Health Services (now the Department of Public Health, DPH) to establish statewide recycling criteria for each type of recycled water use to protect public health. Any person proposing to discharge recycled water must file appropriate information related to the discharge with the Regional Board. After consulting with and receiving recommendations from DPH, and after any necessary public hearing, the Regional Board shall, if necessary to protect the public health, safety or welfare, adopt water reclamation requirements for the recycled water discharge.

The Water Code provides encouragement for the use of recycled water in relation to water rights decisions, as follows (Section 1010 [a][1]):

“The cessation of, or reduction in, the use of water under any existing right regardless of the basis of right, as the result of the use of recycled water, ... is deemed equivalent to and for purposes of maintaining any right shall be construed to constitute, a reasonable beneficial use of water to the extent and in the amount that the recycled ... water is being used not exceeding however, the amount of such reduction.”

The Water Code (Section 13522[b]) provides that the use of recycled water pursuant to uniform statewide reclamation criteria “does not cause, constitute, or contribute to, any form of contamination” unless the DPH or the Regional Board determines that contamination exists.

The Water Code (Sections 13523.1 and 13263[h]) allows Regional Boards to issue master reclamation or recycling permits for suppliers and/or distributors of reclaimed or recycled water. Master reclamation permits must include waste discharge requirements and requirements for the following: compliance with statewide reclamation criteria, establishment and enforcement by the permittee of rules or regulations for reclaimed water users, quarterly reporting on reclaimed water use, and periodic compliance inspections of water users by the permittee.

The Water Code (Sections 13550 through 13556) declares that use of potable water for certain purposes (e.g., irrigation of parks, golf courses, cemeteries, and residential landscaping, and toilet and urinal flushing in nonresidential structures) is a waste and unreasonable use of water if nonpotable water is available, under specific conditions. Section 13555.2 declares the Legislature's intent to encourage the design and construction of distribution systems for nonpotable water separate from those for potable water. Section 13556 allows water suppliers to acquire, store, provide, sell and deliver recycled water for any beneficial use if the water use is in accordance with state water recycling criteria and with Chapter 7 of the Water Code.

While the Regional Board supports the concept of water recycling, it must also consider potential impacts from recycling on ground and surface water quality. When reviewing proposed water recycling projects, the Regional Board carefully considers potential public health impacts from pathogens or conservative organic compounds, as well as the potential of the proposed project to create pollution or nuisance conditions. The Board also considers potential impacts on the quality and beneficial uses of any receiving surface or groundwaters including the potential for eutrophication of surface waters due to nutrient loading from recycled water. Discharges of recycled water are prohibited in areas of the Lahontan Region where waste discharge prohibitions are in place, unless exemption criteria, where applicable, can be met. The Water Code (Sections 13529.2 and 13529.4) includes provisions for reporting cleanup, and administrative civil liabilities for unauthorized discharges of recycled water which has been treated at secondary or tertiary levels.

Accumulation of minerals is a common potential impact to receiving waters from recycled water uses. Accumulation of minerals must be minimized to provide for protection of beneficial uses. A variety of techniques can be used. Where well controlled irrigation is practiced, nitrate problems can be controlled. Vegetative uptake will utilize soluble nitrates which would otherwise move into groundwater under a percolation operation. Demineralization techniques or source control of total dissolved solids may be necessary in some areas where groundwaters have been or may be degraded. Presence of excessive salinity, boron, or sodium in the effluent could be a basis for rejection of proposals to irrigate cropland with effluent. However, the Water Code allows issuance of water recycling requirements to a project which **only** violates salinity objectives.

Water Recycling Control Measures for Indian Creek Watershed

Recycled water from the South Tahoe Public Utility District (STPUD) is exported from the Lake Tahoe Basin to Alpine County, where it is used for irrigation. In order to protect the beneficial uses of the Indian Creek watershed, the Regional Board regulates the use of recycled water for irrigation in coordination with regulation of other discharges such as septic systems, irrigation return flows from lands not irrigated with effluent, and stormwater from pasture lands and manure storage areas. (High nutrient and coliform bacteria levels measured in Indian Creek and the lower West Fork Carson River indicate that better management of animal wastes is desirable in these watersheds.) The amount of nutrients leaching into groundwaters from areas irrigated with domestic wastewater effluent should be minimized.

Facilities Discussion

Wastewater treatment facilities in the Lahontan Region include two regional facilities and more than 50 other municipality, district, community, and commercial wastewater treatment facilities. Only two wastewater treatment facilities discharge to surface waters and are regulated by the Regional Board under the federal National Pollution Discharge Elimination System (NPDES) program. All other wastewater treatment facilities in the Region discharge to land and are regulated under the Waste Discharge Requirements (WDR) program. Information on wastewater treatment facilities regulated by the Regional Board may be accessed from a database on the State Water Resource Control Board's Internet site.

Onsite Wastewater Treatment Systems (Septic Systems)

Onsite Wastewater Treatment System Policy

The State Water Board adopted a *Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment* Systems (OWTS Policy) on June 19, 2012 that became effective May 13, 2013. The OWTS Policy established a statewide, risk-based, tiered approach for the regulation and management of OWTS installations and replacements and sets the level of performance and protection expected from OWTS.

For purposes of the OWTS Policy, an OWTS is an individual disposal system, community collection and disposal system, or alternative collection and disposal system that uses subsurface disposal. OWTS do not include "graywater" systems pursuant to Health and Safety Code section 17922.12. The OWTS Policy does not cover (1) any OWTS with a projected flow of over 10,000 gallons-per-day, (2) any OWTS that receives high-strength wastewater, from other than a commercial food service building, and (3) any OWTS that receives high-strength wastewater from a commercial food service building (a) with a biochemical oxygen demand (BOD) higher than 900 milligrams per liter or (b) that does not have a properly sized and functioning oil/grease interceptor.

The OWTS Policy sets standards for OWTS that are constructed or replaced, that are subject to a major repair, that pool or discharge waste to the surface of the ground, and that have affected, or will affect, groundwater or surface water to a degree that makes it unfit for drinking water or other uses, or that cause a health or other public nuisance condition. The OWTS Policy also includes minimum operating requirements for OWTS that may include siting, construction, and performance requirements; requirements for OWTS near certain waters listed as impaired under Section 303(d) of the Clean Water Act; requirements authorizing local agency implementation of the requirements; corrective action requirements; minimum monitoring requirements; exemption criteria; requirements for determining when an existing OWTS is subject to major repair; and a conditional waiver of waste discharge requirements.

The Regional Board incorporates the OWTS Policy into this Basin Plan (see Appendix B). Implementation of the OWTS Policy is overseen by the State Water Board and the Regional Board. Local agencies (e.g., county and city departments and independent districts) have the opportunity to implement local agency management programs (LAMPs) if approved by the Regional Board or the State Water Board. In addition to the OWTS Policy, this Basin Plan includes waste discharge prohibitions in certain areas that are applicable to OWTS.

The OWTS Policy includes provisions that (1) allow existing OWTS to continue in operation unless they are not properly functioning or the Regional Board finds they are not able to adequately protect water quality and (2) allows local agencies to continue to permit existing, new, and replacement OWTS under their existing program until the earlier of (a) the local agency LAMP has been approved by the Regional Board or (b) May 13, 2018, which is five years after the OWTS Policy effective date. The Regional Board may issue or deny waste discharge requirements or waivers of waste discharge requirements for any new or replacement OWTS within the jurisdiction of a local agency without an approved LAMP if that OWTS does not meet the minimum standards contained in Tier 1 of the OWTS Policy.

Onsite Wastewater Treatment Systems Regulated by Other than the OWTS Policy

For those OWTS, package treatment plants, and other sewage-based wastewater discharges not regulated under OWTS Policy, the Regional Board will apply the following principles and policies in review of water quality factors relating to land developments and waste disposal from individual waste disposal systems:

1. The following criteria will be applied as the minimum to ensure continued adequate protection of water quality, protection of present and future beneficial uses, and prevention of pollution, contamination and nuisance conditions. The Regional Board will prohibit the discharge from individual disposal systems that do not conform to these criteria.

2. These criteria prescribe minimum conditions for waste disposal from individual onsite systems and do not preclude the establishment of more stringent criteria by local agencies or the Regional Board. The Regional Board does not intend to preempt the authority of local agencies and will support local agencies to the fullest extent possible, particularly in the implementation of more stringent regulations.

3. Detailed procedures to implement these criteria and to process exemptions to these criteria are included in "Regional Board Guidelines for Implementation of Criteria for Individual Waste Disposal Systems" (see Appendix C).

4. The criteria contained herein are applicable to the entire Lahontan Region and pertain to any and all proposed building that involves wastewater discharges to other than a community sewer system. The criteria apply to: (1) proposed building on lots within new subdivisions or parcels, **and** (2) proposed building on existing subdivided lots or parcels, **and** (3) proposed subdivisions. The criteria do not apply to: (1) existing individual waste disposal systems, or (2) projects that have final building permits prior to June 16, 1988, unless evidence exists that necessitates retrofit of septic systems to conform with current criteria. The "Regional Board Guidelines for Implementation of Criteria for Individual Waste Disposal Systems" specifies separate exemption procedures for existing developments and for new developments. Existing development includes projects for which **final** development plans, such as a final tract map, were approved by local agencies **prior** to June 16, 1988. New development includes subdivisions or individual parcels which **do not** have final development plans approved by local agencies **prior** to June 16, 1988.

5. These criteria do not apply to projects within septic system prohibition areas where the criteria are more stringent (for prohibitions, see Section 4.1 of this Chapter); and these criteria will preempt less stringent criteria in septic system prohibition areas.

6. Where community sewer systems are available, the Board will encourage connection to the sewer system in lieu of use of individual disposal systems.

Criteria for Individual Waste Disposal Systems

1. ***Maximum Density***

   Individual waste disposal systems associated with new developments that have a gross density greater than two (2) single family equivalent dwelling units per acre will be required to have secondary-level treatment of wastewater. Equivalent dwelling units (EDUs) are defined as a unit of measure used for sizing a development based on the amount of waste generated from that development; the value used in implementation of these criteria is 250 gallons per day per EDU. For the purposes of these criteria, the discharge from a single family dwelling is equal to one EDU. Senior citizen dwelling units and second units as defined in Government Code Sections 65852.1 and 65852.2 will not be considered as additional dwelling units. In addition to residential developments, this secondary level treatment policy also applies to wastewater discharges from commercial, industrial, recreational and all other developments with wastewater discharge volumes exceeding two EDU per acre density (500/gal/day/acre based on 250 gal/day/EDU). Use of new septic systems is permitted in existing developments with lot sizes having a net area greater than or equal to 15,000 square feet. The net area is that contained within the boundaries as set forth in the legal lot description.

2. ***Minimum Distances***

   The Regional Board has established the minimum distances (see Table 4.4-1 entitled, "Minimum Distances for Siting Individual Waste Disposal Systems") necessary to provide protection to water quality and/or public health. Local hydrogeological conditions may necessitate greater separation of the sewage disposal system from a well or watercourse for protection of beneficial uses (e.g., drinking supply and water contact recreation).

3. ***Additional Minimum Criteria***
   a. The percolation rate in the disposal area shall not be slower than 60 minutes per inch if the discharge is to a leachfield or 30 minutes per inch if discharge is to a seepage pit. If percolation rates are faster than 5 minutes per inch, then the soil for a total thickness of five feet below the bottom of the leaching trench shall contain at least 15% of material passing the No. 200 U.S. Standard Sieve and less than one-fourth of the representative soil cross-section shall be occupied by stones larger than 6 inches in diameter. Where the percolation rates are faster than 5 minutes per inch and the above requirement is not met, the minimum distance to ground water between the bottom of the disposal facilities and the anticipated high ground water shall be 40 feet. (The percolation rates shall be determined in accordance with procedures prescribed by the appropriate local public health agency).

   b. Clay, bedrock, other material impervious to the passage of water, or fractured bedrock, shall not be less than 5 feet below the bottom of the leaching trench or less than 10 feet below the bottom of the seepage pit. Impervious is defined for design purposes as a stratum with percolation times of greater than 120 minutes per inch.

   c. Depth to anticipated high ground water below the bottom of the leaching trench shall not be less than 5 feet. Depth to anticipated high ground water below the bottom of the seepage pit shall not be less than 10 feet. Greater depths are required if native material does not provide adequate filtration.

   d. Ground slope in the disposal area shall not be greater than 30 percent.

   e. Minimum criteria specified above must be met within the area of the proposed system and within the 100% expansion area for the proposed system.

Exemptions to the Criteria for Individual Waste Disposal Systems

In certain locations and under special circumstances, the Board or its Executive Officer may waive individual criteria.

1. Waiver of one or more individual criteria may occur if:
   a. The area beneath the proposed septic system discharge has no significant amount of ground water having present or future beneficial uses; or

   b. It can be proven that no pollution, nuisance or unreasonable degradation of either surface or ground waters will occur as a result of the proposed septic system density when considered individually or cumulatively with other discharges in the area; or

   c. Construction of a community collection, treatment, and disposal system is imminent. Short-term, interim use of individual waste disposal systems may be allowed.

Implementation of Criteria for Individual Waste Disposal Systems

1. The Regional Board and the local agencies have adopted, through Memoranda of Understanding, criteria that are compatible with or more stringent than these criteria.

2. The Memoranda of Understanding include the procedures of the review and processing of applications for proposed discharge of wastewater from land developments that only discharge **domestic** waste, including single-family-unit residential, multi-unit residential, commercial, industrial and recreational developments. The Memoranda of Understanding include provisions for Regional Board review and processing of specific application (e.g., for industrial waste discharges).

3. For those local agencies that have adopted these or more stringent criteria, land developments that only discharge **domestic** waste, including single-family-unit residential, multi-unit residential, commercial, industrial and recreational developments, will be permitted entirely by the local agency. (However, the Regional Board reserves the authority to take action, if necessary, as described in item 6 below.)

4. Whenever the proposed development will not meet the minimum criteria and no Memorandum of Understanding or other equivalent document exists between the Regional Board and the local agency, applications for all projects shall be transmitted to the Regional Board along with a complete report of waste discharge and a filing fee.

5. The Regional Board will review, on a project-by-project basis, proposals for commercial, industrial, recreational and all other types of developments that discharge **industrial** waste. If required, the report of waste discharge will contain information on estimated wastewater flows, types of wastes, and occupancy rates that will enable the Regional Board to evaluate the discharge in terms of EDUs.

6. In any case, the Regional Board will prohibit the discharge of wastes from land developments that will result in violation of water quality objectives, will impair present or future beneficial uses of water, or will cause pollution, nuisance, or contamination, or will unreasonably degrade quality of any waters of the State.

Implementation for Other Types of Waste Disposal from Land Developments

1. Severe impact on water quality can result from failure to implement adequate measures to control storm drainage and erosion. Land developers must provide plans for the control of such runoff from initial construction up to the complete build-out of the development. (See “Land Development” section.)

2. The disposal of solid waste can have adverse impacts on water quality and public health. Land developers must submit a plan that conforms to the regional or county master plan and contains adequate provisions for solid waste disposal for complete build-out of the development.

3. The disposal of septic tank sludge is an important part of any area-wide master plan for waste disposal. Land developers must submit a plan that conforms to the regional or county master plan and contains adequate provisions for septic tank sludge disposal for complete build-out of the development.

4. The responsibility for the timely submittal of information necessary for the Board to determine compliance with these guidelines rests with persons submitting proposals for development or discharge. The Porter-Cologne Water Quality Control Act provides that no person shall initiate discharges of waste prior to filing a report of waste discharge and prior to (1) issuance of waste discharge requirements, (2) the expiration of 120 days after submittal of an adequate report of waste discharge, or (3) the issuance of a waiver by the Regional Board.

Alternative Individual Waste Disposal Systems

In areas where conditions do not support the use of conventional individual subsurface waste disposal systems (e.g., septic systems), the use of engineered alternative systems can be considered. Alternative waste disposal systems include, but are not limited to, mound systems, evapotranspiration beds, sand filters (intermittent and/or recirculating), and lined evaporation ponds. The Regional Board supports the use of engineered alternative systems for waste disposal as a remedy for otherwise unsuitable existing lots. However, the Regional Board discourages the use of engineered alternative systems for new construction, lots, or subdivisions.

Several factors the Local Health Officer and/or the Regional Board staff will consider when evaluating a proposal for the use of an alternative system include, but are not limited to:

1. **size of parcel**
2. **density of surrounding development**
3. **depth to ground water and bedrock**
4. **depth of soils** suitable for waste disposal as classified under the USDA classification system
5. **climate**
6. **access**
   (a) for maintenance and pumping year-round
   (b) control to prevent public contact
7. **emergency contingency plans** (including plans for expansion, replacement or repair)
8. **operation and maintenance requirements**
9. **distance to sewer**

Criteria for Alternative Systems

1. The conditions (soils, ground water, slope) that limit the use of conventional septic tank systems may also apply to alternative systems that rely on soil absorption for treatment and/or disposal of all or most of the wastewater generated (see Criteria for Individual Waste Disposal Systems).

2. **Mound Systems**. Mound systems shall be installed in accordance with criteria established in the State Board's *Guidelines for Mound Systems* (1980) or other criteria acceptable to the Executive Officer in conformance with standard engineering practices.

3. **Evapotranspiration Systems**. Evapotranspiration systems shall be installed in accordance with criteria contained in the State Board's *Guidelines for Evapotranspiration Systems* (1980) or other criteria acceptable to the Executive Officer in conformance with standard engineering practices.

4. **Sand Filters**. Sand filters shall be installed in accordance with the specifications for sand filters in the State of Oregon, Department of Environmental Quality's *On-site Sewage Disposal Rules* (July 1, 1991) or other criteria acceptable to the Executive Officer in conformance with standard engineering practices.

5. **Graywater Systems**. Graywater is untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthy processing, manufacturing, or operating wastes. Graywater includes wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers. (H&S Code § 17922.12.) Graywater systems may be an acceptable method of disposal in conjunction with a composting toilet or holding tank to handle black water. Examples of appropriate applications include recreational areas such as campgrounds, day use facilities, trailheads, and residential and commercial facilities where graywater can be managed and disposed in a manner protective of water quality. Graywater systems shall be installed in accordance with the California Plumbing Code (24 Cal. Code of Regs., Part 5) and the local administrative authority. If properly constructed and operated, graywater systems are not expected to create a nuisance or pollution.

6. Other proposals for alternative systems shall be evaluated jointly by the local regulatory agency and Regional Board staff on a case-by-case basis. Some engineered systems may be considered experimental by the Regional Board. Experimental systems will be handled with caution. A trial period of at least one year should be established whereby proper system operation must be demonstrated. Under such an approach, experimental systems are granted a one-year conditional approval.

7. All proposals for alternative systems shall be designed by a Civil Engineer, Engineering Geologist or Sanitarian licensed to practice in California.

Maintenance Requirements

System designers should be responsible for developing specifications and procedures for proper system operation. Designers should provide to system owners an informational operation and maintenance document that includes: (1) clear and concise procedures for operation and maintenance, and (2) instructions for repair and/or replacement of critical items within forty-eight hours following failure. Engineered systems should be inspected by a licensed Civil Engineer, Engineering Geologist or Sanitarian during installation to insure conformance with approved plans.

Permitting Authority

The County Health Officer may approve alternative systems when **all** of the following conditions are met:

1. The Health Officer has found the system to be in compliance with criteria approved by the Regional Board Executive Officer (see Criteria for Individual Waste Disposal Systems and Criteria for Alternative Systems above); ***and***

2. The Health Officer has either: (1) informed the Regional Board Executive Officer of the proposal to use the alternative system and the Executive Officer agrees that it complies with the finding in (a) above; or (2) a written agreement that the Executive Officer has delegated approval authority to the County Health Officer; ***and***

3. A public or private entity has agreed in writing to assume responsibility for the inspection, monitoring, maintenance, and eventual decommissioning/reclamation of the system.

If all of the above conditions cannot be met, the Regional Board will consider issuing waste discharge requirements for alternative systems.

Table 4.4-1
MINIMUM DISTANCES FOR SITING WASTE DISPOSAL SYSTEMS (in feet)

Facility	Domestic Well	Public Well	Perennial Stream[1]	Drainage Course or Ephemeral Stream[2]
Septic tank or sewer line	50	50	50	25
Leaching field	100	100	100	50
Seepage pit	150	150	100	50
Facility	Fill Bank[3]	Cut or Property Line[4]	Lake or Reservoir[5]	
Septic tank or sewer pit	10	25	50	
Leaching field	4h	50	200	
Seepage pit	4h[6]	75	200	

1 As measured from the line which defines the limit of a 100-year-frequency flood.

2 As measured from the edge of the channel.

3 Distance in feet equals four times the vertical height of the cut or fill bank. Distance is measured from the top edge of the bank.

4 Distance in feet from property line of any neighboring lot on which individual well(s) are used. (Distances are to property lines of neighboring lots, i.e., not street easements)

5 As measured from the high water line. (Regional Board Resolution No. 82-6 defines the high water line for Eagle Lake, Eagle Drainage Hydrologic Area as 5117.5 feet, a definition used in prohibiting the discharge of wastes from subsurface disposal systems on a lot with an elevation of less than 5130 feet. See Section 4.1 of this Basin Plan for waste discharge prohibitions for Eagle Lake.)

6 As measured from the high seepage level.

4.5 SOLID AND LIQUID WASTE DISPOSAL TO LAND

The Regional Board regulates the disposal of waste to land under Chapter 15, Division 3, Title 23, of the California Code of Regulations, known as "Chapter 15." Chapter 15 applies to wastes which cannot be discharged directly or indirectly to waters of the State and which therefore must be discharged to land for treatment, storage, or disposal.

Types of operations in the Lahontan Region which are subject to Chapter 15 include solid waste disposal sites (landfills), industrial wastewater ponds (surface impoundments), septage and sludge disposal (see "Septage and Sludge Disposal" in Section 4.4), mining and geothermal operations (see "Mining, Industry, and Energy Development"), and some confined animal facilities (see "Agriculture"). This section contains: (1) a summary of the pertinent sections of Chapter 15, (2) a discussion of Region-specific requirements and prohibitions, and (3) a discussion of the Solid Waste Assessment Test Program.

Chapter 15

Chapter 15 contains minimum, prescriptive standards for proper management of applicable wastes. Regional Boards may impose more stringent requirements to accommodate regional and/or site-specific conditions.

Dischargers may propose alternatives to the construction or prescriptive standards contained in Chapter 15 if they can show that the prescriptive standard is not feasible (i.e., too difficult or costly to implement, or not likely to perform adequately under the given circumstances). The proposed alternative must be able to provide equivalent management of the waste, and must not be less stringent than the prescribed standards.

Discharges to land which may be exempt from Chapter 15 are listed in Appendix D.

Wastes fall into four categories under the current classification system. These four categories are: Hazardous, Designated, Non-Hazardous, and Inert, and are defined in Appendix D. Hazardous and Designated wastes can often be generated by the same source and may differ only by their concentrations of given constituents.

Wastes must be disposed of differently depending on their liquids content and the waste category into which they fall. A table containing the Summary of Waste Management Strategies for Discharge of Waste to Land (see Appendix D) shows the proper level of containment for the various categories of waste. A table containing Geologic and Siting Criteria for Classified Waste Management Units is included in Appendix D.

Receiving water monitoring is required at all waste management units. Appendix D discusses the monitoring requirements for the various classes of waste management units, and describes the progressive phases of monitoring.

The routine ground water monitoring conducted during the entire compliance period of a project's life is referred to as "detection monitoring." If a leak is detected during the course of detection monitoring, an "evaluation monitoring" program must be established. If the evaluation monitoring verifies the presence of a leak, a "corrective action program" must be established and conducted until the problem has been successfully corrected.

Vadose zone monitoring must be conducted at all waste management units. Appendix D discusses the minimum requirements for an acceptable vadose zone monitoring program.

Special requirements for confined animal facilities are discussed in Article 6 of Chapter 15. These facilities are also subject to other portions of Chapter 15 as applicable. Confined animal facilities are discussed in detail in the section entitled "Agriculture."

Under Chapter 15, mining waste discharges are only subject to the requirements of Article 7, or other portions of Chapter 15 as referenced by Article 7. Mining wastes are also subject to regulation under the Surface Mining and Reclamation Act (SMARA, CA Public Resources Code, Title 14, Division 2, Chapter 9). Article 7 and SMARA are discussed in detail in the section entitled "Mining, Industry, and Energy Development."

An inactive waste management unit can still pose a threat to water quality. In fact, due to the nature of some wastes and the characteristics of some disposal sites, sometimes water quality problems do not become evident until years after a site has closed. Therefore, Chapter 15 requires that all waste management units have a plan for acceptable closure procedures and post-closure maintenance and monitoring.

Solid and Liquid Waste Requirements

Solid wastes are disposed of in a landfill or Solid Waste Disposal Site (SWDS). A landfill, as defined in Chapter 15, is a waste management unit at which waste is discharged in or on land for disposal. A landfill may be classified as Class I, II, or III, depending on the type of waste being accepted, but the term “landfill” typically refers to a Class III municipal solid waste landfill which accepts only inert or non-hazardous, municipal solid waste. Landfills are an integral component of most communities in the Lahontan Region, except for those of the Lake Tahoe Basin. Solid waste generated in the Lake Tahoe Basin is exported out of the Basin.

“Hazardous” solid wastes must be disposed of in Class I landfills or waste piles. “Designated” solid wastes must be disposed of in Class I or II landfills or waste piles. Liquid wastes may not be disposed of to Class III waste management units. Rather, liquid wastes must be discharged to Class I or II surface impoundments, depending on their classification.

Discharges from solid and liquid waste management units can impact both ground and surface waters. The receiving water most likely to be at risk from a waste management unit is the ground water beneath the site. Precipitation or runoff may enter the unit and contact the waste, percolate through it, and travel to ground water, carrying constituents of the waste with it. Solid waste may contain enough free liquids to form a leachate and travel to ground water. Vapors may migrate from a waste management unit into the soils and ground water below the unit. Gases forming in a closed waste management unit may pressurize the unit and force contaminants into the ground water. A liquid waste impoundment may leak its contents into the soils and ground water beneath the unit. Liquids may exit a waste management unit and travel to nearby surface waters. Uncontained solid waste may also be transported to surface waters by wind.

The Regional Board regulates all the active waste management units and some of the closed units in the Region under waste discharge requirements which contain pertinent Chapter 15 regulations. Some of the applicable requirements include:

1. Waste management units must be sited in locations where they will not extend over a known Holocene fault or into areas with inadequate separation from ground water.

2. Waste management units must be constructed to minimize (Class III) or prevent (Class I and II) the possibility of leachate contacting ground water. This may be done by siting the unit in an area where the depth to ground water is very great or where natural geologic features will provide containment. A Class III waste management unit may also have a clay or synthetic liner with a leachate collection and removal system (LCRS), if there is a possibility that ground water could be impacted by leakage from the unit. Class I and II units must be lined. A discharger may propose engineered alternatives to the Chapter 15 containment requirements, but the alternatives must provide equal or greater protection to the receiving waters at the site, per Article 1.

3. To minimize or prevent the formation of leachate, solid waste management units shall be covered periodically with soil or other approved materials. Runoff from offsite should be prevented from entering a waste management unit and contacting the wastes in the unit.

4. The potential receiving waters shall be monitored. A waste management unit shall have sufficient ground water monitoring wells at appropriate locations and depths to yield ground water samples from the uppermost aquifer to provide the best assurance of the earliest possible detection of a release from the waste management unit. Perched ground water zones shall also be monitored. Background monitoring should be conducted for one year prior to opening a new waste management unit.

   Chapter 15 requires that the vadose zone shall be monitored at all new sites and at any existing site, unless it can be shown to the satisfaction of the Regional Board that there are no vadose zone monitoring devices that would work at the site, or that installation of vadose zone monitoring devices would require unreasonable dismantling or relocating of permanent structures.

5. All operating waste management units must have an approved closure/post-closure monitoring and maintenance plan and their operators must provide the Regional Board with assurance that sufficient funds are irrevocably committed to ensure that the site will be properly reclaimed and maintained.

6. The operator of a waste management unit must obtain and maintain assurances of financial responsibility for foreseeable releases from the unit.

Municipal Wastewater Sludge Management

Wastewater sludge (biosolids) is a by-product of wastewater treatment. Raw sludge usually contains 93 to 99.5 percent water with the balance being solids that were present in the wastewater and that were added to or cultured by wastewater treatment processes. Most POTWs treat the sludge prior to ultimate use or disposal. Normally, this treatment consists of dewatering and/or digestion. In some cases, such as at Lake Arrowhead and Barstow, a portion of the sludge is incinerated.

Treated and untreated sludges may contain high concentrations of heavy metals, organic pollutants, pathogens, and nitrates. Storage and disposal of municipal sludges on land can result in degradation of ground and surface water if not properly performed. The Regional Board currently regulates handling and disposal of sludge pursuant to Chapter 15 and Department of Health Services (DHS) standards for sludge management (Cal. Code of Regs., Title 22, Division 4, Section 60301).

Sludge may be placed in a Class III landfill (see section on Chapter 15) if it can meet the following requirements, otherwise it must be placed in a Class II surface impoundment:

1. The landfill is equipped with a leachate collection and removal system, ***and***

2. The sludge must contain at least 20 percent solids if primary sludge, or at least 15 percent solids if secondary sludge, mixtures of primary and secondary sludges, or water treatment sludge, ***and***

3. A minimum solids-to-liquid ratio of 5:1 by weight must be maintained to ensure that the co-disposal will not exceed the initial moisture-holding capacity of the nonhazardous solid waste. The Regional Board may require that a more stringent solids-to-liquid ratio be maintained, based on site-specific conditions.

In addition to landfilling, sludge may be disposed of in a number of other ways, provided it meets the requirements specific to the given disposal method. Sludge may be incinerated, applied to land as a soil amendment, made into commercial fertilizer, or stockpiled in piles or drying beds. Generally, the Regional Board regulates the disposal of sludge under the requirements for the treatment plant which generates the sludge. However, for land application of sludge, separate waste discharge requirements for the landowner will be considered. The State's Integrated Waste Management Board (CIWMB) also regulates the disposal of sludge.

The USEPA has promulgated a policy of promoting those municipal sludge management practices that provide for the beneficial use of sludge while maintaining or improving environmental quality and protecting public health. On February 19, 1993, the USEPA published final sewage sludge regulations in 40 CFR Part 503. The regulations are intended to assure that use and disposal of sewage sludges comply with federal sludge use and disposal criteria developed by USEPA. The State Board or the CIWMB may develop a state sludge management program consistent with the USEPA policy and criteria for land application, surface disposal, and incineration of sewage sludge. Applicable federal regulations for the disposal of sewage sludge in municipal solid waste landfills are contained in 40 CFR Parts 257 and 258 (Subtitle D).

Subtitle D

These federal regulations apply to municipal solid waste landfills (Class III landfills under California's “Chapter 15”). The Subtitle D regulations outline the classification of municipal landfills, siting criteria, design criteria, operation procedures, water quality monitoring parameters and standards, closure and post-closure care requirements, and financial assurance guidelines, similar to Chapter 15. USEPA considers Subtitle D to be minimum standards for landfill operation. States may have equal or more stringent requirements, but may not have less stringent requirements. If a state's landfill regulation program meets USEPA's approval, that state may apply to become a USEPA “approved state” for landfill regulation, and Subtitle D provisions do not apply. However, if all or a part of a state's regulations do not meet USEPA's approval, more stringent portions of Subtitle D take precedence until that state modifies its program and obtains approval. California has obtained approval from USEPA.

Discharge Prohibitions that Apply to Solid Wastes

Discharge prohibitions that apply to solid wastes and prohibition exemptions are described in the Waste Discharge Prohibitions section of this Chapter, and in Chapter 5 (Lake Tahoe Chapter).

Solid Waste Water Quality Assessment Test (SWAT)

Section 13273 was added to the California Water Code with Assembly Bill (AB) 3525. This section required the State Board to rank the approximately 2,100 active and inactive solid waste disposal sites throughout the State on the basis of the potential threat they may pose to water quality. The State Board approved a ranked list of solid waste disposal sites, containing 13 ranks with 150 sites per rank, and an incomplete Rank 14.

On July 1, 1987, operators of landfills in Rank 1 were to submit solid waste assessment test (SWAT) reports. By July 1 of each succeeding year, the SWAT reports were due for landfills in the next rank, through rank fourteen, due July 1, 2001. The Porter-Cologne Water Quality Control Act (CA Water Code § 13273[b]) requires SWAT reports to contain the following:

1. An analysis of the surface and ground water on, under, and within one mile of the solid waste disposal site to provide a reliable indication of whether there is any leakage of hazardous constituents.

2. A chemical characterization of the soil-pore liquid in those areas which are likely to be affected if the solid waste disposal site is leaking, as compared to geologically similar areas near the solid waste disposal site which have not been affected by leakage or waste discharge.

The Regional Board must review the SWAT report to determine whether any hazardous waste has migrated into the receiving waters. If hazardous waste has migrated, the Regional Board must notify the Department of Health Services and the Integrated Waste Management Board, and take appropriate remedial action (CA Water Code § 13273[e]). As of August 1992, the Lahontan Region has approximately 161 solid waste disposal sites on the SWAT list, with an average of twelve sites in each rank. A number of solid waste disposal sites throughout the Lahontan Region were not included on the SWAT list, due to age, size, type of wastes being accepted, and other reasons.

Toxic Pits Cleanup Act

The Toxic Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste be retrofitted with a liner/leachate collection system, or dried out by July 1, 1988, and subsequently closed to remove all contaminants or contain any residual contamination.

4.6 GROUND WATER PROTECTION AND MANAGEMENT

The Lahontan Region includes over 1,581 square miles of ground water basins. Ground waters in the Region supply high quality drinking water and irrigation water, as well as industrial service supply, wildlife habitat supply, and aquaculture supply waters. Ground waters in the Region also provide a source of freshwater for the replenishment of inland lakes and streams of varying salinity.

Historic and ongoing agricultural, urban, and industrial activities can degrade the quality of ground water. Discharges to ground water from these activities include: underground and aboveground tank and sump leaks, agricultural and industrial chemical spills, landfill leachate, septic system failures, and chemical seepage via shallow drainage wells and abandoned wells. Severe ground water overdraft has occurred in portions of the Region. Ground water overdraft can affect beneficial uses of surface waters such as wetlands and springs, particularly in dry areas, by reducing natural flows into these areas. It can concentrate trace chemicals, including naturally occurring salts and contaminants resulting from human activities. Overdraft can lead to land subsidence and surface soil cracking. Some soil types (fine grained silts and clays), once compacted, can never again hold as much water upon rewatering of the aquifer. Increased ground water pumping in overdrafted aquifers can draw pollutants toward wells. Imported water used for ground water recharge, if it is of naturally lower quality than local ground water, is a discharge because it contains contaminants above background concentrations (Sawyer 1988). Discharges from some types of construction projects (e.g., placement of fill in wetlands) can reduce ground water recharge.

The resulting impacts on ground water quality from these discharges are often long-term and difficult to remediate. Remediation is often very costly. Consequently, as waste discharges are identified, prompt and expedient efforts to clean up and contain the source areas, as well as to prevent further ground water quality impacts, must be undertaken. Activities that may potentially affect ground waters must be managed to ensure that ground water quality is protected.

The following sections describe the beneficial uses, water quality objectives, and water quality control (implementation) measures specific to ground waters. Much of the information on beneficial uses, water quality objectives, and some of the control measures are described in more detail elsewhere in this Basin Plan. Appropriate references to other parts of this Basin Plan are included.

Beneficial Uses

For purposes of this Basin Plan, “ground water” includes all subsurface waters in the Lahontan Region. Ground water basins in the Region are shown on maps located in Plates 2A and 2B. Beneficial uses applicable to ground waters in the Region include: municipal and domestic water supply (MUN), industrial process supply (IND), agricultural supply (AGR), freshwater replenishment to surface waters (FRSH), wildlife habitat (WILD), water contact recreation (REC-1), water quality enhancement (WQE), and aquaculture supply (AQUA). Beneficial uses of specific ground water basins in the Region are designated in Table 2-2 of this Basin Plan.

Unless otherwise designated by the Regional Board, all ground waters are considered suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making exceptions, the Regional Board will consider the criteria referenced in Regional Board Resolution No. 6-89-94, “Incorporation of “Sources of Drinking Water Policy” into the Water Quality Control Plans (Basin Plans),” where:

- The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 uS/cm, electrical conductivity) and the ground water is not reasonably expected by the Regional Board to supply a public water system; *or*

- There is contamination, either by natural processes or by human activities (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable practices; *or*

- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; *or*

- The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR § 146.4 for the purpose of underground injection, or fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR § 261.3.

Water Quality Objectives for Ground Water

The Nondegradation Objective (State Board Resolution No. 68-16, “Statement of Policy with Respect to Maintaining High Quality of Waters in California” is described in Chapter 3 of this Basin Plan and applies to ground waters. Other water quality objectives for ground water consist primarily of narrative objectives combined with a limited number of numerical objectives, and are included in Chapter 3 of this Basin Plan. Ground waters shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the ground water objectives described in Chapter 3. These objectives define the upper concentration or other limit that the Regional Board considers protective of beneficial uses. These objectives apply to all ground waters, rather than only at a wellhead, at a point of consumption, or at point of application of discharge.

As mentioned above, a limited number of numerical objectives are included in this Basin Plan. The Regional Board is limited in its resources to independently establish numerical ground water objectives for all constituents in all ground water basins.

Numerical ground water objectives for individual ground water basins may be developed in the future. As the Regional Board obtains information which provides more detailed delineation of beneficial uses within basins, revised objectives may be developed to protect these beneficial uses.

Regional Board Control Measures for Ground Water Protection and Management

To protect ground water resources, the Regional Board allows few waste discharges to land. (See the “Solid and Liquid Waste Disposal to Land” section of this Chapter.) Those that are permitted (e.g., landfills) are closely regulated under existing laws and regulations to maintain and to protect ground water quality for beneficial uses. Another category of discharges to land is individual waste disposal systems (e.g., septic systems). In most instances, the Regional Board has waived its regulation of individual waste disposal systems provided that counties (and some cities) in the Region regulate the systems. Specific provisions of the regulation are included in Memoranda of Understanding (MOUs) with each county or city. The MOUs stipulate that regulation of the systems must comply with all Regional Board requirements (see “Wastewater” section of this Chapter).

Discharges of hazardous and nonhazardous waste, and the waste management units at which the wastes are discharged (e.g., landfills, surface impoundments), are regulated by the Regional Board through waste discharge requirements to properly contain the wastes, and to ensure that effective monitoring is undertaken to protect water resources of the Region (also see “Solid and Liquid Waste” section of this Chapter). These waste discharges are also concurrently regulated by other State and local agencies. Local agencies implement the State's solid waste management programs as well as local ordinances governing the siting, design, and operation of solid waste disposal facilities (usually landfills) with the concurrence of the California Integrated Waste Management Board (CIWMB). The CIWMB also has direct responsibility for review and approval of plans for closure and post-closure maintenance of solid waste landfills. The Department of Toxic Substance Control (DTSC) issues permits for all hazardous waste management, treatment, storage, and disposal facilities. The State Board, Regional Boards, CIWMB and DTSC have entered into a Memorandum of Understanding to coordinate their respective roles in the concurrent regulation of these discharges.

The laws and regulations governing both hazardous and nonhazardous solid waste disposal have been revised and strengthened in recent years. Implementation of these laws and regulations through the following programs is summarized below: California Code of Regulations, Title 23, Chapter 15; Resource Conservation and Recovery Act; Toxic Pits Cleanup Act; Solid Waste Assessment Tests. (See the “Solid and Liquid Waste” section of this Chapter for detailed control actions).

California Code of Regulations, Title 23, Chapter 15

Referred to as “Chapter 15,” this is the most significant regulation used by the Regional Board in regulating hazardous and nonhazardous waste treatment, storage, and disposal. These regulations include very specific siting, construction, monitoring and closure requirements for all existing and new waste treatment, storage, and disposal facilities. Chapter 15 requires operators to provide assurances of financial responsibility for initiating and completing corrective action for all known or reasonably foreseeable releases from their waste management units. Detailed technical criteria are provided for establishing water quality protection programs, and corrective action programs for releases from waste management units. Chapter 15 requires the review and update of waste discharge requirements for all hazardous waste treatment, storage, and disposal sites by January 1, 1993 and for all nonhazardous waste, storage, and disposal sites by July 1, 1994. Chapter 15 defines waste types to include hazardous wastes, designated wastes, nonhazardous solid wastes, and inert wastes.

The Federal Resource Conservation and Recovery Act (RCRA)

The State implements RCRA's Subtitle C (Hazardous Waste Regulations for Treatment, Storage, and Disposal) through the DTSC and the Regional Boards. In August 1992, the USEPA formally delegated RCRA Subtitle C program implementation authority to DTSC. As described above, regulation of hazardous waste discharges is also included in the California Code of Regulations (“Chapter 15”). (Chapter 15 monitoring requirements were also amended in August 1991 so as to be equivalent to RCRA requirements). These will be implemented through the adoption of waste discharge requirements for hazardous waste sites covered by RCRA. The discharge requirements will then become part of a State RCRA permit issued by DTSC.

Federal regulations required by the RCRA's Subtitle D have been adopted for municipal solid waste landfills (40 CFR Parts 257 & 258). The USEPA has approved California's Subtitle D program (see Section 4.5 for more information about Subtitle D). USEPA delegation of authority to the State Board for implementation of Subtitle I (Underground Storage Tanks) is pending.

Toxic Pits Cleanup Act

The Toxic Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste be retrofitted with a liner/leachate collection system, or dried out by July 1, 1988, and subsequently closed to remove all contaminants or contain any residual contamination.

Solid Waste Assessment Tests (SWATs)

Section 13273, added to the California Water Code in 1985, requires all owners of both active and inactive nonhazardous landfills to complete a Solid Waste Assessment Test (SWAT) to determine if hazardous wastes have migrated from the landfill into ground water. There were 161 sites identified in the Lahontan Region subject to this program. Pursuant to a list adopted by the State Board, 150 site owners statewide per year would complete this evaluation by 2001. The SWAT program is discussed in detail in the “Solid and Liquid Waste” section of this Chapter.

Underground Storage Tank Program

Implementation of the Underground Storage Tank (UST) Program is unique, as the Health and Safety Code gives local agencies the authority to oversee investigation and cleanup of UST leak sites. The Corrective Action regulations (23 Cal. Code of Regs., Ch. 16, Article 11) use the term “regulatory agency” in recognition of the fact that local agencies have the option to oversee site investigation and cleanup, in addition to their statutory mandate to oversee tank permitting, leak reporting, and tank closure. Several local agencies now have the authority (through Local Oversight Program contracts with the State Board or Memoranda of Understanding with the Regional Board) to act on the Regional Board's behalf in requiring investigations and cleanup. The Regional Board retains the authority to approve case closure.

Reports of leaking USTs are submitted by local agencies (city, county, etc.) and by private parties to the Regional Board. Submittals are on a standard form that complies with Proposition 65 notification (Underground storage tank Unauthorized Releases [Leak]/Contamination Site Report). The local agencies forward copies of the leak reports to the Regional Board. (See also “Proposition 65 Program” in Section 4.2.)

The cleanup and enforcement elements of the program are shared between the Regional Board and the local agencies. Regional Boards are responsible for oversight of investigation and remediation where unauthorized releases from USTs pose a threat to, or have impacted, water quality. Local agencies, such as County Health Services, are responsible for tank permitting, monitoring, and removal, and the investigation and remediation of releases that do not pose a threat to water quality. Additionally, several local agencies have contracted with the State Board under the Local Oversight Program (LOP) to oversee the investigation and remediation of releases that threaten or have impacted water quality.

The California Code of Regulations, Title 23, Division 3, Chapter 16, contains State regulations regarding underground tank construction, monitoring, repair, release reporting, and corrective action. The objectives of the regulations are to:

- Place all USTs storing hazardous substances, covered by law, under permit;
- Ensure that all existing USTs, covered by law, meet standards for the detection of releases of hazardous substances;
- At the time of application for an UST permit, ensure that all new USTs covered by law, meet standards to prevent releases of hazardous substances;
- Ensure that the UST program complies with the federal UST requirements and secure authorization from USEPA to regulate USTs in the State;
- Identify leaking USTs and decide whether the Regional Board or local implementing agency will have the lead for supervision of cleanup within 90 days of the discovery of a leak. Undertake cleanup supervision of 10-25% of existing backlogged and new leak cases each year. The annual caseload will depend on the severity of the water quality problems and the availability of Regional Board resources to oversee cleanup;
- Provide funding for eligible local agencies, under a local oversight program, for the oversight of leaking UST cleanup;
- Ensure that appropriate cleanup actions are undertaken in a timely manner at UST sites which have no identifiable Responsible Party (RP) or which have an insolvent RP (orphan site);
- Ensure that all tank integrity tests, conducted within the State, are performed by or under the direct supervision of a licensed tank tester;
- Require all existing underground pressurized piping to be equipped with an automatic leak detector;
- Ensure that all UST owners and operators shall maintain evidence of financial responsibility for taking corrective action and for compensating third parties for bodily injury and property damage caused by a release;
- Require secondary containment for pressurized piping, corrosive protection for tanks, and spill and overfill prevention equipment for UST systems.

Number of UST Cases in the Region

As of July, 1993, a total of 591 leaking USTs had been documented in the Lahontan Region. Of these 591 releases, approximately 150 (25%) have impacted ground water. A list of these UST releases and the status of investigation and remediation at each site is published quarterly by staff of the Regional Board.

Areas With the Greatest Number of UST Releases Affecting Ground Water

Throughout the Lahontan Region several areas have been identified as containing a significant number of leaking USTs that have impacted ground water. Generally, these areas are light industrial/service areas that typically have shallow ground water and/or coarse soils. Because of the significant number of documented releases in these areas, a substantial amount of geologic and hydrologic data have been generated.

UST Cleanup Trust Fund (SB 2004)

In 1991 the State Legislature passed SB 2004, which required that 0.006 cents be paid by tank owners to the State for each gallon of petroleum products stored in a UST. This tax program generates revenue to provide a maximum of $990,000 grant money per claim for investigation and remediation to those persons who operated or owned USTs that have leaked. The fund reimburses monies that are spent by the discharger during investigation and cleanup. Staff of the Regional Board and State Board are responsible for reviewing technical proposals for investigation and remediation to ensure plans are technically and economically effective.

Dischargers applying for the fund are separated into “A,” “B,” “C,” and “D” categories. These categories are generally based on gross annual income, with “A” applicants having the least income. Since the fund is designed to assist those dischargers with the least financial ability to conduct investigation and remediation, “A” applicants have the highest priority for funding. Since many tank owners and operators lack resources, assistance from the fund increases opportunities for remedial actions.

UST Remediation Goals

Regional Board staff is responsible for ensuring that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of background water quality, or the highest water quality which is reasonable if background levels of water quality cannot be restored. Factors to be considered include: environmental characteristics of the hydrographic unit under consideration, past, present and future beneficial uses of the water, economic factors, and the need to prevent nuisance (CA Water Code § 13241).

Source Removal

The most important factor in ground water remediation is source removal. Sources of ground water pollution at UST sites include leaking tanks and piping, existing soil pollution, and free-phase petroleum products that may be floating on top of the water table. These major sources can feasibly be removed in the short-term at minimal costs as compared to the long-term process necessary to clean up the dissolved phase portion of ground water pollution.

Interim Remedial Actions for USTs

At a site where a leak has occurred from a UST, sources of ground water pollution can be removed in the short-term while investigation of the extent of ground water pollution and ground water remedial design is on-going. Interim remedial actions are considered a cost-effective method of protecting water quality and beneficial uses. Interim remedial actions include the following:

- *Removal of Free-Phase Petroleum Hydrocarbons.* Petroleum products typically spread laterally on top of the water table and within the capillary fringe prior to dissolving into the ground water. Until completely dissolved, this “free product” provides a continuing source of pollution both to the ground water and capillary fringe soils. Removal of this free product can be accomplished while any further investigation of soil and ground water pollution is being conducted.
- *Remediation of Contaminated Soil.* If polluted soils are in direct contact with the ground or surface waters, these soils may pose a continuing threat to water quality and adversely impact beneficial uses. Volatile organic constituents may move within unsaturated soils by leaching or in a vapor phase, which may adversely impact water quality and beneficial uses. This soil pollution can feasibly be removed while investigation of ground water pollution is continuing.
- *Ground Water Pollution Containment.* Containment of ground water pollution as an interim remedial action is necessary if: (a) petroleum constituents in the ground water pose an immediate threat to water supplies or public health and safety, or (b) the pollution plume appears to be migrating off-site at a rate that will limit the dischargers ability to later remediate the pollution. Containment may also be required as a part of overall site remediation.

Dissolved Phase Ground Water Remediation

In cases where ground water has been impacted, dissolved phase ground water pollution must be remediated. Remedial activities shall be conducted to assure that pollution is cleaned up in a manner that: (a) is consistent with maximum benefit to the people of the State, (b) does not unreasonably affect present and anticipated beneficial uses of such water, and (c) does not result in water quality less than that prescribed in the water quality control plans and policies adopted by the State and Regional Boards.

Ground Water Monitoring

In order to determine the effectiveness of any ground water remedial action, ground water monitoring will be necessary. Ground water monitoring may also be necessary to track the movement of pollution plumes, and can be used to monitor any natural degradation of ground water pollution.

Reports of Waste Discharge

The Regional Board requires that dischargers file a report of waste discharge (RWD) when any waste is proposed to be discharged to land or surface waters. RWDs are required for treated ground water discharges to land and surface waters, for in-situ soil and ground water bioremediation projects where substances other than oxygen are being discharged, and for large scale ex-situ bioremediation projects where liquids are being discharged. For specific treatment discharges, a listing of information to support a RWD is available from the Regional Board office. Once a RWD is filed, the Regional Board may issue a waiver or may adopt Waste Discharge Requirements (WDRs) for the discharge.

Cleanup Levels

In addition to the following discussion of cleanup levels for soil and ground water at a UST site, reference should be made to Section 4.2 of this Basin Plan.

Section 2725, Article 11, Chapter 16, Title 23 of the California Code of Regulations outlines what elements are required to be included in a Corrective

Action Plan (CAP). Section 2725(g) requires the establishment of target cleanup levels for ground water in the final CAP. Any CAP that proposes final ground water cleanup levels above background must include justification demonstrating that the Plan: (1) is consistent with maximum benefit to the people of the State, (2) will not unreasonably affect present and anticipated beneficial uses of such water, and (3) will not result in water quality less than that prescribed in the water quality control plans and policies adopted by the State and Regional Boards.

Prior to the initiation of a corrective action, it may not be feasible to generate sufficient technical justification to support not remediating ground water to background concentrations. Target levels are recommended to be set at minimum laboratory detection limits (background) for petroleum related constituents. Technical and economic feasibility of attaining background can best be determined during the remedial process. Dischargers shall consider those items listed in Title 23, Chapter 15, Article 5, Section 2550.4d (Cal. Code of Regs.) in presenting their justification. Final justification for not remediating to background levels may include, but not be limited to, chemical transport modelling, evidence of asymptotic concentrations of pollutants over a duration during remediation, and social/economic considerations.

Final cleanup levels may be allowed between background and established water quality standards in certain cases. (Established standards include primary and secondary drinking water standards and USEPA Health Advisory levels.) Any proposal to remediate ground waters to levels between background and an established numerical water quality standard must include a justification for such degradation. Any justification must consider those items listed in Title 23, Chapter 15, Article 5, Section 2550.4d (Cal. Code of Regs.).

The City of Bishop

The majority of documented releases in the Bishop area have occurred in the light industrial/service area along Hwy. 395 (Main Street). Depth to ground water along Main Street ranges from three to eight feet below ground surface (bgs). Ground water dominantly flows east toward the Owens River.

Soils in the Bishop area are variable. Coarse alluvial cobbles and boulders are present on the alluvial fan of the eastern Sierra Nevada range at the western edge of Bishop. However, throughout the City, soils appear to be predominantly clayey sands and clayey silts with low permeability characteristics. A shallow unconfined aquifer is present beneath the City of Bishop at depths ranging from three to eight feet below ground surface. The ground water gradient of this aquifer throughout the City of Bishop is gently sloping. Additionally, the low permeability soils result in slow ground water velocities.

Municipal supply wells for the City of Bishop are located east and north of known petroleum dispensing facilities. No known water supply wells are located in areas of known or suspected ground water pollution.

Dischargers at several UST sites in the City of Bishop have installed ground water monitoring wells. The results of well sampling indicate that pollution plumes have little or no natural degradation without active remediation, but these plumes also migrate very slowly.

UST Policy for Bishop. Based on the principles of State Board Resolution No. 92-49, Board staff has developed a policy to set time schedules for completing soil and ground water cleanup. To the extent feasible, schedules will be set to coincide with the availability of resources, including UST Trust Funds. The policy specifically applies to potential Trust Fund “A,” “B,” and “C” applicants in specific hydrogeologic areas of Bishop. The policy is as follows:

1. When USTs are removed, all identified soil pollution will be excavated to the property boundaries to the depth of the ground water table (depth to ground water in Bishop ranges from 3 to 8 feet below ground surface). Contaminated soil beneath existing onsite buildings will not be required to be removed at this time.

2. Soil samples will be collected from all excavation sidewalls to document effective removal of contaminated soils or the location of any remaining soil contamination that persists offsite.

3. The discharger will remove any fuel found floating on the water table surface.

4. Field investigation methods (such as Hydropunch™ and cone penetrometers) can be effectively used to preliminarily define the lateral extent of ground water pollution. This data will then be used to locate a maximum of three ground water monitoring wells that approximately define the down-gradient extent of ground water pollution. It is expected that these wells will be installed offsite.

5. Monitoring of the ground water will be conducted by the discharger. Monitoring includes laboratory analysis of ground water samples collected from the installed monitoring wells. The discharger will continue to remove any identified fuel found floating on the water table surface.

6. The UST owner/operator would not be required to perform additional soil or dissolved phase ground water remediation until SB 2004 funding is available, provided that the discharger supplies the Regional Board documentation that a grant application has been filed with the State Board.

7. Dissolved phase ground water remediation would only be required prior to receiving SB 2004 funding if it becomes evident that the discharger will not qualify for SB 2004 funding, or the pollution poses an imminent threat to public health. This policy does not change the overall remedial goals of the Regional Board.

UST Discharges in Hydrogeologic Areas Other than Bishop

Ground water pollution plumes may migrate slowly in other areas of the Region besides Bishop. However, data must be generated in these additional areas that conclusively demonstrates that these conditions exist. In areas where it can be conclusively demonstrated that hydrological conditions similar to Bishop exist, the above policy may be applied to remediation of UST release sites. In areas where pollution plumes do not migrate slowly, failure to initiate ground water remediation in the short-term may result in a substantially more extensive condition of pollution, and may also increase the threat to public health and safety.

Aboveground Storage Tanks

Spills and leaks from aboveground petroleum storage tanks and their associated piping can cause contamination of surface and ground waters. In the past, aboveground storage tanks in California were operated without requirements for secondary containment or for maintaining spill contingency plans.

The State enacted the Aboveground Petroleum Storage Act (APSA) in 1990 (CA Health and Safety Code § 25270, Chapter 6.67). The APSA requires owners or operators of specified aboveground petroleum storage tanks to file a storage statement describing the location and capacity of their facility, submit a filing fee, and perform specified spill prevention and response actions. The APSA also grants authority to the Regional Boards to, under certain circumstances, require the installation of leak detection systems, secondary containment, and/or ground water monitoring.

The APSA does not apply to tanks containing products such as propane, which are not liquid at standard temperatures and pressures.

The Regional Board will conduct periodic inspections of aboveground tanks. The schedule of inspections will focus on those facilities which are near navigable waters, potable water supplies, and/or near sensitive ecosystems.

Spills, Leaks, Investigation, and Cleanup (SLIC) Program

Sites managed within the SLIC Program include sites with pollution from recent or historic spills, subsurface releases (e.g., pipelines, sumps), complaint investigations, and all other unauthorized discharges that pollute or threaten to pollute surface and/or ground waters. Investigation, remediation, and cleanup at SLIC sites proceed as directed in State Board Resolution No. 92-49 as described below. (For further details regarding the SLIC Program, see Section 4.2, “Spills, Leaks, Complaint Investigations, and Cleanups.”)

Federal Superfund Program

The federal “Superfund” program was established in 1980 with the passage of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The CERCLA provided funding and guidelines for the cleanup of the most threatening hazardous waste sites in the nation. High priority sites scheduled for cleanup under this program are placed on the National Priority List (NPL).

To clean up pollution at federal military sites, the State has signed a Memorandum of Agreement with the Department of Defense which established procedures under which site investigation and cleanup will proceed. Investigation and cleanup at these sites must meet the requirements of the USEPA “Superfund” hazardous waste cleanup program. This involves completion of a formal Preliminary Assessment, Site Investigation, and Remedial Investigation and Feasibility Study, leading to a Record of Decision on an acceptable Remedial Action Plan. (For further details, see Section 4.12, “Military Installations.”).

Implementation of State Board Resolution No. 92-49 "Policies and Procedures for Investigation, Cleanup and Abatement of Discharges Under Water Code Section 13304"

This Resolution contains policies and procedures that all Regional Boards shall follow for the oversight and regulation of investigations and cleanup and abatement activities resulting from all types of discharge or threat of discharge subject to Section 13304 of the Water Code. State Board Resolution No. 92-49 outlines the five basic elements of a site investigation. The Resolution requires that the Regional Board ensure that the discharger is aware of and considers minimum cleanup and abatement methods. (For further details, see Section 4.2, "Spills, Leaks, Complaint Investigations, and Cleanups.")

Ground Water Overdraft and Related Water Quality Problems

Ground water overdraft can affect water quality, particularly in terms of total dissolved solids and organic compounds. (See also "Water Quality/Quantity Issues; Water Export and Storage," in Section 4.9 of this Chapter for additional discussion of ground water problems.)

The Regional Board will consider issuance of waste discharge requirements for ground water recharge with imported water which is of lower quality than local ground water. The Regional Board will also consider issuance of waste discharge requirements for projects which would interfere with ground water recharge. The Regional Board will consider monitoring ground water extraction in contaminated basins to ensure that pumping patterns do not cause the migration of pollutants within the basins, causing contaminants to move to unpolluted areas of the basins.

Agricultural Activities

Irrigation practices, pesticide and fertilizer use, and confined animal operations can adversely impact the quality and beneficial uses of ground water. The Regional Board encourages the use of Best Management Practices to minimize water quality impacts from these activities.

The Regional Board participates in a statewide monitoring program for pesticides in ground water, as mandated by the Pesticide Contamination Prevention Act (AB 2021). When appropriate, the Regional Board also issues waste discharge requirements to regulate discharges of waste and/or wastewater from irrigated fields and operations such as confined animal facilities. (See "Agriculture" section, later in this Chapter, for further details.)

Stormwater Management

Infiltration of stormwater is a common treatment method (see Section 4.3, "Stormwater"). It allows removal of nutrients and some other constituents through physical filtration or adsorption, and through biological uptake by plant roots and soil microorganisms. However, in areas with high ground water tables, infiltration may lead to ground water contamination by toxic metals, deicing salts, and/or organic compounds which are common in urban stormwater. In these cases pretreatment to remove toxic stormwater constituents before infiltration, or choice of an alternative treatment method may be necessary. Regional Board staff will review proposals for infiltration of stormwater on a case-by-case basis, and place appropriate conditions in waste discharge permits to ensure protection of ground water quality.

Regional Board staff is currently conducting a study to determine the effectiveness of infiltration trenches in the treatment of surface runoff and in the protection of ground water. Three infiltration trenches in South Lake Tahoe are being studied. Ground water up and down gradient of each trench, and soil moisture from varying depths is being collected and analyzed. Data will be evaluated to determine whether any pollutants are entering ground water via the trenches, and whether any reduction of pollutants in runoff is occurring as the runoff percolates from the bottom of the trenches to the ground water. Contingent on available funding, the Regional Board may continue the study over the next one to five years.

Federal Control Measures for Ground Water Protection and Management

1. A number of federal statutes (e.g., the Clean Water Act, the Resource Conservation and Recovery Act, the Safe Drinking Water Act, the Comprehensive Environmental Response, Compensation and Liability Act, and the Federal Insecticide, Fungicide, and Rodenticide Act) provide the U.S. Environmental Protection Agency (USEPA) with the authority to prevent and control sources of ground water contamination, as well as to clean up existing contamination. USEPA recognized that these authorities to protect ground water were fragmented among many different statutes and were largely undefined. As a result, in 1984, the

USEPA adopted a Ground Water Protection Strategy to articulate the problem and USEPA's role in ground water protection. The Strategy provides a system for internal coordination as well as a strengthening of state programs (National Research Council 1986). Guidelines have been issued for USEPA decisions affecting ground water protection and cleanup. The guidelines include a three-tiered system for classification of ground water. Class I is a strict nondegradation category for irreplaceable drinking water supplies and aquifers associated with ecologically vital systems; Class II includes current and potential sources of drinking water and waters having other beneficial uses; Class III consists of nondrinkable water based on existing poor quality and isolation from drinking water aquifers. The USEPA accords different levels of protection to each water class and is developing guidelines on how the classes will be applied. In its Strategy, the USEPA intends to apply its classification system through all of its programs.

2. The USEPA has authority, under Section 1424 of the Safe Drinking Water Act, to designate certain ground waters as "**sole source aquifers**." There are no USEPA designated sole source aquifers in the Lahontan Region, although ground waters eligible for this designation may exist. Any federal financially-assisted project proposed within an area receiving this designation will be subject to USEPA review to ensure that the project is designed and constructed to protect water quality. The criteria for sole source designation are:

    - The aquifer must be the sole or principal source of drinking water for the area.
    - No economically feasible alternative drinking water sources exist within the nearby area.
    - If contaminated, a significant public health hazard would result.

Ground Water Control Actions by other State Agencies

1. California does not have statewide comprehensive ground water management laws; management is shared by many agencies using authority provided by various State statutes. The California Department of Water Resources' role in ground water management and protection is to provide technical assistance to other agencies, collect data, and conduct investigations. The responsibility of protecting ground water from pollution is shared with the State Board by other departments within the California Environmental Protection Agency (e.g., Department of Pesticide Regulation, Department of Toxic Substances Control, Integrated Waste Management Board, and Office of Environmental Health Hazard Assessment).

2. California water rights law does not require State permits for ground water diversions, except for underground waters which flow in defined channels (e.g., the lower Mojave River). Possible means of addressing the water quality impacts associated with ground water pumping and overdraft include use of nuisance law, the Public Trust doctrine, and existing State Board authority. Adjudication of ground water rights is also possible; this could result in court appointment of a watermaster, with court-defined authority ranging from monitoring and recording to broad management powers. The State Board may also place conditions to protect ground water in grant contracts or water rights permits for surface water use (Sawyer 1988). Adjudications to protect the quality of ground water are further discussed in Section 2100 and Section 2101 of the California Water Code. Water Code Section 2100 allows the State Board to file a Superior Court action or to intervene in an existing or proposed adjudication proceeding to "restrict pumping, or to impose physical solutions, or both, to the extent necessary to prevent destruction or irreparable injury to the quality of such water.

3. Improperly constructed, altered, maintained, or destroyed wells (including monitoring wells) are potential pathways for introducing contaminants to ground water. Such wells can act as conductors or pipelines through which waters of varying water quality can commingle. This may result in the degradation of high quality water supplies. The potential for ground water quality degradation increases as the number of wells and borings in an area increases.

    Improperly constructed, altered, maintained, or destroyed wells can facilitate ground water quality degradation by:

    - Allowing contaminants or poor quality water to enter ground water from the surface.
    - Allowing ground water from polluted or naturally poor quality aquifers to migrate (via

the well annulus), thus contaminating high quality aquifers.

- Allowing the well bore to be used for illegal waste disposal.

Permanently inactive or "abandoned" wells that have not been properly destroyed pose a serious threat to water quality. They are frequently forgotten and become dilapidated with time, and thus can become conduits for ground water quality degradation. In addition, humans and animals can fall into wells left open at the surface.

The California Department of Water Resources (DWR) is responsible for establishing statewide well standards for the protection of water quality (CA Water Code § 231). State law (CA Water Code § 13801), also requires each county, city, or water agency where appropriate, to adopt ordinances that meet or exceed DWR standards for proper well placement, construction, and abandonment. The same law specifies that local governments which fail to adopt an adequate well ordinance shall enforce the DWR standards. State well standards are found in DWR Bulletins No. 74-81 and 74-90, entitled "Water Well Standards, State of California."

4. Section 13169 of the California Water Code authorizes the State Board to develop and implement a ground water protection program, as provided under the Safe Drinking Water Act, Section 300 and following of Title 42 of the United States Code, and any federal act that amends or supplements the Safe Drinking Water Act. This authority allows the State Board to apply for and accept State ground water protection grants from the federal government, and to take any additional action as may be necessary or appropriate to assure that the State's ground water protection program complies with any federal regulations issued pursuant to the Safe Drinking Water Act or any federal act that amends or supplements the Safe Drinking Water Act.

Ground Water Control Actions by Local Agencies

1. The roles of local agencies in regulation of individual waste disposal systems and in oversight of underground storage tanks are described above.

2. County water districts have broad authority to conserve, protect, and replenish ground water supplies. The Subdivision Map Act allows cities and counties to adopt ground water recharge facility plans, construct recharge facilities, and charge a fee for the construction of such facilities as a condition of approval for subdivision maps and building permits (Sawyer 1988).

3. State law permits the formation of local ground water management districts. A few such districts have been established within the Lahontan Region. Local governments should strictly enforce well construction and abandonment standards. Where wellhead protection ordinances have been adopted, they should be strictly enforced.

Recommended Control Actions for Ground Water Protection and Management

1. The potential exists for physical solutions to water quality problems related to ground water overdraft, such as provision of alternative water supplies, artificial recharge, or the establishment of physical barriers or injection carriers to pollutants. Such solutions can be required by the courts in connection with water rights adjudications, or as part of ground water management programs which could include regulation and augmentation of supply. Physical solutions could also be authorized during approval of water development projects. These solutions may involve conjunctive use projects where surface waters are used for ground water recharge or as a substitute supply for ground water users. It is important to manage ground and surface waters as an interconnected resource (Sawyer 1988).

2. Basic data are needed to evaluate potential threats to ground water quality and beneficial uses. This database should contain information on hydrogeology, soil characteristics, ground water location and level, ground water quality, ground water movement, water well location and construction, ground water extractions, land use, waste discharges, potential and existing pollution sources (e.g., landfills, underground storage tanks, significant quantities of chemicals used in land use practices such as pesticides and fertilizers, concentrated areas of septic system use, and drilling operations) and extent of contamination. A database of this type would also be useful to determine cumulative impacts of discharges and other activities on ground water basins. This database could be

maintained by the Regional Board. Most of the information could be obtained from other agencies.

3. Ground water quality monitoring is essential to determine to what extent ground water beneficial uses and water quality are threatened and to evaluate the effectiveness of any actions implemented to protect beneficial uses and water quality. The Regional Board will encourage ground water quality monitoring. All data collected should be entered into STORET or compatible databases.

4. In areas of high septic system density, nitrate and chloride levels should be monitored to detect contamination to ground water from the septic systems.

5. The U.S. Soil Conservation Service, Resource Conservation Districts and U.C. Cooperative Extension Farm Advisors will be encouraged by the Regional Board to promote Best Management Practices such as minimal applications of fertilizers and other chemicals to protect ground waters.

6. The Regional Board will encourage the formation of local ground water management districts. The districts should cooperate with the Regional Board in the regulation of such things as ground water recharge and irrigation practices to conserve ground water.

7. Local governments should consider land use zoning to restrict the type and amount of development in critical ground water recharge areas.

8. To conserve ground water resources, the Regional Board will encourage the use of Best Management Practices to minimize water use for agricultural, landscape, and turf irrigation.

9. To conserve ground water resources, the Regional Board will encourage the use of reclaimed water wherever feasible without adversely impacting beneficial uses. (Regional Boards are required, when establishing water quality objectives, to consider the need to develop and use reclaimed water.)

10. Regional Board staff, in reviewing environmental documents for projects which could affect ground water quality, should ensure that CEQA requirements for public disclosure on impacts, alternatives and mitigation measures are fulfilled.

11. The Regional Board should consider holding public fact finding hearings on specific ground water quality/quantity problems. Such hearings could result in recommendations for State Board action.

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4.7 MINING, INDUSTRY, AND ENERGY PRODUCTION

The primary industries[1] in the Lahontan Region are mining and mineral processing. Other industries in the Region include lumber mills, energy production facilities, chemical manufacturing facilities, and concrete and asphalt batch plants.

Nearly all industrial operations have the potential to produce “general” types of water quality impacts, similar to those of any large construction site (e.g., erosion/sedimentation and spillage of motor vehicle fluids). Additionally, each type of industrial operation may pose its own industry-specific threats to water quality. For example, lumber mills can contribute significant quantities of tannins, lignins, BOD, and color to receiving waters. Concrete batch plants can contribute TDS, high alkalinity, and metals to receiving waters. Mining operations can contribute cyanide, heavy metals, or acid mine drainage to receiving waters.

General Discharge Limitations

Waste discharge requirements are prescribed for each discharger on a case-by-case basis; however, in every case, industrial and municipal effluent discharged to waters of the Region shall contain essentially none of the following substances:

- Chlorinated hydrocarbons
- Toxic substances
- Harmful substances that may bioconcentrate or bioaccumulate
- Excessive heat
- Radioactive substances
- Grease, oil, and phenolic compounds
- Excessively acidic and basic substances
- Heavy metals such as lead, copper, zinc, mercury, etc.
- Other deleterious substances

[1] **Note:** For purposes of this Basin Plan, “industry” is defined as any servicing, producing, manufacturing or processing operation of whatever nature, including, but not limited to: mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, or water well pumping. (This definition is taken from California State Water Resources Control Board and California Regional Water Quality Control Board, 1989). The word “industry” may have a broader meaning in other contexts; for example, in the sense used by modern economists, one of the largest “industries” in the Lahontan Region is tourism. However, the waste discharge prohibitions, effluent limitations, and control measures in this Basin Plan should be understood in the context of the more narrow definition above.

Furthermore, any person who is discharging or proposes to discharge waste, other than into a community sewer system, must file a Report of Waste Discharge (RWD) with the Regional Board unless this requirement is waived by the Regional Board. Detailed lists of information needed in the RWD can be obtained from Regional Board staff. Upon receipt of the RWD, the Regional Board, with information and comments received from state agencies and the public, will prescribe discharge requirements including any appropriate limitations on biological and mineral constituents, as well as toxic or other deleterious substances. Additionally, revised waste discharge reports may be required prior to additions of waste, changes in treatment methods, changes in disposal area or increases in effluent flow.

Discharge requirements will be established that are consistent with the water quality objectives for the receiving water (see Chapter 3 of this Plan), including wasteload allocations or Total Maximum Daily Loads (TMDLs) established for the discharge, the State Board's “non-degradation” policy, the federal anti-degradation and anti-backsliding regulations, and the principle of obtaining the optimum beneficial use of the Basin's water resources.

Mining and Mineral Processing Operations

Many quarries exist in the Lahontan Region, extracting such commodities as iron ore, pumice, marble, limestone, talc, and asbestos. Most such quarries do not use chemical extraction processes, and effects on water quality are usually limited to the general impacts described above.

Sand and gravel quarries are also fairly common in the Region, and are of concern because they often occur in riparian and/or floodplain areas. In general, discharges from sand and gravel operations comply with water quality objectives; such operations are usually considered to be minor, because potential adverse water quality impacts can most often be mitigated with relatively simple measures. The final restoration phase is the most critical—at the end of the project, the site must be stabilized, revegetated, and/or restored in a manner which will ensure long-term water quality protection.

An unknown number of recreation prospectors use “dry wash” or recirculating water systems to gravity separate gold. These activities have the potential to degrade water quality and beneficial uses by disturbing streambeds and riparian and floodplain areas.

The mining operations which pose the most significant threat to water quality in the Lahontan Region are hard rock mining for precious metals (e.g., gold or silver). Toxic chemicals, such as cyanide or mercury, are often leached through ores to obtain precious metals. The chemical leaching process involves placement of crushed ore material onto a liner (heap leaching) or into a tank or vat (vat leaching), and saturation of the ore with the leaching chemical solution (“barren” solution). The solution leaches metals as it percolates through the ore, then drains to a pond (“pregnant” solution pond) where the metals can be recovered. Spent ores are washed with water to remove any remaining chemical solution prior to disposal.

Ore preparation generally involves some crushing or pulverizing. This process exposes a maximum amount of ore surface area for the chemical leaching process. This also maximizes the amount of surface area that will be exposed to the elements after the ore has been processed and disposed. Prolonged exposure to the elements (and/or to acid mine drainage) will result in the leaching of heavy metals and/or salts which the ore may contain.

Acid mine drainage (AMD) is the product of sulfurous rock, bacteria, water, and oxygen. This highly acidic drainage is associated with mining because, although it may occur naturally, mining activities tend to enhance the formation of AMD by opening tunnels (introducing water and/or oxygen to subterranean sulfurous rock) and by exposing large quantities of susceptible rock to the elements (waste tailings piles). Once AMD formation has been established, control is extremely difficult. The best control is prevention.

Water is utilized in mining operations for dust control, equipment cooling, make-up for leaching solutions, and for other purposes. In sand and gravel quarrying, water is used to wash aggregate. Process water may become contaminated with metals, salts, toxic chemicals, oils and greases, fuels, and/or sediments. If allowed to escape containment, process water is likely to impact or threaten to impact receiving waters. When a mining operation ceases, large water-filled ponds often remain on the site. These ponds may threaten receiving waters by concentrating on-site contaminants (becoming toxic pits), and by overflowing into surface waters.

Regulatory Authority

Mining waste discharges are regulated under Article 7 of Chapter 15 (Cal. Code of Regs.). Further regulations for mines are contained in the California Water Code, Section 13260.

All mining operations are subject to the Surface Mining and Reclamation Act (SMARA, CA Public Resources Code, Title 14, Division 2, Chapter 9). SMARA requires that anyone proposing to conduct a mining operation file a reclamation plan with (and be permitted by) the Lead Agency (typically the County) in the area where the mine is to be sited. The reclamation plan must include, in part, a description of the type of operation to be conducted; the initiation and termination dates; and a description of the manner in which reclamation will be accomplished, including a description of the manner in which contaminants will be controlled and mining waste will be disposed of, and a description of the manner in which rehabilitation of affected streambed channels and streambanks to a condition of minimizing erosion and sedimentation will occur. The reclamation plan is a useful tool for the Regional Board in evaluating the level of regulation appropriate for a given operation. Whatever the level of regulation the Board decides upon, the operation will be regulated by the Lead Agency, and the operator will be required to reclaim the site at the end of the operation.

Federal Superfund Program

The federal “Superfund” program was established in 1980 with the passage of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The CERCLA provided funding and guidelines for the cleanup of the most threatening hazardous waste sites in the nation. High priority sites scheduled for cleanup under this program are placed on the National Priority List (NPL). The federal government normally places large sites with identified problems on the Superfund list for cleanup. Ideally, the owner(s) or responsible parties are then required to conduct cleanup operations. However, if the owner(s) cannot be located or do not have sufficient funds, the cleanup becomes the responsibility of federal or state government. Smaller sites, or sites without identified problems may also pose significant threats to water quality, but do not make it onto the Superfund list. Once these sites are identified, they must be handled on a case-by-case basis by the Regional Board, ideally by responsible parties, but otherwise by State or local agencies.

Active Mine Sites

Case History—Mountain Pass Mine and Mill Operations

The Mountain Pass Rare Earth Mine, first located in 1949, is in the Ivanpah district of the South Lahontan Basin. The district was mined intermittently until 1940, for silver, lead, zinc, and copper.

The Mountain Pass Mine and Mill is currently operated by Molycorp. The ore body consists of carbonates, sulfates, bastnaesite, and quartz. Bastnaesite is a rare earth fluorocarbonate which contains lanthanide (rare earth) metals. Lanthanide metals include cerium, lanthanum, samarium, gadolinium, neodymium, praseodymium, and europium, and are used in such things as lighter flints, ultraviolet absorbing glass, coloring agents for glass, and television tubes.

The Mountain Pass Mine and Mill is an open pit mine with milling, beneficiation, and processing facilities. The three major milling plants are the flotation plant, chemical plant, and separation plant. Mine wastewaters were discharged to percolation ponds onsite until 1980, causing degradation of underlying ground waters. Most mine wastewater is currently collected from various discharge points at the mill site and discharged to a 100-acre evaporation pond located on Ivanpah Dry Lake about 13 miles to the east. Mine waste overburden is stockpiled onsite. Process water, tailings, and product storage ponds still exist at the millsite.

Major water quality concerns at the Mountain Pass Mine include the continued leakage from the active main tailings pond. This leakage continues to degrade ground water already polluted by dissolved minerals, nitrates, and sodium lignin sulfonate, which is a surfactant used in the floatation plant. Other concerns included inactive waste disposal sites and lead sulfide precipitates stored at the Molycorp hazardous waste storage site. Molycorp is currently working under Regional Board and Department of Toxic Substances Control schedules to correct the problems.

Abandoned/Historic Mines

In the past, mining operations were often conducted with little concern for immediate or future environmental impacts. Tailings were placed in waterways, ore processing occurred on unlined ground surfaces, toxic chemicals were often not rinsed from ore prior to ore disposal, and no effort was made to reclaim exposed slopes. As a result, numerous old, mostly abandoned, mine sites are now severely impacting surface and ground waters in the Lahontan Region. Many surface waters in the Region, such as Monitor Creek, Leviathan Creek, Bodie Creek, and the Carson River, have moderate to high levels of heavy metals, salts, and/or mercury, due at least in part to past mining activities. High levels of metals have been detected in fish tissue under the State Board's Toxic Substances Monitoring Program. Surface and ground waters are also being impacted by acid mine drainage and severe erosion problems at mine sites.

Case History—Leviathan Mine

The Leviathan Mine, located in Alpine County, is the most significant abandoned mine site in the Lahontan Region. The soil and underlying geology of the site are sulfur-rich, and the mine has primarily been exploited for that mineral (although the earliest mining at the site was for metals). Operations at the site began in 1863, and continued under various owners until the late 1960s.

Until 1952, operations at the site involved tunnel mining, with minimal impact to nearby surface waters. In 1952, Anaconda Copper Company purchased the site and began an open-pit mining operation, dumping tailings directly into surface waters (Leviathan Creek). Acid mine drainage (AMD) then began leaching into surface waters in significant quantities.

After a fish kill occurred in 1959, Anaconda implemented some mitigation measures, but the impacts were difficult to control. In 1962, the Regional Board determined that the mine should be regulated, and requested a report of waste discharge from Anaconda. Anaconda responded by removing all the previously installed mitigation measures and selling the mine to Alpine Mining Enterprises, a small corporation with no assets.

The Regional Board adopted waste discharge requirements on Alpine Mining Enterprises in 1962 and spent the next several years trying unsuccessfully to make Alpine Mining Enterprises correct the AMD and erosion problems at the site. In 1969, the Regional Board referred the matter to the Attorney General, but litigation efforts were stymied by Alpine Mining Enterprises' lack of resources and the apparent lack of recourse against Anaconda under California law.

In 1978, California voters approved a bond measure which enacted the State Assistance Program (SAP), and the State Board granted the Regional Board $3.76 million from this bond act to address the Leviathan Mine problem, which was now causing occasional cattle kills and which had left an eight mile stretch of Leviathan and Bryant Creeks sterile. At about the same time, the Regional Board successfully negotiated with ARCO, the now parent company of Anaconda, for a $2.337 million settlement in lieu of litigation. As part of the settlement, the State of California purchased the mine for $50,000. The State Board was given the responsibility of overseeing restoration activities at the mine. The State Board assigned much of the oversight responsibility to the Regional Board.

In 1985, a restoration project was completed and the mine site was revegetated. The reclamation strategy was designed (by Brown and Caldwell Consulting Engineers) to control or eliminate approximately 75 percent of the AMD pollution previously entering Leviathan Creek. However, the plant species selected for revegetation were not tolerant to site conditions, and most of the plants have since died. This has left acres of eroding slopes which are currently inundating the mine's pollution abatement facilities with sediment, jeopardizing their function. Earth is also eroding from beneath the mine's pollution abatement facilities, undermining their structural stability. Additionally, the road system at the site has little drainage control and is contributing to the erosion and sedimentation problem. The eroding slopes and resulting contaminated sediment loads also endanger the restoration of the potential beneficial uses of the Leviathan Creek system.

Water quality monitoring data (for parameters including nickel, aluminum, iron, arsenic, sulfate, total dissolved solids, and pH) indicates a significant decrease in pollutant concentrations since the project was constructed. However, downstream beneficial uses have not been fully restored, pollutant loading is still significant, and all monitoring has been conducted during drought years when production of AMD is expected to be at a minimum.

On June 9, 1989, the USEPA issued its final decision on Section 304(*l*) of the Clean Water Act. As a result of this decision, Leviathan Creek was identified on the Section 304(*l*)(1)(B) “short list” as a waterbody impaired by toxic pollutants, specifically arsenic and nickel. Concurrently, the Leviathan Mine was listed under Section 304(*l*)(1)(C) as the point source contributing toxics to Leviathan Creek. In addition, the State of California submitted Aspen, Bryant and Leviathan Creeks for inclusion on the 304(*l*)(1)(A) “long list” as waterbodies not meeting State water quality standards.

The Section 304(*l*) listing required the State of California to prepare an Individual Control Strategy (ICS) for the Leviathan Mine by February 4, 1990. USEPA and the Lahontan Regional Board discussed a coordinated effort on the ICS during a workshop in January, 1991. No further actions have been taken by the State or Regional Board to pursue the ICS since that time.

Control Measures for Mining and Mineral Processing

1. The Regional Board shall review all new mining, mineral processing, and exploratory operations (and existing unpermitted operations on a case-by-case basis) and issue conditional waivers, waste discharge requirements, or NPDES permits for operations that may (individually or cumulatively) result in potentially significant impacts to water quality or beneficial uses.

2. To control general water quality threats posed by mining and mineral processing operations, Best Management Practices (BMPs) shall be required, including mechanical or vegetative soil stabilization, runoff collection/treatment systems, vehicle fluid containment facilities, etc. Process water, aggregate washwater, and/or dust control water should be contained in ponds or behind dikes, or otherwise treated to remove sediments. (See BMP and stormwater control discussions in Section 4.3 and in the introduction to this Chapter).

3. Specific control measures include the following:

   - **Gravel and Sand Operations:** The Executive Officer may issue a conditional waiver to any site where all operations and washwaters are confined to land, no discharge to surface waters, including wetlands, will occur, and stockpiles are protected from flooding. If disturbance is proposed in a wetland, Clean Water Act Section 401/404 Water Quality Certification must be obtained.

   - **Leaching Operations:** The Regional Board shall regulate all discharges of cyanide or other toxic chemicals used in precious metal extraction, regardless of the size of the operation. Toxic chemicals should be prevented from escaping any portion of the leaching cycle. Pregnant and barren solution impoundments and leach pads should be lined and monitored; leaching vats and chemical storage facilities should haveadditional containment (e.g., an outer tank) and monitoring. If toxic chemicals are identified in underlying soils or ground water, the leaching process should be stopped until the leak can be located and repaired, and the contamination remediated.

   - **Hard Rock Mining:** When new mining operations are proposed, the discharger must comprehensively test waste materials for acid generation potential. Waste which has a high acid generation potential must be placed in engineered containment or otherwise disposed of to either prevent AMD formation or to contain any AMD which is generated. The potential for leaching of soluble metals and salts should also be evaluated prior to commencement of operation at a new mine site. Mine wastes which will generate significant quantities of metals or salts should be disposed of to engineered containment or otherwise prevented from contaminating surface or ground waters.

Recommended Future Actions for Mining and Mineral Processing

1. Pursuant to 304(*l*) regulations, the State Board must consider funding various remediation alternatives for the Leviathan Mine. The Regional Board shall consider the following alternatives and recommend some or all of them to the State Board for consideration:

   - **Control eroding slopes and mine tailings.** Implement a comprehensive slope stabilization and revegetation program specifically designed to establish plants that are tolerant to acidic soil and low water conditions, such as those which occur at the mine site. The established plants and structural improvements should stabilize the soils and significantly reduce erosion and sediment transport to pollution abatement facilities as well as the Leviathan Creek system. An established vegetative cover will also reduce stormwater percolation and the resultant generation of AMD.

   - **Control roadside drainage and erosion.** Regrade roads for proper drainage and install drainage control and treatment structures. By properly directing the concentrated runoff from roads and installing drainage structures, the integrity of the roads will be maintained while erosion and sediment transport to streams will be reduced.

   - **Control excess AMD.** Construct projects to reduce the pollution loading to area surface waters, construct an additional holding pond to contain AMD overflow from the existing evaporation ponds, and/or establish a wastewater treatment system to treat AMD overflows from the existing evaporation ponds to Leviathan Creek.

   - **Reline the ponds**

   - **Examine water diversion to prevent AMD formation**

2. In order to maintain the beneficial effects of the pollution mitigation project at Leviathan Mine, a number of regular maintenance activities must be conducted. These include: (1) periodic fence repairs, (2) annual sediment removal from drainageways, (3) flow regulation to and between ponds, (4) emergency repairs, and (5) periodic water quality monitoring to ensure that pollution levels are not increasing. Over the long-term, major efforts will be required to either rehabilitate the existing project or to otherwise reduce the level of pollutants leaving the site.

3. The Regional Board should investigate the water quality impacts of other inactive mines and identify and implement appropriate control actions.

4. The Regional Board should consult with the California Department of Fish and Game to develop leaching operations control measures to protect wildlife from lethal chemicals. Such control measures could include covering or otherwise containing all waters with chemical concentrations at levels lethal to wildlife.

Industrial Activities other than Mining and Mineral Processing

Cement production. There are currently several large cement production facilities located in the southern part of the Lahontan Region. These facilities quarry mineral products, crush and blend them proportionally, heat them together in a kiln, and then crush finely the resulting klinker product to form cement. The cement manufacturing process can result in degradation of both surface and ground water quality due to parameters and constituents including pH, chloride, sulfate, potassium, sodium, calcium, and metals such as chromium.

Two significant waste types are generated during cement production. The first, kiln dust, is off-specification product that is unable to meet the cement industry's alkalinity requirements because of the type of raw minerals mined at some plants. (Not all cement plants produce kiln dust.) Kiln dust is frequently dumped onsite near the plants and spread.

The pH of kiln dust is usually very high, ranging from 11 to 13.5 pH units. Due to its corrosive pH, kiln dust can be classified as a “hazardous” waste (under Title 23, Chapter 15, Cal. Code of Regs.). However, if a particular manufacturer has been granted a variance from the California Department of Toxic Substances Control, the Regional Board may find that their kiln dust could be classified as a “designated” waste (under Title 23, Chapter 15, Cal. Code of Regs.) or a “special” waste (under Title 22, Cal. Code of Regs.). The USEPA is currently studying this issue to determine how kiln dust should be classified.

The second type of waste, kiln refractory liner brick, is used to line the kilns and historically contained leachable amounts of chromium in concentrations considered hazardous. Often, when kiln brick containing chromium was replaced, it was disposed onsite. Recently, the kiln brick composition has been reformulated and new brick is now available that does not contain chromium. Currently, when kiln bricks are replaced, most cement plants will crush and recycle the old bricks through the cement manufacturing process.

Concrete production. There are numerous concrete batch plants throughout the Region. Concrete batch plants combine gravel, water, and cement to form concrete. Liquid and semi-solid waste from truck and equipment washout is produced. This waste is very alkaline (the pH may be as high as 12.5 in fresh cement), is high in TDS, and may contain assorted heavy metals. The washout may contain various additives or other chemicals that are used in concrete production. This wastewater is usually disposed to a settling pond, and then to a sewer (POTW) or to onsite percolation ponds. Waste concrete, left over from individual projects, is often disposed onsite by dumping in a large pile, where it hardens

Asphalt production. Asphalt batch plants generally involve mixing petroleum products (usually diesel fuel) with earthen materials. Large quantities of both materials are generally stored onsite. Water quality can be significantly degraded if these materials reach water courses.

Lumber mills. Lumber mills generally consist of outdoor log and lumber storage, indoor milling facilities, energy cogeneration facilities, and waste piles/ponds. Threats to water quality include wastewater from log watering (high in tannins, lignins, color, BOD, etc.), process wastewater from energy cogeneration (high in TDS, plus any chemical additives), ash from energy cogeneration (highly alkaline, possibly high in metals), and spillage of wood treatment chemicals (such as cupric arsenate, pentachlorophenol, etc.).

Control Measures for Industrial Activities other than Mining and Mineral Processing

1. Industrial operations in the Lahontan Region shall be reviewed on a case-by-case basis, and regulated as appropriate. Conditional waivers, waste discharge requirements, or NPDES permits shall be issued as necessary to protect water quality and beneficial uses.

2. To control general water quality threats posed by erosion and stormwater from industrial operations, Best Management Practices (BMPs) shall be used, including mechanical or vegetative soil stabilization, runoff collection/treatment systems, vehicle fluid containment facilities, etc. (See BMP and stormwater control discussions in Section 4.3 and in the introduction to this Chapter). If industrial wastewater is being discharged to a wastewater treatment plant, pretreatment of the wastewater may be required (refer to Pretreatment Policy, discussed in Section 4.4, “Wastewater”).

3. The Regional Board should continue to review Notices of Intent (NOIs) for statewide Industrial Stormwater NPDES permits, and should issue individual permits when needed to protect water quality.

Specific control measures applicable to industrial operations are as follows:

4. **Cement Industry:** The Regional Board shall regulate cement kiln dust disposal and all ready mix cement plants where water quality could be impacted. Wastewater from cement batch plants is considered to be a designated waste, and may need to be discharged to a lined impoundment, if site-specific characteristics (e.g., soil type, depth to ground water, ground water quality, etc) will not protect ground water from degradation. The Regional Board will consider, on a case-by-case basis, the need to line cement wastewater ponds. Solid or semi-solid wastes should be deposited in landfills or other legal points of disposal unless the discharger can demonstrate that the waste will not pose a threat to water quality if deposited onsite.

5. **Asphalt Batch Plants:** Waste control measures are fairly straightforward at such sites. Petroleum products should be stored in tanks, and the tanks placed in lined holding areas. If spillage to soil occurs, contaminated soils should be scraped up, stored on a liner, and incorporated

into asphalt as soon as possible. A berm (or other runoff control) should be placed downgradient from earthen material stockpiles.

6. **Lumber mills:** Waste control measures include lined ponds for untreated wastewater, containment of surface runoff, and proper storage and disposal of ash (ash is usually landfilled, but may also be used as a soil amendment).

Recommended Future Actions for Industrial Activities

1. The Regional Board should consider developing a policy for addressing the disposal of "off-specification" concrete. Possible policy might include requiring that the material be stored on a liner or stored indoors, or that ground water monitoring be conducted around the on-site spreading areas.

2. The Regional Board should consider developing a policy or policies for addressing the large, potentially toxic pits left at mining operations. Possible policies might include (but are not limited to) requiring that the pits be filled at the end of a site's operation, requiring long-term financial assurance to correct future water quality problems resulting from the pits, or lining the pits.

Energy Production

There are several facilities in the Lahontan Region that produce electricity or provide energy for heating purposes. These facilities utilize sources including geothermal fluids, solar energy, fossil fuels, biomass, and hydroelectric power. Facilities producing energy from these sources all generate some type of waste products which can impact water quality if not properly treated, contained or disposed. (The disposal of wastes to land is discussed separately in "Wastewater and Solid Waste" and the "Ground Water Protection" sections of this Chapter).

Potential adverse impacts to water quality may result from the following waste stream components: spent geothermal fluids, cooling tower blowdown, boiler blowdown, ash, and supply water treatment system wastewater. Constituents which can impact water quality include: total dissolved solids (TDS), sediment, heavy metals, solvents, biocides, and residual chlorine. The temperature of discharged water can also affect receiving waters. Additionally, with hydroelectric projects, there may be flow depletions in the affected reach of the river or stream, resulting in impacts to water quality and beneficial uses.

Geothermal

Geothermal resources in the Lahontan Region have been explored and developed in the Surprise Valley, the Honey Lake Valley, Bridgeport Valley, Long Valley near Mammoth Lakes, and the Coso Known Geothermal Resource Area northwest of Ridgecrest. Exploration is currently underway at Fort Irwin. Geothermal resources found in the Region provide many opportunities for alternative energy development. Geothermal power plants extract hot water through large wells drilled from 500-10,000 feet below the surface. The hot water is either passed through heat exchangers (binary process) to create steam to generate electricity, or is used directly for space heating or in a heat exchange process to heat water for domestic and/or commercial uses. Hot water return flows from these processes are usually injected back into the geothermal reservoirs through separate wells, but in some cases are discharged to surface waters or to land. Geothermal steam and condensate may be highly mineralized and corrosive, and special precautions must be taken to ensure that geothermal development will not create pollution problems. Besides spent geothermal fluids, other wastes discharged from geothermal exploratory and production projects are: cuttings from well drilling operations, and fluids from well testing. Until it can be shown that such activities can be conducted without risk of water quality degradation, the Regional Board will oppose further consideration of geothermal exploration or development in the Eagle Lake Basin, Lassen County (see Resolution 82-7 in Appendix B).

Fossil fuels

Fossil fuel energy production facilities in the Lahontan Region include coal-fired steam plants and a gas compressor station. Future development of fossil fuel powered steam plants could occur in the South Lahontan Basin to meet the increasing energy needs of Southern California. Southern California Edison Company operates a coal gasification facility and a coal-fired steam plant using coal fines or underflow from a traditional coal-fired steam plant in Nevada. Waste discharges result from the following components: cooling tower blowdown, boiler blowdown, sulfur recovery processes, slag (from coal gasification) or fly-ash (from coal-fired plants), and supply water treatment system wastewater. The primary concern with the wastewater is the high concentration of total dissolved solids that threaten the water quality of underlying aquifers. Because of the high concentrations of salts and the further concentration through evaporation, the liquids in the waste ponds are considered designated wastes under Chapter 15. Southern California Gas Company operates a gas compressor station that discharges cooling tower blowdown water. The water discharged is of better quality than a nearby well used for irrigation, so most of the wastewater is being reclaimed for irrigation; the remaining water is discharged to an unlined evaporation-percolation pond.

Solar

Solar energy stations use a heating transfer fluid (HTF) to transfer heat from solar energy to water, in order to create steam for generating electricity. Waste stream components include: cooling tower blowdown, sodium regeneration water, demineralization blowdown, solar boiler blowdown, supply water treatment system wastewater, and power block runoff. Biocides are used in the cooling towers to prevent biological growth; the resulting waste products are acids and amines. Blowdown water contains sulfuric salts, due to the use of sulfuric acid to minimize scale buildup in condensers. The wastewaters are similar to those described for fossil fuel facilities and are considered designated wastes under Chapter 15. The HTF is not considered a waste, since it is used for production and is recirculated in a closed system. However, HTF spills do occur and the contaminated soil is classified as a waste. Such contaminated soil must be removed and properly treated and/or stored prior to disposal at an appropriate facility.

Biomass

Several energy production facilities exist in the Region that utilize biomass as a fuel source. Biomass fuels are typically the products or by-products of logging or milling operations, however, household, medical, or other wastes may also be proposed for incineration. The primary water quality concern is the disposal of ash produced by such facilities. Such ash is often hazardous due to high pH and/or metals content. Ash generated by energy production facilities must be tested to determine its degree of hazard and disposed of in compliance with Chapter 15.

Hydroelectric Power

Hydroelectric power, or hydropower, is the power generated by conversion of the energy of running water. Hydroelectric facilities are usually constructed in or immediately adjacent to the water body being utilized. Water may be diverted from the water body, run through the facility, and returned to the river at some point downstream. Alternately, the flow of the entire river may be utilized. Impacts to a water body from hydroelectric projects include erosion and sedimentation resulting from construction, increased turbidity and temperature, and possibly discharge from turbines in the watercourse. Additionally, there may be flow depletions in the affected portion of the stream and loss of habitat and reduction in the recreational/aesthetic quality of the stream, resulting in impairment of the beneficial uses.

Control Measures for Energy Production

1. The Regional Board regulates energy production facilities through the adoption of waste discharge requirements (WDRs) which specify effluent limitations, receiving water limitations, and other provisions in accordance with all applicable laws, regulations, and policies. The WDRs can also prohibit certain discharges, such as PCBs or waste discharges to surface waters or land. Spill control and prevention plans and closure plans, including assurance of financial responsibility, are required. Self-monitoring programs are issued along with the WDRs. The Regional Board may consider issuing a waiver of waste discharge requirements for interim discharges or where discharges are appropriately controlled by another permitting authority.

2. When adopting or amending WDRs for energy facilities, the Regional Board shall implement the following measures wherever appropriate:

   - Where interim waste discharges (such as drilling cuttings and test waters) are proven to be non-hazardous and no impacts to water quality will occur, discharges may be allowed to unlined sumps. Wastes left after evaporation may be buried on site. Such discharges would likely not require regulation by the Regional Board.
   - Where discharges may impact water quality or the waste is considered hazardous, wastes shall be discharged to lined ponds. Closure will require a synthetic liner for capping, or removal of cuttings to an appropriate disposal location. Such discharges would likely require waste discharge requirements or other regulation by the Regional Board.
   - Wastewaters from energy production facilities may be used for dust control during construction and operation where no adverse impacts to surface water or ground water quality will occur and where the wastewater is not hazardous.
   - Waste discharges from energy production facilities may be allowed to land (irrigation) or

to unlined ponds where the effluent quality is similar to or of better quality than the receiving waters. Monitoring will be required to ensure that adverse impacts to the water quality of the receiving waters (either the underlying ground water or the nearby surface waters) will not occur.

3. For all proposed **geothermal operations**, the Regional Board encourages re-injection of spent geothermal fluids to an aquifer with similar water quality as the best measure to protect surface waters and good quality ground waters. If re-injection is not possible, the Regional Board will require all other proposed methods of disposal of spent geothermal fluids to result in a discharge which complies with all provisions of this Basin Plan.

   The Regional Board will coordinate with other permitting authorities to determine whether WDRs are appropriate. Where adequate water quality protection can be provided by another permitting authority, the Regional Board may choose not to issue a waste discharge permit. The California Division of Oil and Gas (CDOG), which has jurisdiction and responsibility for geothermal development, supervises all well drilling and abandonment activities on private lands. CDOG also implements the Underground Injection Control Program, including the reinjection of geothermal fluids on private lands. The Regional Board works closely with the CDOG to regulate these facilities in accordance with the Memorandum of Agreement (MOA) between the State Board and CDOG as amended by State Board Resolution No. 88-61. The U.S. Bureau of Land Management and the U.S. Environmental Protection Agency have responsibility for regulation of reinjection on federal lands.

4. For proposed **hydroelectric projects**, the Regional Board will coordinate permitting processes with the Federal Energy Regulatory Commission (FERC) and the State Board. All hydroelectric projects which will produce energy for sale must comply with the FERC licensing process, or acquire an exemption from FERC. The FERC licensing process includes an optional preliminary permit, giving the permitted developer “first-in-line” status for a given project, while feasibility and environmental impact studies are performed for the project. After review of the feasibility studies, FERC may deny the license, grant it without conditions, or reserve continuing jurisdiction. Projects with capacity of 5 MW or less may be exempt from any FERC licensing requirements if the proposed facility is located at an existing dam, or will use an existing natural water feature. FERC also exempts projects producing 100 KW or less. (Note that hydro projects exempt from FERC may still require State water rights permits and/or waste discharge permits). All FERC licenses have expiration dates. Applicants for relicensing must complete the pre-filing requirements two years prior to the expiration of the current license. Before FERC will issue a license, applicants must provide evidence of compliance with State water rights laws.

   Section 401 of the Clean Water Act requires that applicants for a federal license or permit, such as a FERC license, for any activity which may result in a discharge to navigable waters, obtain a water quality certification from the State. The federal agency cannot issue the permit or license unless the State issues or waives 401 certification, and any conditions of the State's certification must be included as conditions of the federal permit or license. If the State denies the request, the federal permit or license cannot be issued. If the State fails to act on the request for certification within a mandated timeframe, the request is deemed waived. The State Board is the California agency designated to issue Section 401 certifications for hydroelectric projects. The certification process, as related to hydropower projects, is described below.

   Water Rights Permit. An applicant for development of hydropower must either possess a valid water right or else apply for one to the State Board. Generally, the State Board requires that the feasibility studies be nearly completed in order to show that the applicant has demonstrated diligence in acquiring a water rights permit. The State Board will also only issue one water rights permit per site. In the case of competing water rights applications, the Water Board will wait until the FERC permit is granted.

   Protests regarding water rights applications must be filed with the State Board within the 45 or 60-day review period indicated in the notice of application for water rights. If the protestants and applicant cannot resolve their differences directly, the State Board will resolve the issue during an evidentiary hearing.

   California Environmental Quality Act (CEQA). Action cannot be taken by the State Board on a request for water quality certification for a hydroelectric project (Section 401 Certification) until compliance with CEQA is demonstrated. Whether or not a water rights permit is required for the project, the State Board will ordinarily be the lead agency for CEQA purposes. Until the State Board adopts an appropriate CEQA document or determines that the proposed project is exempt, no action will be taken on water quality certification. If the project proponent is a local agency, that agency should be the lead agency under CEQA. Again, no action on water quality certification will be taken until the local agency adopts an appropriate CEQA document.

Section 401 Water Quality Certification. When a complete application and request for water quality certification has been received by the Regional Board, the Board immediately forwards the application and certification request to the State Board. The State Board 401 coordinator and the Regional Board coordinate to make a certification decision (certification issued, issued with conditions, or denied) within the mandated timeframe. The Regional Board may adopt waste discharge requirements in addition to Section 401 Water Quality Certification for hydroelectric projects. However, the WDRs may be preempted by FERC license provisions.

As a result of January 1, 1993 legislation, the State and Regional Boards have limited authority over hydroelectric projects. Their authority includes:

- Full authority over projects which are exempt from FERC licensing (the Los Angeles Department of Water and Power's Owens River Gorge facility is exempt).
- For multi-purpose projects, the State and Regional Boards may apply its requirements to the use of the project for irrigation, municipal use, or similar purposes.
- The State may still apply its water right requirements to the extent necessary to protect proprietary rights.
- The State may apply authority assigned or delegated to it under other federal laws, including water quality certification authority under Section 401 of the Clean Water Act, as described above.

5. For **hydroelectric projects**, in addition to the control actions described in No. 1 and 2 above, the Regional Board will recommend, as appropriate, the following as conditions of waste discharge permits and/or as recommended conditions for Section 401 Water Quality Certification:

   - Temporary and permanent erosion and drainage control measures during project construction and operation, including ongoing sediment cleanout from diversion structures, and stabilization of all disturbed areas associated with the project (e.g., transmission lines, access roads).
   - Mitigation of effects from reduced flows on maintenance of water quality and instream beneficial uses (including impacts on riparian habitat).

6. For **cogeneration facilities**, boiler blowdown and other process waters high in Total Dissolved Solids or conditioning chemicals should be appropriately contained (either by a liner system or by natural geologic containment). Ground water monitoring should be conducted around process water disposal areas.

Recommended Future Actions for Energy Production

In cooperation with other appropriate local, state, and federal agencies, and private landowners, the Regional Board should develop a monitoring program to detect water quality trends, identify problem areas, and determine any needed levels of action.

4.8 LAND DEVELOPMENT

The construction and maintenance of urban and commercial developments can impact water quality in many ways. Construction activities inherently disturb soil and vegetation, often resulting in accelerated erosion and sedimentation. Stormwater runoff from developed areas can also contain petroleum products, nutrients, and other contaminants.

This section contains a discussion of the potential water quality impacts expected to result from land development activities, followed by control measures to reduce or offset water quality impacts from such activities.

Construction Activities and Guidelines

Construction activities often produce erosion by disturbing the natural ground surface through scarifying, grading, and filling. Floodplain and wetland disturbances often reduce the ability of the natural environment to retain sediment and assimilate nutrients. Construction materials such as concrete, paints, petroleum products, and other chemicals can contaminate nearby water bodies. Construction impacts such as these are typically associated with subdivisions, commercial developments, and industrial developments.

Control Measures for Construction Activities

The Regional Board regulates the construction of subdivisions, commercial developments, industrial developments, and roadways based upon the level of threat to water quality. The Regional Board will request a Report of Waste Discharge and consider the issuance of an appropriate permit for any proposed project where water quality concerns are identified in the California Environmental Quality Act (CEQA) review process. Any construction activity whose land disturbance activities exceed five acres must also comply with the statewide general NPDES permit for stormwater discharges (see “Stormwater” section of this Chapter).

The following are guidelines for construction projects regulated by the Regional Board, particularly for projects located in portions of the Region where erosion and stormwater threaten sensitive watersheds. The Regional Board recommends that each county within the Region adopt a grading/erosion control ordinance to require implementation of these same guidelines for all soil disturbing activities:

1. Surplus or waste material should not be placed in drainageways or within the 100-year floodplain of any surface water.

2. All loose piles of soil, silt, clay, sand, debris, or other earthen materials should be protected in a reasonable manner to prevent any discharge to waters of the State.

3. Dewatering should be performed in a manner so as to prevent the discharge of earthen material from the site.

4. All disturbed areas should be stabilized by appropriate soil stabilization measures by October 15th of each year.

5. All work performed during the wet season of each year should be conducted in such a manner that the project can be winterized (all soils stabilized to prevent runoff) within 48 hours if necessary. The wet season typically extends from October 15th through May 1st in the higher elevations of the Lahontan Region. The season may be truncated in the desert areas of the Region.

6. Where possible, existing drainage patterns should not be significantly modified.

7. After completion of a construction project, all surplus or waste earthen material should be removed from the site and deposited in an approved disposal location.

8. Drainage swales disturbed by construction activities should be stabilized by appropriate soil stabilization measures to prevent erosion.

9. All non-construction areas should be protected by fencing or other means to prevent unnecessary disturbance.

10. During construction, temporary protected gravel dikes, protected earthen dikes, or sand bag dikes should be used as necessary to prevent discharge of earthen materials from the site during periods of precipitation or runoff.

11. Impervious areas should be constructed with infiltration trenches along the downgradient sides to dispose of all runoff greater than background levels of the undisturbed site. Infiltration trenches are not recommended in

areas where infiltration poses a risk of ground water contamination.

12. Infiltration trenches or similar protection facilities should be constructed on the downgradient side of all structural drip lines.

13. Revegetated areas should be continually maintained in order to assure adequate growth and root development. Physical erosion control facilities should be placed on a routine maintenance and inspection program to provide continued erosion control integrity.

14. Waste drainage waters in excess of that which can be adequately retained on the property should be collected before such waters have a chance to degrade. Collected water shall be treated, if necessary, before discharge from the property.

15. Where construction activities involve the crossing and/or alteration of a stream channel, such activities should be timed to occur during the period in which stream flow is expected to be lowest for the year.

16. Use of materials other than potable water for dust control (i.e., reclaimed wastewater, chemicals such as magnesium chloride, etc.) is strongly encouraged but must have prior Regional Board approval before its use.

Specific Policy and Guidelines for Mammoth Lakes Area

To control erosion and drainage in the Mammoth Lakes watershed at an elevation above 7,000 feet (Figure 4.8-1), the following policy and guidelines apply:

Policy:

A Report of Waste Discharge is required not less than 90 days before the intended start of construction activities of a **new development** of either (a) six or more dwelling units, or (b) commercial developments involving soil disturbance on one-quarter acre or more.

The Report of Waste Discharge shall contain a description of, and time schedule for implementation, for both the **interim erosion control measures** to be applied during project construction, and **short- and long-term erosion control measures** to be employed after the construction phase of the project. The descriptions shall include appropriate engineering drawings, criteria, and design calculations.

Guidelines:

1. Drainage collection, retention, and infiltration facilities shall be constructed and maintained to prevent transport of the runoff from a 20-year, 1-hour design storm from the project site. A 20-year, 1-hour design storm for the Mammoth Lakes area is equal to 1.0 inch (2.5 cm) of rainfall.

2. Surplus or waste materials shall not be placed in drainageways or within the 100-year flood plain of surface waters.

3. All loose piles of soil, silt, clay, sand, debris, or earthen materials shall be protected in a reasonable manner to prevent any discharge to waters of the State.

4. Dewatering shall be done in a manner so as to prevent the discharge of earthen materials from the site.

5. All disturbed areas shall be stabilized by appropriate soil stabilization measures by October 15 of each year.

6. All work performed between October 15th and May 1st of each year shall be conducted in such a manner that the project can be winterized within 48 hours.

7. Where possible, existing drainage patterns shall not be significantly modified.

8. After completion of a construction project, all surplus or waste earthen material shall be removed from the site and deposited at a legal point of disposal.

9. Drainage swales disturbed by construction activities shall be stabilized by the addition of crushed rock or riprap, as necessary, or other appropriate stabilization methods.

10. All nonconstruction areas shall be protected by fencing or other means to prevent unnecessary disturbance.

11. During construction, temporary erosion control facilities (e.g., impermeable dikes, filter fences, hay bales, etc.) shall be used as necessary to prevent discharge of earthen materials from the site during periods of precipitation or runoff.

12. Revegetated areas shall be regularly and continually maintained in order to assure adequate growth and root development. Physical erosion control facilities shall be

placed on a routine maintenance and inspection program to provide continued erosion control integrity.

13. Where construction activities involve the crossing and/or alteration of a stream channel, such activities shall be timed to occur during the period in which streamflow is expected to be lowest for the year.

Land Development/Urban Runoff Control Actions for Susan River Watershed

1. To protect riparian vegetation and wetlands from land disturbance activities, the Regional Board shall recommend that Lassen County and the City of Susanville require new development or any land disturbing activities to include buffer strips of undisturbed land, especially along the Susan River and its tributaries.

2. The Regional Board, with assistance from the City of Susanville and the California Department of Transportation (Caltrans), should conduct monitoring of the Susan River and Piute Creek within the City of Susanville to assess impacts from urban runoff. Control measures should be planned and implemented based on the results of the monitoring. The monitoring plan should be developed to identify nonpoint sources needing control. Monitoring proposals will be submitted by the Regional Board, and work will be conducted as resources allow and as the Susan River gains priority.

3. The Regional Board shall encourage and assist other agencies in watershed restoration efforts along the Susan River.

4. The Regional Board shall encourage the City of Susanville and Lassen County to adopt a comprehensive grading ordinance. These ordinances should require, for all proposed land disturbing activities, the use of Best Management Practices to reduce erosion and stormwater runoff, including but not limited to temporary and permanent erosion control measures.

5. The Regional Board shall encourage the City of Susanville, Lassen County and Caltrans to implement Best Management Practices to reduce erosion and stormwater runoff when constructing and maintaining roads, both paved and unpaved, under their jurisdiction.

Road Construction and Maintenance

Road construction activities often involve extensive earth moving, including clearing, scarifying, excavating for bridge abutments, disturbing or modifying floodplains, cutting, and filling. Additionally, the potential for land disturbance exists from construction materials, equipment maintenance, fuel storage facilities, and general equipment use.

Once constructed, impervious road surfaces create another source of water pollution. Oils, greases, and other petroleum products, along with such toxic materials as battery acid, antifreeze, etc., may be deposited along the road surfaces. These contaminants become suspended or dissolved in any stormwater runoff that is generated on the road surfaces. Unless otherwise treated, these contaminants will flow toward local surface or ground waters. (See “Stormwater” section of this Chapter.)

Road maintenance can be potentially threatening to water quality in a number of ways. Below-grade culverts slowly fill with sediment and are cleaned out periodically, sometimes by flushing accumulated sediment into downstream drainageways. Grading of shoulders and drainageways can detach sediments and increase the risk of erosion into nearby surface waters. Road surfaces may be repainted or resealed with materials that harden quickly, but which can be washed off while still fresh by stormwater runoff.

In the winter, roads are often snowy, icy, or wet. To reduce winter road hazards, maintenance crews may remove the snow or ice, apply sand to provide added traction, and/or apply deicing chemicals to melt the snow and ice. Sand is rapidly dissipated or crushed by the traffic, and must be replaced frequently. Great quantities of sediment enter drainageways and/or surface waters due to this practice. Snow may be removed mechanically via snowplow or snowblower. This practice is not particularly detrimental to water quality in itself, but the snow often carries substances from the roadway when removed. Sediments, chemical deicers, and vehicle fluids may travel much farther than they would otherwise, possibly reaching area surface waters. Ice and small accumulations of snow may be removed with chemical deicers. The deicer in widest use is rock salt (sodium chloride), due to its low cost, high availability, and predictable results.

Winter road maintenance was brought to the forefront in 1989 when significant numbers of roadside trees in the Lake Tahoe Basin suddenly started dying. The public outcry caused many environmental groups and regulatory agencies, including the Regional Board, to look more closely at what had been a more or less unscrutinized, unregulated process in the past. Data began to show that Caltrans was using very high amounts of salt each winter, and the figure seemed to increase from one year to the next. The consensus of the various regulatory agencies was that Caltrans should reduce salt use, explore various alternate deicers, and monitor the impacts of salt applications on soil, water, and vegetation. Salt use decreased significantly from 1989-1992, due to more careful application procedures and to drought conditions.

However, Caltrans' monitoring of vegetation showed minimal and temporary salt accumulation within the vegetation. During the spring, any salt that had accumulated in the vegetation was flushed out from the plant material. The impacts of chemical deicers on fish and wildlife within the Lahontan Region have not been studied.

Control Measures for Road Construction and Maintenance

(Additional control measures for roads are included in the “Stormwater” section of this Chapter.)

The Regional Board regulates road construction and maintenance projects within the Lahontan Region, concentrating efforts on major construction and construction in sensitive areas. Major construction projects and those projects in sensitive areas are most often regulated under individual WDRs, and are routinely inspected. Less significant projects may be issued conditional waivers of WDRs. The Regional Board has also adopted road maintenance waste discharge requirements for some county governments in the Region. Road construction and maintenance in the Lake Tahoe Basin is also regulated under municipal NPDES Stormwater Permits (see Chapter 5).

For all road projects, the Board requires that construction be conducted in a manner which is protective to water quality, and that, at the end of a given project, the site be restabilized and revegetated. These requirements are detailed in a Management Agency Agreement with Caltrans regarding the implementation of BMPs. Additionally, all road projects are to be in compliance with the Caltrans Statewide 208 Plan (CA Dept. of Transportation 1980), which was approved by the State Board in 1979. This Plan contains a commitment to implement BMPs, but does not include great detail on the BMPs themselves. The State Board should encourage Caltrans to update its 208 plan to provide such detail, with particular attention to:

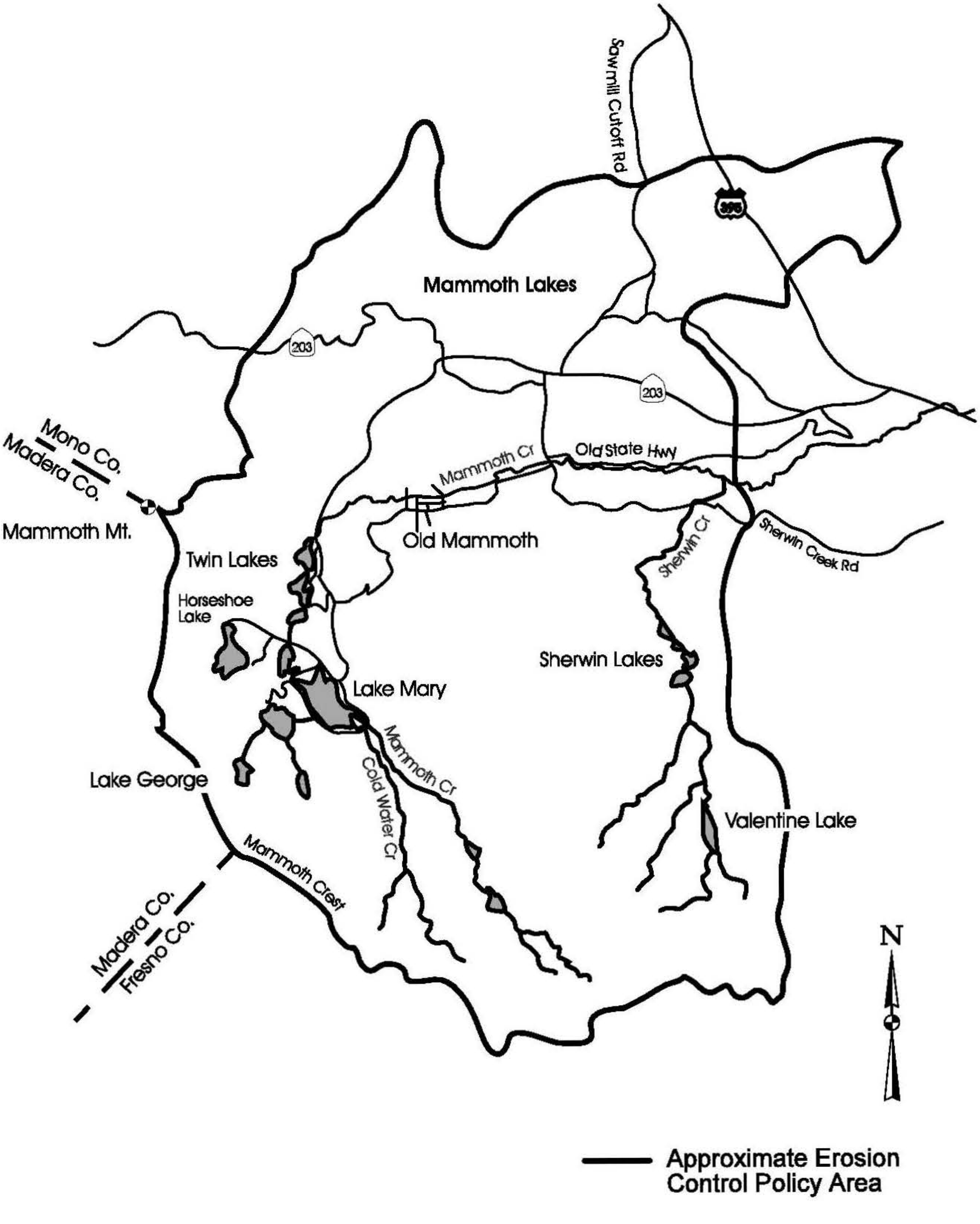
- stormwater/erosion control along existing highways
- erosion control during highway construction and maintenance
- reduction of direct discharges (e.g., through culverts)
- reduction of runoff velocity
- infiltration, detention and retention practices
- management of deicing compounds, fertilizer, and herbicide use
- spill cleanup measures
- treatment of toxic stormwater pollutants

Since much of the implementation of BMPs on highways is done by Caltrans' contractors, the selection of qualified contractors and ongoing education of construction and maintenance personnel on BMP techniques are particularly important.

Existing facilities should be retrofitted to treat stormwater runoff and to restabilize all eroding slopes in a manner consistent with the pollutant load reduction requirements described by the Lake Tahoe TMDL.

The Regional Board should allow salt use to continue as one component of a comprehensive winter maintenance program. However, the Regional Board should continue to require that it be applied in a careful, well-planned manner, by competent, trained crews. Should even the “proper” application of salt be shown to cause adverse water quality impacts, the Regional Board should then require that it no longer be used in environmentally sensitive areas, such as the Lake Tahoe Basin. Similarly, should an alternate deicer be shown to be effective, environmentally safe, and economically feasible, its use should be encouraged in lieu of salt.

Figure 4.8-1
OWENS HYDROLOGIC UNIT



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4.9 RESOURCES MANAGEMENT AND RESTORATION

Natural resources abound within the Lahontan Region. Surface and ground waters are of high quality and in abundant supply relative to surrounding areas. Large expanses of coniferous forests, woodlands and sagebrush lands intermixed with meadows, riparian areas and wetlands are found throughout the Region. Much of this land is publicly owned and managed.

Activities which extract, export, restore or otherwise manage these natural resources can impact beneficial uses and water quality. For instance, water exports from the Region can impact water quality. Diversion of tributaries can result in increased salinity or alkalinity and decreased volume of lakes. Sediment discharges from reservoirs used to store water for export have resulted in fish kills. Ground water pumping for export can impact the quality of the Region's ground water as well as the quantity. Timber harvest operations and related road construction can impact water quality through increased sediment load and changes in water temperature. Ranching activities can adversely affect water quality by contributing excessive sediment, nutrients, and pathogens. Additional examples of land management activities which can impact water quality are: controlled burning, recreation management, and habitat management for threatened, endangered or rare species.

Water quality protection policies, resource management and restoration activities, their related water quality problems and control actions are all described in this section.

Special Designations to Protect Water Resources

Certain waters within the Region are considered exceptional resources for a variety of reasons. The special designations described below are available to protect these exceptional resources.

Wild and Scenic River

The federal Wild and Scenic Rivers Act of 1968 (P.L. 90-542) declared that "the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes."

Federal Wild and Scenic status prohibits construction of new dams and major water diversions. Eligible and designated rivers may include both public and private land. The Act does not prohibit development on private property along designated rivers, but allows for the acquisition of such lands to protect Wild and Scenic values. On public lands, both eligible and designated river segments are specifically managed to protect identified Wild and Scenic values.

There are currently no federally-designated Wild and Scenic Rivers in the Lahontan Region. However, numerous river segments in the Region are eligible for federal Wild and Scenic status (see Table 4.9-1). Federal guidelines require that rivers eligible for National Wild and Scenic River designation be managed to protect their outstandingly remarkable values and free-flowing character until Congress makes a decision concerning designation. A condition (No. 7) of the Nationwide Permit under Clean Water Act Section 404 for dredge and fill activities states that no activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status.

In 1972, the California Legislature passed the California Wild and Scenic Rivers Act (California Stats. 1972, c. 1259, p. 2510, § 5093.50 to 5093.69), which is very similar to the federal legislation. The Act prohibits the construction of dams, reservoirs, and most water diversion facilities on river segments designated by the Legislature to be included in the system. Reaches of two rivers in the Lahontan Region, the West Walker and East Fork Carson, are currently designated as California Wild and Scenic Rivers:

- **West Walker River** -- Approximately 37 river miles from Tower Lake at the headwaters downstream to the confluence with Rock Creek, near the town of Walker on the edge of Antelope Valley, as well as about one mile of one tributary (Leavitt Creek).

- **East Fork Carson River** -- Approximately ten river miles from the town of Markleeville to the California/Nevada state line.

Outstanding National Resource Water

The federal antidegradation regulation (40 CFR § 131.12), initially adopted in 1975, establishes requirements for protection of high quality waters. Implementation of the federal antidegradation regulations includes the potential to designate certain waters of the Lahontan Region as Outstanding National Resource Waters (ONRWs).

The water quality of the waters which are designated an ONRW must be maintained and protected. No permanent or long-term reduction in water quality is allowable in areas given special protection as ONRWs (48 Fed. Reg. 51402). Examples of such waters include, but are not limited to, waters of national and state parks and wildlife refuges, waters of exceptional recreational or ecological significance, and state and federally designated wild and scenic rivers. To date, the only California waters designated as ONRWs are Lake Tahoe and Mono Lake. However, other California waters would certainly qualify. ONRWs may be designated as part of adoption or amendment of water quality control plans. It is important to note that even if no formal designation has been made, lowering of water quality should not be allowed for waters which, because of their exceptional recreational and/or ecological significance, are eligible for the special protection assigned to ONRWs.

Beneficial Use Designations

Certain beneficial use designations recognize special qualities of the waterbody which received the designation. For example, the beneficial use of BIOL (Preservation of Biological Habitats of Special Significance) is designated for waters which support designated areas or habitats such as sanctuaries and ecological reserves. The beneficial use of RARE (Rare, Threatened, or Endangered Species) is designated for waters which support habitats necessary for the survival and successful maintenance of plant and/or animal species established by state or federal law as rare, threatened or endangered. (See also “Beneficial Uses,” Chapter 2 of this Basin Plan.)

Stream Environment Zone

(Lake Tahoe Basin)

A Stream Environment Zone (SEZ) designation is used in the Lake Tahoe Basin for perennial, ephemeral and intermittent streams, lakes, ponds, areas of beach or marsh soils, areas of riparian vegetation and other similar areas. Many discharge prohibitions apply to protect SEZs. (See Chapter 5 for further details.)

Sole Source Aquifer

The U.S. Environmental Protection Agency (USEPA) has authority, under Section 1424 of the Safe Drinking Water Act, to designate certain ground waters as “sole source aquifers.” Any federal financially-assisted project proposed within an area receiving this designation will be subject to USEPA review to ensure that the project is designed and constructed to protect water quality. For a more detailed discussion, see the “Ground Water Protection and Management” section of this Chapter.

Significant Natural Areas

In 1981, Significant Natural Areas legislation (Assembly Bill 1039) was passed to promote awareness and protection of biological diversity throughout California. In response to this mandate, the California Department of Fish and Wildlife (DFW) established the Lands and Natural Areas Program (LNAP) to encourage recognition and perpetuation of California's most significant biological resources (CA Fish and Game Code 1930-1932). The LNAP issues periodically updated reports identifying Significant Natural Areas (SNAs) throughout the State. To qualify for SNA status, a site must meet at least one of the following criteria:

- the site harbors a species and/or community element that is extremely rare
- the site harbors an assemblage of three or more rare biotic elements
- the site is the “best example” of a rare community or habitat type
- the site is a center of high biological diversity

DFW has utilized the Natural Diversity Data Base to identify SNAs by county; exact boundaries of SNAs have not been established through field surveys. Numerous SNAs have been identified in the Lahontan Region. Many of these SNAs harbor special biological resources that are indicative of beneficial uses of water.

The Regional Board considers SNA and other Natural Diversity Data Base information when updating beneficial use designations for the Region's waters and when updating the Region’s Geospatial Waterbody System (GeoWBS) database (see Chapter 7).

Special Aquatic Sites

Special Aquatic Sites (SASs) include wetlands, mudflats, vegetated shallows, coral reefs, riffle and pool complexes, sanctuaries and refuges (as listed in 40 CFR § 230.3), vernal pools, and riparian areas. For the purposes of the SAS definition, “riparian areas” are areas within the jurisdictional waters of the United States which are comprised of the following habitat types, as characterized by the U.S. Fish and Wildlife Service: Palustrine Emergent Wetland, Palustrine Scrub-Scrub Wetland, Palustrine Forested Wetland (Cowardin et al. 1979). U.S. Army Corps of Engineers Section 404 nationwide permits for discharges of dredge and fill materials are not certified, except under certain conditions, for discharges which will affect SAS sites (see also “Wetlands Protection” discussion later in this section). Parts of many waters of the Lahontan Region qualify for the SAS designation as wetlands, riffle and pool complexes, sanctuaries, refuges and riparian areas. The Regional Board considers SAS information when updating beneficial use designations for the Region's waters and when updating the Region's Geospatial Waterbody System (GeoWBS) database (see Chapter 7).

Research Natural Areas and Special Interest Areas

The U.S. Forest Service (USFS) uses the designation of Research Natural Area (RNA) to preserve a specific area as a representative sample of an ecological community, primarily for scientific and educational purposes. The USFS designation of Special Interest Areas (SIA) establishes areas to managed for their unique and special features including botanical and other features. The Regional Board considers USFS RNA and SIA designations when updating beneficial use designations for the Region's waters, and when updating the Region's Geospatial Waterbody System (GeoWBS) database (see Chapter 7).

Areas of Critical Environmental Concern

The U.S. Bureau of Land Management uses the Area of Critical Environmental Concern (ACEC) designation for areas where special management is needed to protect and prevent irreparable damage to important resources including fish and wildlife resources, or other natural systems. The ACEC designation signifies that the area contains significant values or resources. The Regional Board considers BLM Areas of Critical Environmental Concern designations when updating beneficial use designations for the Region's waters, and when updating the Region's Geospatial Waterbody System (GeoWBS) database (see Chapter 7).

Water Quality/Quantity Issues; Water Export and Storage

Because much of the Lahontan Region is desert, water supplies are often limited under natural conditions. Diversions of water for human use have threatened or impaired other beneficial uses in several portions of the Region. Although the authority to issue and modify water rights licenses rests with the State Water Resources Control Board rather than with the Regional Board, the Regional Board can bring water quality problems related to water diversions to the State Board's attention, and request that solutions be considered.

Most surface water in the Lahontan Region has already been allocated through court adjudications, water rights licenses, or interstate agreements (a map illustrating all adjudicated basins in the State is available from the State Board, Division of Water Rights). The California-Nevada Interstate Water Compact was negotiated in the 1960s, approved by the states in the early 1970s, and partially ratified by Congress in 1990 as P.L. 101-618. This law allocates the surface and ground waters of the Carson River and Lake Tahoe/Truckee River watersheds between the two states. Management of reservoirs and flows of regulated streams in these watersheds is the responsibility of a federal watermaster.

Large amounts of water are exported from the Mono Lake and Owens River watersheds by the Los Angeles Department of Water and Power for municipal use in Southern California. Smaller amounts are exported to the American River and Feather River watersheds from the North Lahontan Basin. Some water is imported into the Lahontan Region via the California Aqueduct. Many natural lakes in the Region have been dammed to increase storage, and are operated as reservoirs; new reservoirs have also been constructed. (See the separate discussion of “Reservoir Management,” below.)

Diversions have totally or almost totally dewatered some lakes and streams in the Lahontan Region, impairing or precluding the attainment of aquatic beneficial uses (e.g., Owens Lake). Recent court decisions have required the rewatering of the Owens River Gorge and some Mono Lake tributaries. Where diversion is not total, lower flows, or changes in the timing of flows, can stress aquatic ecosystems through higher summer temperatures, greater winter ice formation, increases in the concentrations of pollutants, and other factors.

Temperature and flow variations can affect critical life stages of aquatic organisms, and can change the nature and rate of nutrient and mineral cycles. In some cases (e.g., Mono Lake), lower water levels can increase the vulnerability of water-dependent wildlife to predators. Low streamflows stress riparian vegetation. Water diversions can aggravate natural stresses on aquatic and wetland ecosystems which result from droughts. Low flows can affect the ability of dischargers to surface waters to ensure attainment of receiving water objectives downstream of the discharge. The magnitude and timing of stormwater flows affects the concentration of pollutants, and the “first flush” of concentrated pollutants which have accumulated on urban pavement during the dry season can be especially stressful to aquatic organisms (see the “Stormwater” section in this Chapter). Diversions from lakes and reservoirs used for boating can result in increased demands for dredging to facilitate access to marinas and piers, with consequent water quality impacts related to resuspension of sediment and contaminants. In some parts of California, removal of vegetation, or conversion of vegetation to a different community type, is being used to increase surface runoff to increase water supplies. Water quality impacts of such practices, in terms of increased erosion and sedimentation, and loss of riparian/wetland values, can be significant.

Most municipal and agricultural water supplies used within the Lahontan Region come from ground water, often from individual wells. Ground water diversions are likely to increase because of new federal regulations which increase treatment requirements for surface sources of drinking water. Severe ground water overdraft has occurred in portions of the Region ranging from Surprise Valley in Modoc County to the Antelope and Victor Valleys in the South Lahontan Basin. Ground water overdraft can affect beneficial uses of surface waters such as wetlands and springs, particularly in dry areas. It can concentrate trace chemicals, both naturally occurring salts and contaminants due to human activities. Overdraft can lead to land subsidence and surface soil cracking. Some soil types (fine grained silts and clays), once compacted, can never again hold as much water upon rewatering of the aquifer. Severe cracking has occurred at Edwards Air Force Base near Lancaster, leading to the concern that cracks extending to the water table may facilitate the entry of toxic substances into water supplies. Increased ground water pumping in overdrafted aquifers can draw pollutants toward wells. Improperly constructed or abandoned wells can also act as conduits for pollutants (see the discussion of well standards in the “Ground Water” section of this Chapter). Imported water used for ground water recharge, if it is of naturally lower quality than local ground water, can be considered a discharge even if no new introduction of wastes into the environment is involved (Sawyer 1988). Some types of construction projects (e.g., placement of fill in wetlands) can reduce ground water recharge.

The potential exists for increased diversion and export of water from the Lahontan Region. The Reno and Las Vegas, Nevada areas are growing rapidly, and are considering increased ground water pumping on the Nevada side of the state line. Such pumping could affect beneficial uses of surface and ground waters in California, including springs and wetlands in Death Valley which support endangered species. Concern has also been expressed about the migration of radionuclides from the Nevada Test Site in California ground waters in the area.

Water quality problems can also occur as a result of flooding. In some areas the potential for flooding has increased due to hydrologic modification, increased impervious surface, and disturbance of wetlands and riparian vegetation. Flooding can erode streambanks, and wash out sewer lines and stored fuels and hazardous materials. (See also Section 4.3, “Stormwater, Runoff, Erosion, and Sedimentation”; and the “Floodplain and Riparian Area Protection” discussion later in this section.)

Control Measures to Prevent or Mitigate Water Quality Problems Related to Water Quantity

Regional Board and other state, as well as federal and local, control actions related to water quantity/quality are described below.

Regional Board Control Actions

Actions which can be taken by the Regional Board to prevent or mitigate the impacts of water quality problems related to water quantity include:

1. Establishment of flow-weighted numerical water quality objectives for surface waters, based on long-term hydrologic data, in order to reduce the frequency of violations due to natural drought conditions.

2. Consideration of the flow and water supply needs of aquatic organisms, riparian/wetland

vegetation, and wildlife when establishing biological water quality objectives.

3. Consideration of water availability before the issuance of waste discharge requirements, and placement of conditions in requirements limiting water use in order to protect water quality. (The State Board has determined that such conditions are appropriate under limited circumstances. Because the Porter-Cologne Act provides that the Regional Board cannot specify the method of compliance, the authority to include water use limits in waste discharge requirements does not provide authority to specify water conservation measures to achieve those limits [Sawyer 1988].) One example would be placement of conditions in waste discharge requirements for hydroelectric projects to mitigate the impacts of releases from impoundments on downstream uses. (See also the “Ground Water” section in this Chapter.)

4. Issuance of waste discharge requirements for ground water recharge with imported water which is of lower quality than local ground water.

5. Issuance of waste discharge requirements for projects which would interfere with ground water recharge.

6. Encouragement of the use of Best Management Practices to minimize water use for agricultural, landscape, and turf irrigation.

7. Undertaking investigations (e.g., fact finding hearings) into ground water quality/quantity problems, and making recommendations for State Board action under Water Code Section 2100.

8. Encouragement of the use of reclaimed water wherever feasible without adverse impacts on beneficial uses. (Regional Boards are required, when establishing water quality objectives, to consider the need to develop and use reclaimed water.)

9. Recommendations to the State Board during review of construction projects which may also require water rights permits.

10. Encouragement of the adoption and implementation of wellhead protection programs. (See the discussion of well standards in the “Ground Water Protection and Management” section of this Chapter.)

11. Continued participation by Regional Board staff as observers in meetings involving proposed changes in water exportation from the Lahontan Region (e.g., changes in the Truckee River operating agreement). Staff should also attempt to stay informed on large scale diversion proposals even when no formal meetings are being held.

12. Careful review of and consideration of waste discharge requirements for any proposals to manage vegetation or convert vegetation types in order to increase water yield from a watershed.

13. Careful staff review of CEQA documents to ensure that water quality/quantity issues are adequately addressed.

Control Measures for Water Quantity/Water Quality by other State Agencies

The Porter-Cologne Act provides authority for planning in relation to water quantity/flow issues, but implementing authority is generally separate from the authority provided by State water quality plans (Sawyer 1988).

1. Under the Public Trust Doctrine (see Chapter 1 of this Plan), the State Water Resources Control Board must consider the protection of a variety of environmental values when making decisions to issue or renew water rights permits. The State Board can grant appropriative water rights for the protection of beneficial uses, and can ensure that natural flows remain in a water body to protect designated beneficial uses. For some areas, the State Board has adopted water rights policies which give direction for future actions on water rights applications. The policy affecting the Lake Tahoe Basin was adopted in 1969 and is in need of update.

2. California water rights law does not require State permits for ground water diversions, except for underground waters which flow in defined channels (e.g., the lower Mojave River). However, the State is bound by limits such as those set by the California-Nevada Interstate Water Compact on all diversions from the Carson River and Lake Tahoe/Truckee River systems. Possible means of addressing the impacts of ground water pumping and overdraft include use of nuisance law, the Public Trust doctrine, and existing State Board authority. Adjudication of ground water rights is also possible; this could result in court appointment

of a watermaster, with court-defined authority ranging from monitoring and recording to broad management powers. The State Board may also place conditions to protect ground water in grant contracts or water rights permits for surface water use (Sawyer 1988). See also the discussion of Water Code Section 2100 in Section 4.6 of this Chapter.

3. The Department of Fish and Game should continue to define instream flow requirements for fish and other aquatic organisms, and should bring water quality problems related to water quantity to the attention of the State and Regional Boards. The Wildlife Conservation Board can purchase land and acquire associated riparian water rights for the protection of fish and wildlife.

4. The Attorney General of California has authority to bring legal action for protection of the natural resources of the State. This authority could be used to correct water quality problems related to water quantity.

Federal Control Measures for Water Quantity/ Water Quality

1. The U.S. Environmental Protection Agency should continue to give special attention to water quality/quantity relationships in the arid west when giving direction to states on the adoption of water quality standards and the implementation of these standards in permits.

2. The Federal Energy Regulatory Commission should give special attention to the water quality/quantity impacts of hydroelectric projects proposed within the Lahontan Region.

3. Federal land management agencies within the Lahontan Region should define the water supply needs for all beneficial uses which occur within their jurisdictions, and should bring these needs to the attention of the State Board for consideration during the formulation of water rights policies and the revision of water rights permits.

Local Control Measures for Water Quantity/Water Quality

1. County water districts have broad authority to conserve, protect, and replenish ground water supplies. The Subdivision Map Act allows cities and counties to adopt ground water recharge facility plans, construct recharge facilities, and charge a fee for the construction of such facilities as a condition of approval for subdivision maps and building permits (Sawyer 1988).

2. State law permits the formation of local ground water management districts. A few such districts have been established within the Lahontan Region, and more may be formed in response to proposed ground water pumping on the Nevada side of the state line. Local governments should strictly enforce well construction standards. Where wellhead protection ordinances have been adopted, they should be strictly enforced.

3. The Tahoe Regional Planning Agency has adopted an “environmental threshold carrying capacity” standard to protect fisheries in the Lake Tahoe Region. This standard provides that, until instream flow standards are established in the TRPA Regional Plan, a nondegradation standard shall apply to instream flows. The threshold standards also state the policy of the TRPA Governing Body to seek transfer of existing points of water diversion from streams to Lake Tahoe. The Best Management Practices Handbook in the 208 Plan (TRPA 1988) includes lists of approved native and “adapted” grass, shrub, and tree species for use in landscaping and revegetation.

Recommended Future Actions for Water Quantity/Water Quality

1. The potential exists for physical solutions to water quality problems related to ground water overdraft, such as provision of alternative water supplies, artificial recharge, or the establishment of physical barriers or injection barriers to pollutants. Such solutions can be provided through the courts in connection with water rights adjudications, or as part of ground water management programs including regulation and augmentation of supply. Physical solutions could also be authorized during approval of water development projects. These solutions may involve conjunctive use projects where surface waters are used for ground water recharge or as a substitute supply for ground water users. It is important to manage ground and surface waters as an interconnected resource (Sawyer 1988).

2. Long drought periods beginning in the 1970s inspired a variety of legislation related to water conservation and reclamation. Local governments are now required to have

ordinances regulating landscape irrigation. Local governments within the Lahontan Region should be encouraged to require use of native plants or species adapted to local conditions, which have low requirements for irrigation, fertilizer, and pesticides for survival and maintenance.

Reservoir Management

Reservoirs and natural lakes used as reservoirs, are widely utilized throughout the Lahontan Region to store water for municipal and agricultural supply. These reservoirs also supply aquatic and wildlife habitat and meet ground water recharge, recreation, and flood control needs. Reservoir operations and maintenance activities can impact water quality and beneficial uses both within and downstream of reservoirs.

Reservoir release practices can result in the release of high levels of nutrients and sediments, deoxygenated water, or insufficient downstream flows to sustain fish and maintain aquatic habitats. The release of deoxygenated water from the bottom of reservoirs is extremely detrimental as it can result in large downstream fish kills. Likewise, the release of warmer water can also impact downstream aquatic life forms. Reservoir discharges through improperly designed spillways can increase downstream erosion.

Stored or impounded water can develop taste and odor problems caused by algal growth or other microorganisms. Water impoundment can also cause water temperature to increase. Temperature differences between inflowing water and reservoir surface water can result in the formation of density or turbidity currents. These currents plunge below the surface, carrying any sediment load to the reservoir dam.

Point and nonpoint sources of pollution within a reservoir's drainage area, such as fertilizer applications, bank erosion, timber harvesting, stormwater runoff, wastewater discharges and industrial discharges, can contribute to the sediment and nutrient load into a reservoir. High nutrient levels in a reservoir can contribute to accelerated eutrophication and/or impact downstream waters. Most reservoirs act as large sediment basins and accumulate sediments. Coarse sediments usually deposit in a delta at the head of the reservoir, while finer sediment can remain in suspension and may eventually settle in the deepest pools or be carried to the dam. Some pollutants, such as metals, can be re-suspended from the sediments into the water column. Certain conditions, such as flooding or reservoir dewatering, can cause accumulated reservoir sediments to be discharged into downstream waters.

Dredging is sometimes used to remove sediment, and to control internal nutrient cycling and macrophyte growth. However, dredging itself can impact water quality and beneficial uses. Specific impacts and regulation of dredging are discussed in the “Boating and Shorezone Recreation” discussion of the “Recreation” section of this Chapter.

Control Measures for Reservoirs

(See also Control Measures for Lake Restoration later in this Section.)

The reservoirs (both constructed and natural lakes operated as reservoirs) in the Lahontan Region and their beneficial uses are listed in Chapter 2. Past control measures for these reservoirs included adoption of waste discharge requirements (WDRs) for construction activities (regulation of discharges related to waste earthen materials, stormwater runoff, construction-related wastes, domestic wastewater generated during construction). WDRs have also been adopted for hydroelectric projects associated with reservoirs (hydroelectric projects are discussed in the “Mining, Industry, and Energy Development” section of this Chapter). The WDRs included surface water discharge limitations for a variety of water quality parameters including nutrients, turbidity, pH, taste, odor, temperature and algal growth potential, as well as Best Management Practices (BMPs) to prevent discharge of waste earthen materials. Construction of future reservoirs will be regulated in a similar manner. During review of any future proposed reservoirs, the Regional Board will coordinate closely with the State Board's Division of Water Rights, California Department of Fish and Wildlife, California Division of Dam Safety, as well as other agencies.

Recommended Future Actions for Reservoir Management

In addition to careful review of proposed new reservoirs, the Regional Board should focus on operations and maintenance of existing reservoirs to minimize impacts on water quality and beneficial uses. This regulation should incorporate relevant provisions contained in the State Board's Thermal Plan. (The Thermal Plan is summarized in Chapter 6.) Through MAAs, MOUs or WDRs, operation and maintenance activities such as dredging, discharges, and repairs should include control measures to prevent increases in nutrient levels and sediment loads, as well as BMPs to prevent downstream bank erosion and impacts to downstream aquatic habitats. The Regional Board should consider a prohibition against the release of deoxygenated water from reservoirs.

Wetlands Protection and Management

California historically supported an estimated 5 million acres of wetlands. Wetlands have not always been considered as valuable natural resources. Thus, in California, an estimated 91 percent of wetlands have been lost due to alterations in their biological, chemical and physical properties (National Research Council 1992). The remaining wetlands are considered very valuable resources. Wetland values and functions include high productivity, water purification, flood control, nutrient removal and transformation, sediment stabilization and retention, water supply, ground water recharge and erosion control. The high biological productivity of wetlands results in important wildlife habitat for both aquatic and terrestrial animals and plants, including feeding, breeding and nursery grounds. A greater than average number of rare species are found in wetland habitats. Wetlands also provide a number of other scientific, educational and aesthetic uses.

The statewide Water Quality Assessment database (see Chapter 7 of this Basin Plan) lists some of the wetlands within the Lahontan Region. The Regional Board also maintains a separate wetland database that includes general locations (maps), descriptions, and assessments of the condition of many wetlands within the Region. Because of the seasonality of rainfall in the Region, some wetlands may not be easy to identify by simple means (e.g., aerial photographs) or by obvious wetland characteristics. Thus, site-specific boundaries of the Region's wetland areas will be determined on an as-needed basis using methods in the current “Federal Manual for Identifying and Delineating Jurisdictional Wetlands” (U.S. Army Corps of Engineers, 1987) performed by certified wetland delineators (certification program established in accordance with Section 307[e] of the Water Resources Development Act of 1990) or by other qualified professionals acceptable to the Regional Board. A separate method of identifying “Stream Environment Zones” in the Lake Tahoe Basin is used for regulatory purposes in that watershed (TRPA 1988, Vol. III).

Wetlands within the Region are defined to include areas that are “inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (including) playa lakes, swamps, marshes, bogs and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds” (40 CFR § 110.1[f]).

The federal Clean Water Act formally equates “navigable waters” with “waters of the United States” (§ 502[7]). The Code of Federal Regulations also equates “navigable waters” to “waters of the United States” and specifically incorporates wetlands in navigable waters definitions, including those for interstate and intrastate waters (40 CFR § 232.2[q]). The Porter-Cologne Water Quality Control Act (CA Water Code § 13050[e]) defines “waters of the State” to be “any water, surface or underground, including saline waters, within the boundaries of the State.” Thus, wetlands are both waters of the State and waters of the United States. Therefore, provisions of the California Water Code apply. These provisions include protection of beneficial uses and water quality. Beneficial uses of wetlands are listed in Chapter 2 of this Plan. Water quality objectives which apply to surface waters, including wetlands, are included in Chapter 3 of this Plan. (The Regional Board recognizes that the natural pH of some wetlands may not meet the pH narrative objective.)

Numeric criteria to protect one or more designated uses of surface waters have been developed by the U.S. Environmental Protection Agency (USEPA). Where appropriate, these criteria directly apply to wetlands. For example, wetlands which actually are, or recharge, municipal water supplies should meet human health criteria. The USEPA numeric criteria for protection of freshwater aquatic life, as listed in *“Quality Criteria for Water—1986*,” although not developed specifically for wetlands, are generally applicable to most wetland types (USEPA 1990).

As with other types of surface waters, such as saline or alkaline lakes, natural water quality characteristics of some wetlands may not be within the range for which the criteria were developed. Adjustments for pH, hardness, salinity, temperature, or other parameters may be necessary.

Impacts to the water quality of wetlands can negatively affect any or all of the wetlands' functions and values. Thus, the following control measures are necessary to protect wetlands.

Control Measures for Wetland Protection

As direction for implementing control measures for wetlands protection, the Regional Board will use Senate Concurrent Resolution No. 28 which states that *"It is the intent of the Legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend upon them for the benefit of the people of the State."*

Regional Board and other State, as well as federal and local, wetland protection control actions are described below and apply to all wetlands which are considered "waters of the State" and/or "waters of the United States." Additional control measures applicable to "Stream Environment Zones" in the Lake Tahoe Basin are discussed in Chapter 5. Control measures specific to constructed/artificial wetlands are also included below, and in the sections of this Chapter on "Wastewater" and "Stormwater." The "Stormwater" section includes a detailed discussion of the use of wetlands for stormwater treatment. Control measures specific to wetland restoration are discussed separately, later in this section.

Regional Board Control Measures for Wetland Protection and Management

1. For proposed discharges of municipal wastewater, stormwater, solid wastes, earthen materials, or other wastes to wetlands, the Regional Board will ensure that wetlands are afforded the same level of protection as other types of surface waters with respect to standards and minimum treatment requirements. For discharges to wetlands, all applicable water quality standards for the wetland and any adjacent waters must be met. Recommended conditions pursuant to Clean Water Act Section 401 Water Quality Certification, waste discharge requirements, monitoring and inspections programs, Cease and Desist/Clean-up and Abatement Orders will be implemented as necessary. The monitoring may include water quality, sediment quality, whole effluent toxicity and biological measurements such as diversity indices. Monitoring the fate of persistent or bioaccumulative contaminants may also be required by the Regional Board.

2. Hydrology is a major factor influencing the type and location of wetlands. To protect the beneficial uses and water quality of wetlands from impacts due to hydrologic modifications, the Regional Board will carefully review proposed water diversions and transfers (including ground water pumping proposals), and require or recommend control measures and/or mitigation as necessary and applicable.

3. In conjunction with beneficial use designations and water quality objectives, the Regional Board will implement the State Board's Resolution No. 68-16 "Statement with Respect to Maintaining High Quality Waters In California" (see "Nondegradation Objective" in Chapter 3; also see Chapter 6, "Plans and Policies") to regulate point and nonpoint source discharges to wetlands, particularly for those types of impacts difficult to assess through compliance with established water quality objectives alone (e.g., impacts due to physical and hydrological modifications).

4. The Clean Water Act Section 401 program (Water Quality Certification process) gives the Regional Board extremely broad authority to review proposed activities in and/or affecting the Region's waters (including wetlands). The Regional Board can then recommend that the State Board grant, deny, or condition certification of federal permits or licenses that may result in a discharge to "waters of the United States" (e.g., U.S. Army Corps of Engineers CWA Section 404 permits, licenses from the Federal Energy Regulatory Commission). The Regional Board, in coordination with the State Board, will use this authority to prevent impacts to beneficial uses of wetlands and/or violation of wetlands water quality objectives. In addition to recommending that the State Board grant, deny or condition certification of federal permits or licenses, the Regional Board has independent authority under the California Water Code to regulate discharges to wetlands through waste discharge requirements or other orders (see No. 1 above).

5. Many beneficial uses and the water quality of wetlands can be impacted by filling and dredging. For proposed discharges due to dredging activities, and for proposed discharges of dredged and/or fill materials into wetlands regulated under Clean Water Act Section 404 (U.S. Army Corps permit program), the Regional Board will utilize the process described above in No. 4.

   Note: U.S. Army Corps Section 404 nationwide permits for discharges of dredge and fill materials are not certified, except under certain conditions, for discharges which will affect "Special Aquatic Sites." Special Aquatic Sites are defined in the "Special Designations to Protect Water Resources," at the beginning of this Section.

During its review of projects proposing discharges of dredged and/or fill materials into wetlands, the Regional Board will consider whether the project is water dependent and whether there are viable project alternatives. For projects where no viable alternatives exist, the Regional Board will consider whether wetland impacts can be made acceptable through certification and/or permit conditions. The Regional Board may elect to use its independent authority under the California Water Code to regulate discharges to wetlands through waste discharge requirements or other orders (see No. 1 above).

6. The Regional Board now coordinates wetlands permitting with other agencies. Staff will work with local governments toward further streamlining of the permitting process by facilitating earlier consultation with and coordination among all permitting agencies, including the U.S. Army Corps of Engineers and the California Department of Fish and Wildlife. Improved coordination may also include measures such as development of a single permitting package containing necessary forms and instructions for all appropriate agencies, with coordinated review times, and development of Memoranda of Understanding with local governments.

7. The Regional Board will also explore the feasibility of streamlining permitting by defining wetland values and mitigation requirements on an areawide basis (e.g., for an existing subdivision) and then issuing general waste discharge requirements, waiving waste discharge requirements, or recommending waiver of Water Quality Certification for subsequent individual projects in that area. Areawide permits, or new Regional Board policy language, would define the specific types of wetland disturbance covered and the extent of mitigation required. This process could be coordinated with the U.S. Army Corps of Engineers' Special Area Management Plan (SAMP) process and/or with local governments' wetlands plans and policies (see the section below on "Local Control Measures for Wetland Protection and Management"). Areawide general permits or new Regional Board policies would require CEQA compliance, with project level detail on required mitigation.

8. For proposed fill activities or other discharges which will result in wetland loss, the Regional Board will require compensatory mitigation so that there will be no net loss of wetland acreage and no net loss of wetland functions and values when the project and mitigation lands are evaluated together. The Regional Board may require an inventory of wetland characteristics to take place prior to wetland disturbance to determine wetland size, functions and values, to serve as a guide for wetland restoration or creation, and to form a comparative basis for evaluating the success of the mitigation project.

   In determining the functions and values of the wetland, the Regional Board will consider integrated physical, chemical and biological wetland parameters including water purification, flood control, nutrient removal and transformation, sediment stabilization and retention, water supply, ground water recharge/discharge, erosion control, recreation, wildlife diversity/abundance and aquatic diversity/abundance. Suggested methods to determine wetland function and values are shown in Table 4.9-2. The Regional Board will consider wetland function and value determinations made by other methods such as the Wetland Evaluation Technique (WET) developed by Adamus et al. (1987) for the U.S. Army Corps of Engineers. Wetland function and value determinations made using other methodologies will be considered by the Regional Board on a case-by-case basis. In recognition that determining wetland function and value uses relatively new methods, the Regional Board will carefully and judiciously make wetland function and value determinations. The Regional Board will also track the development of new methodologies, and review such methodologies for application in future wetland function and value determinations.

   The Regional Board will consider wetland boundaries determined by using the U.S. Army Corps of Engineers' 1987 "Federal Manual for Identifying and Delineating Jurisdictional Wetlands." Delineation of wetlands shall be performed by certified wetland delineators (certification program established in accordance with Section 307[e] of the Water Resources Development Act of 1990) or by other qualified professionals.

The Regional Board will coordinate all wetland mitigation requirements with those of the U.S. Army Corps of Engineers.

9. The Regional Board prefers avoidance of wetland disturbance to disturbance followed by mitigation such as restoration or creation. In its review of projects with potential wetland impacts, the Regional Board will follow the sequence of: Avoid; Minimize; Mitigate. Through a thorough analysis of project alternatives, the project proponent must first demonstrate to the Regional Board that wetland impacts are not <u>avoidable</u>. If the impacts are not avoidable, the proponent must then demonstrate that the impacts to the wetland area are the <u>minimum</u> necessary for the project. The project proponent must then propose <u>mitigation</u> to compensate for any wetland impacts.

   When mitigation is necessary, the Regional Board prefers in-kind, on-site mitigation whenever possible. If not possible, the Regional Board will then consider in-kind, off-site mitigation. As a last choice, the Regional Board will consider out-of-kind mitigation. "In-kind" means that the mitigation wetland site will have similar function and value to that of the disturbed wetland site in terms of physical, chemical and biological wetland parameters including water purification, flood control, nutrient removal and transformation, sediment stabilization and retention, water supply, ground water recharge/discharge, erosion control, recreation, wildlife diversity and abundance, and aquatic species diversity and abundance. "Out-of-kind" means that the mitigation wetland site will substantially differ from the disturbed wetland site in regard to these same parameters.

   Regional Board staff is available to assist the project proponent by identifying potential mitigation opportunities. The Regional Board may accept payment by the project proponent to a mitigation bank or to another entity that will provide the required mitigation.

10. Restoration of an historic wetland (once functioning wetland but now damaged or destroyed) generally will have a greater chance of success in terms of restoration of wetland functions and long-term persistence than constructed wetlands at an upland site (Kusler and Kentula 1990). Thus, for mitigation purposes, the Regional Board prefers wetland restoration rather than wetland creation.

11. For restored or created wetlands, measures may be necessary to protect the wetland from excessive sedimentation, foot traffic, offroad vehicles, exotic species, or other factors that may inhibit wetland functions or degrade wetland values. Protective measures may include buffers (between the mitigation site and the surrounding area), fences or other barriers, and sedimentation basins. Thus, the Regional Board will require that the proposed mitigation provide for buffer zones or other protective measures, as appropriate.

12. When mitigation is necessary, the Regional Board will require, as a waste discharge permit condition, or as a recommended condition for Clean Water Act Section 401 Water Quality Certification, that a mitigation plan be prepared and executed. The plan must demonstrate that no net loss of wetland acreage and no net loss of wetland functions and values will occur when the project and mitigation lands are evaluated together. Proof of ownership, easement, or similar documents for the mitigation site must be provided in the mitigation plan. The plan should also clearly establish specific goals of the mitigation that can be targeted in subsequent evaluations. Wetland restoration or creation proposed as compensatory mitigation, which could or will result in a waste discharge, will be regulated as necessary by the Regional Board to ensure compliance with all provisions of this Basin Plan (see also "Wetland Restoration" discussion later in this Section, as well as "Constructed Wetlands" discussion in Section 4.4 of this Chapter). For both restored or created compensatory wetlands, the mitigation plan should include details of establishing and maintaining the restored wetland, as well as a monitoring program to evaluate the status and success of the restoration or creation.

13. Created wastewater treatment wetlands designed, built, and operated solely as wastewater treatment systems are generally not considered to be waters of the United States (USEPA 1990). Water quality standards that apply to natural wetlands generally do not apply to such created wastewater treatment wetlands. However, many created wetlands are designed, built, and operated to provide, in addition to wastewater treatment, functions and values similar to those provided by natural wetlands.

Under these circumstances, such created multiple use wetlands may be considered waters of the U.S. and applicable water quality standards would apply. The applicability of water quality standards to created wetlands will be determined by the Regional Board on a case-by-case basis. In its determination, the Regional Board will consider factors such as size, type of waste to be treated, location, degree of isolation of the created wetlands, and other appropriate factors. Any discharge from a created wetlands which does not qualify as “waters of the U.S.” must meet applicable water quality standards of its receiving water(s).

Control Measures for Wetland Protection and Management by Other State Agencies

1. Through required conditions in its Lake/ Streambed Alteration Permits, the California Department of Fish and Wildlife can provide some wetland protection, especially for fish and wildlife resources, and other aquatic resources.

2. The California Resources Agency, including the Departments of Fish and Game and Water Resources, is developing a comprehensive wetlands conservation plan. State Board staff is participating in the Resources Agency's planning process. An implementation strategy is to be included in the conservation plan. The strategy may include specific legislation, bond acts, administrative law changes, and other means as necessary to accomplish the goals of the conservation plan.

3. The California Department of Parks and Recreation has developed a Wetlands Protection Policy.

4. The California Department of Forestry utilizes a streamside protection zone system which provides some wetlands protection.

Federal Control Measures for Wetland Protection and Management

1. The United States Army Corps of Engineers (COE) addresses intrusions into navigable waters and issues permits for discharge of fill and dredge material to navigable waters (including wetlands). These permits are referred to as Clean Water Act (CWA) Section 404 permits. In its permitting process, the COE considers comments from other federal agencies, such as the U.S. Fish and Wildlife Service and from state agencies, such as the Regional Board and the California Department of Fish and Wildlife. The permits are reviewed by the U.S. Environmental Protection Agency. The USEPA has veto authority over COE CWA Section 404 permits for discharges to navigable waters.

2. Under the Emergency Wetlands Resources Act of 1986, the U.S. Fish and Wildlife Service (USFWS) is required to complete the mapping of wetlands within the lower 48 states by 1998 through the National Wetlands Inventory and to assess the status of the nation's wetland resources every ten years. The maps, status and trends resulting from the USFWS's work will provide necessary documentation to support additional wetlands protection measures if necessary.

3. The U.S. Forest Service utilizes a streamside protection zone system which provides some wetlands protection.

Local Control Measures for Wetland Protection and Management

1. The Tahoe Regional Planning Agency, in cooperation with the Regional Board, implements discharge prohibitions and other protection measures for “Stream Environment Zones,” including wetlands, in the Lake Tahoe Basin (see Chapter 5 of this Plan).

2. Mono County is developing a Wetland Preservation Policy. The draft policy includes wetlands protection or “buffer” zones, development guidelines and mitigation requirements including provisions for the development of a local mitigation bank.

3. The Mojave River Task Force, with members from the staff of the Town of Apple Valley, the Cities of Hesperia and Victorville and San Bernardino County Regional Parks, is developing a multiple objective resource management plan for the Mojave River Corridor (San Bernardino County). One main objective of the plan is to balance the many uses of the riparian corridor such as wetland habitat, recreation and flood control while still providing the necessary level of resource protection.

Recommended Control Measures for Wetland Protection and Management

1. When practical, where wetland restoration or creation is required as mitigation, the Regional Board should consider requiring that the mitigation be completed **before** allowing wetland disturbance to occur.

2. Because of the risks inherent in restoring or creating certain wetland types, such as those which support threatened or endangered species or unique biological communities, area ratios of disturbed to restored/created wetlands should be 1:1.5, 1:2, or higher, for some mitigation projects. Larger mitigation areas increase the likelihood of successfully restoring or creating the wetland function and value of the disturbed wetland.

3. Design of wetland restoration and creation should consider the relationship of the wetlands to the watershed (including water sources, other wetlands, adjacent upland and deep water habitats).

4. The Regional Board should encourage local government entities to develop and execute wetland protection policies. The policies should include provisions to develop local mitigation banks whose primary focus is on the restoration of historic wetland sites (once functioning wetland sites that are now damaged or destroyed).

5. The Regional Board should encourage evaluation of past wetland mitigation efforts to guide future efforts.

6. The Regional Board should discourage wetland disturbance in areas designated by the California Department of Fish and Wildlife as Significant Natural Areas (see “Special Designations to Protect Water Resources” at the beginning of this Section).

Floodplain and Riparian Area Protection

(See also “Wetlands” discussion above, and the discussion of discharge prohibitions in Section 4.1.)

A 100-year floodplain is defined as the extent of a flood that has a statistical probability of occurring once in 100 years. Floods of this extent may occur more than once every 100 years, and floods of even greater extent are possible. Most state, federal and local floodplain protection planning is based upon the 100-year floodplain. Floodplains often include wetland and riparian areas which may extend beyond the limits of the 100-year floodplain. Riparian areas are typically defined as the terrestrial moist soil zone immediately adjacent to wetlands, lakes, and both perennial and intermittent streams.

Undisturbed floodplains and riparian areas provide natural storage for flood waters and thus moderate downstream flood flows and augment dry season (base) flows. The wetland and riparian areas of floodplains can provide water treatment including settling of suspended matter as flood flows are slowed, physical filtration of sediment and associated chemicals by vegetation, uptake of nutrients by roots and foliage, adsorption of chemicals on soil particles, and uptake and chemical transformation of substances by soil microorganisms. Riparian areas are important habitat for fish and other wildlife (including significant habitat for threatened or endangered species), providing drinking water, abundant food, a moderate climate (with more shade and cooler temperatures than many upland areas), and shelter. Riparian areas support abundant and diverse mixtures of plant and animal life. An estimated 25 percent of California's mammals, half of its reptiles, and three-fourths of its amphibians are closely associated with riparian areas (Warner and Hendrix 1984). Riparian vegetation is important in providing streambank stability and shading, temperature control, and food for aquatic systems.

In addition to the values of flood control, water quality protection, base flow augmentation, and wildlife habitat, floodplains and riparian areas can provide opportunities for dispersed recreation, access points for water contact recreation, and open space for aesthetic enjoyment. As all of these values can be impacted by development or other disturbances in the floodplain and riparian areas, protection measures are necessary.

Control Measures for Floodplain and Riparian Areas

Regional Board and other state, as well as federal and local, floodplain and riparian protection control actions are described below.

Regional Board Floodplain Control Actions

Regional Board prohibitions regarding floodplains, as well as prohibition exemption criteria, are described in the Waste Discharge Prohibitions section of this Chapter, and in the Lake Tahoe Chapter.

Control Measures for Floodplain and Riparian Areas by other State Agencies

1. California Executive Order 8-39-77 directs that “all agencies responsible for programs which affect land use planning, including state permit programs, shall take flood hazards into account in accordance with recognized floodway and

100-year frequency flood design standards when evaluating plans and shall encourage land use appropriate to the degree of hazard involved."

2. The California Department of Water Resources (1980) flood management policy includes the following provisions:

    - The preferred method of flood damage reduction is to adjust use and occupancy of the floodplain through management or regulation of uses, rather than solely by structural works in the stream;

    - Structural flood damage reduction projects should usually be limited to those already developed areas in which flood-proofing or relocation of development is not economically or socially feasible;

    - The social values of essentially natural streams will be recognized, and flexibility in degree of protection will be considered where a community so desires since the traditional solution of channelization or elimination of a stream is often seen as a bigger problem by the community;

    - The structural integrity of existing flood protection works must be assured through effective management and surveillance programs, accompanied by programs to deal with residual risks;

    - Flood management efforts will be carried out in a way that incorporates ground water recharge, wetland, fish and wildlife protection and enhancement, and recreational development as integral parts of the flood management program. This includes recognition of the values of wetland and riparian habitat and native vegetation and maximum efforts to preserve these values and resources.

3. California Department of Forestry and Fire Protection (CDF) Forest Practice Rules (Rules) detail specific best management practices to protect riparian areas during timber harvest operations on non-federal lands throughout California. These Rules require establishment of Watercourse and Lake Protection Zones adjacent to lakes, streams, wetlands, and springs to exclude equipment, roads, and landings, and to retain sufficient canopy cover.

4. Other state agency programs which may regulate floodplain and riparian protection activities include the Department of Fish and Wildlife's stream alteration permit program and endangered species review process (see "Sensitive Species and Biological Communities" discussion later in this section).

Federal Control Measures for Floodplain and Riparian Areas

1. The 1977 Executive Order 11988 (floodplain management) and Executive Order 11990 (wetlands) directed federal agencies to avoid actions that would adversely affect floodplains and wetlands. The floodplain order states that if avoidance is not practical, agencies are to restore and preserve natural floodplain values. The order also provided a basis for coordination among the many federal agencies with floodplain management authority.

2. A U.S. Forest Service policy (Leven 1984) provides that preferential consideration be given to riparian area-dependent resources over other resources and activities when conflicts occur.

3. The U.S. Army Corps of Engineers federal Clean Water Act Section 404 permit program for dredging and filling activities also affects floodplains. For details of the Section 404 permit program, see "Wetlands Protection" discussion above.

Local Control Measures for Floodplain and Riparian Areas

Many counties in the Region provide general protection for floodplains and riparian areas through zoning, land use ordinances and the project review process. Examples include specified buffer zones, building setbacks, grading limits, and building bans within floodplains.

Recommended Future Actions for Floodplain and Riparian Areas

1. For proposed projects with probable floodplain impacts where floodplains have not been mapped by FEMA or the Corps of Engineers, the Regional Board should require appropriate floodplain mapping by the project applicant.

2. The Regional Board should consider adopting floodplain discharge prohibitions for other environmentally sensitive areas of the Region such as Mammoth Lakes.

3. The Regional Board should continue to promote protection of riparian areas on U.S. Forest

Service, U.S. Bureau of Land Management, and non-federal grazing operations, allotments, and leases.

Forest Management

Forested lands are found throughout much of the Lahontan Region. Management of these lands can include commercial timber harvests, vegetation management to address fire risk and forest health, fire suppression, the use of prescribed fire, watershed and ecological restoration, and other activities. The forests of the Lahontan Region have suffered under a century of fire suppression, leaving an unhealthy condition in many locations where an abundance of undergrowth and dense canopy have created increased risk for catastrophic fire. Efforts to reduce these “fuel loads” and to create defensible space for property owners are an ongoing priority. Forest management activities can also include the use of pesticides and various restoration techniques. Restoration techniques and pesticide use are discussed elsewhere in this Chapter. Other activities on forested lands, such as mining, livestock grazing, and recreation, are also discussed separately in this Chapter.

Silviculture/Timber Harvests

Silvicultural activities in the Lahontan Region occur on both federal and non-federal forest land. Tree harvesting methods include commercial thinning, clearcutting, sanitation, and salvaging of dead or dying trees, as well as non-commercial thinning to improve forest health and/or reduce the risk of and severity of wildfire. These harvesting operations are performed on areas of up to several thousand acres per project, and often involve heavy equipment such as tractor skidders, bulldozers, log hauling trucks, chip vans for biomass removal, and road watering trucks. Many project sites have not been harvested for many decades, if at all, and therefore have thick undergrowth, especially near streamcourses or wetlands. Activities such as log felling/yarding and particularly the construction, improvement and use of forest roads, log landings, and watercourse crossings can result in significant impacts. These impacts can include soil erosion and/or compaction, discharge to streams, streamcourse disturbance and diversion, and removal of riparian or wetland vegetation. Such impacts on soils, vegetation and hydrology can in turn affect water quality and beneficial uses.

Control Measures for Silvicultural Activities

Prohibitions on unauthorized waste discharge to surface waters apply throughout the Lahontan Region. Prohibitions on waste discharges to 100-year floodplains apply to forestry activities in the Lake Tahoe and Truckee River watersheds. In the Lake Tahoe Basin, prohibitions on waste discharges to Stream Environment Zones (SEZs) also apply. Exemptions from these prohibitions may be granted for certain types of forest management activities. See Sections 4.1 and 5.2 of this Basin Plan for information on waste discharge prohibitions and exemption criteria.

The Regional Board requires proponents of vegetation or forest management activities with the potential to discharge wastes that could affect the quality of waters of the state to obtain coverage under waste discharge requirements or a waiver of waste discharge requirements. Dischargers must ensure that their activities comply with the applicable provisions of this Basin Plan (including water quality objectives and waste discharge prohibitions or exemption criteria) and are protective of water quality. To the extent that funding and staffing allows, Regional Board staff inspect the project area with the land owner or representative, and recommend water quality protection measures. If Regional Board concerns are not satisfactorily addressed or if violations are observed, the Regional Board may take enforcement actions in accordance with the California Water Code.

The Regional Board regulates timber harvest proposals for both federal and non-federal lands. Special forest management provisions apply to the Lake Tahoe Basin (see Chapter 5).

Federal Lands. The United States Forest Service (USFS) has the authority and responsibility to manage and protect the land which it administers, including protection of water quality. When the USFS plans a timber harvest, it is generally listed quarterly in a notice called the Schedule of Proposed Actions (SOPA). Water Board staff typically review the quarterly SOPA notices and comment on those projects that have the potential to significantly impact water quality within the Lahontan Region. The USFS generally writes a National Environmental Policy Act (NEPA) document and routes it for public review. When the NEPA document is approved, the USFS writes a timber sale contract agreement with the hired logger. This agreement lists the terms of contract and includes protection measures for streamcourses, sensitive vegetation, soil stabilization, and erosion prevention that the logger must follow.

There is a Management Agency Agreement (MAA) between the USFS and State Water Resources

Control Board (State Board). The MAA recognizes the mutual desire of each agency to achieve the goals of the Clean Water Act and to assure control of water pollution through implementation of Best Management Practices (BMPs). Each agency mutually agrees to coordinate water quality monitoring, share data, and cooperate in other water quality management planning activities.

During timber harvest activities on NFS lands, the USFS requires use of BMPs to directly or indirectly mitigate adverse effects to water quality and beneficial uses. Once BMPs are applied during a timber operation, their effectiveness is evaluated by the USFS. If BMP implementation did not produce the desired results, the USFS initiates corrective action and the BMPs may be modified as needed.

Timber harvest BMPs that are intended to protect water quality within National Forest System lands include:

- The location and method of streamcrossings, and location of skid trails and roads, must minimize impacts to water quality.
- Maintenance of the natural flow of streams and reduction of sediment and other pollutants that may enter watercourses.
- All project debris must be removed from the streamcourse in the least disturbing manner.
- Timber sale contracts shall specify that timber operators must repair all damage to streamcourses, banks and channels.
- Water bars and other erosion control structures must be located to prevent water and sediment from being channeled into streamcourses and to dissipate concentrated flows.
- Equipment must stay a set minimum distance from streamcourses depending upon slope and high water mark.
- Proper drainage must be maintained during use of log landings.
- Used landings must be ditched or sloped to permit drainage and dispersion of water.
- Appropriate water quality or visual monitoring shall be conducted.

The USFS must obtain waste discharge requirements (permit) or a waiver thereof from the State Water Board or the Regional Board prior to implementing projects that have the potential to discharge wastes that could affect the quality of the waters of the state. The permit or waiver considers the BMPs that have been developed by the USFS and may include additional conditions to protect water quality.

Non-federal lands. The State Board recognizes the water quality authority of the Board of Forestry (BOF) and the California Department of Forestry and Fire Protection (CALFIRE) during timber operations on non-federal lands. The State Water Board has certified a water quality management plan which includes Best Management Practices for these timber operations on non-federal lands.

In cases when a timber owner wishes to conduct commercial timber harvest on private lands, a registered professional forester (RPF) is required to complete and sign a Timber Harvest Plan (THP). The THP includes a topographic map of the area, determination of number of acres, expected time period of operation, locations of roads, large landings and stream crossings, type of harvest, and watercourse and wetland protection measures. This THP is then filed with CALFIRE. A review team meeting is held at the regional CALFIRE office. This meeting may include representatives from CALFIRE, the Regional Board, California Department of Fish and Wildlife (DFW), and California Geologic Survey (CGS). After the meeting, a copy of the THP with any revisions is sent to the Regional Board for its review of potential water quality impacts.

Regional Board staff may elect to meet on-site with CALFIRE staff and the RPF who completed the THP. The land or timber owner and other review team agency representatives may also be present. The timber harvest operation is inspected to ensure compliance with State Forest Practice Rules (FPRs) and the Regional Board's Basin Plan and permit or waiver. These FPRs include the following provisions:

- Timber operations shall prevent unreasonable damage to riparian vegetation, and site productivity must be maintained by minimizing soil loss.
- Appropriate levels of protection are assigned to different types of watercourses, including minimum distances logging machinery must be kept away from streamcourses and wet areas (buffer zones). The widths of the buffer zones depend on side slope and beneficial uses of the water.

- Depending on the watercourse classification there are retention standards for understory and overstory vegetation.
- Watercourse crossings must be kept to a minimum.
- If fish are present, the crossing must allow unrestricted passage of fish and water.
- Roads must be located and constructed to minimize impacts to water quality.
- Roads and landings should have adequate drainage.
- Heavy equipment is not to be operated on unstable soils or slide areas.
- Waterbreaks must be installed before the winter period. Standards are to be followed for distances between water breaks on slopes. These water breaks should allow water to discharge into vegetative cover, duff, slash, rock or less erodible material to minimize erosion and should be maintained during timber operations.
- Timber operations during the winter period must not be performed under saturated soil conditions.
- Material from logging operations shall not be discharged into waters of the State in quantities deleterious to beneficial uses of water.
- Timber operators shall not use watercourses, marshes or wet meadows as log landings, roads or skid trails.
- Trees cut within watercourse and lake protection zones shall be felled away from the watercourse by endlining to protect vegetation from heavy equipment operations.

Lake Tahoe Basin. Special control actions for forest management activities within the Lake Tahoe Basin are included in Chapter 5 of this Plan.

Recommended Future Actions for Silvicultural Activities

Regional Board staff should continue to actively review both federal and non-federal timber harvest proposals and to conduct on-site inspections as necessary. Since 2003, the Regional Board has had conditional waivers of waste discharge requirements for vegetation management activities on both public and private lands in California (Timber Waivers). These timber waivers address both commercial and non-commercial timber harvest and vegetation management activities. Non-commercial activities may be conducted for fuel reduction and forest health purposes. Timber Waivers must be renewed every 5 years and may be terminated at any time by the Regional Board. The timber waiver renewal must occur in a public hearing with prior public noticing. Significant research and equipment innovation is being conducted to address the shift in forest management associated with fuel reduction activities. The timber waiver acknowledges that new approaches are being developed to address forest and watershed health. The waiver allows for project specific analysis of implementation approaches and an avenue to regulate practices as new technologies are developed. The timber waiver and the Basin Plan need to have flexibility in allowing for increased future utilization of biomass created during fuel reduction activities. Future Regional Board efforts should focus on adaptive management, the use of innovative technology, and design features and BMPs that reduce water quality impacts of forest management activities.

Fire Control and Prescribed Burns

Wildfires are part of the natural process of the forest ecosystem. Some species of trees and other plants are dependent upon wildfires for seed germination and/or seedling establishment. However, these fires, both natural and human caused, can have major impacts on vegetation conditions with subsequent effects on soils and water quality. In many forests, fire suppression techniques are commonly used, adding an abundance of available “fuel” to the forest. This “fuel” can contribute to a high intensity wildfire which magnifies impacts on vegetation, soils, and water quality.

Fires initiate a process of soil movement that continues through subsequent rainstorms. The process begins as fires consume vegetation. With the vegetation removed, effective ground cover to hold soils in place is also removed. The vegetation is no longer removing and using soil nutrients like nitrogen and phosphorus. Many nutrients are left in the ashes which can easily be transported to surface waters by stormwater runoff or ground water flow. If the fire destroys the duff layer (a biologically rich protective layer of decaying needles and branches), only easily erodible ashes are left to cover the bare mineral soils. The duff layer normally functions like a sponge, soaking up precipitation, including snow melt. Without the duff layer, the water which would normally infiltrate to ground water becomes erosive runoff. In areas of sandy soils, intense burning of the duff layer can chemically alter the soils, creating a water repellant or "hydrophobic" layer which can further increase runoff. Runoff can rapidly erode bare mineral soil and flush nutrient-rich ashes into rills and gullies. Over time, these gullies can increase in size, eventually draining to surface waters, eroding upland areas, scouring some natural stream channels while adding sediments to some channels and lakes. This increased sedimentation can impact fish spawning gravels and fill pools and riffles which are important aquatic habitat components. Sediments also contribute large amounts of nutrients to streams and lakes. Fires can further impact water quality by increasing the magnitude of floods associated with moderate and extreme storms. Fires can also impact water temperature by reducing stream shading.

Burning under prescribed conditions to control undesirable vegetation, control insects or pathogens, or to maintain ecological succession, can have similar water quality impacts to those of wildfires, but usually on a lesser scale.

Thus, from a water quality perspective, controlling fires is important. However, fire fighting can also leave its mark on watersheds. The activities of firefighters and heavy equipment can result in soil disturbance, vegetation removal, and stream sedimentation. Chemical fire retardants also have the potential to impact water quality. Many of these fire retardants are ammonium-based and decompose to such products as ammonia, sodium cyanide and sulfuric and phosphoric acids. Some retardants are mixes of foaming and wetting agents. Aquatic toxicity testing of these fire retardants has shown aquatic organism sensitivity to many retardants. In the case of foaming agents, the water surface tension is reduced which interferes with the ability of fish and other organisms to obtain oxygen from the water. Surface waters in many of the forested watersheds of the Lahontan Region are naturally oligotrophic, and loading of nitrogen and phosphorus from fire retardants to surface waters may contribute to eutrophication.

Control Measures for Fire Control and Prescribed Burn Operations

The Regional Board shall rely on the water quality expertise of the USFS and CALFIRE to promptly take measures after fires to reduce the adverse effects on water quality and beneficial uses. The Regional Board shall further rely on the USFS and CALFIRE in the design and use of fire control activities and prescribed burn activities which avoid or minimize adverse impacts on water and soil resources. The Regional Board encourages the USFS and CALFIRE to consider the following measures to protect water quality and beneficial uses.

- Burning under prescribed conditions should generally be located away from stream channels or standing water. Some types of burns may be closer to standing water. The Regional Board should be notified of any proposal to conduct burning activities near watercourses. Prescribed burning activities may be covered by the Regional Board's waiver of waste discharge requirements or other regulatory mechanism. Efforts shall be made to limit fire intensities, prevent transport of ash and soil to waters, increase recovery of vegetation and/or implement BMPs to quickly stabilize soils following burning.

- When the residual fuel load will be acceptable, non-burning techniques such as scattering or hauling away slash are acceptable, especially where the slash, chipped or masticated material will provide soil protection. (Timber harvests and herbicide use, both possible means of reducing fuel loads, are discussed elsewhere in this Chapter.)

- When selecting and stocking fire retardants, fire protection agencies should consider the relative potentials of different compounds for toxicity to aquatic life (particularly to threatened/endangered species), and for eutrophication of naturally oligotrophic waters. When fighting fires, direct drops of fire retardants into streams, lakes, wetland areas, or riparian areas should be avoided.

Recommended Future Actions for Fire Control and Prescribed Burn Operations

The Regional Board may request each state and federal land management agency within the Region to submit information on any fire retardant proposed for use in fire fighting. This information should include chemical composition, chemical decomposition products, results of any aquatic organism toxicity or other toxicity testing and mode of action (foaming, wetting, etc.). Following any fire fighting activities, information on amounts used and locations of use should be submitted to the Regional Board.

Range Management

Rangeland is the most extensive landtype in California, accounting for more than 40 million acres of the State's 101 million acres. As most of the rangelands are located between forested areas and major river systems, nearly all surface waters in theState flow through rangelands. Thus, rangeland activities can greatly impact water quality. In this section, grazing activities are discussed. Other rangeland management activities, such as riparian restoration and erosion control, are discussed elsewhere in this Chapter.

Livestock Grazing

Grazing activities (particularly overgrazing), by contributing excessive sediment, nutrients and pathogens, can adversely impact water quality and impair beneficial uses. Soil erosion and sedimentation are the primary causes of lowered water quality from rangelands. When grazing removes most of the vegetative cover from pastures and rangelands, the soil surface is exposed to erosion from wind and water. With runoff, eroded soil becomes sediment which can impair stream uses and alter stream channel morphology. With steep slopes, highly erodible soils and intense storm events, the sediment delivery ratio (a measure of the amount of eroded soil delivery to a waterbody) on rangeland can be very high. Streambank erosion and lakeshore erosion are other sources of sediment on rangelands. Lakeshores, streambanks and associated riparian zones are often subjected to heavy livestock use. Trampling and grazing of vegetation contribute to lakeshore and streamside instability as well as accelerated erosion.

Sediments can contribute large amounts of nutrients to surface water. Nutrients, mainly nitrogen and phosphorous, from manure and decaying vegetation also enter surface waters, particularly during runoff periods. Very critical nutrient problems can develop where livestock congregate for water, feed, salt and shade. Pasture fertilization can also be a source of nutrients to surface waters, as well as a source of pesticides, particularly if flood irrigation techniques are used on rangelands. (Irrigation return flows are discussed in the “Agriculture” section of this Chapter).

Stream zone and lakeshore areas are important for water quality protection in that they can “buffer” (intercept and store nutrients which have entered surface and ground waters from upgradient areas). These “buffer zones” are more sensitive to processes which can increase nutrient discharges such as soil compaction, soil erosion, and vegetation damage than other areas of the rangeland.

Localized contamination by pathogens in surface water, ground water and soils can result from livestock in pastures and rangelands. Rangeland streams can show increased coliform bacterial levels with fecal coliform levels tending to increase as intensity of livestock use increases. Fecal coliform serve as indicators that pathogens could exist and flourish. The extent of the pathogens is usually determined by livestock density, timing and frequency of grazing, and access to the surface waters.

Control Measures for Grazing

Grazing activities occur on both public and private lands in the Lahontan Region. Regulation of grazing on federal lands differs from that on private lands.

Federal lands. Grazing activities on federal lands are regulated by the responsible land management agency, such as the U.S. Bureau of Land Management (BLM) or the U.S. Forest Service (USFS). Through MOUs and MAAs, the Regional Board recognizes the water quality authority of the USFS and BLM in range management activities on federal lands. Both the USFS and BLM require allotment management plans (AMPs) to be prepared for a specific area and for an individual permittee. The Regional Board relies on the water quality expertise of the USFS or BLM to include appropriate water quality measures in the AMPs. Most AMPs include specific Best Management Practices (BMPs) to protect water quality and existing and potential beneficial uses.

Non-federal (private) lands. The Range Management Advisory Committee (RMAC) is a statutory committee which advises the California Board of Forestry on rangeland resources. The RMAC has identified water quality protection as a major rangeland issue and it assumed a lead role in developing a water quality management plan for private rangelands in California. The California Rangeland Water Quality Management Plan (Rangeland Plan) was accepted by the State Water Resources Control Board (SWRCB) in 1995. The Rangeland Plan summarizes authorities and mandates for water quality and watershed protection, and specifies a framework for the voluntary and cooperative development of ranch management strategies for water quality protection under Tier I of the SWRCB’s Nonpoint Source Management Plan. (See the Introduction to Chapter 4 of this Basin Plan for an explanation of the Nonpoint Source Plan.) The Rangeland Plan provides that where water quality or the beneficial uses of water are impaired or threatened, ranch owners shall develop an individual Rangeland Water Quality Management Plan (RWQMP) or participate in one of the several other recognized individual or coordinated rangeland planning processes. The Rangeland Plan also describes sources of technical and financial assistance available to ranch owners.

On private lands whose owners request assistance, the U.S. Natural Resources Conservation Service (NRCS), in cooperation with the local Resource Conservation Districts (RCDs), can provide technical and financial assistance for range and water quality improvement projects. An MOU is in place between the NRCS and the State Board for planning and technical assistance related to water quality actions and activities undertaken to resolve nonpoint source problems on private lands.

On both public and private lands, the Regional Board encourages grazing strategies that maintain adequate vegetative cover to reduce erosion and sedimentation. The Regional Board promotes dispersal of livestock away from surface waters as an effective means of reducing nutrient and pathogen loading. The Regional Board encourages use of BMPs to improve water quality, protect beneficial uses, protect streamzone and lakeshore areas, and improve range and watershed conditions. These BMPs include:

- Implementing rest-rotation grazing strategies
- Changing the season of use (on/off dates)
- Limiting the number of animals
- Increasing the use of range riders to improve animal distribution and use of forage
- Fencing to exclude grazing in sensitive areas
- Developing non-lakeshore and non-stream zone watering sites
- Constructing physical improvement projects such as check dams
- Restoring riparian habitat

These same BMPs may result in improved range and increased forage production, resulting in increased economic benefit to the rancher and land owner. The Regional Board also encourages land owners to develop appropriate site-specific BMPs using technical guidance documents from the Natural Resources Conservation Service and the U.S. Environmental Protection Agency (USEPA 1993).

Regional Board Control Actions for Livestock Grazing

In addition to relying on the grazing management expertise of agencies such as the USFS, BLM or RMAC, the Regional Board can directly regulate grazing activities where voluntary implementation of BMPs is deemed by the Regional Board or its Executive Officer to be inadequate to ensure protection of water quality and beneficial uses of water. Actions available to the Regional Board include:

1. Require that a Report of Waste Discharge be filed, that an AMP be prepared, or that an Individual Rangeland Water Quality Management Plan (RWQMP) or Coordinated Resource Management Plan (CRMP) be adopted within one year of documentation of erosion problems, destruction or major impairment of vegetation, or significant addition of nutrients, pathogens and/or sediments to surface waters or ground waters resulting from grazing or grazing management activities. Such problems indicate impairment of beneficial uses or violation or threatened violation of water quality objectives.

2. Require that all AMPs, RWQMPs and CRMPs contain BMPs necessary to correct existing water quality problems or to protect water quality so as to meet all applicable beneficial uses and water quality objectives contained in Chapters 2 and 3 of this Basin Plan. Corrective measures would have to be implemented within one year of submittal of the AMP, RWQMP or CRMP, except where staged BMPs are appropriate. Implementation of a staged BMP must commence within one year of submittal of the AMP, RWQMP or CRMP.

3. Require that each AMP, RWQMP or CRMP include specific objectives, actions, and monitoring and evaluation procedures. The discussion of actions must establish the seasons of use, number of livestock permitted, grazing system(s) to be used, a schedule for rehabilitation of ranges in unsatisfactory condition, a schedule for initiating range improvements, and a schedule for maintenance of improvements. The schedule for initiating and maintaining range improvements must include priorities and planned completion dates. The

discussion of monitoring and evaluation must propose a method and timetable for reporting of livestock forage conditions, watershed condition, and surface and ground water quality.

4. Require that all AMPs and CRMPs be circulated to interested parties, organizations, and public agencies.

5. Consider adoption of waste discharge requirements if an AMP, RWQMP or CRMP is not prepared or if the Executive Officer and the landowner do not agree on BMPs proposed in an AMP, RWQMP or CRMP.

6. Decide that AMPs, RWQMPs and CRMPs prepared to address a documented watershed or water quality problem may be accepted by the Regional Board's Executive Officer in lieu of adoption of Waste Discharge Requirements.

7. Oversee monitoring of water quality variables and beneficial uses. Provide data interpretation.

Eagle Lake. The following control measures apply to the Eagle Drainage Hydrologic Area (see map in Section 4.1):

- A Report of Waste Discharge must be filed, or an AMP, RWQMP or CRMP prepared for specific areas within one year of documented proof of (1) erosion problems that threaten water quality or beneficial uses of water, (2) destruction, or major impairment of vegetation, or (3) significant addition of nutrients to surface waters or ground waters resulting from grazing or grazing management activities.

- All AMPs, RWQMPs or CRMPs must contain Best Management Practices (BMPs) necessary to correct existing water quality problems or to protect water quality. Corrective measures must be implemented within one year of submittal of the plan, except where staged BMPs are appropriate. Implementation of a staged BMP must commence within one year of submittal of the plan. The BMPs required because of documented watershed or water quality problems may be accepted by the Regional Board's Executive Officer in lieu of adoption of Waste Discharge Requirements.

- AMPs and CRMPs must be circulated to interested parties, organizations, and public agencies. Each AMP, RWQMP and CRMP must address objectives, actions, and monitoring and evaluation. The discussions of actions must establish the seasons of use, number of livestock permitted, grazing system to be used, a schedule for rehabilitation of ranges in unsatisfactory condition, a schedule for initiating range and watershed improvements, and a schedule for maintenance of range and watershed improvements. The schedule for installing and maintaining range and watershed improvements must include priorities and planned completion dates. The discussion of monitoring and evaluation must propose a method and timetable for reporting of livestock forage conditions, watershed condition, and surface and ground water quality. Each plan should describe all BMPs in enough detail to show that all water quality standards of this Basin Plan will be protected or restored.

Recommended Future Actions for Grazing Management

1. Provide information to private landowners, local RCDs and other agencies regarding grant monies available through the SWRCB and other sources for water quality planning and BMP implementation on rangelands. When requested, Regional Board staff should participate in the voluntary implementation of BMPs on rangelands by providing information and technical assistance to facilitate grant applications.

2. Encourage private landowners to request technical and financial assistance from the Natural Resources Conservation Service and the University of California Cooperative Extension, in cooperation with the local Resource Conservation Districts, in the preparation of AMPs, RWQMPs and CRMPs, and the implementation or construction of grazing and water quality improvements.

Fisheries Protection and Management

Fisheries protection, including the preservation and enhancement of aquatic habitat, is a necessary consideration during project review, when potential impacts may occur as a result of a project. Recommended control actions for protecting fishery-related beneficial uses are described below.

Fisheries management activities in the Lahontan Region include operation of public hatcheries to rear fish, restoration of habitat, and use of fish toxicants (i.e., rotenone) to eliminate undesirable fish populations. Regulation of activities related to public hatcheries and fish toxicants are discussed in this section. Habitat restoration is discussed elsewhere in this Chapter.

Control Actions for Fisheries Protection

1. The Regional Board will coordinate with the California Department of Fish and Wildlife (DFW) and the U.S. Fish and Wildlife Service (USFWS) to decide on the appropriate and necessary protection measures to protect a specific fish population and its habitat. Fisheries protection requirements should be considered during review of any proposed project that may impact any fishery or its habitat.

2. Chapter 2 of this Plan designates beneficial uses of the Region's surface waters. The general uses related to fish habitat are: “Cold Freshwater Habitat” (COLD), “Warm Freshwater Habitat” (WARM), “Inland Saline Water Habitat” (SAL). Some surface waters have also been further designated for “Migration of Aquatic Organisms” (MIGR) and “Spawning, Reproduction, and Development” (SPWN). Where migration and/or spawning occur, the special measures listed below are required to protect spawning areas and migration corridors:

   - Prior to activities which may impact spawning habitat, an assessment of the gravel bed condition will be made by the discharger with assistance from DFW. Waste discharge activities with detrimental impacts to the gravel bed will not be allowed.

   - During construction, maintenance or operation of any project, minimum stream flows are to be maintained for fish survival and/or passage.

   - During construction, maintenance or operation of any project, fish passage shall be provided.

   - When designing facilities to be placed in a streambed, such as a culvert, stream velocities shall be maintained at a reasonable level which will not result in obstruction of fish passage.

Fish Hatcheries

Discharges produced by fish hatcheries include suspended solids and nutrients from fish wastes and unconsumed fish food, as well as potential discharges of pesticides or other substances used to control fish diseases. Potential water quality impacts downstream from these discharges include increased productivity and algal growth, increased biological oxygen demand, and impaired aquatic habitat. However, in one instance, discharges from a hatchery (Hot Creek Hatchery) promoted the growth of vegetation fed upon by the endangered Owens tui chub. Because the routine removal of the vegetation was threatening the endangered fish, hatchery personnel stopped removing the vegetation.

Hatchery operations are themselves sensitive to water conditions. For example, optimum propagation of fish is restricted to a narrow range of temperatures; alteration of ambient water temperature can have a severe effect on hatchery fish production. In one instance, geothermal development in the vicinity of a fish hatchery could alter the temperature of geothermal springs that are used as water supplies for hatchery operations. The potential loss in productivity due to altered temperature of the hatchery water supplies could potentially result in several million dollars in monetary damages. (Geothermal development is discussed in the “Mining, Industry and Energy Development” section of this Chapter.)

Control Actions for Hatcheries

All hatchery operations which include point source discharges to surface waters are regulated under National Pollutant Discharge Elimination System (NPDES) permits. Effluent discharge parameters limited in the NPDES permits include suspended solids and settleable matter. Receiving water limitations in the NPDES permits for hatcheries include color, taste, odor, foaming agents, toxic substances, dissolved oxygen, turbidity and aquatic growth.

Rotenone Use in Fisheries Management

The California Department of Fish and Wildlife (DFW) and the United States Fish and Wildlife Service (USFWS) occasionally have cause to eliminate competitors, predators, and otherwise undesirable fish populations as part of their fishery management programs. Such management programs may include the restoration or protection of threatened or endangered species, control of fish diseases, elimination of restricted species, actions to increase the abundance of desirable sport fish species, and actions to establish and maintain wild trout stocks.

In carrying out their management programs, the DFW or the USFWS occasionally find it necessary to completely eliminate existing fish populations in designated areas; this practice provides conditions for propagation of healthy, desirable fish. The DFW has determined that in certain situations the use of rotenone, a fish toxicant, is the only effective, practical method of achieving this objective.

The discharge of rotenone formulations and the detoxifying agent, potassium permanganate, can violate water quality objectives and adversely affect beneficial uses of water. Impacts may occur both within project boundaries and outside of those boundaries. (Project boundaries are defined as encompassing the treatment area, the detoxification area, and the area downstream of the detoxification station up to a thirty-minute travel time.)

Rotenone treatment is typically followed by the addition of potassium permanganate, which is a strong oxidant used to detoxify the active ingredient(s). (Potassium permanganate may cause a characteristic purple or brown color to waters being detoxified and downstream receiving waters). Unexpected fish kills have also occurred downstream of project boundaries due, at least in part, to permanganate toxicity. However, potassium permanganate decomposes quickly in water and does not persist for more than a day following the end of detoxification. At these levels, potassium permanganate is not considered a health threat to humans.

In addition to the active ingredient, liquid rotenone formulations also contain “inert” ingredients (e.g., carriers, solvents, dispersants, emulsifiers), and may also contain, in trace amounts, organic contaminants. Such “inert” ingredients and contaminants may include naphthalene, methylnaphthalene, xylene, acetone, trichloroethylene (TCE), benzene, and ethylbenzene.

The use of rotenone and detoxifying agents has both short-term and long-term impacts. Short-term impacts(such as toxicity, discoloration, and odors) last only as long as chemical residues from the rotenone treatment persist. Chemicals are introduced to the water during the treatment and detoxification process, but tend to decompose or volatilize in a matter of hours or days, depending on site conditions. Some chemical residues may be detectable for longer periods, particularly where standing water (i.e. lakes) is treated. In addition to effects on aquatic life, short-term impacts can adversely affect aesthetics, recreation, and water supplies. Short-term impacts are generally limited to the area within project boundaries.

Long-term impacts of rotenone use are those that persist after the chemical residues have dissipated. Because rotenone is toxic to all gill-breathing animals, non-target aquatic invertebrates and amphibians are also killed. This may adversely affect non-target endemic species, including undiscovered species or threatened or endangered species, as well as instream assemblages of more common species. The time period for full recovery of instream invertebrate assemblages is unknown, and it is possible that endemic species with limited ranges could be lost entirely. Long-term impacts also result where treatments are repeated at a given project site for multiple years. During this time, most or all fish are eliminated from the project site causing a loss of fishing opportunities until fish are re-stocked after a multi-year project is completed.

As described above, the application of rotenone to surface waters by the DFW or the USFWS will result in a temporary lowering of water quality. The State Board's “Statement of Policy with Respect to Maintaining High Quality of Waters in California” (Resolution No. 68-16) directs that whenever the existing quality of waters is better than standards established in water quality objectives, the existing level of quality shall be maintained. Water quality degradation is permissible only if the Regional Board finds that such a change will be consistent with maximum benefit to the people of the State. Similarly, the Federal Antidegradation Policy (40 CFR § 131.12) dictates that water quality shall be preserved unless degradation is necessary to accommodate important economic or social development.

The temporary degradation of water quality due to the use of rotenone by the DFW or the USFWS may be justifiable in certain situations. The Regional Board recognizes that the State and federal Endangered Species Acts require the restoration and preservation of threatened and endangered species. The Regional Board also recognizes that situations may arise where outbreaks of fish disease or the threat presented by prohibited or exotic species may require immediate action to prevent serious damage to valuable fisheries resources and aquatic habitat. These resources are of important economic and social value to the people of the State, and the transitory degradation of water quality and impairment of beneficial uses that would result from rotenone application may be justified, provided suitable measures are taken to protect water quality within and downstream of the project area.

Control Measures for Rotenone Use and Other Fish Toxicants

The Regional Board may grant the conditional use of rotenone by the DFW or the USFWS, provided the rotenone application is proposed for the purposes of (1) the restoration and protection of threatened or endangered species (2) the control of fish diseases where the failure to treat could result in significant damage to fisheries resources and aquatic habitat or (3) the elimination of species (as defined in CA Fish and Game Code § 2118), where competition or predation from such species threatens the native fish populations, or populations of other organisms (includes rare, unique, sensitive, or candidates for listing as endangered or threatened species.

The Regional Board may, on a project-by-project basis, grant exemptions for the use of fish toxicants in other kinds of fisheries management activities, when the DFW or the USFWS can provide the necessary justification for allowing a temporary lowering of water quality (i.e. degradation) according to the provisions of the federal Antidegradation Policy (contained in 40 CFR § 131.12) and State Board Resolution No. 68-16.

Before the Regional Board considers an exemption to the prohibition against discharges of pesticides to surface waters, the project proponent must submit a project proposal that satisfies the below criteria. A prohibition exemption will not be granted for any project that fails to meet these criteria.

1. Chemical residues resulting from rotenone treatment must not exceed the narrative or numerical limitations established in Chapter 3 of this Basin Plan, under the section entitled "Water Quality Objectives For Fisheries Management Activities Using the Fish Toxicant Rotenone."

2. The planned treatment protocol will result in the minimum discharge of chemical substances that can reasonably be expected for an effective treatment.

3. Chemical transport, spill contingency plans, and application methods will adequately provide for protection of water quality.

4. A public notification plan accepted by the Executive Officer.

5. Suitable measures will be taken to identify potentially affected sources of potable surface water intakes and ground water wells, and to provide potable drinking water where necessary.

6. The chemical composition of the rotenone formulation has not changed significantly (based on analytical chemical scans to be performed by the DFW or USFWS on each formulation lot to be used) in such a way that potential hazards may be present which have not been addressed.

7. Plans for disposal of dead fish are adequate to protect water quality.

8. To promote decomposition and minimize persistence of active ingredients and detoxifying agents, rotenone shall not be applied to waters when the water temperature is below five (5) degrees Celsius.

9. Pre-project monitoring and mitigation plan to determine the presence of and to protect threatened or endangered species. Where threatened or endangered species are present, appropriate mitigation measures (e.g., temporary or permanent relocation) shall be implemented to lessen adverse effects.

10. A monitoring and reporting program and a mitigation program[1], accepted by the Regional Board, will be followed to assess the effects of treatment on surface and ground waters, and on bottom sediments if specified by the Regional Board. The monitoring plan shall specify, but not limited to: chemical monitoring methods (for active ingredients, detoxifying agents, and any pesticide "inert" ingredients of concern), biological monitoring methods (pre-project and post-project bioassessment surveys at appropriate test and control sites, sufficient to characterize project impacts and recovery considering spatial and temporal variability), sampling locations, index period(s), frequencies, schedule, and QA/QC procedures.

    Both the pre-project monitoring and mitigation plan for T&E species, and the monitoring,

[1] The mitigation program must examine potential measures to facilitate the restoration of non-target to pre-project abundance and diversity. The mitigation program must include a discussion of mitigation measures included and those that were considered but rejected. The project proponent must justify why these measures were rejected as feasible mitigation measures. The requirement to implement mitigation measures may be waived during post-project recovery at the discretion of the Regional Board.

reporting, and mitigation program for non-target communities shall be peer-reviewed by independent experts. The peer reviewers shall be proposed by the DFW and/or USFWS and shall be mutually agreeable to both the project proponent(s) and the Regional Board.[2]

The biological monitoring plan must be based on an appropriate study design, metrics, and performance criteria to evaluate restoration of aquatic life. The indices used in the assessment must be commonly accepted by the scientific community and accepted by the Regional Board. Biological monitoring shall be designed, and conducted as long as needed, to effectively demonstrate that non-target macrovertebrate populations have been fully restored. Fully restored means that the structure and function of non-target macrovertebrate communities have returned to conditions that reflect pre-project conditions. Function will be judged by metrics and indices related to trophic levels (e.g., functional feeding groups) and productivity (e.g., abundance/biomass). Structure will be judged based on metrics and indices related to richness and diversity (e.g., taxa richness, multivariate O/E (observed/expected) model predictions, multivariate ordinations) and presence of sensitive and rare taxa. This definition of “fully restored” shall be provided to the peer reviewers prior to peer review of the monitoring and reporting plan, with instructions to determine whether the monitoring design is capable of determining whether full restoration has been achieved.

Within two years of the last treatment of a specified project, a qualified biologist(s) from the DFW or USFWS must assess the restoration of non-target aquatic life and benthic communities within treated waters, and if, based on the monitoring data, the evidence demonstrates, certify in writing that all affected non-target biological communities have been fully restored. The certification shall be accompanied by a report detailing the pre-project and post-project monitoring, including detailed explanation of the assessment methods used and the rationale for the certification. Macroinvertebrates shall be identified and classified, and data provided in electronic formats using conventions acceptable to the Regional Board. A project will be considered complete only upon written acceptance by the Regional Board of such report and certification.

If non-target biological communities are not fully restored after two years, the project proponent must conduct continued annual monitoring and implement the proposed mitigation measures until the Regional Board accepts the certification.

The Regional Board acknowledges that projects may occur where the non-target communities do not fully recover to pre-project levels. After five years of annual post-project monitoring, the project proponent may petition the Regional Board to release it from annual monitoring and reporting and mitigation obligations. Such petitions must include: (1) results of mitigation efforts, (2) monitoring trends demonstrating maturity of an asymptotic recovery, and (3) evidence that the ability to attain full recovery has been significantly affected by natural environmental factors (e.g., fires, floods, drought) or catastrophic events (e.g., chemical spills) during the years of monitoring. Annual reporting shall continue unless and until the Regional Board rescinds the monitoring requirements.

Recommended Future Actions for Rotenone Use

1. In cooperation with the DFW or the USFWS, monitor projects involving the discharge of fish toxicants to determine impacts on water quality and beneficial uses.

2. In cooperation with the DFW or USFWS, modify rotenone application, detoxification, and monitoring procedures, whenever measures are identified that will provide greater protection for water quality and beneficial uses.

3. In cooperation with other state and federal agencies, and private entities, encourage the development of rotenone formulations which pose the lowest possible environmental hazards while still achieving project goals.

4. In cooperation with other state and federal agencies, and private entities, encourage research to determine whether rotenone persists in stream sediment and, if so, what impact, if any, does it have on hyporheic invertebrates.

[2] The Regional Board can exempt DFW or the USFWS from the requirement of the monitoring and reporting program and mitigation program being externally peer-reviewed.

Sensitive Species and Biological Communities

Because of its great topographic, geologic and climatic diversity, and because of environmental changes over time which have created ecological islands which facilitate evolutionary change, the Lahontan Region supports a wide variety of plant and animal species and many biological community types. Numerous plant and animal species in the Region are listed as threatened or endangered under the federal Endangered Species Act and/or the California Endangered Species Act (CESA), or are candidates for such listing. Examples include the Lahontan and Paiute cutthroat trout, several kinds of desert pupfish, the Lake Tahoe shorezone plant Tahoe yellowcress, and springsnails which are restricted to a few springs in the Owens River watershed. These and many other sensitive species depend directly on aquatic or wetland habitats for survival. The Lahontan Region also includes water bodies which support rare or unique combinations of species (biological communities). Examples include the Grass Lake sphagnum bog in the Lake Tahoe Basin, the Mono Lake ecosystem, and the springs and wetlands in the Amargosa River watershed. In some cases, these communities have been given special recognition and protection, as U.S. Forest Service Research Natural Areas or Special Interest Areas, U.S. Bureau of Land Management Areas of Critical Environmental Concern, etc. Detailed information on sensitive species and communities in the Lahontan Region can be found in the Department of Fish and Wildlife's (DFW's) Natural Diversity Database, which is updated on an ongoing basis. The Regional Board's Geospatial Waterbody System (GeoWBS) database can also provide information on the presence of sensitive species and communities in association with specific water bodies.

Aquatic and wetland habitats for many sensitive species have been degraded, impaired, or threatened by water diversions and/or the nonpoint source problems (mining, silviculture, livestock grazing, etc.) discussed elsewhere in this Chapter. The human introduction of nonnative predator and competitor species or species capable of hybridizing with sensitive plants and animals is also a problem. Because little chemical or biological monitoring has been done for most water bodies in the Lahontan Region, the habitat requirements of many sensitive species are not well known.

Control Measures for Sensitive Species and Biological Communities

1. The U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife (through the Fish and Game Commission) are responsible for "listing" threatened and endangered species, defining critical habitats, and preparing and implementing recovery plans. These agencies review proposed projects which could affect sensitive species or critical habitats. Under the CESA, state agencies which are lead agencies under the California Environmental Quality Act must consult with the California Department of Fish and Wildlife (DFW) before approving projects with potential impacts on state-listed species. If the DFW issues a determination of "jeopardy," the lead agency must provide for DFW-approved mitigation in order to approve the project. The Regional Board consults with DFW under CESA regarding potential impacts of its Basin Plan amendments, policy changes, and the development projects for which it occasionally takes lead agency responsibility.

2. The Regional Board has recognized existing or potential habitats for sensitive species and biological communities through the "RARE" and "BIOL" beneficial use designations in Chapter 2 of this Plan. Additional water bodies will be so designated as new species are listed or new information about species distribution becomes available. The Regional Board may allow the use of rotenone and piscicides in treatment of water bodies prior to the reintroduction of threatened or endangered fish species provided these projects (i.e. fish toxic treatments) comply with the criteria described in Chapter 4 under the section entitled "Exemption Criteria for Aquatic Pesticide Use" under the sub-section titled "Exemption Criteria for Fisheries Management."

Recommended Future Actions for Sensitive Species and Biological Communities

1. The State Water Resources Control Board and/or the Department of Fish and Wildlife should provide the necessary funds for the biological and chemical monitoring in the Lahontan Region to support Regional Board determinations on the adequacy of statewide objectives to protect threatened/endangered species, and to support the development of site-specific objectives if necessary.

2. Local governments should recognize and provide protection for sensitive aquatic/wetland species and communities in their land use planning, zoning and project review activities.

Watershed Restoration

As water flows through a watershed, its quality is determined by many factors within that watershed including climate, geology and topography. Natural events within the watershed, such as fire and flooding, can affect the quality of the ground waters, lakes, streams and wetlands within the watershed. The quality of these ground waters, lakes, streams and wetlands can also be impacted by human land use activities within the watershed, including the precipitation and dry deposition of atmospheric contaminants.

"To restore and maintain the chemical, physical and biological integrity of the Nation's waters" is a proclaimed goal of the federal Clean Water Act (33 U.S.C. 466 et seq.). Part of this goal, maintaining or protecting water quality, is addressed in many parts of this Plan, including nondegradation policy statements (Chapters 3 and 6), designation of water quality standards (Chapters 2 and 3) and identification of special designations to protect water quality (Chapter 4). The second part of this goal is to "restore." As described above, water quality is so closely related by drainage basin or watershed conditions that water quality restoration relies to a great extent on watershed restoration.

In this section, the term *restoration* means the reestablishment of pre-disturbance functions and related physical, chemical and biological characteristics of aquatic ecosystems (National Research Council 1992). The goal of restoration is to return an ecosystem to a former natural condition—to emulate a natural system which is ecologically integrated with its surrounding area.

This section is divided into three parts: lake, river/stream and wetland restoration. However, the Regional Board supports an integrated approach to restoration—an approach which tries to consider ecological interactions within a watershed. As all watershed components (lakes, streams, rivers, ponds, ground water, wetlands) are interconnected, successful restoration of one component must consider all other components, including cumulative impacts to the watershed.

In each part of this section, impacts and stresses to the water body type which could create the need for restoration are described, followed by a discussion of restoration techniques, water quality control measures and recommended actions for the restoration techniques. Potential sources of funding for restoration are also included.

Lake and Reservoir Restoration

Main causes of degradation of lake quality include eutrophication (increased biological productivity due to excessive loading of nutrients and organic matter), hydrologic changes (e.g., artificially stabilizing lake level), siltation from erosion, acidification (from atmospheric sources or acid mine drainage) and toxic contamination (National Research Council 1992).

Eutrophication is a natural process. However, excessive addition of inorganic nutrients, organic matter and/or silt to lakes and reservoirs can accelerate the process, leading to increased biological production (such as increased populations of algae and rooted plants) and a decrease in lake or reservoir volume. Sediment and associated nutrients from nonpoint sources (such as land development, agriculture, livestock grazing, forest practices, and recreational activities) are often the cause of accelerated eutrophication. Signs of accelerated eutrophic conditions include algal blooms, surface scum, rapid loss of volume in lakes and reservoirs, noxious odors, tainted fish flesh, tainted domestic water supplies, depleted dissolved oxygen, fish kills and development of nuisance plant or animal populations such as common carp. Thus, eutrophic conditions affect water quality and impair the aesthetic, recreational, fish and wildlife, industrial, domestic and other beneficial uses of lakes and reservoirs. Eutrophication can result in decreased property values and the need for expensive water treatment or the development of new water supplies, including construction of new reservoirs.

In the Lahontan Region, accelerated eutrophication is a concern in many lakes and reservoirs. As early as 1946, possible impacts on the water quality of Lake Tahoe from land use activities were noted. Land uses such as waste treatment from septic systems in the Eagle Lake basin of Lassen County are contributing to the eutrophication of Eagle Lake. The prolific growth of aquatic weeds in Twin Lakes of the Mammoth Lakes Basin is considered a nuisance by many Basin residents.

Hydrologic changes to a lake include diversions of tributary stream flows which can result in long-term lowering of the lake level and ecological impacts to both the tributaries and the lake. Diversion of tributaries into Mono Lake resulted in a lowered water supply, increased the lake's salinity and caused ecological damage to the tributaries and to the lake itself. Stabilizing lake levels through use of a control structure such as a dam can lead to damage to near-shore ephemeral wetlands, loss of fish spawning areas, and degraded water quality from accumulation of littoral sediments (oxidizing organic sediments) (National Research Council 1992).

Acidification of poorly buffered lakes by acidic deposition can affect the entire ecosystem. Acid deposition is discussed in detail later in this section (see “Atmospheric Deposition” later in this Section).

Lake restoration technology can be divided into two main categories (National Research Council 1992). The first category includes steps to divert, prevent or treat excessive nutrient, silt and organic loads. This first category of technology may be insufficient to produce immediate and long-lasting effects due to internal nutrient recycling and associated algal/macrophyte production. Thus, a second category of technologies may be necessary which changes or controls internal physical, chemical or biological processes of the lake or reservoir. In the first category, several restoration techniques have been documented to achieve the physical and chemical control of nutrients (diversion, advanced waste treatment, dilution, flushing, sediment removal and hypolimnetic flushing or aeration). Likewise, several techniques in the second category such as plant biomass control measures (harvesting, biological controls, herbicide use) have also been documented.

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.

Generally, the Lahontan Regional Board encourages the restoration of water quality and beneficial uses through lake and reservoir restoration measures, particularly those techniques which prevent pollutant loading into lakes or reservoirs. However, to prevent possible detrimental impacts to water quality or beneficial uses from certain restoration techniques, the following control measures are necessary.

Control Measures for Lake/Reservoir Restoration

1. Erosion control and other nonpoint source control measures designed to prevent pollution loading into lakes and reservoirs must comply with proven, standard Best Management Practices (see BMP discussion in the Introduction to this Chapter). Proposed alternative BMPs may be considered on a case-by-case basis.

2. The Regional Board will review, and regulate as necessary, grazing practices and other land use practices to minimize damage to lake ecosystems and to restore damaged lakes. Where appropriate, the Regional Board may require a protection or buffer zone for the restoration project.

3. Herbicidal and algicidal chemicals have been associated with major adverse impacts on lake systems, none of which are considered restorative. These impacts include nutrient releases to the water after plant death, dissolved oxygen depletion following plant decay, toxic effects on nontarget organisms at recommended doses, rapid regrowth of plants following treatment, as well as conflicting and unresolved issues regarding the mutagenic and carcinogenic effects of some of the chemicals. Thus, the use of herbicides and algicides for lake/reservoir restoration purposes is strongly discouraged. The Regional Board’s regionwide prohibition for pesticides and control measures for pesticides, discussed in Chapter 4, is applicable to the use of herbicides and algicides for lake/reservoir restoration. The Regional Board may grant prohibition exemptions to allow the use of aquatic pesticides for lake/reservoir restoration projects only if the pesticide application project is proposed for the circumstances described in Chapter 4 under the section entitled “Circumstances Eligible for Prohibition Exemption” and according to the criteria under the section entitled, “Exemption Criteria for Aquatic Pesticide Use.”

4. Restoration projects which propose the use of biological controls will be carefully reviewed and regulated by the Regional Board if necessary to ensure the protection of beneficial uses of the lake/reservoir. To avoid the unintentional development of pest populations, review of biological control proposals will be coordinated with the California Department of Fish Game.

5. Restoration techniques which could or will result in a waste discharge, such as sediment removal (see discussion on "Dredging" in the "Recreation" section of this Chapter), flushing, nutrient precipitation/removal, bank sloping, placement of woody debris, and/or placement of spawning gravel will be regulated as necessary by the Regional Board to ensure compliance with all provisions of this Basin Plan including waste discharge prohibitions. The prohibitions and exemption criteria for restoration work are discussed in the "Waste Discharge Prohibitions" section of this Chapter.

6. Any proposal to reduce the effect of lake/reservoir acidification (e.g., liming or calcite treatments, dilution) will be reviewed by the Regional Board on a case-by-case basis and will be regulated as necessary.

7. Eroding shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more cost-effective, considering the severity of wind and wave erosion, offshore bathymetry, and the potential adverse impacts on other shorelines and offshore areas.

   The USEPA (1993) summarizes information on a variety of shoreline protection practices. General considerations include design of all shorezone structures so that they do not transfer erosion energy or otherwise cause visible loss of surrounding shorezones; establishment and enforcement of no wake zones to reduce erosion potential from boat wakes, establishment of setbacks for upland development and land disturbance, and direction of upland drainage away from bluffs and banks so as to avoid accelerating slope erosion.

8. The Regional Board will recommend that all proposals for lake/reservoir restoration include adequate monitoring to evaluate the success of the project. The monitoring may include the establishment of baseline water quality, habitat assessment and biotic community data as a reference from which to evaluate project success, as well as monitoring after implementation of the restoration project. Where appropriate, the monitoring may be required by the Regional Board.

Recommended Future Actions for Lake/Reservoir Restoration

1. The Regional Board should encourage evaluation of past lake restoration efforts to guide future efforts.

2. The Regional Board should encourage lake restoration methods which promote a stable, self-sustaining system.

3. The Regional Board should support lake restoration projects which develop improved techniques for aquatic plant (macrophyte) and littoral zone management.

4. The Regional Board should support projects which result in the ability to predict a lake's trophic state from nutrient loading.

5. The Regional Board should support demonstration watershed-scale restorations which integrate lake components with river/stream and wetland components. Whenever possible, demonstration projects should be conducted outside of sensitive areas such as the Lake Tahoe Basin.

Potential Sources of Funds for Lake and Reservoir Restoration

A potential source of funds for lake restoration projects is the federal Clean Lakes Program. The Clean Lakes Program is administered by the U.S. Environmental Protection Agency (USEPA). The Program includes funding for both diagnostic and feasibility studies, and for implementation projects. The Regional Board coordinates with the State Board and the USEPA to solicit and evaluate lake restoration proposals, and also participates in the grant award process. State Board Nonpoint Source (§ 319), Water Quality Management (§ 205[j]) and Special Investigations Programs also are potential sources of funds for lake restoration projects.

River and Stream Restoration

Healthy, vegetated riparian habitat is essential to the natural ecological functioning of associated rivers and streams (National Research Council 1992). The removal of riparian vegetation by livestock, farming, logging, mining and urban development can result in wider, shallower and warmer streams and rivers, as well as introduction of excessive sediment loads and toxics from runoffinto the water. Flood control practices, such as straightening stream channels, can cause water to gouge wide, shallow channels, resulting in altered riparian vegetation.

Diversions have totally or almost totally dewatered some streams in the Lahontan Region, impairing or precluding the attainment of aquatic beneficial uses (e.g., the Owens Gorge, Mono Lake tributaries). Recent court decisions have required the rewatering of the Owens River Gorge and some Mono Lake tributaries. Where diversion is not total, lower flows, or changes in the timing of flows, can stress aquatic ecosystems through higher summer temperatures, greater winter ice formation, increases in the concentrations of pollutants, and other factors. Temperature and flow variations can affect critical life stages of aquatic organisms, and can change the nature and rate of nutrient and mineral cycles.

Environmental stresses to streams and rivers, such as those described above, can impact water quality parameters including temperature, turbidity, dissolved oxygen, nutrients and pH. The stresses can also impact aquatic habitat quality by affecting substrate type, water depth and velocity, spawning and nursery areas, and habitat diversity (pools, riffles, woody debris).

The goal of river and stream restoration is to restore the natural sediment and flow regimes, a natural channel morphology, the natural riparian plant community, and the native aquatic plants and animals (National Research Council 1992). River and stream restoration technology can be divided into the two categories of nonstructural and structural techniques. Both nonstructural and structural techniques can be used in species-centered restoration, such as restoring stream habitat to improve trout productivity, or in general restoration.

Nonstructural techniques include policies and procedures that limit or regulate activities such as withdrawal of water from a stream or land use practices such as grazing. Other examples of nonstructural techniques are the preservation or restoration of floodplains (see “Floodplain” discussion above), the establishment of riparian protection zones (buffer zones) and exclusion of riparian areas from heavy human and livestock use.

Structural techniques include installation or removal of instream structures, or modifications such as installation of fish ladders or selective water withdrawal structures to maintain downstream temperatures. Structural instream techniques also include placement of logs, root wads or artificial structures for habitat improvement and channel modifications. Structural bank modifications include use of vegetation for stabilization, bank sloping, sheet piling and riprap. These structural techniques can be divided into three types: biotechnical engineering (e.g., channel modification which uses vegetation); natural or “soft” engineering (e.g., restoration which uses local natural materials such as woody debris and alluvium), and “hard” hydraulic engineering (e.g., use of concrete, sheet piling, riprap).

Generally, the Lahontan Regional Board encourages the restoration of water quality and beneficial uses through stream and river restoration measures, particularly erosion control or other measures which prevent pollutant loading into streams and rivers. However, to prevent possible detrimental impacts to water quality or beneficial uses from certain restoration techniques, the following control measures are necessary.

Control Measures for River and Stream Restoration

1. Erosion control and other measures to prevent pollution loading must comply with proven, standard Best Management Practices (see BMP discussion in the Introduction to this Chapter). Proposed alternative BMPs may be considered on a case-by-case basis. The Regional Board will encourage erosion control by biotechnical or “soft” engineering approaches for bank stabilization and repair, where appropriate, in preference to dams, levees, channelization, riprap or other “hard” engineering approaches.

2. The Regional Board will review, and regulate as necessary, grazing practices and other land use practices to minimize damage to riparian ecosystems and to restore damaged streams and rivers. Where appropriate, the Regional Board may require a protection or buffer zone for the restoration project.

3. Restoration techniques which could or will result in a waste discharge such as bank sloping, placement of woody debris, and/or placement of spawning gravel or sediment removal, will be regulated as necessary by the Regional Board to ensure compliance with all provisions of this Basin Plan, including waste discharge prohibitions. The prohibitions and exemption criteria for restoration work are discussed in the

"Waste Discharge Prohibitions" section of this Chapter.

4. The Regional Board will recommend that all proposals for river and stream restoration include adequate monitoring to evaluate the success of the project. The monitoring may include the establishment of baseline water quality, habitat assessment and biotic community data as a reference from which to evaluate project success, as well as monitoring after implementation of the restoration project. Where appropriate, the monitoring may be required by the Regional Board.

Recommended Future Actions for River/Stream Restoration

1. The Regional Board should encourage evaluation of past river/stream restoration efforts to guide future efforts.

2. The Regional Board should encourage river/stream restoration methods which promote a stable, self-sustaining system. This could include designation of floodplain/riparian protection zones or removal of dikes/levees to reestablish connections between rivers, streams, riparian wetland areas and floodplains.

3. During the issuing or renewal of water rights permits (e.g., renewal of hydroelectric licenses, dam operating permits), the Regional Board should support opportunities to allocate waters to instream uses. Similarly, the Regional Board should support opportunities to allocate waters to instream uses when water conservation efforts result in surplus water.

4. The Regional Board should support demonstration watershed-scale restorations which integrate river/stream components with lake and wetland components. Whenever possible, demonstration projects should be conducted outside of sensitive areas such as the Lake Tahoe Basin.

Potential Sources of Funds for Stream/River Restoration

Federal Clean Lakes Program funds are also available for projects affecting tributaries into lakes (see program description above). River and stream restoration funds are available from the State Board Nonpoint Source (§ 319), Water Quality Management Programs (§ 205[j]) and Special Investigations Programs. Funds for urban stream restoration are available from the California Department of Water Resources. Urban stream restoration funds are awarded to reduce damage from flooding and from bank erosion while restoring the aesthetic value of the stream.

Wetland Restoration

(Creation of artificial wetlands for mitigation purposes is discussed in the "Wetlands Protection" section above; SEZ restoration is discussed in the Lake Tahoe Chapter.)

Unlike lakes and rivers, wetlands have not always been considered as valuable natural resources. Thus, in California, an estimated 91 percent of wetlands have been lost due to alterations in their biological, chemical and physical properties (National Research Council 1992). Biological alterations include damage to or removal of natural biota, including impacts from the introduction of non-native plants and animals. Many riparian wetland areas of the Owens River have been impacted by grazing which causes soil compaction and destruction of the natural wetland vegetation. Physical alterations include changes in the hydrology and topography which support the wetland. Mono Basin wetlands have been impacted by water diversions, as have wetlands in the Owens River basin. Draining wetlands for agriculture, dredging and filling in rivers and lakes and construction of dams all can physically damage wetlands. Construction of the Tahoe Keys subdivision at the delta of the Upper Truckee River into Lake Tahoe resulted in dredge and fill of over 300 acres of wetlands. Point and nonpoint source runoff can chemically alter wetlands by discharging nutrients, toxic, hazardous or other chemical wastes into the wetland.

Wetland restoration techniques include reestablishing flow (restoring river flows, restoring flood regimes, controlling drainage) reestablishing topography (removing fill, replacing dredged materials), controlling pollutant loading and reestablishing wetland biota.

Generally, the Lahontan Regional Board encourages the restoration of water quality and beneficial uses through wetland restoration measures, particularly erosion control or other measures which prevent pollutant loading into the wetlands. However, to prevent possible detrimental impacts to water quality or beneficial uses from certain restoration techniques, the following control measures are necessary.

Control Measures for Wetland Restoration

1. Erosion control and other measures to prevent pollution loading into the wetland restoration

site must comply with proven, standard Best Management Practices (see BMP discussion in the Introduction to this Chapter). Alternative management practices may be considered on a case-by-case basis.

2. The Regional Board will review, and regulate as necessary, grazing practices and other land use practices to minimize damage to wetland ecosystems and to restore damaged wetlands. Where appropriate, the Regional Board may require a protection or buffer zone for the restoration project.

3. Restoration techniques which could or will result in a waste discharge, such as removal of fill or replacement of dredged materials, will be regulated as necessary by the Regional Board to ensure compliance with all provisions of this Basin Plan, including waste discharge prohibitions. The prohibitions and exemption criteria for restoration work are discussed in the "Waste Discharge Prohibitions" section of this Chapter.

4. The Regional Board will recommend that all proposals for wetland restoration include adequate monitoring to evaluate the success of the project. The monitoring may include the establishment of baseline water quality, habitat assessment and biotic community data as a reference from which to evaluate project success, as well as monitoring after implementation of the restoration project. The monitoring may include sampling off the project site wherever affected by the restoration. Where appropriate, the monitoring may be required by the Regional Board.

5. In instances where natural wetlands are to be restored for the main purpose of wastewater treatment (including stormwater treatment), the Regional Board will determine the applicability of water quality standards to the wetland on a case-by-case basis, and may elect to develop site-specific objectives. In its determination, the Regional Board will consider factors such as size, type of waste to be treated, location, degree of isolation of the created wetlands, and other appropriate factors.

Recommended Future Actions for Wetland Restoration

1. The Regional Board should encourage evaluation of past wetland restoration efforts to guide future efforts.

2. The Regional Board should encourage wetland restoration methods which promote a stable, self-sustaining system.

3. The Regional Board should encourage wetland restoration assessment to evaluate both structural (hydrology, flora, fauna) and functional (sediment retention, nutrient cycling) parameters.

4. The Regional Board should promote projects which will result in more natural wetland restoration (e.g., native wetland plant propagation, baseline studies of natural wetland ecosystems).

5. When practical, where wetland restoration is required as mitigation, the Regional Board should require that the mitigation is completed **before** allowing wetland damage to occur.

6. The Regional Board should support demonstration watershed-scale restorations which integrate wetland components with lake and river/stream components. Whenever possible, demonstration projects should be conducted outside of sensitive areas such as the Lake Tahoe Basin.

Potential Sources of Funds for Wetland Restoration

The State and Regional Board coordinate in submittal and administration of federal wetland grants issued under Clean Water Act § 104(b)(3). The focus of these grants is wetland protection but wetland restoration can be included when it is part of an overall wetland protection program. Other grant programs (e.g., § 314, § 319, § 205[j]) administered by the State Board may also provide funds for wetland restoration.

Atmospheric Deposition ("Acid Rain" and Dry Deposition of Pollutants)

Public concern over the impacts of air pollutants on water quality has increased in recent years. Acidic rain, snow, and fog have been measured in California. Dry deposition of pollutants can also occur directly onto surface waters. Nitric acid from vehicle emissions tends to be the most important acidic pollutant, in contrast to the eastern United States where sulfuric acid from the burning of coal is more abundant. Organic acids are also present in acid rain. The California Air Resources Board (CARB) has documented long distance transport of pollutants from urban coastal areas to the Sierra

Nevada and the Mojave Desert. The CARB is sponsoring long-term research on the impacts of wet and dry deposition of air pollutants on Sierra Nevada ecosystems. Although much of this research is centered on the west slope of the Sierra, the results are applicable to comparable soils and waters of the Lahontan Region.

Atmospheric deposition is of concern because of the direct and indirect impacts of acidification on beneficial uses of water, and because of the potential for increased eutrophication due to the deposition of nitrogen, which is known or presumed to be the limiting nutrient for many Sierra waters. Many of the high elevation lakes and streams of the Lahontan Region naturally have very low alkalinity, and their granitic watersheds provide very little buffering capacity for incoming acidity. Short-term drops in the pH of streams in the Lake Tahoe Basin have been documented during the snowmelt season (U.S. Forest Service, Lake Tahoe Basin Management Unit 1990) but the long-term acidification of surface waters in the Lahontan Region has not been conclusively documented. Limited sampling by the U.S. Environmental Protection Agency (1987) and the Department of Fish and Wildlife (McClenaghan et al. 1987) demonstrated that some Lahontan Region lakes have pH values below the 6.5 unit objective in Chapter 3 of this Plan. However, in the absence of long-term baseline monitoring data for most of these lakes, it is difficult to ascertain whether these low pH values are natural or the result of acidification.

Changes in pH may stress or kill aquatic organisms directly. Spring flushes of acidity accumulated in winter snowpacks may be directly damaging. Experiments have shown that acidity increases the tendency of benthic invertebrates to leave their stream substrates and “drift” downstream. This obviously affects local nutrient and energy cycling and the availability of food for fish. Acidity also affects aquatic biota by changing the mobility of nutrients and toxic trace elements in soils, and their availability in waters. In the eastern United States, the increased availability of aluminum as a result of acidification is a major factor in the decline of fish populations. There are naturally high levels of metals in many Lahontan Region watersheds, as shown by the large number of inactive mines and the results of the Toxic Substances Monitoring Program (see Chapter 7). Increased mobilization of these metals due to atmospheric deposition would be of great concern. Through one or more of these mechanisms, atmospheric acidity may be involved in the documented declines of amphibian populations in the Sierra Nevada in the 1980s.

Although the magnitude of the impacts is still controversial, acid deposition has been linked to “forest decline” in the northeastern U.S. and in Europe. The CARB has documented stress to forest trees in the San Bernardino Mountains from air pollutants from the South Coast air basin. The death of terrestrial vegetation may affect nutrient loading to surface waters by increasing rates of erosion and reducing nutrient uptake. Studies in and near the Lake Tahoe Basin have shown that undisturbed meadow soils and vegetation are capable of removing at least 98% of the nitrogen in incoming precipitation.

The impacts of direct wet and dry nutrient deposition on eutrophication of surface waters have not been studied for most surface waters of the Lahontan Region. Logically, one would expect such eutrophication to occur in small, shallow lakes near the Sierra crest which receive more precipitation than waters further east. Such eutrophication has not been documented.

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 deposition on the Lake has 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..

Atmospheric deposition is also a key source of fine sediment particle deposition to the lake. The Lake Tahoe TMDL estimates that approximately 16 percent of Lake Tahoe’s total fine sediment particle load is from atmospheric deposition. Over 70 percent of this atmospheric particulate load 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. 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).

Recommended Control Measures for Acid Deposition

1. The control of air pollution is outside of the authority of the State and Regional Boards. However, these agencies should work with state and regional air pollution control, transportation, and land use planning authorities to ensure that atmospheric deposition continues to be monitored, and that pollution emissions are minimized to the greatest extent feasible.

2. The CARB expects to continue studying the impacts of acid deposition on aquatic ecosystems, and has been directed to consider the feasibility of air quality standards for areal loading of pollutants (e.g., kilograms of nitrogen per hectare per year). Regional Board staff should continue to review CARB reports related to water quality issues and should comment on the loading standards if and when they are proposed.

3. The State and Regional Boards should work with the Department of Fish and Wildlife, the Department of Water Resources, and university researchers to ensure that adequate biological and chemical monitoring of Lahontan Region waters is done so that trends toward acidification and/or eutrophication as a result of atmospheric deposition can be detected before such problems become significant and perhaps irreversible.

4. Restoration techniques for acidified waters (e.g., liming) are being developed, largely in the eastern United States. However, these methods are expensive, require long-term maintenance, and are probably not feasible for the remote lakes in federal wilderness areas which are the most vulnerable to acidification.

5. Regional Board staff should consider atmospheric nutrient loading when constructing nutrient budgets for specific watersheds, for use in wasteload allocations and effluent limitations, and for revisions to receiving water objectives. Atmospheric deposition may be an important consideration in stormwater NPDES permits (see the “Stormwater Runoff” section of this Chapter). Staff should evaluate whether existing objectives for nutrients, pH, and biological communities are adequate to protect beneficial uses threatened by acidification. Additional site specific objectives may be necessary.

6. The Tahoe Regional Planning Agency has adopted a regional “environmental threshold carrying capacity” standard to reduce annual “vehicle miles travelled” (VMT) within the Lake Tahoe Basin by 10% from the 1981 level in order to reduce nitrogen oxide emissions and consequent atmospheric deposition to the Lake. The 208 Plan (TRPA 1988), outlines control measures to be implemented by TRPA and local governments to reduce atmospheric nutrient deposition. These include increased and improved mass transit; redevelopment, consolidation, and redirection of land uses to make transportation systems more efficient; controls on combustion heaters and other stationary sources of air pollution; protection of vegetation, soils, and the duff layer; and controls on offroad vehicles to control suspension of nutrient-laden dust.

Table 4.9-1
List of rivers in Lahontan Region determined eligible for National Wild & Scenic River designation by federal land management agencies

Hydrologic Unit Number	Name of river/creek followed by managing agency	NF = National Forest; RA =USBLM Resource Area
601	Lee Vining Creek	Inyo NF
601	Mill Creek	Inyo NF
601	South Fork Mill Creek	Inyo NF
601	Upper Parker Creek	Inyo NF
603	Walker Creek	Inyo NF
603	Convict Creek	Inyo NF
603	Cottonwood Creek (Sierra Nevada)	Inyo NF
603	Fish Slough	Bishop RA
603	George Creek	Bishop RA
603	Glass Creek	Inyo NF
603	Hot Creek	Inyo NF & Bishop RA
603	Independence Creek	Bishop RA
603	Laurel Creek	Inyo NF
603	Lone Pine Creek	Inyo NF
603	McGee Creek	Inyo NF
603	Rock Creek	Inyo NF & Bishop RA
603	South Fork Bishop Creek	Inyo NF
603	Upper Owens River	Inyo NF
604	Cottonwood Creek (White Mountains)	Inyo NF
630	Atastra Creek	Bishop RA
630	Dog Creek	Bishop RA
630	East Walker River	Toiyabe NF
630	Green Creek	Bishop RA
630	Rough Creek	Bishop RA
630	Virginia Creek	Bishop RA
631	West Walker River	Toiyabe NF
632	East Fork Carson River	Toiyabe NF
634	Cold Creek	Tahoe NF
634	Martis Creek	Tahoe NF
634	Upper Truckee River	LTBMU
635	Alder Creek	Tahoe NF
635	Lower Truckee River	Tahoe NF
636	Independence Creek	Tahoe NF
636	Little Truckee River	Tahoe NF
636	Perazzo Canyon	Tahoe NF
636	Sagehen Creek	Tahoe NF

Table 4.9-2
SUGGESTED METHODS FOR EVALUATING WETLAND FUNCTIONS AND VALUES

Function/Value	Suggested Methods of Evaluation
HYDROLOGY	
Surface Water Inflow/Outflow	Monitor flow rates; hydrological model of watershed dynamics (usually a simple model of extent of wetland, timing and volume of inputs, depth and duration of flooding, discharge from wetland); install and monitor staff gages.
Ground Water Discharge/Recharge	Monitor water levels in appropriate wells; Install and monitor piezometers; Model of watershed dynamics (see above).
Nutrient Supply and their limiting factors	Analyze soil texture and organic matter content; Determine soil and pore water nutrient concentrations; Sample inflowing and outflowing waters for nutrient concentrations (use to estimate nutrient removal); Survey for toxic substances; Conduct bioassays for limiting factors.
Flood Storage	Monitor water levels in relation to flow velocity; Model of watershed dynamics (see above).
Erosion/Accretion/Sedimentation	Measure in channels and in wetlands
Shoreline Stabilization	Map shoreline from aerial photographs; Install and monitor markers.
PRODUCTIVITY	Assess cover of floating or epibenthic algae by calculating change in biomass through time; also see "Plant Growth" below.
VEGETATION	
Plant Cover	Use aerial photographs to determine cover of dominant species; Verify aerial photograph determinations by using methods such as belt transect (forested wetlands), replicate transect (herbaceous wetlands), multiple quadrants (shrub dominated wetlands); Establish and use fixed point panoramic photograph locations.

(from National Research Council, 1992; Kusler and Kentula, 1990)

Table 4.9-2 (continued)
SUGGESTED METHODS FOR EVALUATING WETLAND FUNCTIONS AND VALUES

Function/Value	Suggested Methods of Evaluation
VEGETATION (CONTINUED)	
Plant Growth and its Limiting Factors	Measure end-of-season live standing crop (EOSL); use linestrip/elongated quadrant (to monitor survival and growth of weedy species); Assess/monitor organic matter composition; Measure soil redox potential; Measure nutrient content of inflowing waters; Establish and use fixed point panoramic photograph locations.
Sensitive Plant Species/Communities	Quantitatively survey populations of sensitive plant species; Determine life history characteristics to predict ability to survive in restored wetland (e. g., numbers, seed production and germination, seedling establishment, recruitment).
WILDLIFE / FISHERY HABITATS	Survey/censuses; Sample community composition, seasonally if necessary, including macroinvertebrate sampling (artificial substrate samplers); reliable observations (record habitat use and movements between habitats, identify areas for feeding, nesting, refuge, spawning, nursery.
Sensitive Species/Communities	Quantitatively survey populations; Determine life history characteristics to predict ability to survive.
RESILIENCE	Follow recovery of species impacted by environmental extremes; Establish and use fixed point panoramic photograph locations.
RESISTANCE TO INVASIVE EXOTICS	Map occurrence of weedy plants, and rank species abundance; census exotic animals and evaluate population (stable, declining, increasing).
RECREATION (Contact and non-water contact)	Survey recreational uses.
ECOLOGICAL WATERSHED CONTEXT	Use analytical models to evaluate the relationships between wetland, upland, and transitional areas in terms of factors such as flood control, habitat, and food chain support.

(from National Research Council, 1992; Kusler and Kentula, 1990)

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4.10 AGRICULTURE

Agriculture is an important land use in many parts of the Lahontan Region. Agricultural uses include ranching, dairying, aquaculture, and the production of irrigated crops[1]. Rangeland livestock grazing is a major agricultural use in the Region that is discussed separately in the "Range Management" discussion of the "Resources Management and Restoration" section of this Chapter. Public fish hatcheries are discussed separately in the "Fisheries Management" discussion of the "Resources Management and Restoration" section of this Chapter.

Agricultural activities can affect water quality in a number of ways. Agricultural drainage contributes salts, nutrients, pesticides, trace elements, sediments, and other by-products that can degrade the quality of surface and ground waters. There are unique problems associated with irrigated agriculture, animal confinement operations, aquaculture facilities, and the use of agricultural chemicals.

Irrigated Agriculture

Irrigation drainage can contain significant amounts of pesticides, fertilizers, salts, trace elements, and sediment. (Control of pesticides and fertilizers is discussed in the following section entitled "Agricultural Chemicals.")

Trace elements (such as molybdenum, boron, arsenic, selenium, etc.) can have both chronic and acute toxic effects on humans and other animals. Sedimentation impairs fisheries and, by virtue of the characteristics of many organic and inorganic compounds to bind to soil particles, it serves to distribute and circulate toxic substances through stream, lake, and riparian systems. The cost of pumping and treating water for municipal and industrial use also increases with increasing sediment load.

Salts contained in irrigation water become concentrated as evaporation and crop transpiration remove water from soils. Depending on the fraction of applied irrigation water that is leached through the soil, salts may either accumulate in the crop root zone or be carried with the drainage water. Salt accumulation in the root zone can result in reduced crop yield and quality. Salts present in drainage waters may reach surface or ground water via natural flows or via discharge of surface drains (e.g., tailwater ditches) or subsurface drains (e.g., tile drains).

Improved irrigation efficiency can substantially reduce the rate of salt accumulation, allowing crop production to continue into the foreseeable future even in the low rainfall areas. Water saved through implementation of irrigation efficiency programs could be used for dilution of agricultural wastewater, recharge of ground water, and/or non-agricultural uses.

However, in areas experiencing chronic salt accumulation, agriculture can be sustained in the long-term only if degraded waters are removed at a sufficient rate to maintain low salt levels and to achieve a satisfactory balance between imports and exports of salts. This may be achieved by installation of drainage systems and by export of saline drainage to temporary or permanent "salt sinks." Salt sinks are designated acceptor areas for saline wastewaters, where such waters can be stored and evaporated. Both the North and South Lahontan Basins contain a number of alkali and dry lakes that could possibly be adapted for use as salt sinks. However, any such proposal(s) must comply with the water quality objectives contained in this Basin Plan, and with all other applicable laws, regulations, and policies.

Salt inputs to a basin can be reduced in part by improved management of salt sources such as fertilizers, animal wastes, and soil amendments. Regulation may be required, but an appreciable improvement can also be expected from education of farmers to understand and better utilize existing information and Best Management Practices.

In the North Lahontan Basin, areas where irrigated agriculture is important include the East and West Walker Rivers, Carson River, and lower Susan River watersheds. In the South Lahontan Basin, the majority of irrigation occurs in the Antelope, Owens, and Fremont Valleys, and along the Mojave and Amargosa Rivers.

Until about 1960, irrigated agriculture constituted the South Basin's major developed land use, with the greatest acreage in the Antelope Valley. Around 1950, however, rising ground water-pumping costs, resulting from dropping ground water levels in parts of the Antelope Valley, caused a decline in agricultural acreage. The 30,000-acre reduction in

[1] **Note:** Other agricultural activities include, but are not limited to: operations associated with confined animal and concentrated animal feeding, confined animal feeding, confined animal holding, confined and concentrated aquatic animal production facilities, and the treatment and/of disposal of agricultural wastewater.

the Basin's irrigated agriculture experienced from 1950 to 1970 is largely attributed to the declining ground water levels in Antelope Valley. Irrigated acreage in Antelope Valley will probably continue to decline until the year 2000, and agricultural waste loads will decline correspondingly.

The effect of irrigation drainage on the receiving ground water is highly variable. For instance, in the Owens Valley, irrigation has produced no appreciable effect on the ground water quality due to the low mineral content of the irrigation supply water and the relatively minor amount of irrigated acreage. However, in the Little Rock area and along the Mojave River, irrigation drainage has noticeably contributed to localized increases in mineral and nitrate content of the underlying ground water.

Water supply wells are discussed in the “Ground Water Protection and Management” section of this Chapter. The use of reclaimed water is discussed in the “Wastewater” section of this Chapter.

Control Measures for Irrigated Agriculture

Regional Board Actions

The Regional Board shall take all appropriate measures, as required by the California Constitution (Article X, § 2) and the California Water Code (§ 275), to prevent waste of water, unreasonable use of water, unreasonable method of use of water, and/or unreasonable method of diversion of water within the Lahontan Region. Irrigation practices shall also be regulated by implementing relevant provisions of the State Board's “Sources of Drinking Water Policy,” and Nonpoint Source Management Plan. Both the Policy and Plan are summarized in Chapter 6 of this Basin Plan.

Specific Control Actions for the Susan River Watershed

1. The Regional Board shall work with the Resource Conservation District, the Soil Conservation District and private agricultural landowners to formulate a plan to begin implementation of Best Management Practices on agricultural lands to reduce pollutant loading to the Susan River.

2. The State Board, with assistance from the Regional Board and the Department of Water Resources, should examine water rights on the Susan River to determine if violations are occurring which threaten beneficial uses. As water rights permits are renewed, the Regional Board will work with State Board staff to ensure that beneficial uses are adequately protected.

3. In cooperation with agricultural users of the CSD effluent, the Susanville CSD with assistance from Regional Board staff, shall establish a monitoring program for the effluent ditch/Brockman Slough system to quantify point and non-point sources of pollutants that are contributing to the degradation of the sloughs and hence, the Susan River.

Federal Control Measures for Irrigated Agriculture

1. Under the authority of the amended Coastal Zone Management Act, the U.S. Environmental Protection Agency has developed guidance specifying management measures for sources of nonpoint water pollution (including agriculture) in coastal waters (USEPA 1993). Measures have been proposed for sediment control, animal waste management, nutrient and pesticide management, grazing, and irrigation. This guidance may be applicable to many non-coastal waters as well.

2. In April 1992, the U.S. Environmental Protection Agency and the U.S. Department of Agriculture signed a Memorandum of Agreement (MOA) to implement increased pollution prevention in the agricultural sector. The MOA calls for the development of a pollution prevention strategy which targets the areas of nutrient management, total resource management planning, voluntary livestock or poultry management agreements, safer pesticide registration, and voluntary action projects in selected watersheds. The strategy emphasizes reduced risk to human health and natural ecosystems from agricultural activities through voluntary action. The federal Conservation Reserve Program (CRP), administered by the USDA, takes fragile farmland out of production for between 10 and 15 years. The land owners receive an annual rental payment for idling the land, as well as cost-share assistance for establishing permanent vegetative cover. Stream corridors, wellhead protection areas, and other environmentally critical lands are also eligible for CRP.

Recommended Future Actions for Irrigated Agriculture

In cooperation with other appropriate local, state, and federal agencies, and private landowners, the Regional Board should:

1. Develop a monitoring program to detect water quality trends, identify problem areas, and determine the needed levels of action.

2. Encourage the use of irrigation methods designed to reduce deep percolation and nitrate leaching, and to eliminate surface runoff and erosion (e.g., drip irrigation systems, surge valves on furrow irrigation systems, etc.).

3. Support efforts by the Soil Conservation Service, Resource Conservation Districts, University Cooperative Extension, and others to develop guidelines to improve irrigation practices and to educate individual farmers about the principles of irrigation efficiency, and methods of controlling salt inputs.

4. Regulate the reclamation of new lands which could contribute large quantities of salts or pollutants to waters of the State.

5. Regulate the importation and reuse of wastewater to minimize the application of waters which are of poorer quality than existing or imported supplies. If such import or transport to upslope areas for reuse is allowed, the Regional Board should take suitable steps to mitigate short- and long-term adverse effects of increased salt load resulting from wastewater recycling.

6. Restrict the use of reclaimed waters, where water supplies are limited, to existing irrigated acreage rather than developing new irrigated acreage to utilize the reclaimed water.

Agricultural Chemicals

Agricultural chemicals include pesticides (insecticides, herbicides, fungicides, rodenticides, etc.), fertilizers, soil amendments, and other compounds. Pesticides and fertilizers can contaminate surface and ground water supplies, posing health hazards to humans and animals. Fertilizers can also contribute to the eutrophication of streams, lakes, and rivers by adding nutrients to these systems.

Pesticides

The California Department of Pesticide Regulation (DPR) is the lead agency responsible for pesticide registration and regulation in California. The DPR maintains a computerized data base that contains information on the kinds and quantities of pesticides used in the State, including the location and acreage of chemical applications, and the type of crop treated.

Local administration of the DPR's pesticide regulatory program is the responsibility of the County Agricultural Commissioners (CACs), with coordination, supervision, and training provided by the DPR. The CACs enforce pesticide laws and regulations, and evaluate permit requests for the use of restricted pesticides. In addition, the CACs monitor and inspect pesticide handling and use operations, investigate suspected pesticide misuse, and take enforcement action against violators. The CACs are required by law to consult quarterly with Regional Board staff to report any problems resulting from pesticide use.

Effective control of problems related to pesticides is difficult because application practices tend to vary, depending on the particular chemicals and crops involved. Furthermore, the types of pesticides and formulations that are currently in use tend to change rapidly, as often as every three to five years.

On March 19, 1997, the State Water Resources Control Board and DPR entered into a Management Agency Agreement (MAA) and approved a “California Pesticide Management Plan for Water Quality” for implementation of the MAA. The MAA provides for cooperation and communication between the two agencies, and summarizes their respective roles and responsibilities. In the MAA, the State Board conditionally agrees to accept the MAA and plan as measures consistent with the State’s Nonpoint Source Management Plan. Both agencies commit to exchange information, and to work together in the development of plans, policies, and “reduced risk practices” for the protection of water quality from the impacts of pesticides. Implementation of “reduced risk practices” is to be initially on a voluntary basis, followed by regulatory action if necessary. The MAA includes a section on “Reservation of Authority” which provides that nothing in its text shall be construed as limiting the authority of the State and Regional Boards “in carrying out their legal responsibilities for management, regulation, coordination, and control of water quality.” The plan describes more specifically how DPR and the CACs will work with the State and Regional Boards. It includes provisions for outreach programs, compliance with water quality standards, ground and surface water protection programs, self-regulatory and regulatory compliance, interagency communication, and conflict resolution. Appendices to the plan include a list of “reduced-risk practices” for minimizing the potential for offsite pesticide movement and transport of residues to surface or ground waters, and summaries of applicable state and federal regulations.

The Director of the DPR, in consultation with the State Board, the Regional Boards, and the California Office of Environmental Health Hazard

Assessment, is required under the Pesticide Contamination Prevention Act (AB 2021) to annually report the following information to the California Legislature:

- The location and number of ground water wells sampled for pesticide active ingredients, and the agencies responsible for drawing and analyzing the samples.
- The location and number of well samples with detectable levels of pesticide active ingredients, and the agencies responsible for drawing and analyzing the samples.
- An analysis of the results of well sampling described above to determine the probable source of the residues. The analysis shall consider factors such as the physical and chemical characteristics of the economic poison, volume of use, method of application, irrigation practices, and types of soil in areas where the economic poison is applied.
- Actions taken by the DPR and the State and Regional Boards to prevent economic poisons from migrating to ground waters of the State.

Regional Board responsibilities in the AB 2021 Program include compiling and transmitting to the State Board any of the activities described above that have occurred in the Region during the year. The State Board combines information from all of the Regional Boards to assist in the preparation of the annual AB 2021 report to the California Legislature.

Fertilizers

Nutrients contained in fertilizers (including animal manure) can reach surface water via storm runoff, irrigation drainage, or by natural subsurface flows. Fertilizers can contribute to nitrate accumulation in ground water, resulting in violations of the drinking water standard. Fertilizers can also contribute to cumulative nutrient loading, along with other sources such as septic systems and urban runoff.

Because the primary agricultural land use in the Lahontan Region is range livestock grazing, agricultural fertilizer use is relatively low compared to that in some other parts of the State. However, localized water quality problems have resulted from agricultural fertilizer applications. For example, increases in salinity and nitrates in ground waters of the Mojave River and Antelope Valley areas are believed to have resulted in part from excess applied fertilizers. Off-site application of manure from dairies also has resulted in water quality degradation.

More efficient application of fertilizers could help to reduce the amount of nutrients reaching surface and ground waters with agricultural drainage and runoff.

Vector Control and Weed Control

Agricultural chemicals are often employed for non-agricultural uses. For instance, aquatic herbicides are sometimes used for the control of aquatic weeds to improve vehicle access, to enhance recreational opportunities, or for aesthetic reasons. The use of terrestrial herbicides may be proposed for forest management, landscaping, fire control, golf course maintenance, or for other similar purposes. Pesticides are also used by public agencies for vector control (i.e., to eliminate pests and disease-carrying organisms such as mosquitoes).

The Regional Board has asked to be notified by public agencies of any large-scale applications of such chemicals within their jurisdiction. For example, the U.S. Forest Service is expected to notify the Regional Board of plans for chemical applications associated with timber harvest or other forest management activities. The California Department of Food and Agriculture, which is currently responsible for certain pest control programs such as that for the gypsy moth, has been asked to notify the Regional Board of plans for pesticide applications in this Region. The U.S. Bureau of Land Management, in implementing its Noxious Weed Control Program, has been asked to notify the Regional Board of aerial herbicide applications and of any spills in, or near, surface waters. Upon such notification, the Regional Board is able to become involved in the environmental consultation process required by the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). In this way, the Regional Board can ascertain whether potential water quality impacts from such activities will be mitigated.

For smaller-scale applications, such as the use of herbicides for golf courses or other turf areas, the Regional Board has adopted waste discharge requirements which include control measures for herbicide use. The Regional Board may wish to have staff review projects on a case-by-case basis, in order to determine whether there is any potential for water quality impacts and if waste discharge requirements are necessary.

In some instances, use of these substances will have unavoidable water quality impacts, particularly in situations where the chemicals are applied directly into or near surface water (such as aquatic weed control or vector control). In these cases, the use of such chemicals can result in the violation of water quality objectives for toxic substances, as well as in the violation of waste discharge prohibitions. Federal regulations (40 CFR § 131.13) allow the Regional Board to grant conditional variances to water quality objectives under certain circumstances. Additionally, the Regional Board may allow the use of pesticides for purposes of vector control provided the project is conducted under the circumstances described in Chapter 4 under the section entitled, “Circumstances Eligible for Prohibition Exemption” under the subsection entitled “Vector Control” and according to the criteria described in Chapter 4 under the section entitled “Exemption Criteria for Aquatic Pesticide Use” under the subsection entitled “Exemption Criteria for Vector Control.” Furthermore, pursuant to Section 13269 of the California Water Code, the Regional Board may waive the need for waste discharge requirements and reports of waste discharge, for specific types of discharge, where such a waiver is in the public interest. Such actions nevertheless must conform to State and federal nondegradation requirements. Although these policies do allow limited decline in water quality when the State finds that an overriding public benefit will result, both the federal and State policies require that water quality be maintained at a level sufficient to protect existing beneficial uses. USEPA guidance on variances from water quality standards is summarized in Chapter 3 of this Basin Plan under “General Direction Regarding Compliance With Objectives.”

Control Measures for Agricultural Chemicals

Regional Board Control Actions

Chapter 4 includes a prohibition against discharges of pesticides to surface or ground waters. The Regional Board may grant an exemption to the pesticide prohibition for projects that propose to apply aquatic pesticides for purposes of protecting public health (e.g., vector control) or natural resources (e.g., fisheries management, control of aquatic invasive species infestations) provided the project is proposed under the circumstances and according to the criteria detailed in Chapter 4.

The use of agricultural chemicals shall be further regulated by relevant provisions of the State Board's Nonpoint Source Program Plan, which guides implementation of the State Board's 1991 MOU with the Department of Pesticide Regulation. Some pesticides are also included in the California Department of Health Services' Proposition 65 list of carcinogens which should not be present above “action levels” in sources of drinking water. (Proposition 65 is discussed in the “Spills, Leaks, Complaint Investigations and Cleanups” section of this Chapter.)

The pesticide waste discharge prohibition and the applicable exemption criteria that must be satisfied to grant a prohibition exemption, are important considerations in the Regional Board's regulation of discharges of pesticides.

Federal Control Measures for Agricultural Chemicals

1. Under the authority of the amended Coastal Zone Management Act, the U.S. Environmental Protection Agency (USEPA) has developed guidance specifying management measures for sources of nonpoint pollution (including agriculture) in coastal waters (USEPA 1993). Measures have been proposed for nutrient and pesticide management. This guidance may be applicable to many non-coastal waters as well.

2. In April 1992, the USEPA and the U.S. Department of Agriculture (USDA) signed a Memorandum of Agreement (MOA) to implement increased pollution prevention in the agricultural sector. The MOA calls for the development of a pollution prevention strategy which includes safer pesticide registration. The strategy emphasizes reduced risk to human health and natural ecosystems from agricultural activities through voluntary action.

3. The USEPA and USDA are cooperating in the development and implementation of environmentally-sound pest management practices, and in the identification of the best methods of applying integrated pest management in agriculture. As a first step, both agencies sponsored a public/private Integrated Pest Management Forum in June 1992.

4. In April 1992, a *Federal Register* notice and public workshop solicited public comments on possible criteria, policies, and procedures for encouraging the development and registration of negligible-risk pesticides and replacement pesticides than are less hazardous than currently-registered products. Options suggested included faster review of applications, lower fees and registration costs for safer pesticides, reconsideration of current registrations for riskier pesticides, and public listing of risky pesticides as targets for replacement.

5. The Agriculture in Concert with the Environment (ACE) grant program is administered by the USEPA's Office of Pollution Prevention and the USDA Cooperative State Research Service. ACE grants have been awarded for projects whose objective is adopting sustainable agriculture practices and reducing the use of herbicides and other pesticides.

6. The USDA's Sustainable Agriculture and Research Program gives grants to develop and distribute to farmers practical, reliable information on alternative farming practices.

Recommended Future Actions for Agricultural Chemicals

In cooperation with other appropriate local, state, and federal agencies, and private landowners, the Regional Board should:

- Encourage the State Board to develop a monitoring program to detect water quality trends related to agricultural chemicals, identify problem areas, and determine the needed levels of action.

- Review proposals for weed control and vector control and invasive species control on a case-by-case basis, and consider allowing qualified projects to proceed by granting an exemption to the pesticide prohibition.

- Support efforts by the Soil Conservation Service, Resource Conservation Districts, University Cooperative Extension, and others to educate individual farmers about Best Management Practices for fertilizer and irrigation management, including, but not limited to, developing fertilizer management plans and/or other strategies to optimize the type, amount, rate, and timing of application.

- Develop Best Management Practices or other guidance for the control of aerial applications of agricultural chemicals.

Confined Animal Facilities

Confined animal facilities are used to raise or shelter high population densities of animals such as cattle, pigs, chickens, turkeys, sheep, horses, commercial furbearers, and pets. A number of such facilities presently exist in the Lahontan Region.

Confined animal facilities may potentially impact water quality in a number of ways. Stormwater runoff can carry by-products of such operations into surface waters. Such pollutants include washwater from milking areas, salts present in animal feed and manure, nutrients and pathogens found in manure, and sediment that has been detached by trampling and other land disturbances. Manure disposal can also affect ground water quality by increasing concentrations of total dissolved solids (salt) and nitrate.

Manure and wastewater from confined animal facilities may generally be applied to disposal fields or crop lands, provided that the quantities applied are reasonable. “Reasonable” is defined as the amount the land or crops can beneficially utilize. Overloading may be detrimental to the application site, as well as nearby receiving waters.

The confined animal facilities presently of most concern in the Lahontan Region are dairies. Studies have shown that the total dissolved solids (salt) content of the ground water along the Mojave River has become elevated both along the length of the river and over time. Dairy manure is one likely contributor to the overall salt loading of this closed basin.

In the early 1980s, dairy operators in the increasingly urbanized Chino basin began looking to the high desert along the Mojave River to relocate. A proposal to establish a large number of dairies in Summit Valley (the headwaters of the Mojave River) prompted the Regional Board to commission a study to identify and evaluate potential areas of concern associated with the location/siting of confined animal facilities. That study, conducted by the Department of Water Resources, concluded that a two- to three-mile band along the Mojave River would most rapidly be impaired by percolation of dairy and other wastes, and that other areas outside of the Mojave River floodplains could also be impacted by dairy waste, but at a slower rate. The Regional Board responded by adopting waste discharge requirements for large dairies located along the Mojave River.

Control Measures for Confined Animal Facilities

(For confined animal facilities regulations which apply in the Lake Tahoe Basin, see Chapter 5.)

The State and Regional Water Boards have authority under the California Water Code, in general, and regulations contained in the California Code of Regulations, Title 23, Chapter 15, Article 6, in particular, to fully regulate waste disposal activities at confined animal facilities.

Regional Board Control Actions

The Regional Board has adopted waste discharge requirements (WDRs) for several dairy operations in the Lahontan Region. Regional Board staff will periodically inspect all confined animal facilities for which WDRs have been adopted. Based on inspections and other information, the WDRs will be periodically evaluated to determine if they are protective of water quality and in conformance with the minimum standards contained in the California Code of Regulations (23 Cal. Code of Regs. § 2560-2565). Control systems must be designed to minimize surface runoff, minimize percolation of field-applied wastewater to ground water, and minimize percolation of water through manure into ground water. Any control system utilizing retention ponds should either be lined or situated over soil of relatively low permeability to allow slow infiltration and percolation. Additional and/or more stringent measures may be required in areas overlying threatened or impaired sources of drinking water. The need for construction/retrofit of pollution prevention or ground water monitoring facilities (including time schedules) will be considered on a case-by-case basis.

The State Board's Dairy Waste Task Force issued guidelines in 1991 to facilitate consistent regulation of waste management at dairies throughout California. Those guidelines (and any future amendments) will be used by the Regional Board to assess and respond to the potential water quality impacts of dairy operations. The regulatory process for existing dairies is initiated by surveying dairy owners and encouraging the use of Best Management Practices. If a dairy owner does not voluntarily implement BMPs, a conditional waiver of waste discharge requirements may be issued. Waste discharge requirements may be adopted for those facilities that fail to comply with the conditional waiver. Regardless of the tier under which a facility is regulated, all confined animal operations are required to comply with the minimum standards contained in the California Code of Regulations and this Basin Plan.

All proposed new or re-opening dairies must file a report of waste discharge with the Regional Board. The Regional Board will require that the report of waste discharge include the information outlined in the Dairy Waste Task Force guidance. Based on the report of waste discharge (and other information as available), the Regional Board will either adopt waste discharge requirements or a conditional waiver stipulating that, at a minimum, facilities will be designed, constructed and operated to meet the minimum criteria contained in the California Code of Regulations and this Basin Plan. Monitoring programs may be required to assure compliance.

The Regional Board relies heavily upon the USDA Soil Conservation Service (SCS), which has the technical expertise and congressional authority to assist farmers in developing pollution prevention plans to comply with state regulations, including this Basin Plan. In some cases, matching funds are available through the SCS to assist the owners of confined animal facilities in the design and construction of pollution prevention measures.

The process described above for the regulation of dairies will also be utilized to assess and regulate other types of confined animal facilities, whenever deemed appropriate by the Regional Board's Executive Officer.

Regulation of confined animal facilities by the Regional Board shall account for cumulative effects such as salt and nitrate accumulations in ground water from other sources.

Waste discharge requirements adopted for a specific confined animal facility may not effectively regulate the off-site disposal of manure. Potential water quality degradation due to such disposal shall be regulated by implementing relevant provisions of the State Board's Nonpoint Source Management Plan.

Federal Control Measures for Confined Animal Facilities

1. Under the authority of the amended Coastal Zone Management Act, the U.S. Environmental Protection Agency has developed guidance specifying management measures for sources of nonpoint water pollution (including agriculture) in coastal waters (USEPA 1993). Measures have been proposed for animal waste management. This guidance may be applicable to many non-coastal waters as well.

2. In April 1992, the U.S. Environmental Protection Agency and the U.S. Department of Agriculture signed a Memorandum of Agreement (MOA) to implement increased pollution prevention in the agricultural sector. The MOA calls for the development of a pollution prevention strategy which includes voluntary livestock or poultry management agreements. The strategy emphasizes reduced risk to human health and natural ecosystems from agricultural activities through voluntary action.

Recommended Future Actions for Confined Animal Facilities

1. In cooperation with other agencies, the Regional Board should develop a monitoring program to detect water quality trends, identify problem areas, and determine the needed levels of action.

2. Where appropriate, the Regional Board should begin actively regulating all confined animal facilities that may adversely affect water quality or beneficial uses.

3. To aid in the development of BMPs for dairy systems, the Regional Board should cooperate with other agencies to collect and review, whenever feasible, field-scale data on salt and plant-available nitrogen for cropped or pastured dairy production systems.

4. The Regional Board should encourage the use of plant nutrients in liquid and solid animal wastes as a resource, rather than a waste to be disposed of.

5. The Regional Board should encourage and assist in the development of criteria for allowable animal units/acre for different site-specific crop, soil, climate, and management variables.

Aquaculture Facilities

(Public fish hatcheries are addressed in the "Fisheries Management" discussion within the "Resources Management and Restoration" section of this Chapter.)

Discharges from aquaculture operations can contain waste products (nutrients and suspended solids) as well as pesticides and other substances. Potential water quality impacts downstream of these discharges include increased productivity and algal growth, increased biological oxygen demand, and impaired aquatic habitat. The temperature of discharged waters can also affect receiving waters.

Another concern with aquaculture facilities is the release of exotic species. If commercial species are not properly contained, they could escape and become established outside of the facility, potentially violating objectives for species diversity and nondegradation of aquatic communities.

Regional Board Control Actions for Aquaculture Facilities

All aquaculture facilities which include point source discharges to surface waters shall be regulated under National Pollutant Discharge Elimination System (NPDES) permits.

Recommended Future Actions for Aquaculture Facilities

The Regional Board should be advised of routine and other applications of pesticides or other substances potentially containing toxic substances.

4.11 RECREATION

Tourism related to outdoor recreation is a major sector of the Lahontan Region's economy. Recreational activities range from backpacking in wilderness areas to golfing, boating, and skiing at highly developed resorts. Water quality concerns associated with outdoor recreation include sanitation, erosion/stormwater problems (related to disturbance of soils and vegetation), and water contamination due to the use of pesticides at golf courses and fuel and paint at marinas.

Impacts of recreation are of special concern in the Lake Tahoe Basin, which receives as many as 20 million visitors annually. The application of special control measures to recreational projects on sensitive lands in the Lake Tahoe Basin is discussed in Chapter 5.

Water quality problems associated with specific recreational activities are discussed below, together with recommended regionwide control measures.

Backcountry Recreation

The Lahontan Region includes at least part of nine National Forests and ten designated wilderness areas within these forests. Wilderness recreation in the eastern Sierra Nevada is so popular that quotas for overnight use have been established for several areas. Much of the National Forest land which is not designated wilderness is managed for dispersed recreation, with few developed facilities such as parking lots, restrooms, etc. Much of the Bureau of Land Management land within the Region is also managed for dispersed recreation. Dispersed recreation can include hiking, backpacking, packing with livestock, fishing, hunting, camping at undeveloped areas, recreational use of natural hot springs, cross-country skiing, snow camping, etc. (Problems related to use of offroad vehicles are discussed in a separate section below.)

Problems related to dispersed and wilderness recreation include disposal of human and animal waste too close to surface waters, littering, destruction of meadow and riparian vegetation by trampling from humans and livestock, erosion of trails, and watershed damage by human-caused wildfires. One unusual type of problem results from the unauthorized “development” of natural hot springs for spa use, including physical alterations to create pools, and use of disinfectant chemicals and soaps which may be harmful to unique hot spring biota.

Relatively little quantitative information is available on the baseline quality of backcountry water bodies to enable the evaluation of the extent of problems related to recreation.

Control Measures for Backcountry Recreation

Designated wilderness and national park areas are of special concern. Land use practices in these areas must assure protection of beneficial uses of water. Erosion control in the vicinity of surface waters must be implemented for all human activities which disturb the natural ground surface. Animal wastes must be managed to prevent nuisance and to protect beneficial uses of water.

Recommended Control Measures for Backcountry Recreation

1. The USFS and BLM have ongoing programs of trail maintenance and watershed restoration, including the restoration of wetlands disturbed by recreational use. Information is provided to wilderness users at trailheads regarding sanitation, etc., and wilderness rangers patrol backcountry areas to increase public awareness. These programs should be continued.

2. The USFS and BLM should conduct additional water quality monitoring to determine the impacts of dispersed recreational use. Where problems are apparent, the Regional Board should work with land managers to prevent further impacts and to ensure the implementation of remedial measures.

3. Regional Board staff should review and comment on recreation and wilderness management plans prepared by public agencies, and should encourage these agencies to mitigate water quality problems that have been identified by monitoring and/or public complaints.

Campgrounds and Day Use Areas

Developed recreation areas such as campgrounds, picnic areas, vista points, and interpretive centers generally have roads and parking lots and may have restrooms and recreational vehicle waste dumping facilities. They generally result in more soil disturbance and compaction, and a greater amount of impervious surface, than undeveloped recreational facilities. They are often located near surface waters, and heavy foot traffic may damage streambanks and lakeshores. Pesticides may be used at such facilities to control mosquitoes or rodent vectors of disease.

Control Measures for Campgrounds and Day Use Areas

1. The Regional Board regulates developed recreation facilities on public lands under MOUs and MAAs (see Chapter 6). It may also issue waste discharge requirements where necessary to protect water quality. Wastewater disposal at developed recreational facilities is subject to the control measures discussed in the "Wastewater" section of this Chapter, and to the regionwide septic system density limits and areawide waste discharge prohibitions where applicable.

2. New private recreation facilities involving soil disturbance of 5 acres or greater are subject to the statewide stormwater construction NPDES permit (see "Stormwater" section of this Chapter).

Recommended Control Measures for Campgrounds and Day Use Areas

1. In portions of the Region where erosion and stormwater problems threaten sensitive surface water bodies, waste discharge requirements (WDRs) should be considered for the construction of new private recreational facilities even when the statewide construction permit does not apply. WDRs may also be necessary to require installation of BMPs by existing private facilities in such areas. Waivers of WDRs may be appropriate in less sensitive areas.

2. New campgrounds and day use recreation facilities should be designed to minimize water quality impacts by avoiding disturbance of steep slopes, highly erodible soils, and riparian/wetland areas. Best Management Practices can be applied to new and existing campgrounds and day use areas to reduce erosion and provide treatment for stormwater. Control of erosion from unpaved roads and parking areas is particularly important. Interpretive displays and programs at recreational facilities should address water quality impacts of recreation and request public cooperation (e.g., use of designated fishing trails rather than random trampling of streambank vegetation).

   Campgrounds and other recreational facilities on public lands are occasionally closed and remodeled or relocated to allow the recovery of compacted soils and natural vegetation. Public agencies operating developed recreational facilities which have encroached on wetlands or riparian areas should be encouraged to relocate facilities outside of these sensitive areas, and to restore riparian/wetland functions where feasible.

3. Where other disposal facilities are not locally available, public and private campgrounds which attract significant numbers of recreational vehicles should provide waste dumping stations to reduce the extent of illegal dumping.

4. Additional monitoring of the water quality impacts of developed recreation in the Region should be performed in order to facilitate the implementation of control measures, as needed.

Boating and Shorezone Recreation

Water quality problems related to boating result both from discharges of wastes from boats, and from construction and operation of facilities to support recreational and commercial boating. "Support" activities and facilities include dredging, piers, marinas, boat launching facilities, boat parking and storage facilities. (The term "boats" for purposes of this section includes river rafts, jet skis, and other watercraft.) Lake Tahoe has the greatest number of developed support facilities, including a U.S. Coast Guard station. Large commercial tour boats operate on Lake Tahoe, and there are plans for expanded "waterborne transit." However, boating is popular at other large lakes in the Region (e.g., Arrowhead, Eagle, Crowley), and there are public and private marinas and launching facilities at many smaller lakes. There are many private piers at some lakes which are surrounded by residential development, such as Donner Lake. When flows permit, the Truckee and East Fork Carson Rivers are very popular for rafting.

Waste discharges associated with boating include human sewage, garbage and litter, fuels from leaks, spills, and engine exhausts, and antifouling chemicals in boat paints. Boat wakes and propwash in shallow waters can also erode shorelines or suspend bottom sediment, increasing turbidity and mobilizing nutrients and contaminants in the sediment.

Almost all surface waters in the Lahontan Region are designated sources of drinking water pursuant to Proposition 65 (see "Spills, Leaks, Complaint Investigations, and Cleanups" section of this Chapter), and many of them, including Lake Tahoe, Donner Lake, and some of the Mammoth and June Lakes, have existing surface water intakes for municipal supply. (The Mammoth and June Lakes, and Crowley Lake, a very popular boating area, are part of the Los Angeles Department of Water and Power's domestic supply system.) It is thus very important to protect these domestic supplies from vessel wastes.

Dredging, whether it is done to create marinas or to maintain or increase boat access to marinas and piers under low water conditions, can have a number of potentially significant water quality impacts. It disturbs sediments, smothers bottom-dwelling organisms, and releases nutrients and contaminants which had settled out of the water. The sediments may also be redeposited elsewhere. Disposal of dredged material in the shorezone of a lake may allow leaching of dissolved nutrients and contaminants back into the lake.

The construction of piers and other shorezone structures can involve localized erosion, suspension of bottom sediments, and destruction of valuable riparian vegetation. Even after construction, piers, jetties, and marinas constitute physical alterations in natural shorezone conditions. Impermeable (e.g., rock crib) piers can alter natural patterns of sand and sediment transport along the shore, adversely affecting habitat values. Even permeable shorezone structures may have cumulative impacts on sand transport.

Many marinas are enclosed areas which trap sediment, nutrients and contaminants. Higher water temperatures within enclosed marina areas may lead to algae blooms and/or dissolved oxygen depletion. Some pollutants may accumulate in marina sediments, and affect biological processes both through gradual long-term release and through resuspension of sediment upon dredging. Pollutants may enter marinas from boats, maintenance activities near or over water, and stormwater runoff from parking lots and other onshore impervious surfaces. In some cases, disposal of fish-cleaning wastes can increase biochemical oxygen demand (BOD). The level of pollutant accumulation in the marina depends on the level of flushing; however, flushing merely redistributes pollutants elsewhere in the lake.

Metals and metal containing compounds are widely used in boats and marina related activities. Examples include lead as ballast, arsenic in paint pigments, pesticides and wood preservatives, zinc anodes used to deter corrosion of metal hulls and engine parts, and copper and tin in antifoulant paints. Boatyard hull pressure washing operations may release metals in concentrations of environmental concern (USEPA 1993).

Elevated levels of petroleum hydrocarbons may occur in marina waters as a result of refueling activities and bilge or fuel discharges from boats. Petroleum hydrocarbons tend to adsorb to particulate matter and become incorporated into sediments. They persist for years, with long-term impacts on benthic organisms (USEPA 1993).

Shorezone structures near stream inlets to lakes can act as barriers to fish migration and/or alter currents and the transport of sediment from streams. The visual presence of large numbers of piers and shorezone structures can alter the quality of visitors' recreational experiences and thus affect recreational beneficial uses.

Beach use is popular at Lake Tahoe and at other lakes around the Region. Water quality problems associated with beach use can include sanitation, littering, and stormwater problems related to nearshore parking facilities. Because the beaches of Sierra lakes are often rocky, resorts sometimes import sand to create beaches. Lake currents may repeatedly transport the sand away from the beach, making ongoing replenishment necessary. Sand used for replenishment may contain nutrients, salts, or contaminants. Private landowners with rocky beaches may also rearrange underwater rocks offshore to create a sandy bottom for swimming and wading, with detrimental impacts on fish habitat.

Control Measures for Boating and Shorezone Recreation

1. *Vessel Wastes.* Direct discharges of wastes, including sewage, garbage, and litter into surface waters of the Lahontan Region are prohibited (see “Waste Discharge Prohibitions” section of this Chapter). Control of discharges of human sewage from boats is discussed in detail in the “Wastewater” section of this Chapter. Briefly, the Regional Board should determine needs for specific marinas and public launching facilities serving larger boats with holding tanks to have wastewater pumpout facilities; and should request the State Board to use its authority under the Harbors and Navigation Code to require installation of these facilities. Dumping stations for “portapotties” from smaller boats should also be readily available onshore, and floating latrines may be appropriate in some areas. Public land managers and river rafting businesses should provide restrooms or chemical toilets at heavily used raft put-in and take-out points; these facilities will be subject to regionwide onsite disposal system criteria and any local discharge prohibitions.

2. Public education programs are needed to increase use of wastewater disposal facilities and to prevent the dumping of garbage and litter from boats and rafts. Local governments should strictly enforce anti-litter laws. Voluntary beach and stream litter cleanup operations should be encouraged.

3. Most boat engines are designed for operation near sea level. These engines operate on a "rich" (very high) fuel-to-air ratio on high mountain lakes. Soot and unburned fuel can be discharged from engines not adjusted for high altitude operation. Boats based year-round at high elevations should have their engines adjusted for high altitude operation.

4. Regional Board staff should obtain additional information about the extent and impacts of petroleum product discharges from boat engine exhausts to surface waters of the Region. If the problem appears to be significant, the Regional Board should work with the State Board, the Department of Boating and Waterways, the Department of Fish and Game, county and state health departments, and other appropriate agencies to develop control measures. Statewide and possibly national action, like that used to control tributyltin (TBT), may be necessary to promote or require alternative fuels and more efficient engines.

5. The use of paint containing the antifouling agent TBT on smaller boats is now prohibited by State and federal legislation. Vessels painted with TBT before January 1, 1988 may continue to be used, but may not be repainted with TBT paint. Maintenance activities on older boats need careful controls to prevent TBT paint from entering lakes in stormwater (see marina discussion below). Regional Board staff should attempt to stay aware of new information on other antifouling paint ingredients (e.g., copper) which could have significant water quality impacts.

6. Local governments, resource management agencies, and other entities with authority to regulate boating activity should exclude motorized vehicles from shallow water areas which support important habitat in order to prevent sediment and shorezone disturbance from propwash. Speed limits and "no-wake zones" can also be used for this purpose.

7. *Dredging and Underwater Construction.* The following guidelines apply primarily to dredging in connection with recreational activities. However, dredging is also performed for other purposes, such as removal of sediment from reservoirs and hydroelectric facilities. Many of the considerations below apply to these types of projects as well; see also the separate discussions of these facilities elsewhere in this Chapter.

8. For regulatory purposes, Regional Board staff divide dredging activities into "maintenance" and "new" dredging. Maintenance dredging involves areas and sediment depths which have been previously dredged. The depth of dredging is important to water quality because the concentrations of nutrients, organic matter, and toxic substances in sediment may vary with depth depending upon physical, chemical, and biological processes. (In Lake Tahoe, maintenance dredging may not be done below an authorized lake bottom elevation; see Chapter 5.) New dredging is that done outside of maintenance dredging boundaries, or below any applicable approved lake bottom elevation. Waste discharge permits for marinas may include conditions for allowable ongoing maintenance dredging; new dredging generally requires a new or revised permit.

9. There are two major types of dredging equipment: bucket ("clamshell") dredges, and suction dredges. Bucket dredging involves the scooping and transfer of sediments to a dewatering site, and the subsequent removal of sediments to an approved disposal site. Such operations typically create highly turbid water due to bucket drag on the lake bottom as it pulls free from the sediment. Turbidity barrier installation is usually required to isolate water disturbed by mechanical dredging operations.

10. Suction dredges are operated like a vacuum cleaner. Sediments are removed in a slurry, which is pumped through a semi-flexible pipeline to a dewatering and/or settling area. ("Bypass" dredging may involve redeposition of sediments in another area of the lakebed.) Experience has shown that water quality impacts can be minimized if suction dredging is employed and the slurry is pumped out of the lake; in such cases, turbidity barriers may not be necessary.

11. Dewatering and settling areas must be designed to accommodate the expected flow and to provide necessary removal of suspended and dissolved solids. If dewatering and/or settling areas are not designed to accommodate the expected flow, temporary shutdown of dredging operations may be necessary to avoid overloading the system. Overloading the system may lead to the failure of containment berms and/or the release of water which may violate water quality standards. It is important to note that dewatering and settling areas need not be adjacent to the dredging site. Slurries can be pumped for distances of several thousand feet to

several miles, depending upon particle size. In some dredging operations in Lake Tahoe, dredged sediments have been pumped from an outer channel area and discharged within a marina to be removed mechanically. In these cases, turbidity barriers are usually required to isolate the disturbed water from the lake.

12. Suction dredging is often the most effective and most environmentally safe method, especially with offsite disposal. However, even with turbidity barriers, suction dredging followed by interim storage of dredged material in an “inner harbor” situation may create more problems than bucket dredging. Localized problems related to turbidity may result from repeated disturbance of stored material for final disposal. Practical limitations, such as land availability for dewatering and/or settling, may also make bucket type dredging more appropriate in some cases.

13. In the Lake Tahoe Basin, Regional Board staff may apply 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.

14. Turbidity barriers must be designed and used with caution. Failures or breaches of turbidity barriers are usually the result of wind and current loadings which cause the barrier to pull away from its bottom anchoring. A breach in the turbidity barrier is always accompanied by a release of waters which may violate water quality standards. To avoid failures, turbidity barriers should be designed to withstand expected wind and current loadings. Care must be taken to ensure that the barrier conforms to the lake bottom, forming an adequate seal. A recommended method of bottom anchoring is to sew a heavy chain into the bottom of the barrier. It is important to realize that the weight of an object decreases when placed under water. For example, the weight of a sand bag is reduced to 1/3 when placed in water, and additional bags must be used to effectively anchor the barrier. Turbidity barriers may contribute to localized temporary water quality problems since they trap nutrients from suspended sediments, and reduced water circulation increases water temperature inside the barrier; both of these factors can lead to algae blooms.

15. Entanglements with dredging machinery are often the cause of breaches in the barrier. A ten-foot buffer zone between the barrier and machinery could prevent such occurrences.

16. Freeboard is the distance between the water surface and the top of the turbidity barrier. The amount of freeboard should be based on site-specific characteristics. In some cases, it may be desirable to allow some splash over the barrier, while in others it may be impossible to limit splashover without violating water quality standards. Too much freeboard can allow the barrier to act as a sail, catching the wind, which puts additional stress on the barrier and bottom anchoring. Too little freeboard could allow splashover to occur, leading to a violation of water quality standards. Fastening the tops of turbidity curtains to sections of floating piers can be very effective. In all cases, turbidity barriers should be designed with a freeboard which will limit the stress placed on the bottom anchoring and ensure that splashover discharges do not result in violation of standards.

17. Turbidity barriers are classified into two types, permeable and impermeable. Permeable barriers allow water and dissolved solids to pass through while stopping all but the smallest of suspended solids; impermeable barriers prevent passage of water and dissolved or suspended constituents. In dredging of an area with a high concentration of nutrients and/or toxics, and low wind and current loadings, an impermeable barrier might be more effective at isolating the nutrients and/or toxics. In cases where nutrients and/or toxics are not in high concentrations and wind and current conditions are high, permeable barriers may be preferred. Permeable barriers also have the advantage of preventing barrier failure due to excessive water pressure behind the curtain.

18. Site specific design is the key to successful dredging operations. The configuration of the area to be dredged, land type and availability for dewatering and or settling, types and amount of material being dredged, nutrient concentrations within the sediments, and expected weather conditions should all be considered. By tailoring the dredging operations to the specific site, violations of water quality standards can be avoided.

19. Dredging and filling activities within surface waters may require a Section 401 or 404 permit from the U.S. Army Corps of Engineers (see "Wetlands" discussion in the "Resources Management and Restoration" section of this Chapter). Most lakebeds and streambeds in California are owned by the State, and their disturbance may also require a permit from the State Lands Commission and/or the Department of Fish and Game.

20. Proposals for dredging, filling, or dredged material disposal should continue to be evaluated on a case-by-case basis; the Regional Board should consider issuing waste discharge requirements where necessary to protect beneficial uses.

21. *Beach Creation and Replenishment.* Because it disturbs natural shorezone habitats and associated wetland/riparian values, the importation of sand to create new recreational beaches at natural lakes and reservoirs should be discouraged. Replenishment of existing sand beaches should use only clean sand.

22. *Shorezone Protection.* Eroding shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more cost-effective, considering the severity of wind and wave erosion, offshore bathymetry, and the potential adverse impacts on other shorelines and offshore areas.

The USEPA (1993) summarizes information on a variety of shoreline protection practices. General considerations include design of all shorezone structures so that they do not transfer erosion energy or otherwise cause visible loss of surrounding shorezones; establishment and enforcement of no wake zones to reduce erosion potential from boat wakes, establishment of setbacks for upland development and land disturbance, and direction of upland drainage away from bluffs and banks so as to avoid accelerating slope erosion.

23. *Piers.* Discharges attributable to the construction of new piers in certain habitat types in Lake Tahoe are prohibited (see Chapter 5). Although there are no specific pier-related prohibitions applicable to other lakes in the Region, the general discharge prohibitions discussed elsewhere in this Chapter apply to pier construction. The Regional Board has historically regulated piers serving single family homes to a lesser extent than public piers, breakwaters, jetties, marinas, and other large in-lake construction projects. Pier construction projects throughout the Region should meet the following conditions:

- The disturbance of lake bed materials should be kept to a minimum during construction. Best practicable control technology should be used to keep suspended earthen materials out of the lake. (This may involve techniques such as installation of pilings within caissons.)
- No petroleum products, construction wastes, litter or earthen materials should enter surface waters. All construction waste products should be removed from the project site and dumped at a legal point of disposal. Any mechanical equipment operating within the lake should be cleaned and maintained prior to use.
- No wood preservatives should be used on wood which will be in contact with lake water.
- The pier owner should ensure that the project contractor is aware of these and any other applicable conditions.

Regional Board staff should continue to review proposals for shorezone and underwater construction on a case-by-case basis through the Section 401 water quality certification process, and the Board should consider waste discharge requirements where necessary to protect water quality.

24. *Marinas.* Certain types of marinas in California are subject to the statewide industrial stormwater NPDES permit (see the "Stormwater Runoff, Erosion, and Sedimentation" section of this Chapter). These include marinas which are primarily in the business of renting boat slips, storing boats, cleaning boats, and repairing boats, and which generally perform a range of other marine services (USEPA 1993). The NPDES permit applies only to point sources of stormwater from the maintenance areas at the marina. The NPDES program does not apply to marinas that are not involved in equipment cleaning or vehicle maintenance activities, or to "marine service stations" which are primarily in the business of selling fuel without vehicle maintenance or equipment cleaning operations (USEPA 1993). Marina construction or maintenance activities which do not fall under the statewide industrial stormwater NPDES permit may be subject the statewide construction stormwater NPDES permit and/or areawide

municipal stormwater NPDES permits (e.g., at Lake Tahoe).

25. Because of the sensitivity of the affected surface waters, the Regional Board should keep individual waste discharge requirements in effect for all larger existing marinas, in order to effectively regulate the maintenance of fueling and wastewater disposal facilities, maintenance dredging, and other operation and maintenance activities which could adversely affect water quality. Proposals for new or significantly expanded marinas should be evaluated on a case-by-case basis against applicable water quality objectives, prohibitions, and effluent limitations.

26. Boat maintenance areas at marinas should be designed and operated to prevent the entry of toxic pollutants from marina property into surface waters. The USEPA (1993) recommends the designation of discrete impervious areas for maintenance activities, the use of roofed areas to prevent rain from contacting pollutants, and the diversion of offsite runoff away from the maintenance area for separate treatment. It also recommends source controls to collect pollutants and thus keep them out of runoff, such as sanders with vacuum attachments, the use of large vacuums to collect debris from the ground, and the use of tarps under boats which are being sanded or painted. Infiltration of runoff from non-maintenance areas is recommended; in some parts of the United States hull-cleaning waste is required to be pretreated and discharged to a sewer.

27. Over-water boat maintenance activities by marina tenants should not require opening more than a pint-size paint can. Engine oil changes should not be done while a boat is in the water. The State Board's BMP handbook for industrial NPDES permits (APWA Task Force 1993) contains additional recommendations to prevent problems from over-water maintenance activities.

28. Liquid and solid wastes produced by marina operation, maintenance, and repair activities, including waste oils, solvents, antifreeze, and paints, should be properly disposed of. Marinas with heavy use by fishermen should also manage fish waste disposal. Fish waste management can include establishment of fish cleaning areas with waste receptacles, issuance of rules controlling or prohibiting fish cleaning at the marina, education of boaters about waste problems, and implementation of composting where appropriate (USEPA 1993).

29. The USEPA (1993) recommends the use of automatic shutoff nozzles, and fuel/air separators (on air vents or tank stems of inboard fuel tanks), to reduce the amount of fuel spilled into surface waters during fueling of boats. It also recommends the use of oil-absorbing materials in the bilge areas of all boats with inboard engines. These materials should be examined at least once a year and replaced as necessary.

30. Marina fueling stations should be designed to allow for ease in cleanup of spills. This includes allowance for booms to be deployed to surround a fuel spill. Marinas should have fuel spill contingency plans meeting local and State requirements. These plans should include health and safety procedures, notification, and spill containment and control. Appropriate containment and control materials should be stored in a clearly marked, easily accessible location. Materials should include absorbent pads and booms, fire extinguishers, a copy of the spill contingency plan, and other equipment deemed suitable. Marina tenants and employees should be educated on spill prevention and cleanup (USEPA 1993, APWA Task Force 1993).

31. Some marinas have chemical over-water fire retardant systems. In reviewing marina projects, Regional Board staff should investigate the types of chemicals being used and their potential water quality impacts in relation to applicable water quality objectives.

32. Marina water treatment systems (to remove nutrients and turbidity) have been suggested as mitigation for the impacts of marina expansion at Lake Tahoe. The Tahoe Keys subdivision currently has a treatment system to remove phosphorus from the waters of its artificial lagoons. Any new proposals for marina water treatment systems in the Lahontan Region should be evaluated based upon site specific conditions and water quality risks associated with the proposed treatment (see discussion of lake restoration in the “Resources Management and Restoration” section of this Chapter.)

33. Additional monitoring should be conducted in areas of heavy boating and rafting use to document the water quality impacts of vessel wastes, shorezone construction, and dredging. In particular, marina sediments should be sampled for TBT when dredging is proposed.

Offroad Vehicles

Offroad vehicles (ORVs), (also called "off-highway" vehicles or OHVs), include, but are not limited to, any of the following: bicycles, motorcycles, "all terrain vehicles," snowmobiles, and any other vehicle (including passenger trucks and cars) operated off of paved roads. While the impacts of "mountain" bicycles are still being debated, motorized vehicles can cause serious erosion problems, directly (through soil detachment, compaction, or creation of ruts) or indirectly (through damage to vegetation or by starting wildfires). Operation of over-the-snow vehicles can also disturb soils and vegetation if there is insufficient snow cover.

Control Measures for Offroad Vehicles

1. The U.S. Forest Service and Bureau of Land Management designate ORV routes on public lands and prohibit operation away from these routes. ORV use may be further restricted during extremely dry conditions in order to prevent fires, and during wet (i.e., winter/spring) conditions when excessive soil disturbance is likely. However, illegal use can and does occur. Compliance should be encouraged via well planned and targeted public education efforts, as well as strict enforcement of regulations.

2. Regional Board staff should continue to review and comment on proposed changes in ORV management plans of public agencies. These agencies should be encouraged to monitor the water quality impacts of legal ORV use, and to modify or close routes where water quality problems are occurring. Modifications could include rerouting of trail segments away from surface waters and wetlands, or installation of bridges at stream crossings. Closed routes should be stabilized and revegetated.

3. Some local governments have ordinances regulating ORV use, although these may be directed at problems unrelated to water quality (e.g., noise). All local governments in the Region should be encouraged to adopt and enforce ordinances which will prevent erosion from ORV use on private lands.

4. Although waste discharge requirements are generally an infeasible means of controlling the impacts of private ORV use, the Regional Board can issue requirements or cleanup orders to landowners whose property is contributing to water quality problems as a result of ORV damage. Waste discharge requirements can also be issued to commercial ORV facilities to ensure proper operation (e.g., to ensure that snowmobiles are operated over snow deep enough to prevent soil damage).

Ski Areas

Alpine skiing facilities are found on public and private lands in the San Bernardino and San Gabriel Mountains and in the Sierra Nevada, including the Mammoth Lakes, June Lakes, Lake Tahoe, and Truckee areas. Some of these ski areas have stimulated neighboring private resort development, which can include facilities such as golf courses and bike trails designed to attract summer visitors. The potential exists for the expansion of existing ski areas and the creation of new ones.

Downhill skiing facilities tend to be located at high elevations on steep terrain with poorly developed soils, in areas receiving high amounts of precipitation. Water quality problems associated with ski areas include: erosion and sedimentation from construction and maintenance activities, disturbance of wetlands, stormwater runoff from parking lots and other impervious surfaces, and disposal of domestic wastewater in areas which are remote from urban wastewater treatment plants and which are usually unsuitable for septic systems. Snow-making and snow-grooming are also of concern. Installation of pipelines and excavation of storage ponds for snow-making can lead to severe erosion. Some ski areas use bacteria as nucleating agents for snow crystals; the bacteria can contribute nitrogen to surface runoff. Salts such as ammonium nitrate and sodium chloride may be used to groom ski slopes. Upon snowmelt, these salts may adversely affect instream uses and/or riparian vegetation.

Older ski areas were constructed with little consideration of water quality impacts. Preparation for the 1960 Winter Olympics at Squaw Valley involved channelization of a creek, filling of a wet meadow to support parking, and construction of a wastewater treatment plant which raised nitrate levels in a sole-source municipal aquifer. Later ski area developments have been more carefully planned. However, even the use of Best Management Practices (BMPs) for erosion and stormwater control cannot completely eliminate water quality impacts. The fragile soils, harsh climates, and short growing seasons at ski areas make the revegetation of cleared roads, trails, and ski slopes very difficult. Disturbed areas at most older ski resorts are still not adequately stabilized. A State Water Resources Control Board study of one ski area which used "state-of-the-art" BMPs showed an erosion rate six times higher than natural levels (White and Franks 1978).

The U.S. Forest Service uses conceptual models to evaluate the risk of Cumulative Watershed Effects (CWE) and adverse impacts on beneficial uses of water from land management activities. The methodology is primarily used to evaluate the effects of proposed timber harvest activities; however, it has recently been adapted to predict the impacts of new land disturbance during construction of skiing facilities. Chapter 20 of the U.S. Forest Service's Soil and Water Conservation Handbook (R-5 FSH 2509.22) provides a general overview of CWE methodology and analysis recommendations. The U.S. Forest Service's 1993 report entitled *Cumulative Watershed Effects Analysis for Heavenly Valley Ski Area* discusses the potential use of CWE procedures for ski areas in the Lake Tahoe Basin.

Analyses are performed by an interdisciplinary team, and include some degree of professional judgement. CWE analysis involves quantifying existing and proposed watershed disturbance as “Equivalent Roaded Acres” (ERA). (An acre of road is assigned an ERA of 1.0. An acre of well-vegetated ski run on a gentle slope might be assigned an ERA coefficient of 0.2; an acre of badly eroding ski run on a steep slope might be given a value of 2.0 ERA.) Disturbed areas can be analyzed after the performance of remedial erosion or drainage control work, and the ERA value can be revised downwards. CWE analysis also involves determination of a “Threshold of Concern” (TOC) for each watershed affected. The TOC is an upper limit of tolerance to disturbance (in ERA). The risk of initiating adverse cumulative water quality effects greatly increases as this upper limit is approached or exceeded. Determination of the TOC is an interactive and multi-step process which involves comparison of several watersheds with respect to the extent of land use disturbance and the occurrence or nonoccurrence of adverse cumulative impacts.

Where CWE analysis indicates that the TOC of a subwatershed in a ski area is currently exceeded or is expected to be exceeded as a result of proposed development, conditions may be placed in the ski area permits on additional new projects. These conditions can be used as a means of phasing new projects in relation to the accomplishment of remedial erosion control programs. This approach is being used by the U.S. Forest Service, Lake Tahoe Basin Management Unit and the Tahoe Regional Planning Agency for proposed ski area expansions in the Lake Tahoe Basin, and may be applied to Forest Service ski area permits elsewhere.

Control Measures for Skiing Facilities

1. The Regional Board has adopted waste discharge requirements (WDRs) and/or NPDES permits for all large ski areas in the Region, to address the problem areas identified above in relation to locally applicable water quality objectives, discharge prohibitions, and effluent limitations. These WDRs are updated periodically to address proposed ski area expansions and/or changes in operation and maintenance activities which could affect water quality. Permit conditions include the use of temporary and permanent BMPs, the prevention and cleanup of fuel and sewage spills, and in some cases, remedial measures to correct water quality problems created by past development. Permit conditions also regulate the use of snow-making chemicals and bacteria in addition to snow-grooming chemicals.

2. The Regional Board shall review proposed new skiing facilities and issue WDRs and/or NPDES permits as appropriate.

3. Skiing facilities in the Lake Tahoe Basin shall continue to be regulated under the provisions of Chapter 5, Section 5.15 of this Basin Plan, in addition to the general control measures outlined in Chapter 4.

Recommended Control Measures for Skiing Facilities

1. The U.S. Forest Service and local governments with permitting authority over ski areas should consider placing conditions in their permits to require:

    - the effective implementation of all applicable temporary and permanent BMPs
    - measures to prevent, report, and clean up fuel and sewage spills
    - measures to limit the use of snow-making and snow-grooming chemicals where appropriate, in order to protect water quality
    - sufficient monitoring to assess water quality impacts and the effectiveness of mitigation measures

2. Land management agencies and local governments which have lead agency

responsibility for permitting new or expanded ski areas outside of the Lake Tahoe Basin should encourage the preparation of comprehensive master plans and master environmental documents which recognize and mitigate the potential direct, indirect, and cumulative water quality impacts of each new project.

3. New and expanded ski areas should be designed to minimize soil and vegetation disturbance, particularly the disturbance of wetlands. Modern techniques permit ski lift installation without road construction. Logging for clearance of ski slopes and trails can also be done by helicopter, cable, over-the-snow vehicles or other means that minimize soil disturbance. Stream crossings should be kept to a minimum. Because of the difficulty of revegetation, native herbaceous and shrubby plants should be left in place on ski slopes and trails to the greatest extent possible.

4. Local governments, land management agencies, and the Regional Board should use the Cumulative Watershed Effects (CWE) model as a means to evaluate the water quality impacts of, and the adequacy of mitigation for, development of new skiing facilities outside of the Lake Tahoe Basin. Where appropriate, CWE analyses should be prepared for existing ski areas to determine necessary remedial improvements. Where CWE analysis indicates that current or projected disturbance is in excess of the Threshold Of Concern (TOC) for subwatersheds within the ski area, further development should be permitted only in conjunction with remedial erosion control programs and monitoring plans which ensure that the ERAs within those subwatersheds are substantially reduced and driven toward or below the TOC.

Golf Courses and Other Turf Areas

For visual amenity and to provide water hazards, golf courses are often located near surface waters. Construction of golf courses may include hydrologic modification, such as diversion or damming of streams or alteration of wetlands. Golf courses involve intensive management of turf, including the use of pesticides and fertilizer which may run off into surface waters or percolate into ground water. Mowing of turf creates large volumes of clippings containing nutrients and pesticides which must be considered in decisions on disposal or composting. Golf course turf demands large amounts of water for irrigation. In some portions of the Region, reclaimed water is used to irrigate golf courses; however, as noted elsewhere in this Chapter, the use of reclaimed water is not without a risk of water quality problems.

Other large turf areas, such as athletic fields and urban parks, can pose water quality problems similar to those created by golf courses, and should be addressed through similar control measures.

Control Measures for Golf Courses and other Turf Areas

(Control measures concerning the use of pesticides and fertilizers are discussed separately in the “Agriculture” section of this Chapter.)

1. The Regional Board has adopted waste discharge requirements (WDRs) for golf courses in the sensitive Lake Tahoe and Truckee River watersheds, and should consider issuing similar WDRs for any golf courses which have the potential to cause significant impacts on surface or ground waters. WDRs should include effective implementation of Best Management Practices, record-keeping of fertilizer and pesticide use, and monitoring of surface and/or ground water quality. Construction stormwater NPDES permits may be required for new or expanded golf courses.

2. New and remodeled golf courses should be designed to minimize the need for hydrologic modification and disturbance of wetlands and riparian vegetation.

3. New and remodeled golf courses should also be designed to require minimal fertilizer and pesticide application (e.g., through the use of target greens which require intensive maintenance on only a small portion of the course).

4. Water use for irrigation of golf courses should be minimized to the greatest extent possible. In addition to making limited water supplies available for other uses, such conservation will reduce the loading of nutrients and pesticides to surface and ground waters. New technology in irrigation systems can greatly reduce water use. Any proposed use of reclaimed water for golf course irrigation should be evaluated carefully in relation to site-specific water quality constraints.

5. In addition to irrigated turf, golf courses include buildings such as clubhouses and maintenance facilities, and parking lots, all of which may contribute to erosion or stormwater problems. Pretreatment of any pesticides and/or petroleum products in this stormwater may be necessary

before such discharges could be permitted. Stormwater containment and treatment should be an integral part of golf course design in portions of the Region where surface waters may be affected. Although water hazard ponds may be used as stormwater retention or detention basins, eutrophication is likely to be a problem and these basins may need frequent maintenance. In desert areas of the Region, stormwater control for golf courses may be a less important consideration; however, toxic substances should be protected against the hazard of washout from flash floods.

6. Local governments should evaluate proposals for new or expanded/remodeled golf courses, or for zoning to facilitate such projects, against the water quality concerns outlined above, and should incorporate appropriate water quality mitigation measures into their conditional permits.

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4.12 MILITARY INSTALLATIONS

Military installations have created some of the nation's largest and most complex environmental contamination problems. Executive Order No. 12580, adopted in 1987, directs all federal facilities to investigate and remediate areas of environmental contamination. As a result, the U.S. Department of Defense (DOD) has assumed responsibility for investigation and remediation at military installations.

The Regional Board is actively involved in investigation and remedial activities at military installations, including seven active military sites, one recently closed site, and six formerly used defense sites. All but two of these installations are in the South Basin and include three of the world's largest bases. Following are lists of active military bases in the Lahontan Region with one noted as being recently closed. (These lists are current as of 1994).

- South Lahontan Basin:
- Fort Irwin National Training Center
- George Air Force Base (closed)
- Edwards Air Force Base
- Air Force Plant #42, Palmdale
- Marine Corp Logistics Base, Barstow
- China Lake Naval Air Weapons Station
- North Lahontan Basin:
- Sierra Army Depot
- Marine Corps Mountain Warfare Training Center

The operations of the above military installations for the past 60 years have yielded hazardous substance releases that have degraded water quality within, and in some cases, outside of base properties. The manner in which these hazardous substances were handled was, in fact, common practice at all federal facilities across the nation during this time. As a result of past waste disposal practices, spills, and inadequate regulations, the military installations have created significant water quality problems.

Adverse impacts to water quality can result from discharge of petroleum hydrocarbons, heavy metals, solvents, acids and alkalis, landfill leachate, explosive organic compounds, and low-level radionuclides. These pollutants originate from the following sources:

- gas stations
- fuel pipelines
- stormwater retention basins
- contaminated wells
- fire training facilities
- evaporation ponds
- target ranges
- waste piles
- washwater/solvent catchment basins
- storage tanks (above and underground)
- waste disposal sites (solid, hazardous, pesticides, munitions, low-grade radioactive)

These releases have created substantial soil, surface water, and ground water contamination affecting or threatening to affect wildlife and aquatic habitats and causing domestic wells to be abandoned.

Control Measures for Military Installations

The Regional Board has the regulatory responsibility under the federal Clean Water Act and the California Water Code to protect water quality on federal property in the State, including military installations. Past control measures on bases included adoption of waste discharge requirements (WDRs) for discharges related to storm runoff, construction activities, and municipal wastewater treatment facilities. The WDRs included surface and ground water discharge limitations for water quality parameters such as nutrients, turbidity, pH, taste, odor, temperature and algal growth, as well as BMPs to prevent discharge of waste earthen materials. Other control measures by the Regional Board have been to review and regulate military base compliance in detecting and removing leaking underground storage tanks, uncovering and eliminating toxic pits, and issuance of Cleanup and

Abatement Orders or other actions to remediate polluted ground water.

The State of California entered into a Memorandum of Agreement (DSMOA) with the DOD that identified 92 federal facilities within California for site remediation. The purpose of site remediation is to characterize and remove hazardous pollutants that pose a potential or actual threat to human health and/or the environment. Upon completion of site remediation, the facilities may be available for unrestrictive use. The DSMOA acknowledges the State's role for providing oversight of the site remediation and provides for the State to receive payment for its oversight costs.

At military installations where water quality is threatened due to the release of hazardous substances, both the Regional Board and the Department of Toxic Substances Control (DTSC) have overlapping jurisdiction to order cleanup of sites. A Memorandum of Understanding (MOU) was executed in 1990 between the DTSC, the State Water Resources Control Board, and the Regional Boards, which specified each agency's responsibilities in hazardous waste site cleanup. Under that MOU, the Regional Board retained lead responsibility for certain cleanup operations at military installations. Subsequently, in 1994, the Secretary of Cal/EPA designated DTSC as the lead agency for all DSMOA military installations in California. DTSC is now responsible for coordinating cleanup activities and for ensuring that the Regional Boards' concerns regarding water quality issues are addressed. The Regional Board remains the state lead agency for regulation of active sites permitted by WDRs (such as landfills and sewage treatment plants), cleanup of leaking underground storage tank sites, and other programs mandated by the federal Clean Water Act.

The Regional Board acts as state lead agency at George Air Force Base.

Recognizing that a large number of federal facilities have been contaminated by hazardous substances which may pose a risk to human health and the environment, Congress has passed many acts to provide funding, regulations, and guidelines for site cleanup.

Installation Restoration Program

The Department of Defense (DOD) developed the Installation Restoration Program (IRP) to comply with the federal Resource Conservation and Recovery Act (RCRA) of 1976. (RCRA required federal agencies to comply with local and state environmental regulations concerning waste disposal practices at federal facilities.) The objective of the IRP is to assess hazardous waste disposal and spill sites at military installations and to develop remedial actions consistent with the National Contingency Plan (NCP) for those sites which pose a threat to human health and the environment. The IRP is the DOD's primary mechanism for response actions at all military installations.

Federal "Superfund" Program (CERCLA)

The federal "Superfund" program was established in 1980 with the passage of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The CERCLA provided funding and guidelines for the cleanup of the most threatening hazardous waste sites in the nation. High priority sites scheduled for cleanup under this program are placed on the National Priority List (NPL). In California, a large number of federal facilities have been placed on the NPL; a significant proportion of these are military installations.

As of 1994, three federal facilities within the Lahontan Region are on the NPL, all being military bases in the South Basin. They are: the Marine Corps Logistics Base near Barstow, Edwards Air Force Base, and George Air Force Base.

Over the years, provisions of the IRP have been developed and modified to insure DOD compliance with other federal enactments such as the CERCLA, and the Superfund Amendment and Reauthorization Act (SARA), an amendment to the CERCLA. SARA requires that all federal facilities on the NPL enter into a Federal Facilities Agreement (FFA) with the USEPA. States can also be a party to the FFA but this is not a requirement. The FFA is a site-specific document which defines the USEPA's and the State's expectations as to site investigation and problem remediation. It specifies tasks and compliance schedules, describes a dispute resolution process, and stipulates penalties for compliance schedule violations. In the Lahontan Region, all three military bases on the NPL have signed a FFA of which the Regional Board is a signatory party.

Response Process. All military bases in the State with historical discharges that threaten or have potential to threaten human health and the environment are being cleaned up in compliance with the CERCLA guidelines. The guidelines include a response process consisting of removal, remedial, and enforcement programs. The rigorous response process includes the following actions:

- *Preliminary Assessment,* to determine release sites and the extent of contamination or threat of contamination to the environment.

- *Remedial Investigation/Feasibility Study (RI/FS),* evaluates all information obtained during the Remedial Investigation (an investigation to fully characterize the contaminant sources requiring remediation), identifies ARARs (Applicable or Relevant and Appropriate Requirements, which are numerical constituent limits for cleanup and/or discharge, and other action-, location-, or chemical-specific requirements), compares treatment technologies and recommends a Preferred Alternative for the cleanup operation.

- *Record of Decision,* a document disclosing the cleanup action to be pursued, including ARARs which list the numerical final constituent limits for cleanup or discharge.

- *Remedial Design/Remedial Action,* is the design of the cleanup technology used at the site and the remedial activities to take place.

- *Operation and Maintenance,* is the operation and maintenance of the cleanup activities at the site during the time of remediation.

SARA requires federal facilities with FFAs to comply with applicable state standards in performing remedial actions. Thus, applicable state agencies can be involved in the CERCLA response process regarding ranking, long-term planning, RI/FSs, remedial action selection, and other negotiations.

The Regional Board takes an active role in the response process for the military installations with FFAs to assure that ground water investigations and cleanup activities are completed in accordance with Regional Board policies for the protection of water quality. This is achieved by establishing ARARs, providing input for remedial design and remedial actions, overseeing operation and maintenance of cleanup activities, and conducting inspection of bases to insure compliance with FFAs. Sometimes, however, disagreements will occur between signatory parties of FFAs regarding how and when to achieve compliance. In these cases, the parties enter the dispute resolution process under the FFA to alleviate disagreements and achieve resolution.

Non-NPL Federal Facilities

Another provision of SARA requires federal facilities not listed on the NPL to comply with all state laws for the cleanup of hazardous substances released into the environment. Section 120(a)(4) allows states to pursue all enforcement remedies, including assessment of civil liability against federal facilities not implementing acceptable remedial actions for contaminated sites. Federal facilities, including military bases, not on the NPL can sign into a state compliance agreement called a Federal Facilities Site Remediation Agreement (FFSRA). This is a document that formalizes a working agreement between the federal facility and state agencies. It establishes a schedule for site investigations and any necessary cleanup, and it provides the enforcement mechanism for commitments not met. As of 1994, one non-NPL military base in the Lahontan Region (Sierra Army Depot) has signed a FFSRA.

As of 1994, the other military bases in the Region (the Marine Corps Mountain Warfare Training Center, Fort Irwin, Air Force Plant #42, and the China Lake Naval Weapons Center) are not on the NPL and do not have FFSRAs. These facilities, however, have sites contaminated with petroleum products, heavy metals, and other pollutants that have led to degradation of water quality. Site agreement (FFSRA) negotiations are in progress for some bases.

Formerly Used Defense Sites (FUDS)

There are six major FUDS in the Lahontan Region, all being in the South Basin. Most of the operations on these now-closed bases were similar to operations on other bases where investigations revealed serious water quality problems. As of 1994, these six FUDS have not been formally investigated by the Department of Defense to determine if contamination problems exist, and if water quality is being impacted or threatened. The U.S. Army Corps of Engineers is responsible for environmental investigations and cleanup of FUDS.

Recommended Future Actions for Military Installations

The Regional Board should continue to work with DTSC and other state agencies to obtain FFSRAs for the military bases in the Region without this document. Having a FFSRA can assist facilities in acquiring funding for remedial activities and insure that progress is made towards achieving compliance with State water quality standards. The agreements can also ensure that cleanup activities at the bases are performed in a timely manner, or that enforcement action will be taken and civil penalties pursued by the Attorney General's office. The Regional Board should continue to monitor compliance at all other bases to insure that remediation work is being performed to comply with FFSRAs and FFAs.

The Regional Board should work to see that all FUDS are investigated to determine if they pose a threat to water quality. If water quality is being impacted or threatened at these sites, the Regional Board must ensure that appropriate remediation actions are being pursued by the DOD.

4.13 TOTAL MAXIMUM DAILY LOADS

Section 303(d)(1) (A) of the Clean Water Act requires that "Each State shall identify those waters within its boundaries for which the effluent limitations... are not stringent enough to implement any water quality standard applicable to such waters." The Clean Water Act also requires states to establish a priority ranking for waters on the Section 303(d) list of impaired waters and to establish Total Maximum Daily Loads (TMDLs) for such waters. TMDLs are essentially strategies to ensure the attainment of water quality standards in impaired waters.

The requirements of a TMDL are described in 40 CFR 130.2 and 130.7 and Section 303(d) of the Clean Water Act. A TMDL is defined as "the sum of the individual wasteload allocations for point sources and load allocations for nonpoint sources and natural background" (40 CFR 130.2) such that the capacity of the water body to assimilate pollutant loadings (the "loading capacity") is not exceeded. TMDLs are also required to address seasonal variations and to include a margin of safety to address uncertainty in the analysis. In addition, federal regulations (40 CFR 130.6) require states to develop water quality management plans to implement water quality control measures including TMDLs.

The U.S. Environmental Protection Agency (USEPA) is required to review and either approve or disapprove the TMDLs submitted by states. If the USEPA disapproves a TMDL submitted by a state, the EPA is required to establish a TMDL for that water body. Upon establishment of the TMDL by the USEPA, the state is required to incorporate the TMDL, along with appropriate implementation measures, into the state water quality management plan.

This section of the Lahontan Basin Plan contains Total Maximum Daily Loads (TMDLs) for specific water bodies and pollutants. Future TMDLs will be added as they are approved. Background information used to develop each of the specific TMDLs will be retained with the administrative record of the Basin Plan amendments, and will be available to the public on request.

Heavenly Valley Creek, El Dorado County

Introduction. Heavenly Valley Creek is a tributary of Trout Creek in the southern portion of the Lake Tahoe watershed. The segment of Heavenly Valley Creek within the permit boundaries of the Heavenly Ski Resort is impaired by sedimentation related to historic ski resort development (including roads and ski runs). Sedimentation of Heavenly Valley Creek is of concern not only because of its impacts on instream uses but also because of its cumulative contribution to the degradation of Lake Tahoe. All of the subwatershed affected by the Total Maximum Daily Load (TMDL) for sediment is National Forest land administered by the U.S.D.A. Forest Service, Lake Tahoe Basin Management Unit (LTBMU) and within the permit boundaries of the Heavenly ski resort.

The purpose of this TMDL is to ensure attainment of all sediment-related water quality standards, especially narrative objectives related to protection of instream beneficial uses. (When this TMDL was developed, Heavenly Valley Creek was close to attainment of the numerical suspended sediment objective applicable to tributaries of Lake Tahoe.) The LTBMU has modeled sediment delivery to Heavenly Valley Creek, and reductions in sediment loading expected as a result of ongoing erosion control work. This TMDL is based on LTBMU modeling and monitoring data, interpreted by Regional Board staff to translate hillslope sediment delivery to instream loads. The TMDL implementation program is based substantially on continuation of existing erosion control and monitoring programs which are being carried out under an adaptive management approach by the LTBMU and the ski resort. Progress toward attainment of water quality standards in Heavenly Valley Creek will be evaluated in relation to monitoring data for Hidden Valley Creek, another tributary of Trout Creek with an undisturbed watershed within National Forest lands. A Regional Board staff report (California Regional Water Quality Control Board, Lahontan Region, 2000) provides the technical information supporting the regulatory elements of this TMDL. The staff report should be considered as the reference for all of the information in Tables 4.13-HVC-1 through 4.13-HVC-6 below.

Problem Statement. The water quality standards of concern in relation to this TMDL are beneficial uses related to aquatic life (COLD, RARE, MIGR, and SPWN; see Chapter 2 of this Basin Plan), and narrative water quality objectives for sediment, settleable materials, suspended sediment, and nondegradation (see Basin Plan Chapter 5). Ski resort development began in the Heavenly Valley Creek watershed in 1956, and there is evidence of significant sediment-related impacts on water quality and beneficial uses in the early 1970s, before adoption of the North Lahontan Basin Plan. The creek has been significantly affected by hydromodification (including a snowmaking reservoir and diversion of part of the creek into a culvert). Monitoring data show that the creek has elevated suspended sediment concentrations and loads compared to the reference stream (Hidden Valley Creek). Problems have been identified with stream channel stability (although improving trends in channel conditions have been documented since the beginning of the erosion control program). The creek has been rated as "marginal" fish habitat since 1982.

Desired Conditions. A variety of parameters, reflecting desired instream and hillslope conditions, have been selected for tracking to evaluate the effectiveness of the TMDL. They are shown in Tables 4.13-HVC-1 and 4.13-HVC-2. Most of these parameters are already being monitored or tracked by the LTBMU. As used in the desired instream conditions, the loading capacity, and load allocations, the term "5 year rolling average" means the arithmetic mean of 5 contiguous annual load estimates (T/yr). For example, in the fifth year, the mean of annual averages for years 1-5 will be calculated. In the sixth year, a new mean, based on data for years 2-6 will be calculated, and so on. The terms "parameter" and "desired condition(s)," as used in this TMDL, are equivalent to the terms "indicator" and "target(s)" as used in USEPA guidance for the development of TMDLs (e.g., USEPA, 1999) and are not meant to have any additional regulatory meaning. The terms "indicator" and "target" will be used in future TMDLs.

Source Analysis. Modeled sediment delivery from various hillslope source categories to Heavenly Valley Creek is shown in Table 4.13-HVC-3. Monitoring data for 1996-99 were used to estimate the instream suspended sediment load, which was converted to a total (suspended plus bedload) sediment load using the assumptions that instream bedload sediment constitutes 20 percent of the total. Since there has been a concerted effort to implement Best Management Practices (BMPs) in the watershed since 1991, instream sediment loads in 1996-99 presumably reflect improved water quality compared to unmitigated conditions. Using information provided by LTBMU staff regarding BMP implementation to date, back-calculations were done to estimate the total unmitigated sediment load (150 tons) shown in Table 4.13-HVC-4. That unmitigated load was divided among hillslope sources using the same relative percentages shown in Table 4.13-HVC-3. Natural sediment loading in Hidden Valley Creek is included in Table 4.13-HVC-4 for reference.

The discrepancy between the estimated hillslope sediment delivery and the instream total sediment load can be attributed partly to the limitations of the sediment delivery model. Sediment delivery is a long term process; other factors contributing to the discrepancy may include temporary storage of eroded sediment on hillslope sites and in ephemeral channels before it reaches Heavenly Valley Creek.

Loading Capacity/Total Maximum Daily Load and Linkage Analysis. The loading capacity for total annual instream sediment loading to Heavenly Valley Creek, measured at the "Property Line" station near the resort permit boundaries, is 58 tons of sediment per year, expressed as a 5 year rolling average. The loading capacity was calculated by assuming an overall 65% efficiency for BMPs and therefore a 65% reduction in the unmitigated instream sediment load. After consideration of differences in watershed size, this figure is reasonably close to the estimated 45 tons/year total sediment load in the reference stream. Because the wasteload allocation is zero and the TMDL margin of safety is implicit, the loading capacity is also the Total Maximum Daily Load.

It is difficult to predict precise relationships between hillslope sediment delivery and instream conditions because these linkages are often indirect (e.g., temporal and spatial lags between erosion and instream impacts) and because of the seasonal and annual variability in ecosystem processes. This TMDL uses an "inferred linkage" based on comparison of conditions in Heavenly Valley and Hidden Valley Creeks, and a literature review, summarized in the staff report, which indicates that the loading capacity will adequately protect aquatic life uses. Compliance with standards will be measured through long term evaluation of all of the parameters in Tables 4.13-HVC-1 and 4.13-HVC-2. If the desired conditions are attained, erosion rates and sediment delivery should decline to levels which will allow instream habitat and beneficial uses to recover, over time, from the impacts of excessive sedimentation in the past.

Wasteload Allocations. There are no point sources of sediment to the Section 303(d) listed segment of Heavenly Valley Creek, and the wasteload allocation for point sources is zero.

Load Allocations. Load allocations are shown in Table 4.13-HVC-5. The contributions to the mitigated instream sediment load from the "undisturbed lands" and "impervious surface" source categories are assumed not to change as a result of TMDL implementation. The allocation for new development is based on LTBMU modeling data and reflects estimated loading after full application of BMPs. The road and ski run source categories have been given a single load allocation as "historically disturbed lands".

Margin of Safety. The TMDL includes an implicit margin of safety to account for uncertainty in the analysis. Sources of uncertainty include: interpretation of compliance with standards, including narrative objectives and beneficial use support; limited data available for some parameters; limitations of the LTBMU sediment delivery model, and inherent seasonal and annual variability in sediment delivery and instream impacts of sediment.

The TMDL provides a margin of safety by: 1) interpreting compliance with standards through use of multiple parameters to evaluate progress toward desired conditions; 2) incorporating conservative assumptions in the source analysis and development of load allocations; and 3) incorporating a rigorous monitoring and review program and schedule which provides an ongoing mechanism to adjust the TMDL if adequate progress toward attainment of standards is not being made.

Seasonal Variations and Critical Conditions. The TMDL evaluates a variety of parameters in order to integrate the net cumulative effects of sedimentation over longer time frames. The loading capacity and the load allocations are expressed as 5 year rolling averages to account for natural seasonal and annual variation in sediment loads, with the recognition that trends may not be apparent within shorter time frames. Other parameters are also expressed as long term trends. The TMDL and load allocations are set at levels which, over time, will allow instream aquatic habitat to recover to a level which adequately supports aquatic life uses.

Implementation Measures and Schedule. Implementation is the responsibility of the U.S. Forest Service, Lake Tahoe Basin Management Unit (the landowner) and the Heavenly Ski Resort (an LTBMU permittee). The program of implementation summarized in Table 4.13-HVC-6 is based primarily on continuation of the existing LTBMU erosion control program which requires application of Best Management Practices to all disturbed areas in the ski resort under an adaptive management approach. The implementation program includes full application of Best Management Practices to all new and existing disturbed areas within the ski resort. Implementation also include the monitoring and review and revision programs discussed below.

The Regional Board will use its existing authority, including the Lake Tahoe Basin control measures outlined in Chapter 5 of this Basin Plan, and the three-tier compliance approach (ranging from voluntary compliance to regulatory action) in the statewide Nonpoint Source Management Plan, to ensure implementation of the TMDL. If needed, the Regional Board will use enforcement orders to ensure implementation. The LTBMU and the Tahoe Regional Planning Agency have authority, and have made commitments, to ensure implementation in the Nevada portion of the Heavenly Valley Creek watershed.

Erosion control work within the Heavenly Valley Creek watershed is expected to be complete by 2006. The consequent reduction in hillslope sediment delivery is expected to allow recovery of instream physical conditions to more natural levels, leading to gradual recovery of aquatic life uses. Attainment of instream standards is projected to occur within 20 years after final approval of the TMDLs (by 2021). The technical staff report includes additional information on authority for and commitments to implementation, and demonstrates that there is reasonable assurance of continued implementation and attainment of standards.

Monitoring. The TMDL monitoring program will focus on the parameters listed in Tables 4.13-HVC-1 and 4.13-HVC-2. Suspended sediment concentration and flow will continue to be monitored to enable calculation of annual sediment loads. With the exception of macroinvertebrate community health, all of these parameters are already being monitored as part of the LTBMU's adaptive management program. Most of these parameters are sampled annually; surveys for others, such as the Pfankuch stream channel condition index, are conducted at longer intervals to detect long term trends. TMDL monitoring will include stations in both the Heavenly Valley Creek and Hidden Valley Creek watersheds. The technical staff report for the Heavenly Valley Creek TMDL includes recommendations for sampling locations and frequencies. However, because of the adaptive management approach to implementation, and the pending completion of the first comprehensive review of five years of monitoring data, this TMDL allows flexibility for modification of the monitoring program over time. No later than 120 days after the final approval of the Heavenly Valley Creek TMDLs, Regional Board staff will reach agreement with LTBMU and Heavenly ski resort staff on initial sampling frequencies and locations for all of the TMDL parameters. This agreement may be formalized either through a Memorandum of Understanding or through modifications to the monitoring program in the waste discharge requirements for the Heavenly ski resort.

Results of the TMDL monitoring will be reported in the annual reports produced by the LTBMU as part of its adaptive management program for the Heavenly ski resort as a whole, and in the projected comprehensive evaluations for this program which are to be produced at five year intervals beginning in 2001.

Schedule for Review and Revision of the TMDL. Regional Board staff will continue to participate in the interagency technical advisory group for the LTBMU's erosion control and monitoring programs. Staff will review the annual and five year monitoring and evaluation reports described above from the perspective of progress toward implementation of controls necessary to meet the load allocations, and toward attainment of water quality standards. If significant progress is not apparent at the conclusion of the second (2005-2006) review, Regional Board staff will evaluate the need for revision of the TMDLs and/or the implementation program.

Table 4.13-HVC-1
Desired Instream Conditions, Heavenly Valley Creek TMDL

Parameter	Desired Condition(s)
Instream Total Sediment Load[1]	Maximum 58 tons/year as a 5 year rolling average, as measured at the Property Line monitoring station.
Geomorphology Measures	
Pfankuch channel stability rating (composite rating includes numeric scores for 15 different indicators)[2]	Increasing trend over time from "fair-poor" to "good" (comparable with overall rating of Hidden Valley Creek)
USFS Region 5 "Stream Condition Inventory" (SCI)[2]	Improving trends in channel morphology over time
Biological Parameters	
Macroinvertebrate community health.	Improving trends in benthic invertebrate community metrics over time, approaching conditions in Hidden Valley Creek

[1] Incorporated by reference in CRWQCB, Lahontan Region ,2000 (technical staff report, Sections 3.2 and 3.5, with May 2002 supplement.

[2] Incorporated by reference in U.S. Forest Service, 1996 (pages 5-2 to 5-9); U.S. Forest Service, 1997, pages 5-1 to 5-9; Hazelhurst and Widegren ,1998, and Hazelhurst *et al.,* 1999 (annual U.S. Forest Service Heavenly Ski Resort environmental monitoring reports).

Table 4.13-HVC-2
Desired Hillslope Conditions, Heavenly Valley Creek TMDL

Parameter	Desired Condition(s)
Watershed disturbance[1]	Schedules in ski resort master plan mitigation program (TRPA 1995, 1996) for implementing and maintaining BMPs for roads and ski runs are met, with progress and BMP effectiveness reported annually and evaluated at 5-year intervals
Effective soil cover (vegetation, woody debris, organic matter, rocks) on ski runs and roads[2]	Cover meets modeled mitigation targets set for specific road/run segments in watershed, and overall cover rating is "good" or better using LTBMU evaluation criteria

[1] Incorporated by reference in Tahoe Regional Planning Agency (TRPA) Draft EIR/EIS/EIS for Heavenly Ski Resort Master Plan (1995), pages 4.1-50 to 4.1-72 (CWE Soil Erosion Reduction Program) and Appendices H and I; TRPA (1996), pages 6.4-1 to 6.5-6 (Revised Mitigation and Monitoring Plan); and U.S. Forest Service (1998), Appendix G (CWE Technical Memorandum No. 1).

[2] Incorporated by reference in TRPA (1995) Appendix I, Road and Run Segment Mitigation Tables; Hazelhurst and Widegren (1998) pages 3.1 to 3.13 (on effective soil cover evaluation); and Hazelhurst *et al*., 1999, pages 3.1 to 3.7 and 6.3 to 6.7 (on effective soil cover evaluation).

Table 4.13-HVC-3
Modeled Sources of Upland Sediment Delivery to Heavenly Valley Creek
(Sediment delivery figures are for the 1341 acre watershed. Data are from TRPA 1995, 1996, with changes by Regional Board staff as explained in the staff report.)

Source Category	Area (acres)	Sediment Delivery (tons/year)	Percent of Total Load
Roads	19	349	62
Ski Runs	182	176	32
Impervious surface	1	0[1]	0[1]
Undeveloped Area	1119	34[2]	6
TOTAL	1341	559	100

[1] Sediment delivery from impervious surface is considered "de minimis".
[2] Number rounded upwards

Table 4.13-HVC-4
Source Analysis for Instream Total Sediment Loading to Heavenly Valley and Hidden Valley Creeks

(Loads are estimated *unmitigated* values, rounded to the nearest ton.)

Source Category	Loading (Tons/Year)	Percent of Total Load
Heavenly Valley Creek		
Roads	93	62
Ski Runs	48	32
Undisturbed Lands	9	6
Impervious Surface	0[1]	0
TOTAL	150	100%
Hidden Valley Creek		
Undisturbed Lands	45	100%
TOTAL	45	100%

[1] Sediment delivery from impervious surface is considered "de minimis".

Table 4.13-HVC-5
Instream Load Allocations for Total Sediment in Heavenly Valley Creek

(measured at the Property Line Station)

Source Category	**Load Allocation** (tons/year as a 5 year rolling average)
Historically Disturbed Lands	48
New Development	0.7
Undisturbed lands	9
Impervious surface[1]	0
TOTAL	57.7[2]

[1] The contribution of impervious surface to sediment loading is considered *de minimis*. See the text.

[2] The discrepancy between the total load allocations and the loading capacity (58 tons/year) is considered to be within the margin of error of the calculations.

Table 4.13-HVC-6
Summary of TMDL Implementation Program

Implementation Measure	Schedule
Abandon and restore 7.59 acres of existing unpaved roads[1]	Complete by 2006
Stabilize 21.10 acres of existing roads which will remain in use[1]	Complete by 2006
Restore 182 acres of existing ski runs[1]	Complete by 2006
Maintain BMPs as necessary[1]	Annually
Review success of specific BMPs at specific sites; identify and implement improvements through adaptive management approach[1]	Annually
Conduct a comprehensive review of progress toward watershed restoration and attainment of water quality standards and identify needs for change through adaptive management program.[1]	At five year intervals beginning in 2000: (first evaluation report completed in 2001)~~.~~

[1] Incorporated by reference in Tahoe Regional Planning Agency (TRPA) Draft EIR/EIS/EIS for Heavenly Ski Resort Master Plan (1995), pages 4.1-50 to 4.1-72 (CWE Soil Erosion Reduction Program) and Appendices H and I; TRPA (1996), pages 6.4-1 to 6.5-6 (Revised Mitigation and Monitoring Plan); Hazelhurst and Widegren (1998); Hazelhurst *et al.* (1999); and U.S. Forest Service (1998), Appendix G (CWE Technical Memorandum No. 1).

Indian Creek Reservoir, Alpine County

Introduction. Indian Creek Reservoir was constructed in 1969-70 on an ephemeral tributary of Indian Creek, a tributary of the East Fork Carson River. The location of the reservoir within the Carson River watershed is shown in Figure 3-7 of this Basin Plan. The reservoir was designed to store tertiary wastewater effluent exported from the Lake Tahoe watershed for later use in pasture irrigation and to support a trout fishery. The U.S. Bureau of Land Management (USBLM) operates a campground and day use facilities at the reservoir. The reservoir became eutrophic during the 1970s and was placed on the Section 303(d) list for eutrophication in the 1980s. It no longer receives wastewater, and its level is maintained with water diverted from the West Fork Carson River and Indian Creek.

The subwatershed affected by this TMDL is shown in Figure 4.13-ICR-1. It includes the lands that contribute surface runoff directly to the reservoir and the lands tributary to upper Indian Creek and to Snowshoe Thompson Ditch #1 downstream of the diversion point from the West Fork Carson River. Water entering the ditch at the diversion point is considered "background" quality for purposes of the TMDL. The TMDL implementation program does not include controls for nonpoint sources in the West Fork Carson River watershed above the diversion point. Nonpoint source problems in that watershed will be addressed through other Regional Board programs (e.g., the nonpoint source, stormwater, and Watershed Management Initiative programs).

The purpose of this TMDL is to ensure the attainment of all water quality standards for Indian Creek Reservoir that are affected by eutrophication, including beneficial uses for aquatic life and recreation. Attainment will be interpreted in terms of a change from eutrophic to mesotrophic conditions and maintenance of mesotrophic conditions over time. A Regional Board staff report (California Regional Water Quality Control Board, Lahontan Region, 2001), and a 2002 supplement to that report, provide the technical information supporting the regulatory elements of this TMDL.

Problem Statement. The South Tahoe Public Utility District (STPUD) discontinued wastewater disposal to Indian Creek Reservoir in 1989 and acquired water rights to maintain a minimum reservoir level to support recreational uses. Monitoring showed decreases in the concentrations of most wastewater-related constituents after wastewater disposal ceased. Concentrations of total phosphorus decreased but remained at levels which the scientific literature indicates will maintain eutrophic conditions, apparently due to internal loading from the sediment. The reservoir has continued to show symptoms of eutrophication including blooms of blue-green algae, low transparency, and depletion of dissolved oxygen in the hypolimnion.

Numeric Targets and Indicators. Total phosphorus was selected as the quantitative focus of the TMDL because frequent violations of the water quality objective for this constituent have occurred even after the cessation of wastewater disposal and because of the important role of phosphorus as a factor in the eutrophication of many north temperate lakes. Other parameters are also potentially important in control of eutrophication, and a variety of other indicators and targets have been selected for monitoring and periodic evaluation.

The primary numeric target for the Indian Creek Reservoir TMDL is an annual mean concentration in the water column of 0.02 mg/L total phosphorus. A scientific literature review, summarized in the staff report, indicates that this target represents the threshold between mesotrophic and eutrophic conditions. Mesotrophic conditions should adequately protect aquatic life and recreational uses of the reservoir. Based on the literature review and modeling of tributary water quality, the target can feasibly be attained if phosphorus loading from the sediment is significantly reduced. Phosphorus loading can be reduced by methods such as increased flushing, removal of phosphorus-rich sediment, or chemical treatment to prevent phosphorus release to the water column.

The current water quality objective for total phosphorus (0.04 mg/L expressed as a mean of monthly means) was based the water quality achievable when the reservoir was receiving tertiary wastewater effluent, rather than on criteria for protection of beneficial uses. An interim total phosphorus target based on this objective is proposed, and is projected for attainment by 2013. The Regional Board recognizes that potential reservoir management measures (oxygenation of the hypolimnion or significantly increased dilution and flushing) may lead to attainment and maintenance of mesotrophic conditions at an ambient total phosphorus concentration higher than the long term target. If monitoring demonstrates that beneficial uses are supported at a higher phosphorus concentration, the Board may consider revising that target. Targets and indicators for the TMDL are summarized in Table 4.13-ICR-1.

Source Analysis. Indian Creek Reservoir does not receive phosphorus loading from any natural tributary streams. (The ephemeral stream reach dammed during construction of the reservoir was completely inundated.) Phosphorus enters the reservoir in water diverted from the West Fork Carson River and Indian Creek, in precipitation and direct surface runoff, and by internal loading from the sediment. Internal loading is the most important source of phosphorus. The estimated "existing" loads are based on modeling of tributary inputs using water quality and flow data for 1999. Literature sources were used to estimate precipitation and runoff inputs and internal phosphorus loading rates. Numbers are rounded to the nearest pound. The “tributary inflow” source represents combined diversions from the West Fork Carson River and Indian Creek. All sources are considered to be nonpoint. Estimated loads from all sources are summarized in Table 4.13-ICR-2.

Loading Capacity. Assuming a uniform phosphorus concentration throughout the water column and a reservoir volume of 1515 acre feet (at the minimum staff gage level maintained under an agreement between STPUD and Alpine County), the maximum amount of phosphorus that can be present in the water column if a concentration of 0.02 mg/L total phosphorus is to be maintained is 82 lb/yr.

Load Allocations. There are no point sources of phosphorus loading to Indian Creek Reservoir; thus, the wasteload allocation is zero. Load allocations for external and internal nonpoint sources of phosphorus are summarized in Table 4.13-ICR-3. The load allocations for external sources assume no reduction in phosphorus loading from precipitation, a 75% reduction in loading from surface runoff and tributary inflow, and an 87 % reduction in internal loading. No load allocations are being established for indicators other than total phosphorus.

Loading capacity linkage analysis. The loading capacity and the associated numeric target for phosphorus are based on a strong quantitative framework, developed through a large set of empirical scientific data, which allows for the prediction of algal biomass and other associated water quality parameters from nutrient loading and water column nutrient concentrations (USEPA, 1999). The proposed phosphorus concentration target corresponds to a literature threshold between mesotrophic and eutrophic conditions.

The literature review summarized in the staff report indicates that the proposed numeric target and the associated loading capacity, if attained, will be adequate to protect designated aquatic life and recreational uses of Indian Creek Reservoir, the beneficial uses most likely to be impaired by eutrophication, and to ensure compliance with applicable narrative water quality objectives.

Margin of safety. The Indian Creek Reservoir TMDL provides an implicit margin of safety by:

1. Interpreting compliance with standards (including beneficial use support and progress from eutrophic to mesotrophic conditions) through multiple targets and indicators.

2. Incorporating conservative assumptions in the source analysis and development of load allocations. Assumptions that provide a margin of safety include:

    - Development of the TMDL for total phosphorus rather than for orthophosphate or "soluble reactive phosphorus," which are the forms of phosphorus most readily available to plants. The analysis assumes that all P in the system, including sediment P, will eventually be recycled and made biologically available.

    - The "worst case" assumption that all phosphorus released from the sediment during summer stratification is made available for algal growth in the hypolimnion during the summer.

Seasonal and interannual factors and critical conditions. The TMDL for Indian Creek Reservoir accounts for seasonal and annual variations in external and internal phosphorus loading and associated impacts on beneficial uses in several ways:

- The load allocations for surface runoff and tributary inflow are set as a 10 year rolling averages to account for seasonal and annual variations in runoff, tributary flows, and phosphorus concentrations.

- The most critical conditions for attainment of aquatic life and recreational uses in Indian Creek Reservoir occur during summer stratification, when the greatest release of phosphorus from the sediment occurs and warm temperatures promote algal blooms and depletion of oxygen in the hypolimnion.

Attainment of the loading capacity will require significant reduction of internal phosphorus loading through methods such as removal of phosphorus rich sediment or chemical treatment to lower phosphorus release from the sediment, or else a significant increase in the level of dilution and flushing with fresh water. Summer stratification of the reservoir may continue to occur, but reduced phosphorus loading will reduce the risk of oxygen depletion in the hypolimnion.

Implementation Plan. Implementation of the TMDL is the responsibility of the STPUD (for control of internal phosphorus loading) and of the U.S. Bureau of Land Management, Alpine County, STPUD, and other land owners and land managers in the watershed (for control of external sources). The implementation program does not specify the means of compliance with the TMDL, but rather establishes a process for identification and implementation of controls for external and internal sources of phosphorus loading to Indian Creek Reservoir. (The Regional Board is prohibited by Section 13360 of the California Water Code from specifying the manner of compliance with its orders.) The implementation program will involve an adaptive management approach.

Implementation will be done in coordination with the Regional Board's ongoing watershed management planning and nonpoint source control efforts. The California State Water Resources Control Board’s 2000 *Plan for California's Nonpoint Source Pollution Control Program* (California Nonpoint Source Plan) and the 1995 *California Rangeland Water Quality Management Plan* will be used as appropriate in the implementation process.

The implementation process will include the following:

1. **For control of all sources:**

   Within 4 months after final approval of the TMDL, Regional Board staff will convene a stakeholder group for ongoing communication about TMDL issues. The group should include, but will not be limited to, representatives of STPUD, the USBLM, the U.S. Forest Service and Alpine County, and other public and private landowners in the subwatershed affected by the TMDL (Figure 4.13-ICR-1). Participation should also be invited from the U.S. Natural Resource Conservation Service, the Alpine Resource Conservation District, the Alpine County Watershed Group, and downstream stakeholders in California and Nevada, including the Nevada Division of Environmental Protection, the Upper Carson River Coordinated Resource Management Plan group and the Carson Water Subconservancy District.

2. **For control of internal loading:**

   - Immediately after final approval of the TMDL, Regional Board staff will request a report from the STPUD on the method(s) it intends to use to reduce internal loading of phosphorus to Indian Creek Reservoir from the sediment and to optimize reservoir management for protection and enhancement of aquatic life and recreational uses.

   - By 15 months after final approval of the TMDL, STPUD will investigate the feasibility of controls for internal phosphorus loading to Indian Creek Reservoir and the feasibility of other management measures to protect and enhance beneficial uses and will submit a plan for approval by the Regional Board. Depending upon the nature of the proposed action, the Regional Board may provide direction to staff for implementation, issue waste discharge requirements and/or a formal monitoring program for activities to control internal phosphorus loading, or take other appropriate action.

   - By 2013, STPUD will fully implement controls for internal phosphorus loading.

3. **For control of external loading:**

   - By 1 year after final approval of the TMDL, Regional Board staff and stakeholders will identify specific sites within the watershed contributing direct surface runoff to Indian Creek Reservoir that need Best Management Practices (BMPs) for phosphorus control.

   - By 1 year after final approval of the TMDL, Regional Board staff and stakeholders will identify specific sites needing BMPs for phosphorus control on public and private lands within the watershed tributary to the irrigation ditch that provides inflow to Indian Creek Reservoir from Indian Creek and the West Fork Carson River. Problem assessment and planning for BMP implementation on non-federal rangelands will follow the implementation procedures in the *California Rangeland Water Quality*

Management Plan.

- By 3 years after final approval of the TMDL, depending on progress toward BMP implementation under the 1995 *California Rangeland Water Quality Management Plan* and the 2000 California Nonpoint Source Plan, staff will consider the need for regulatory action to ensure implementation of BMPs to control external sources of phosphorus loading to Indian Creek Reservoir.

- By 2013, BMPs will be fully implemented for nonpoint sources of phosphorus loading to Indian Creek Reservoir within the subwatershed affected by the TMDL. The California Nonpoint Source Plan requires implementation of management measures for all nonpoint source problems statewide by 2013.

Attainment of the interim total phosphorus and dissolved oxygen targets is projected to occur by 2013. Attainment of the long term total phosphorus and dissolved oxygen targets, other TMDL targets and the narrative water quality objectives related to protection of beneficial uses is projected to occur by 2024.

Potential implementation measures include BMPs to control external sources of phosphorus loading and in-lake measures to increase flushing of phosphorus from the reservoir, remove phosphorus-rich sediment or inactivate the internal phosphorus release process. Agricultural BMPs potentially relevant to control of external phosphorus loading to Indian Creek Reservoir include: range and pasture management, proper livestock to land ratios, irrigation management, livestock waste management, fences (livestock exclusion), retention/detention ponds, constructed wetlands, streambank stabilization, sediment ponds; and riparian buffers (USEPA, 1999). The STPUD (2002)_has proposed conversion of the irrigation ditch tributary to Indian Creek Reservoir to an underground pipeline; this could eliminate some or all of the need for agricultural BMPs in that area. Additional potentially relevant nonpoint source management measures include: education outreach; runoff control for existing development; road, highway and bridge runoff systems; marina and recreational boating management measures (including shoreline stabilization); instream habitat restoration; and vegetated treatment systems.

Further study will be necessary to identify the best and most cost effective in-lake phosphorus control method(s) for Indian Creek Reservoir. The STPUD is considering the acquisition of additional water for flushing phosphorus from the reservoir through purchase and changes in the place and time of use of water rights. Based on the literature review summarized in the staff report, both phosphorus inactivation (by one of several chemical methods) and phosphorus removal (by dredging or bulldozing) appear to have the potential for rapid attainment of the numeric target. Other potential control methods include hypolimnetic withdrawal, hypolimnetic oxygenation, biomanipulation, and treatment systems involving harvest of periphyton to remove nutrients.

The BMPs and lake restoration measures summarized in the staff report and supplement are technically feasible and have been shown to be effective in reducing phosphorus loading and/or abating eutrophic conditions. The Regional Board recommends that, in addition to any in-lake treatment measure(s), STPUD should use the full amount of its existing water rights, under the constraints imposed by the Alpine Decree, in a manner that will maximize fresh water inflow into Indian Creek Reservoir.

Monitoring. The proposed TMDL monitoring plan involves continuation of current monitoring by the STPUD of Indian Creek Reservoir and its tributary inflow. (Not all of the parameters sampled are necessary for determining compliance with TMDL load allocations.) Regional Board staff recognize that sampling parameters, stations and frequencies may need to be changed over time as a result of an adaptive management approach to implementation. Consequently, the Basin Plan does not specify sampling parameters, locations and frequencies or sampling and analytical protocols. The Regional Board's Executive Officer may adopt a formal monitoring program for Indian Creek Reservoir and its tributary inflow pursuant to the California Water Code, and changes in this program may be made over time without the necessity for further Basin Plan amendments.

The TMDL monitoring program is expected to involve:

- monitoring of tributary inflow and water quality (including P concentration)

- monitoring of Indian Creek Reservoir including gage height, water quality, and algal cell/colony counts

- monthly depth-profile measurements in Indian

Creek Reservoir including dissolved oxygen and temperature

- monthly measurements of total phosphorus concentrations at several depths including the hypolimnion

- monthly measurement of chlorophyll a at the near-surface depth

- monthly measurements of Secchi depth in Indian Creek Reservoir during the stratification period, and

- periodic inspections of BMPs, once they have been installed.

The phosphorus concentration and inflow amounts of precipitation and surface runoff to the reservoir will not be measured directly. The success of BMPs to reduce phosphorus runoff to Indian Creek Reservoir will be assessed through measurements of reservoir quality. If implementation results in increased outflow from the reservoir, monitoring of the outflow channel and Indian Creek may be necessary to document impacts on downstream water quality and beneficial uses.

Schedule for review and revision of the TMDL. Regional Board staff will continue to review monitoring reports on an ongoing basis and will periodically discuss them with STPUD and other stakeholders. The review process will use all indicators and targets to evaluate progress from eutrophic to mesotrophic conditions. Comprehensive reviews of monitoring data and progress toward implementation and attainment of targets will be conducted at five year intervals following final approval of the TMDL. Because some of the targets and load allocations are expressed as ten year rolling averages to account for seasonal and annual variability, the first decision point on the need for revision of the TMDL will not occur until after the comprehensive review held in the tenth year.

Table 4.13-ICR-1
Numeric Targets and Indicators for Indian Creek Reservoir TMDL

Indicator[1]	Target Value	Reference
Total P concentration	(Interim[2]) No greater than 0.04 mg/L, annual mean	Current water quality objective (mean of monthly means); see Basin Plan Table 3-14
Total P concentration	(Long term[2]) No greater than 0.02 mg/L, annual mean	USEPA, 1988, 1999.
Dissolved oxygen concentration	(Interim[2]) 30 Day Mean 6.5 mg/L; 7 Day Mean Minimum 5.0 mg/L; 1 Day Minimum 4.0 mg/L	Regionwide water quality objective for waters designated for COLD use; see Basin Plan Table 3-6
Dissolved oxygen concentration	(Long term[2]) Shall not be depressed by more than 10 percent, below 80 percent saturation, or below 7.0 mg/L at any time, whichever is more restrictive.	Water quality objective for surface waters of Indian Creek watershed; see Basin Plan Chapter 3
Secchi depth	Summer mean no less than 2 meters	USEPA, 1988. 1999
Chlorophyll a	Summer mean no greater than 10 ug/L	USEPA, 1988,1999
Carlson Trophic Status Index	Composite index no greater than 45 units	USEPA 1988, 1999

[1] These indicators will be measured for at least one depth profile sampling station in Indian Creek Reservoir. The Carlson Trophic Status Index will be computed from other parameters as explained in the technical staff report.

[2] Interim targets are expected to be attained by 2013. Long term targets are expected to be attained by 2024. See the Implementation Plan below.

Table 4.13-ICR-2
Estimated Existing Phosphorus Loads to Indian Creek Reservoir from External and Internal Sources (rounded to the nearest pound)

Source	Load (pounds per year) and % of total
EXTERNAL SOURCES	
Precipitation	3
Direct surface runoff	68
Tributary inflow	43
Minor sources[1]	0
A. Total External Load (lb/yr)	114 [24%]
INTERNAL SOURCES	
Total anoxic load (by literature formula from Welch and Cooke, 1999, for 120 day stratification period)	204
Total oxic load (by subtraction)	150
B. Total Internal Load (lb/yr)	354 [76%]
C. Loss in Reservoir outflow (lb/yr)	137
TOTAL LOAD (A + B)	468
NET WATER COLUMN LOAD (A + B – C)	331

[1]Loading and losses from the minor sources and sinks discussed in the staff report are considered *de minimis.*

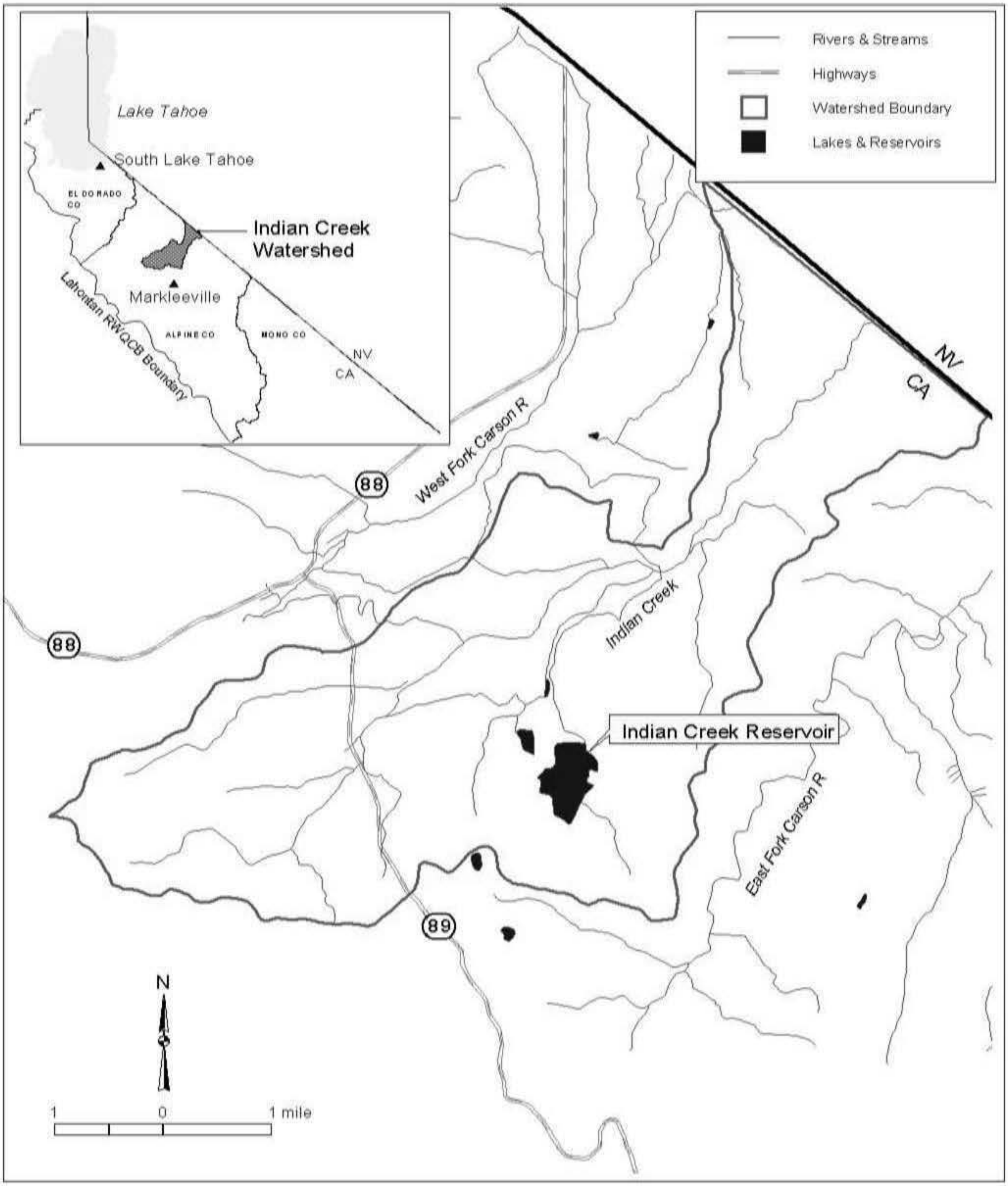
Table 4.13-ICR-3
Load Allocations for Indian Creek Reservoir

Source	Load Allocation (lb/yr)
EXTERNAL	
Precipitation	3
Direct Surface Runoff[1]	17
Tributary Inflow[1]	32
Total external allocation	52
INTERNAL	
Total internal allocation	46
OUTFLOW	18
Total Load Allocation	98
Net Load Allocation[2]	80

[1]Allocations for these parameters are interpreted as 10 year rolling averages to account for seasonal and annual variability.

[2]This allocation is to the water column, with the assumption that an additional 18 lb/yr of internally derived phosphorus will leave the reservoir in the outflow.

FIGURE 4.13-ICR-1. INDIAN CREEK WATERSHED



Squaw Creek (sediment), Placer County

Introduction: Squaw Creek is located in an 8.2 square mile alpine watershed about six miles northwest of Lake Tahoe in Placer County, between Tahoe City and Truckee. The creek is impaired due to sedimentation/siltation from historic and current watershed disturbance associated with land development. Land uses in the watershed are primarily for ski facilities, commercial and residential developments, and related infrastructure.

The purpose of this Total Maximum Daily Load (TMDL) is to ensure attainment of all sediment related water quality standards, including narrative objectives related to protection of in-stream beneficial uses. The TMDL implementation program is based substantially on continuation and improvement of existing erosion control and monitoring programs currently conducted by Squaw Valley Ski Corporation, The Resort at Squaw Creek, and Intrawest Village at Squaw Valley -

Phase I and II. One additional operational permit will be assigned to Placer County to control nonpoint source erosion and sediment delivery to Squaw Creek. Other individual or general Waste Discharge Requirements (WDRs) may be issued as warranted for construction-related or other land-disturbing activities to control sediment discharges to the creek. The Water Board staff report (Lahontan Regional Water Quality Control Board, 2006) provides the technical information supporting the regulatory elements of this TMDL.

Problem Statement: The focus of this TMDL is beneficial uses related to aquatic life and recreational activities (COLD, SPWN, REC-1, REC-2, WILD, MIGR, and COMM; see Chapter 2 of this Basin Plan), and water quality objectives for sediment, settleable materials, suspended sediment, turbidity and nondegradation (see Chapter 3 of Basin Plan). The magnitude and extent of the sedimentation impairment was determined based on regional bioassessment studies, where the abundance and diversity of benthic macroinvertebrates (aquatic organisms at least one-half millimeter in size) and substrate particle size were evaluated as measures of aquatic life health and stream channel conditions, respectively. Bioassessment data were composited into "biologic condition scores" to numerically quantify and compare the integrity of biologic communities at reference streams (physically comparable stream sites exhibiting conditions associated with minimally disturbed landscapes) and Squaw Creek. The biologic condition score is a numeric value based on an index of seven biologic metrics that are sensitive to changes in biological integrity caused by sedimentation.

Biologic condition scores calculated for Squaw Creek's meadow reach indicate degraded macroinvertebrate communities compared with reference streams. Stream channel substrate data collected from the Squaw Creek meadow reach showed smaller median particle size (referred to as D-50 particle size) and larger average percentages of fines and sand (defined as particles less than 3 millimeters in size) when compared to low gradient reference stream sites. Excessive fine particles deposited on the streambed can be detrimental to fish and invertebrates by increasing embeddedness of gravels and decreasing interstitial spaces, leading to changes in species composition and diversity. Accelerated hillslope erosion from land disturbance related to development in naturally erosion-prone areas contribute to excess sediment delivery to the creek. Stream channel erosion, road sanding operations and naturally occurring erosion also contribute to sediment loading to the creek.

Desired Conditions: Indicators and targets (numeric targets) were selected to interpret the water quality standards and track the effectiveness of the TMDL. For the Squaw Creek TMDL, these include indicators of stream substrate quality (D-50 particle size and percentage of fines and sand), and a biological condition score selected to represent abundant and diverse benthic macroinvertebrate communities, based on data collected from regional reference streams. Because the aquatic life beneficial use is the most sensitive to excessive sedimentation, it is reasonable to assume that protection of the aquatic life beneficial use will ensure support of all beneficial uses potentially impacted by sedimentation. The numeric targets are shown in Table 4.13-SC-1 and will be included in future updates of monitoring programs for operational WDRs issued to dischargers in the watershed.

Source Analysis: Sediment delivery from hillslope source categories was estimated based on studies conducted in primarily in 2000 and 2001. The estimated annual sediment load for the watershed during this time period is 37,900 tons per year. The contribution of sediment from hillslope sources is divided among categories as shown in Table 4.13-SC-2. The source analysis indicates that approximately 60 percent of the sedimentation affecting Squaw Creek is related to disturbance brought on by human activities.

Loading Capacity and Linkage Analysis: The sediment loading capacity of Squaw Creek isderived from mathematical comparisons of biologic conditions found in reference streams and Squaw Creek, and is set such that Squaw Creek will meet its water quality objectives and support beneficial uses. It is estimated that that a 25 percent reduction in the overall sediment loading of 37, 900 tons per year is needed to protect beneficial uses. Therefore, the loading capacity is 28,425 tons per year.

Linkage between sediment delivery to the creek and impairment of aquatic life beneficial uses was based on USEPA guidance, best professional judgment, modeled loading estimates, and sediment-related in-stream physical habitat parameters that correlate with biologic conditions found in regional streams.

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 sediment load (i.e., the load capacity) is distributed among the existing controllable sediment source categories, future growth and a margin of safety.

There are currently no National Pollutant Discharge Elimination System (NPDES)-regulated point sources in the watershed; therefore, the wasteload allocation is zero. The allocations reflect conservative assumptions about the efficiency of Best Management Practices (BMPs) to control sedimentation. No reduction in sediment delivery from undisturbed lands was assigned. A summary of the TMDL, allocations, and required load reductions is presented in Table 4.13-SC- 3.

Because the load allocations are broad estimates, they are not appropriate for use as discharge specifications in WDRs/permits. Water Board staff expect dischargers to follow an iterative approach to implementing storm water pollution controls, including using data from the instream monitoring to guide hillslope activities accordingly.

Margin of Safety, Seasonal Variations and Critical Conditions: An explicit margin of safety is established by reserving (by not allocating) part of the total loading capacity, thereby requiring greater load reductions from existing and/or future source categories. An implicit margin of safety incorporates conservative assumptions in the TMDL analysis. The Squaw Creek TMDL includes both an implicit and explicit margin of safety.

Conservative assumptions were incorporated into data interpretations throughout the TMDL.

The explicit margin of safety was established by reserving four percent of the loading capacity to offset uncertainties in the analysis. The TMDL also incorporates a monitoring and review program which allows for future management revisions if the Water Board finds that water quality objectives are not being met or that beneficial uses are not being protected. The TMDL takes into account seasonal variations and critical conditions to assure that the load allocations will support water quality standards over time. The Squaw Creek TMDL accounts for critical conditions by establishing targets based on net long term effects.

Implementation and Monitoring Plan: The Implementation Plan relies on compliance with the existing pollution controls in place in the watershed, and proposes additional actions to address sediment discharges that are not currently regulated. These controls include permitting authorities outlined in the Porter-Cologne Water Quality Control Act, such as NPDES permits, WDRs, waivers of WDRs and Basin Plan discharge prohibitions.

WDRs issued to existing dischargers in the watershed contain comprehensive requirements to control sediment dischargers. These water quality requirements specify that discharges must identify erosion control problems, propose projects to address the problem, and maintain those projects. Proposed WDRs/NPDES permits will follow the template set by the existing permits.

Implementation monitoring will focus on tracking compliance with existing and proposed regulatory actions, including installation and maintenance of BMPs to control sediment discharges, with a focus on control of fine sediment. Progress toward meeting the TMDL will be determined through monitoring of the in-stream physical and biological parameters identified in the numeric targets section. The monitoring and reporting programs for existing WDRs/permits in the watershed will be updated to require monitoring of these numeric targets, and any new operational permits will incorporate these monitoring parameters as well. Reporting and surveillance requirements provide the mechanism for the Water Board, dischargers, and public to determine if the Implementation Plan is achieving the TMDL, or if other actions are required. The monitoring requirements are presented in Tables 4.13-SC-4 and 4.13-SC-5.

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 for the significant temporal disparities between upland erosion control actions, sediment delivery, and the time needed for the target indicators to respond to decreased sediment loading.

Attainment of the biologic health target will be evaluated by the rolling average of biologic condition scores calculated from three consecutive sampling events. For example, if numeric target sampling begins in 2006, biologic condition data will be collected in 2006, 2008 and 2010. These data will be assessed in 2010 by averaging all biologic condition scores for each site collected over this period. Data collected in 2012 will be added to the dataset, and an average value for biologic condition scores collected in 2008, 2010 and 2012 will be calculated, and so on. The biologic condition target will be met when the rolling average for three consecutive 3- sampling event datasets meets or exceeds 25.

Progress toward meeting the physical habitat numeric targets will be evaluated by assessing the data trend for each indicator (decreasing trend for percent fines and sand, and increasing trend for median (D-50) particle size. Data assessment will begin after three sampling events have occurred. For example, if numeric target sampling commences in 2006, data will be collected in 2006, 2008, and 2010; therefore, in 2010, the data trend will be evaluated. Each subsequent sampling event's data will be added to the dataset for purposes of trend evaluation.

Permit compliance status will be assessed quarterly, using the Water Board's permit compliance tracking database currently in place, and through semi-annual field inspections. Permit compliance for the purposes of TMDL attainment refers only to those permit conditions specific to erosion and sedimentation control. Compliance information will be taken into account when assessing the need for any revisions to targets or TMDL implementation. During the 10-year data review (the halfway point estimated for TMDL attainment), staff shall examine all data trends to determine the need for revision of the TMDL, numeric targets, allocations, or implementation plan. Revisions to the WDRs, NPDES permits, or other regulatory actions shall be made as warranted to ensure that applicable water quality objectives and beneficial uses are attained.

Table 4.13-SC-1
Indicators and Targets for Squaw Creek TMDL

Indicator	Target Value	Notes
Biologic Health: Biologic Condition Score, calculated from Index of Biologic Integrity.	Biologic condition score of 25 or more when meadow reach stream flows are continuous. Applies to the meadow reach of Squaw Creek.	Represents desired biologic integrity of stream, protective of aquatic life uses. Target value based on regional reference stream biologic conditions.
Physical Habitat: Median (D-50) Particle Size	Increasing trend in D-50 value approaching 40 millimeters (mm) or greater. Applies to the meadow reach of Squaw Creek.	Represents desired substrate conditions for aquatic life. Target value based on regional reference stream substrate conditions.
Physical Habitat: Percent Fines and Sand	Decreasing trend in percent fines and sand value approaching 25% cover of the stream bottom or less. Applies to the meadow reach of Squaw Creek.	Represents desired substrate conditions for aquatic life. Target value based on regional reference stream substrate conditions.

Table 4.13-SC-2
Sediment Delivery Estimates, Squaw Creek Watershed
(Rounded to nearest 100 tons)

Sediment Source Category	Annual Sediment Delivery (Tons/year)	Percent of Total Annual Sediment Delivery
Dirt Roads	9,300	25%
Dirt Roadcuts	900	2%
Road Traction Sand	300	1%
Residential/Commercial Areas	200	1%
Graded Ski Runs	9,000	24%
Alluvial Channel Erosion	4,300	11%
Undisturbed Areas	14,000	37%
Uncontrollable Sources*	16,100	42%
Controllable Sources	21,800	58%
Total Annual Sediment Delivery**	37,900	100%

*This is considered the best estimate of current naturally occurring sediment delivery. The estimate shown includes 50 percent (rounded to 2,100 tons/year) of the annual channel bank contribution and 100 percent (14,000 tons/year) of sediment delivery from undisturbed areas.

**This estimate adds to 37,900 tons/year because the alluvial channel erosion estimate was distributed equally between the "controllable" and "uncontrollable" sediment source categories. The estimate of one-half of 4,300 tons/year (2,150 tons/year) was rounded down to 2,100 tons/year.

Table 4.13-SC-3
TMDL, Allocations and Percent Reductions Needed by Sediment Source Category

Sediment Source Category	Annual Sediment Delivery (Tons/year)	Percent Reduction Required	Load Allocation* (Tons/year)
Dirt Roads	9,300	60%	3,700
Dirt Road Cuts	900	50%	450
Road Traction Sand	300	25%	200
Residential/Commercial Areas	200	25%	150
Graded Ski Runs	9,000	50%	4,500
Alluvial Channel Erosion (50 percent of the total load from channel bank erosion is assumed to be controllable)	2,100	10%	1,900
Total Controllable Sources	21,800	50%	10,900
Alluvial Channel Erosion (50 percent of the total load from channel bank erosion is assumed to be naturally occurring)	2,100	0%	2,100
Undisturbed Areas	14,000	0%	14,000
Total Uncontrollable Sources	16,100	0%	16,100
Total Existing Sediment Load	37,900	Load Allocation to Existing Sources	27,000
Overall Reduction Needed to Achieve TMDL	25%	Load Allocation to Future Growth	150
TMDL = Load Allocations (existing and future sources) + MOS	28,425	Load Allocation to Margin of Safety (4%)	1,275
		Total Load Allocations	28,425

* Allocations to existing sources rounded to nearest 50 tons.

Table 4.13-SC-4
Numeric Target Monitoring Plan and Compliance Schedule

Indicators and Target Values	Monitoring Specifications	Responsible Monitoring Parties	Schedule
Biologic Health Indicator: Biologic condition score, based on bioassessment data. **Target Value:** Biologic condition score of 25 or greater. **Physical Habitat Indicator:** D-50 Particle Size. **Target Value:** Increasing trend approaching 40 mm or greater. **Physical Habitat Indicator:** Percent fines and sand. **Target Value:** Decreasing trend approaching 25 percent.	1. Establish 3 sampling sites (upper, middle, and lower) on the meadow reach of Squaw Creek 2. Conduct bioassessment sampling and calculate biologic condition score using Herbst (2002) protocol. 3. Analyze D-50 particle size and percent fines and sand using Herbst protocol. 4. All sampling protocols will be specified in WDRs.	• SVSC (existing permit) • Resort at Squaw Creek (existing permit) • Village at Squaw Valley (existing permit) • Placer County (anticipated permit)	1. Water Board to add monitoring requirements to existing WDR Monitoring & reporting programs of permitted dischargers no later than six months after final approval of TMDL. 2. Water Board to issue WDRs/permit for Placer County stormwater discharges no later than six months after final approval of TMDL. 3. Each regulated discharger to conduct sampling individually or as agreed to cooperatively. 4. Numeric target sampling shall be conducted once every two years between the months of July and September when flow in the meadow reach is continuous. 5. Progress toward attainment of the physical habitat targets to be evaluated by trend assessment, beginning after 3 consecutive sampling events have been completed. Trend assessment will be based on all monitoring data for each physical habitat indicator. 6. Attainment of the biologic condition score target will be assessed using 3-(sampling) event rolling average datasets. The biologic condition target will be met when the rolling average for three consecutive 3-event datasets meets or exceeds 25.

Table 4.13-SC-5
Monitoring of Sediment Control Actions(1)

Monitoring Parameter	Responsible Monitoring Party	Monitoring Schedule
Compliance with all sediment-related permit requirements, including discharge specifications, BMP installation and maintenance, general requirements and prohibitions, monitoring, and reporting.	Water Board staff	Assess permit compliance quarterly using Water Board's permit tracking database currently in place. Assessment of numeric target data (collected as specified in permits) will occur according to schedule outlined in Table 4.13-SC-4, above.
Facilities inspections to ensure permit compliance.	Water Board staff	Water Board staff to inspect all facilities twice annually.
TMDL data review and assessment.	Water Board staff	As outlined in Schedule of TMDL Attainment, Data Review and Revision, above.

(1) Requirements may already be satisfied under existing WDRs.

Middle Truckee River Watershed (sediment), 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 (SSCs) 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 numeric water quality objective of 3 Nephelometric Turbidity Units. 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 90th 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 (WLAs) for point sources

[National Pollutant Discharge Elimination System (NPDES)-regulated sources] and load allocations (LAs) 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 90th 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 United States Forest Service (USFS)-Tahoe National Forest, the Tahoe Donner Land Trust (TDLT), and the Truckee River Watershed Council (TRWC) 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

Indicator	Target Value	Notes
Water Column: Suspended sediment concentration	Annual 90th percentile value of less than or equal to 25 milligrams per liter (mg/L) suspended sediment. Measured at Farad (United States Geological Survey gauge 10346000) 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.	Target represents protection of aquatic life beneficial uses (COLD and SPWN), based on literature review.
Implementation Measure: Road sand application best management practices (BMPs), and recovery tracking	Road sand is applied using BMPs and recovered to the maximum extent practicable (MEP).	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.
Implementation Measure: Ski area BMP implementation and maintenance	Ski areas identify and prioritize areas within their facilities where BMP implementation and maintenance is needed to control erosion and sedimentation to stream channels.	Candidate sites to be identified and prioritized in annual worklists submitted to fulfill WDR permit requirements.
Implementation Measure: Dirt roads maintained or decommissioned	Identified dirt roads with inadequate erosion control structures are rehabilitated and maintained, or decommissioned. Focus on dirt roads with high potential for sediment delivery to surface waters (e.g., within 200 feet of watercourse).	Candidate roads to be identified and prioritized through watershed assessments or Water Board inspections.
Implementation Measure: Legacy sites restoration/BMP implementation	Identified legacy sites are restored or storm water BMPs are implemented to prevent erosion and sedimentation to surface waters.	Candidate sites to be identified and prioritized through watershed assessments, or Water Board inspections. Storm water NPDES/WDR holders should identify and prioritize legacy sites in annual worklists.

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

Summary of Suspended Sediment Sources (Water Year 1996-1997[a] in Tons)			
Subwatershed	**Total Watershed Loading (tons/year)**	**Urban Areas (tons/year)**	**Non-Urban Areas[b] (tons/year)**
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
Subwatershed Totals	10,345	828	9,517
Intervening Zones/Unmeasured Inputs[c]	15,973	1832	14,141
Load Measured at Farad	26,318		
Event-Based Loading[d]	24,064	2,406	21,658
Total Suspended Sediment Load	50,382	5,066	45,316
Percent of Total		10%	90%

a. Except for the estimate for event-based loading, which relies on the Desert Research Institute's (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

	Allocations (All Estimates in Tons/Year)			
Subwatershed	**Urban Areas (Wasteload Allocation)[a]**	**Non-Urban Areas (Load Allocation)[b]**	**Total Allocated Load**	**Notes**
Squaw Creek	350	1,878	2,228	Allocations are per Squaw TMDL: Total load = 25% reduction from total watershed load shown in Table 4.13-TR-2; WLA = road sand/urban allocation from Squaw TMDL.
Donner/Cold Creeks	84	1,626	1,710	Controllable non-urban load = 40%
Gray Creek	0	1,293	1,293	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%
Total Suspended Sediment Loads Allocated to Subwatersheds	549	7,469	8,018	
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.
Totals	4,936	35,392	40,328	
Allocations Summary				
Total WLA			4,936	(549 + 916 + 1,203 + 2,268)
Total LA			35,392	(7,469 + 11,030 + 16,893)
Total Allocated Loads (WLA +LA) *Must not exceed TMDL*			40,300	(4,936 + 35,392), rounded to nearest 100 tons
TMDL (Loading Capacity)			40,300	(50,382 x 80%; 20% overall load reduction**) rounded to nearest 100 tons**

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

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

Chapter 5
WATER QUALITY STANDARDS AND CONTROL MEASURES FOR THE LAKE TAHOE BASIN

Introduction

Lake Tahoe is a designated Outstanding National Resource Water[1] (ONRW) that is renowned for its extraordinary clarity and purity, and deep blue color. Since the 1960s, Lake Tahoe has become impaired by declining deep water 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. Degradation of Lake Tahoe is controlled by federal and state antidegradation regulations and guidelines. Attainment of 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 that in many cases are more stringent than those applicable elsewhere in the Lahontan Region.

For the reader's convenience, this Chapter contains copies of some information on water quality objectives, beneficial use designations, and waste discharge prohibitions for waters of the Lake Tahoe Basin that is also included in Chapters 2, 3, and 4 of this Basin Plan.

Water Quality Problems and Control Needs

Steep slopes, erodible soils, and a short growing season make the Lake Tahoe Basin acutely sensitive to human activities. Development practices and ongoing soil disturbing land uses that may have little impact elsewhere can cause severe erosion in the Tahoe Basin, increasing fine sediment particle, nitrogen and phosphorus loads to Lake Tahoe. 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 phosphorus is erosion resulting from land development and ongoing soil disturbance associated with land management practices. Lake Tahoe has historically been considered nitrogen limited; recent bioassays indicate that phosphorus is also becoming limiting. It is important to control **all** controllable sources of both nitrogen and phosphorus. Development disturbs vegetation and soils, and creates impervious surface coverage that 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 transparency loss from fine sediment particles is the scattering of light in the water column. This contrasts with deep water transparency loss due to light absorption caused by enhanced phytoplankton productivity. Runoff from roadways and other urbanized landscapes are the primary sources of fine sediment particles reaching the lake.

Phytoplankton productivity in Lake Tahoe increased more than 420 percent, and deep water transparency decreased by 31 percent, between 1968 and 2007. (Water quality standards for clarity and phytoplankton productivity are based on 1968-1971 levels.) Increased growth of attached algae in nearshore waters may be linked to the level of onshore development. The Regional Board is addressing Lake Tahoe's nearshore water quality through collaborative investigation and regulatory actions. Pollutant load reduction actions taken to implement the Lake Tahoe TMDL are anticipated to improve the nearshore environment by decreasing pollutant loads entering the lake. Additional analysis, however, is needed to determine whether different resource management actions are needed to address the nearshore condition. While targeted

[1] **Note:** ONRWs are described in Chapter 4. See the subsection entitled "Special Designations to Protect Water Resources" within Section 4.9, "Resources Management and Restoration."

load reduction actions may or may not immediately address localized pollutant discharges to the nearshore, long term, basin-wide pollutant load reduction efforts are expected to improve the nearshore condition. The Regional Board will evaluate results of ongoing research related to nearshore conditions and take appropriate actions if necessary to improve nearshore conditions.

Although the primary purpose of the implementation program in this Chapter is to protect and enhance the water quality and beneficial uses of Lake Tahoe, it will also protect tributary waters. There are 170 other lakes, 63 tributary streams, and numerous wetlands in the Lake Tahoe Basin; most of the lakes and about half of the streams are in California. There are also two named ground water basins in the California portion of the watershed. Most of these waters have naturally high quality, and state and federal antidegradation regulations apply. The Upper Truckee River and the lower Truckee River downstream of the Lake Tahoe dam are under study for inclusion in the National Wild and Scenic Rivers System. Although many of the lakes are within wilderness areas, they are threatened by heavy recreational use and atmospheric deposition. Other tributary waters have been adversely affected by erosion, stormwater, diversion, channelization, or filling. In particular, wetlands have been drastically disturbed by human activities; see the section on Stream Environment Zones (SEZs) below.

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 remedial measures to correct existing erosion/runoff problems. The principal control measures are:

- Large-scale erosion remediation, stormwater treatment, and drainage control and SEZ restoration projects.
- Installation and maintenance of onsite erosion and surface runoff (stormwater) control measures in connection with all new and existing development.
- Controls on discharges related to other activities including timber harvest, livestock confinement and grazing, and recreational facilities (including golf courses, dredging, and shorezone construction to support water-related recreational activities).

In addition to the control measures for sediment and nutrients, regionwide control measures for toxic pollutants, needed for attainment of the water quality objectives in the USEPA's National Toxics Rule, section 131.36 of 40 CFR (12/22/92), and California Toxics Rule, section 131.38 of 40 CFR (5/18/00), which are incorporated by reference, apply to the Lake Tahoe Basin. Because the Lake Tahoe program emphasizes the use of wetlands (SEZs) for stormwater treatment, the attainment of objectives for toxic metals and whole effluent toxicity in waters affected by stormwater discharges must be given special consideration. Control measures to ensure attainment of the objective for nondegradation of biological communities and populations are also of concern in relation to stormwater discharges.

Implementation Authority

Implementation of the water quality control programs discussed in this Chapter is a bistate, interagency effort. Many of the control measures can best be implemented by local governments or the Tahoe Regional Planning Agency (TRPA), but the Lahontan Regional Board and State Water Resources Control Board are ultimately responsible for implementation of those controls within their authority. To the extent that other agencies do not make and fulfill implementation commitments, the Regional Board may require implementation of these control measures. Similar control measures are being implemented by TRPA and the Nevada Division of Environmental Protection in Nevada.

The Lahontan Regional Board's authority for planning, regulation, and enforcement is discussed in greater detail in Chapters 1 and 4 of this Basin Plan. The Regional Board implements the federal Clean Water Act, portions of the California Water Code (including the Porter-Cologne Act) and a variety of laws related to control of solid waste and toxic and hazardous wastes. The Regional Board has authority to set and revise water quality standards and discharge prohibitions. It may issue permits, including federal NPDES permits and Section 401 water quality certifications, and State waste discharge requirements or waivers of waste discharge requirements. Its planning and permitting actions require compliance with the California Environmental Quality Act (CEQA). The Regional Board has broad enforcement authority; actions may range from staff enforcement letters, through cleanup and abatement or cease and desist orders, to civil penalties or referral to the California Attorney General.

The State Board has authority to review Regional Board planning, permitting and formal enforcement actions. It sets statewide water quality policy. It may also adopt water quality standards and control measures on its own initiative. Other State Board functions that may affect the Lake Tahoe Basin include loan and grant funding for wastewater treatment facilities and nonpoint source control projects, and water rights permitting authority.

The TRPA's authority comes from P.L. 96-551 and from the water quality planning functions delegated by California, Nevada, and the USEPA under Section 208 of the Clean Water Act. TRPA has a bistate Governing Body with appointed members, an Advisory Planning Commission that includes a Lahontan Regional Board representative, and a technical staff under an Executive Director. It may set regional environmental standards, issue land use permits including conditions to protect water quality, and take enforcement actions. TRPA is directed to ensure attainment of the most stringent state or federal standards for a variety of environmental parameters in addition to water quality; for example, it is a designated air quality and transportation planning agency in California. TRPA has delegated authority to review certain types of new development to local governments under Memoranda of Understanding (MOUs). P.L. 96-551 establishes a TRPA environmental review process that is legally separate from CEQA and from the National Environmental Policy Act (NEPA). TRPA's Code of Ordinances and its MOUs with federal, state and local governments identify categories of projects and activities that are exempt from TRPA's review.

The U.S. Forest Service (USFS), Lake Tahoe Basin Management Unit (LTBMU), controls over 70 percent of the land in the Lake Tahoe Basin. It implements a land and resource management plan (USFS 1988, amended 2004 and 2007) and the statewide USFS 208 Plan (USFS 1979). In contrast to some National Forest plans that emphasize resource extraction activities such as timber harvest, the major emphasis of the LTBMU plan is water quality protection. The LTBMU has an ongoing watershed restoration program, and implements a land acquisition program to prevent development of sensitive private lands. It has permitting and enforcement authority over activities by other parties on National Forest lands. USFS activities and permits are subject to environmental review under NEPA. The Lahontan Regional Board may issue waste discharge requirements or a waiver of waste discharge requirements for timber harvest activities by the LTBMU in the Tahoe Basin. It may also issue permits for other activities on National Forest land (e.g., ski area expansion).

Local governments in the Lake Tahoe Basin have been delegated authority by TRPA to implement its plans for certain types of development projects. They also have major responsibility for implementing the remedial projects for water quality problems that are discussed later in this Chapter.

Other agencies involved in implementation of water quality control measures in the California portion of the Tahoe Basin include the U.S. Army Corps of Engineers, the U.S. Natural Resources Conservation Service, the California Department of Transportation (Caltrans), the California Tahoe Conservancy, the California State Lands Commission, the California Department of Parks and Recreation, the California Department of Fish and Wildlife, the California Department of Forestry and Fire Protection, and the Tahoe Resource Conservation District. Monitoring carried out by the LTBMU, the U.S. Geological Survey, the University of California Tahoe Environmental Research Center, the California Department of Water Resources, and other agencies continues to be important in assessing progress on implementation.

Jurisdictional Boundaries

The California water quality standards and discharge prohibitions, and most of the control measures discussed later in this Chapter apply to the “Lake Tahoe Basin” or “Lake Tahoe Hydrologic Unit (HU),” which is the entire watershed tributary to and including Lake Tahoe in California. This area (Figure 5-3) includes portions of Alpine, El Dorado, and Placer Counties. The TRPA Compact established the “Lake Tahoe Region,” which is defined by P.L. 96-551. The Lake Tahoe Region includes lands in El Dorado and Placer Counties (California) and Douglas, Carson City, and Washoe Counties (Nevada) that are tributary to Lake Tahoe. It does not include the Alpine County portion of the Lake Tahoe watershed, but does include part of the Truckee River HU, between the Lake Tahoe outlet dam and the Bear Creek confluence (Figure 5-4).

The Alpine County portion of the watershed is almost all National Forest land, but includes some State highway right-of-way and part of the South Tahoe Public Utility District (STPUD) wastewater export pipeline. The Regional Board has reviewed fisheries management activities, grazing permits, and proposed watershed restoration activities in this portion of the Tahoe Basin. It is a popular recreation area that includes a segment of the Pacific Crest Trail. All of the control measures discussed below for construction and other activities on National Forest lands, or for road and right-of-way construction and maintenance, apply in this area, even though TRPA permits may not apply. The Regional Board will consider issuing or revising waste discharge permits for activities in this area as necessary to protect water quality.

In the portion of the Truckee River watershed that is within TRPA's jurisdiction, the Lahontan Regional Board implements a separate set of water quality standards, discharge prohibitions, and exemption criteria. This area includes existing residential, commercial, and highway development.

Figure 5-1
ANNUAL AVERAGE SECCHI DISK DEPTH
AT THE INDEX STATION, LAKE TAHOE
(UC DAVIS, 2010)

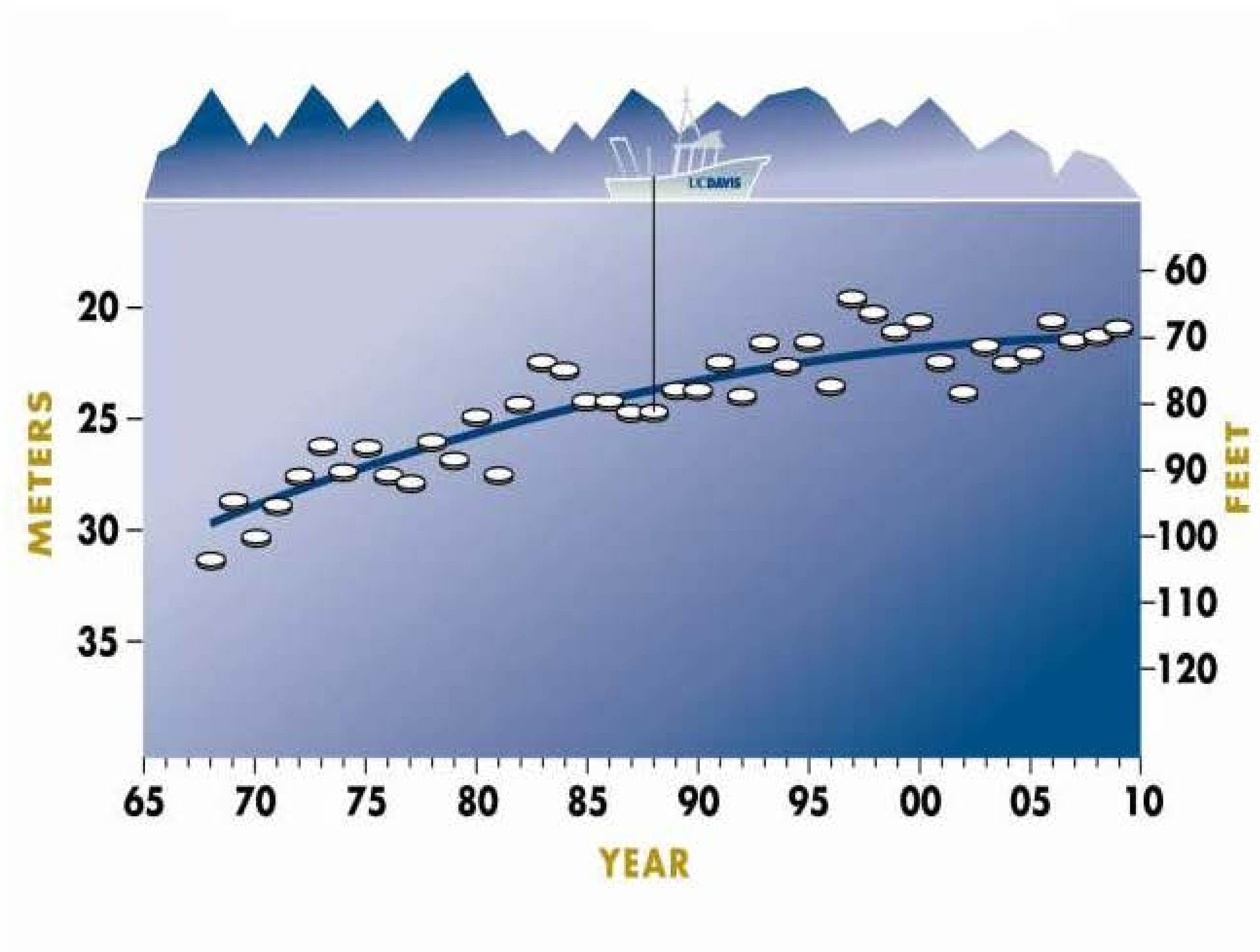


Figure 5-2
PRIMARY PRODUCTIVITY
AT THE INDEX STATION, LAKE TAHOE
(UC DAVIS, 2010)

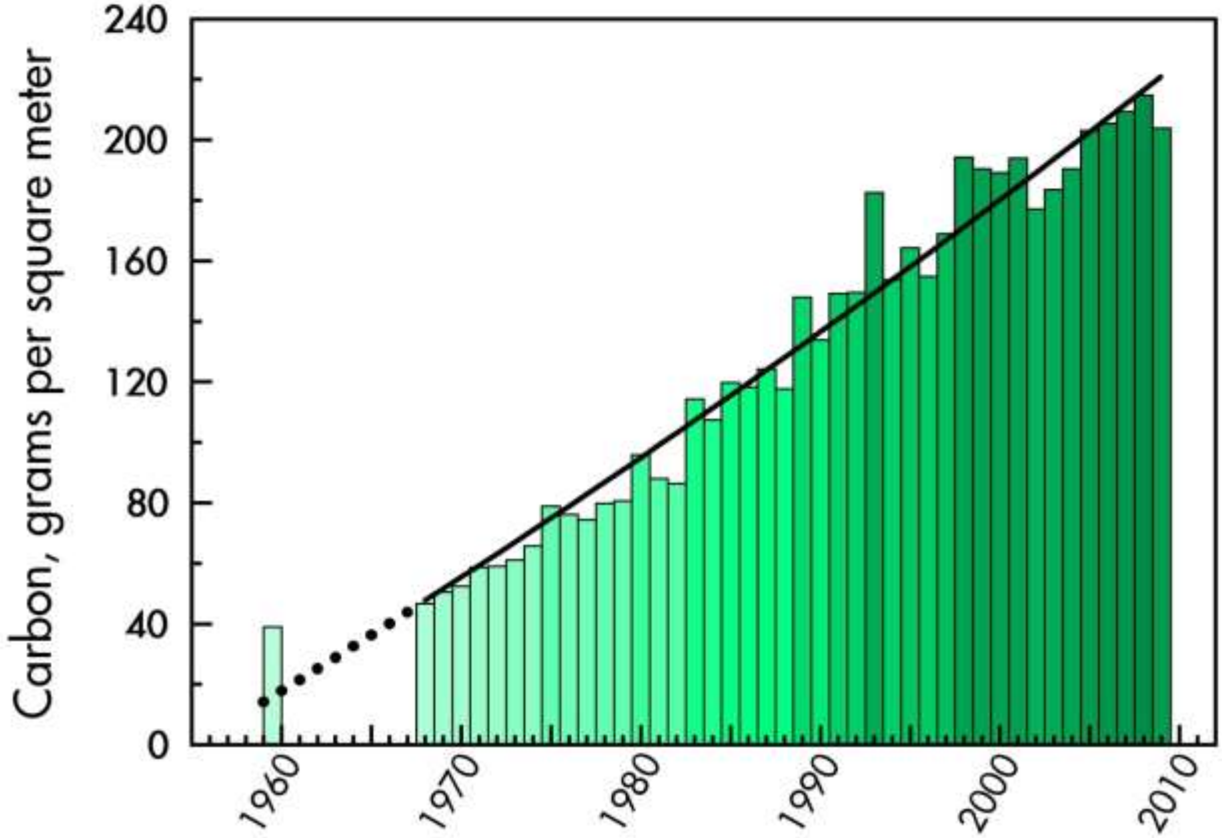
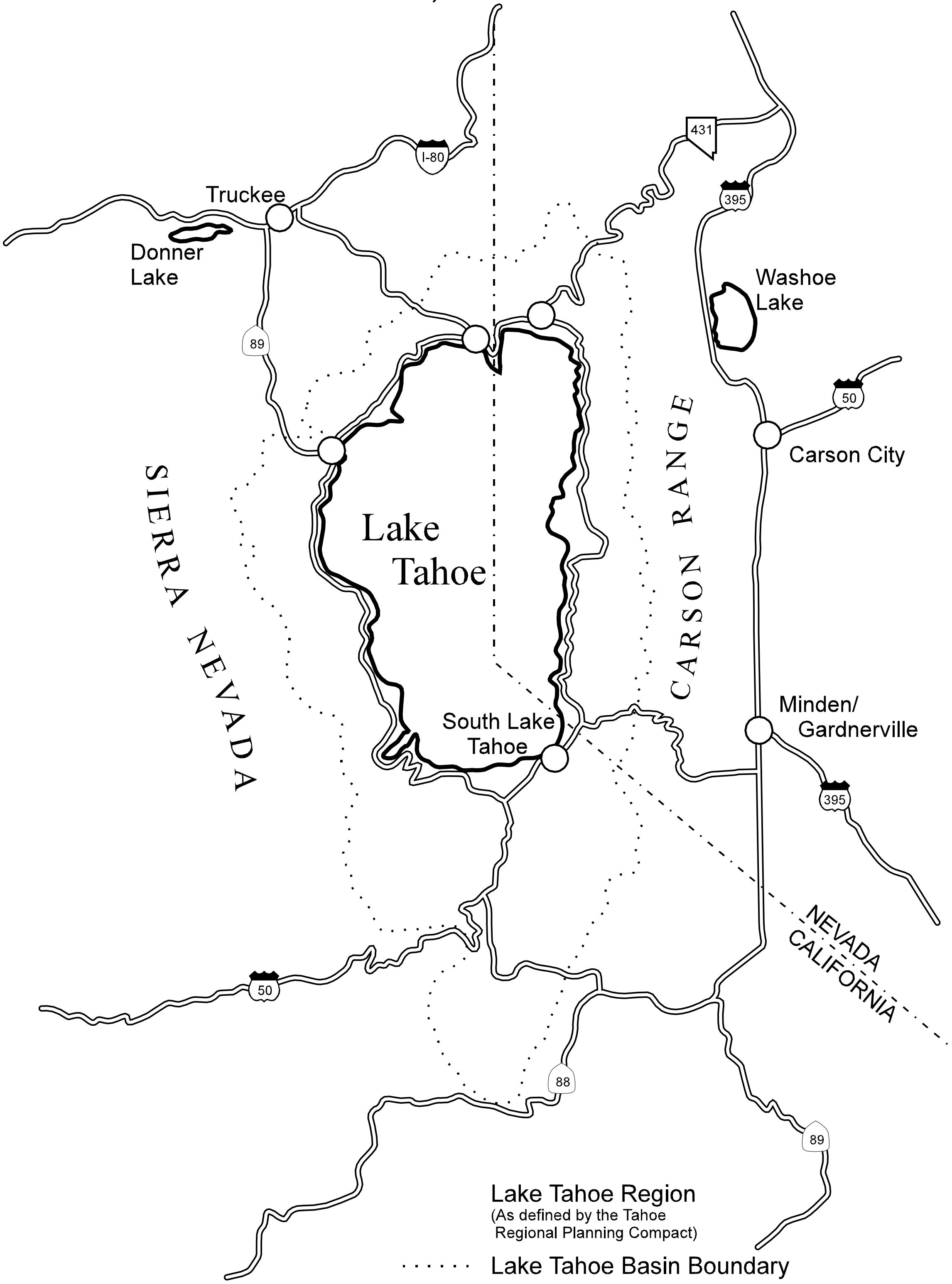
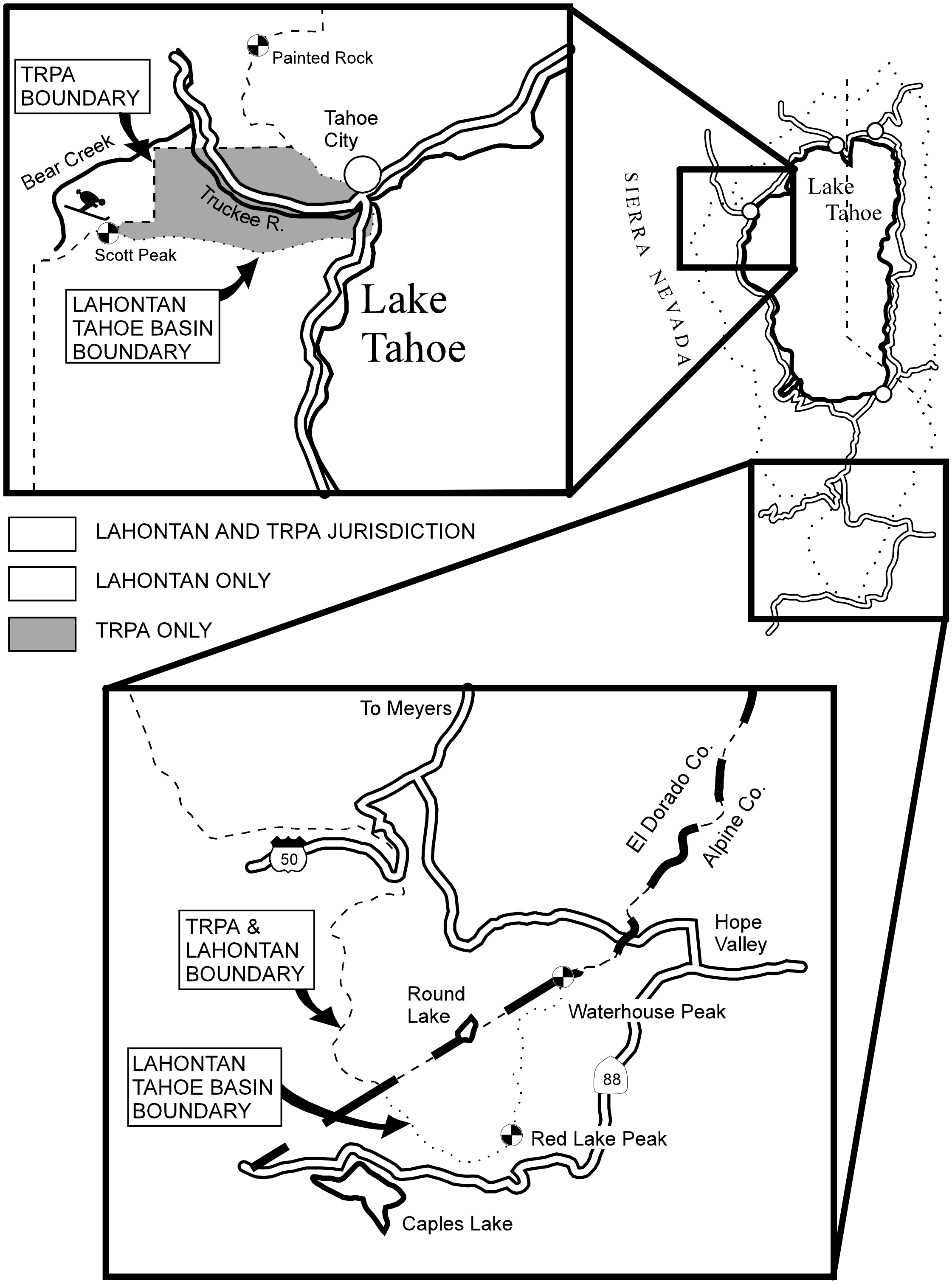


Figure 5-3
LOCATION MAP, LAKE TAHOE REGION



Redrawn from TRPA, 1988, Vol.1

Figure 5-4
LAHONTAN AND TRPA VARIATIONS IN JURISDICTIONAL BOUNDARIES FOR THE LAKE TAHOE BASIN



5.1 WATER QUALITY STANDARDS

The federal Clean Water Act defines "water quality standards" to include both "designated uses" (i.e., beneficial uses) and "water quality criteria" (i.e., water quality objectives). Thus, the designated beneficial uses and the water quality objectives listed below are the California water quality standards for waters of the Lake Tahoe Hydrologic Unit (HU).

Twenty-three beneficial uses and their definitions were developed by the State Board staff and recommended for use in the Regional Board Basin Plans. Three of those beneficial uses (Marine Habitat, Estuarine Habitat, and Shellfish Harvesting) are not found within the Region. Regional Board staff added two additional uses (Water Quality Enhancement, Flood Peak Attenuation/Flood Water Storage). Thus, the following nine beneficial use designations have been added since adoption of the 1975 Basin Plans: Industrial Process Supply, Fish Spawning, Fish Migration, Navigation, Commercial and Sport Fishing, Water Quality Enhancement, Preservation of Biological Habitats of Special Significance, Aquaculture, and Flood Peak Attenuation/Flood Water Storage. Specific wetland habitats and their associated beneficial uses has been added in recognition of the value of protecting wetlands. This Chapter contains two tables (Tables 5.1-1 and 5.1-2) designating the beneficial uses of surface waters and ground waters in the Lake Tahoe HU.

Definitions of Beneficial Uses

AGR **Agricultural Supply**. Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing

AQUA **Aquaculture**. Beneficial uses of waters used for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, and harvesting of aquatic plants and animals for human consumption or bait purposes.

BIOL **Preservation of Biological Habitats of Special Significance**. Beneficial uses of waters that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, and Areas of Special Biological Significance (ASBS), where the preservation and enhancement of natural resources requires special protection.

COLD **Cold Freshwater Habitat**. Beneficial uses of waters that support cold water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

COMM **Commercial and Sportfishing**. Beneficial uses of waters used for commercial or recreational collection of fish or other organisms including, but not limited to, uses involving organisms intended for human consumption.

FLD **Flood Peak Attenuation/Flood Water Storage**. Beneficial uses of riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters.

FRSH **Freshwater Replenishment**. Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

GWR **Ground Water Recharge**. Beneficial uses of waters used for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

IND **Industrial Service Supply**. Beneficial uses of waters used for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, geothermal energy production, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

MIGR **Migration of Aquatic Organisms**. Beneficial uses of waters that support habitats necessary for migration, acclimatization between fresh and salt water, or temporary activities by aquatic organisms, such as anadromous fish.

MUN **Municipal and Domestic Supply**. Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.

NAV **Navigation**. Beneficial uses of waters used for shipping, travel, or other transportation by private, military, or commercial vessels.

POW **Hydropower Generation**. Beneficial uses of waters used for hydroelectric power generation.

PRO **Industrial Process Supply**. Beneficial uses of waters used for industrial activities that depend primarily on water quality.

RARE **Rare, Threatened, or Endangered Species**. Beneficial uses of waters that support habitat necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened or endangered.

REC-1 **Water Contact Recreation**. Beneficial uses of waters used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.

REC-2 **Non-contact Water Recreation**. Beneficial uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

SAL **Inland Saline Water Habitat**. Beneficial uses of waters that support inland saline water ecosystems including, but not limited to, preservation and enhancement of aquatic saline habitats, vegetation, fish, and wildlife, including invertebrates.

SPWN **Spawning, Reproduction, and Development**. Beneficial uses of waters that support high quality aquatic habitat necessary for reproduction and early development of fish and wildlife.

WARM **Warm Freshwater Habitat**. Beneficial uses of waters that support warm water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates

WILD **Wildlife Habitat**. Beneficial uses of waters that support wildlife habitats including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

WQE **Water Quality Enhancement**. Beneficial uses of waters that support natural enhancement or improvement of water quality in or downstream of a water body including, but not limited to, erosion control, filtration and purification of naturally occurring water pollutants, streambank stabilization, maintenance of channel integrity, and siltation control.

Historical Beneficial Uses

The 1975 Basin Plans included brief discussions of the history of human water use in the Lahontan Region, and tables of “historical” beneficial use designations from earlier interstate water policies and “interim” final Basin Plans. Earlier beneficial use designations were primarily on a watershed basis; the 1975 Plans designated uses for specific water bodies. Copies of historical information from the 1975 Plans may be obtained by contacting Regional Board staff. The 1975 beneficial use designations were based on knowledge of the existing and potential water uses, with emphasis on the former. For example, many high quality surface waters of the North Lahontan Basin were not designated for municipal use because water supplies in these areas were taken from ground water sources. Historical beneficial uses have been incorporated into Tables 5.1-1 and 5.1-2 as potential uses (a use which once existed could potentially exist again).

No beneficial use designations adopted in the 1975 Basin Plans have been removed from waters of the Lake Tahoe HU. Removal of a use designation requires a “Use Attainability Analysis,” using U.S. Environmental Protection Agency methodology, to show that the use does not occur and cannot reasonably be attained.

Present and Potential Beneficial Uses

In the Basin Planning process, a number of beneficial uses are usually identified for a given body of water. Water quality objectives are established (see below) which are sufficiently stringent to protect the most sensitive use. The Regional Board reserves the right to resolve any conflicts among beneficial uses, based on the facts in a given case. It should be noted that the assimilation of wastes is **not** a beneficial use.

In the tables of beneficial uses (Tables 5.1-1 and 5.1-2), an “X” indicates an existing or potential use. Many of the existing uses are documented by biological data or human use statistics; some are not. Lakes and streams may have potential beneficial uses established because: (1) plans already exist to put the water to those uses, (2) conditions (location, demand) make such future use likely, (3) the water has been identified as a potential source of drinking water based on the quality and quantity available (see Sources of Drinking Water Policy, in Appendix B), and/or (4) existing water quality does not support these uses, but remedial measures may lead to attainment in the future. The establishment of a potential beneficial use can have different purposes such as: (1) establishing a water quality goal which must be achieved through control actions in order to re-establish a beneficial use as in No. 4, above, or (2) serving to protect the existing quality of a water source for eventual use.

The water body listings in Tables 5.1-1 and 5.1-2 name all significant surface waters and ground water basins. Maps of the hydrologic units and the ground water basins are included as part of this Basin Plan (see Plates 1A and 2A). Hydrologic units and ground water basins are listed from north to south. Unit and basin numbers are provided in the tables for reference to the Department of Water Resources standardized maps. Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 5.1-1 (i.e., specific surface waters which are not listed have the same beneficial uses as the streams, lakes, wetlands, or reservoirs to which they are tributary). Other minor surface waters, including wetlands, springs, streams, lakes, and ponds, are included under one heading for each hydrologic unit. These minor surface waters have an “X” to designate each potential or existing beneficial use. Also, ground waters which are not a part of the named basins are recognized as potential or existing “municipal and domestic water supply” (MUN). The beneficial uses for ground water which are contained in Table 5.1-2 are for each ground water basin or sub-basin as an entirety. Some ground water basins contain multiple aquifers or a single aquifer with varying water quality which may support different beneficial uses. Therefore, the placing of an “X” in Table 5.1-2 does not indicate that all of the ground waters in that particular location are suitable (without treatment) for a designated beneficial use. However, all waters are designated as MUN unless they have been specifically exempted by the Regional Board through adoption of a Basin Plan amendment after consideration of substantial evidence to exempt such waters (see Sources of Drinking Water Policy in Appendix B). Also, certain surface waters, including internal drainage lakes, may have varying water quality from changes in natural conditions (e.g., change in water volume). The designation of multiple beneficial uses in Table 5.1-1, which may appear conflicting for a particular surface water, indicates existing or probable future beneficial uses that may occur only temporarily.

In most cases, removing a beneficial use designation from Table 5.1-1 will require a Use Attainability Analysis (UAA) to be conducted (using USEPA methodology). If there is substantial evidence to remove a use designation from a specific water body, the Regional Board will consider adoption of a Basin Plan amendment to remove a designated beneficial use. However, there are many beneficial uses which are not intended to apply to the entire length of a stream or to a surface water during certain temporal conditions (see above). The beneficial use designations that may be considered for temporary or site specific designation include: IND, PRO, GWR, FRSH, NAV, POW, COLD, MIGR, SPWN, and WQE. For these situations, Regional Board staff, in order to make a recommendation to the Regional Board, will rely on site-specific documentation which may include: water quality data, field data, professional opinions (from Regional Board staff or other state and federal agencies, also universities), and other evidence collected by a discharger. The most sensitive existing or probable future use will be protected. Uses that did not exist, do not exist and will not exist in the foreseeable future, will not be required to be protected. The MUN designation will not be considered for a site-specific designation since it is designated for all waters, unless specifically exempted by the Regional Board in accordance with the State Board's Sources of Drinking Water Policy.

Water Quality Objectives

The Porter-Cologne Water Quality Control Act defines “water quality objectives” as the allowable “limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.” Thus, water quality objectives are intended to protect the public health and welfare, and to maintain or enhance water quality in relation to the existing and/or potential beneficial uses of the water. The objectives, when compared to future water quality data, will also provide the basis for detecting any future trend toward degradation or enhancement of basin waters.

Water quality objectives apply to "waters of the State" and "waters of the United States." Some of the waters of the Lahontan Region are interstate waters, flowing into or from either Nevada or Oregon. The Lahontan Regional Board has a responsibility to ensure that waters leaving the state meet the water quality standards of the receiving state (see the discussion of "Interstate Issues" in the Introduction to Chapter 4).

Water Quality Objectives and Effluent Limits

It is important to recognize the distinction between ambient water quality objectives and "effluent limitations" or "discharge standards" which are conditions in state and federal waste discharge permits. Effluent limitations are established in permits both to protect water for beneficial uses within the area of the discharge, and to meet or achieve water quality objectives. Stormwater effluent limitations for the Lake Tahoe HU are discussed in Section 5.6.

Methodology for Establishing Water Quality Objectives

Water quality objectives are numerical or narrative. Narrative and numerical water quality objectives define the upper concentration or other limits that the Regional Board considers protective of beneficial uses.

The general methodology used in establishing water quality objectives involves, first, designating beneficial water uses; and second, selecting and quantifying the water quality parameters necessary to protect the most vulnerable (sensitive) beneficial uses.

In establishing water quality objectives, factors in addition to designated beneficial uses are considered. These factors include environmental and economic considerations specific to each hydrologic unit, the need to develop and use recycled water, as well as the level of water quality that could be achieved through coordinated control of all factors that affect water quality in an area. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, and that may be reasonably controlled.

Water quality objectives can be reviewed and, if appropriate, revised by the Lahontan Regional Board. Revised water quality objectives would then be adopted as part of this Basin Plan by amendment. Opportunities for formal public review of water quality objectives will be available at a minimum of once every three years following the adoption of this Basin Plan to determine the need for further review and revision.

USEPA water quality criteria and State Water Resources Control Board policies may result in statewide water quality objectives that are more restrictive than regionwide or waterbody-specific water quality objectives within this Basin Plan. For example, the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* implements the USEPA National Toxics Rule and the California Toxics Rule. The most stringent criterion or objective applies.

Establishment of Numerical Objectives for Specific Water Bodies

Where available data were sufficient to define existing ambient levels of constituents, these levels were used in developing the numerical objectives for specific water bodies. By utilizing annual mean, 90th percentile values and flow-weighted values, the objectives are intended to be realistic within the variable conditions imposed by nature. This approach provides an opportunity to detect changes in water quality as a function of time through comparison of annual means, while still accommodating variations in the measured constituents.

Objectives for specific water bodies generally reflect either historical (often pre-1975) water quality, or the levels of constituents needed to protect the most sensitive beneficial use. The waters of the Lake Tahoe Basin are generally of very high quality; however, in a few water bodies, State water quality objectives may be exceeded due to natural causes. For example, some wells in South Lake Tahoe have concentrations of uranium exceeding the drinking water maximum contaminant level. The Regional Board recognizes that such violations may occur, and will assess compliance with the objectives on a case-by-case basis.

Most of the numerical water quality objectives for Lake Tahoe and its tributaries, and the narrative objectives for clarity and productivity, are based on historical high quality. In 1980, the State Board revised the numerical objectives set for Lake Tahoe and its tributaries in the 1975 North Lahontan Basin Plan, with some modifications clarifying the standards for Lake Tahoe and revising the standards for tributary streams. The clarity and productivity objectives were based on monitoring data from the late 1960s and early 1970s and were set to stabilize the quality of Lake Tahoe at levels recorded in those years. The revised water quality objectives for tributary streams were based on data collected during TRPA's Section 208 planning effort in the 1970s for streams classified as draining disturbed or undisturbed watersheds. Weighted mean concentrations were determined for total nitrogen, total phosphorus, and iron for each tributary stream. For a stream draining an undisturbed watershed, the water quality objectives for these three parameters in Table 5.1-3 represent the weighted mean concentrations determined for that specific stream. For streams draining disturbed watersheds, the objectives in Table 5.1-3 are based on the overall mean nutrient concentration for all streams draining undisturbed watersheds.

Numerical objectives have not yet been established for all streams tributary to Lake Tahoe in California. TRPA has requested that the Regional Board review and consider revising existing objectives for iron, since recent monitoring data show violations of objectives in some presumably undisturbed water bodies. Regional Board staff propose to review and consider further revision of objectives for tributaries of Lake Tahoe as part of the Triennial Review process as resources allow.

Achieving water quality objectives for tributary streams will also help to protect Lake Tahoe. Tributary objectives are in addition to, not a substitute for the standards for Lake Tahoe. Despite attainment of the standards for a stream, further reductions in the nutrient concentrations in the stream may be required so that the total nutrient load from all streams is reduced enough to prevent deterioration of Lake Tahoe.

Prohibited Discharges

Discharges that cause violation of any narrative or numerical water quality objective are prohibited. (See also Section 5.2, “Waste Discharge Prohibitions.”)

After application of reasonable control measures, ambient water quality shall conform to the narrative and numerical water quality objectives included in this Basin Plan. When other factors result in the degradation of water quality beyond the limits established by these water quality objectives, controllable human activities shall not cause further degradation of water quality in either surface or ground waters.

Compliance with Water Quality Objectives

The purpose of text, in italics, following certain water quality objectives is to provide specific direction on compliance with the objective. General direction on compliance with objectives is described in the last section of this Chapter. It is not feasible to cover all circumstances and conditions which could be created by all discharges. Therefore, it is within the discretion of the Regional Board to establish other, or additional, direction on compliance with objectives of this Basin Plan. The purpose of the italic text is to provide direction only, and **not** to specify method of compliance.

Antidegradation Policy

This policy applies to **all** waters of the Lahontan Region (including surface waters, wetlands, and ground waters.)

On October 28, 1968, the State Water Resources Control Board adopted Resolution No. 68-16, “Statement of Policy with Respect to Maintaining High Quality of Waters in California,” establishing an antidegradation policy for the protection of water quality. This policy requires continued maintenance of existing high quality waters. Whenever the existing quality of water is better that the quality of water established in this Basin Plan as objectives (both narrative and numerical), such existing quality shall be maintained unless appropriate findings are made under the policy. The U.S. Environmental Protection Agency, Region IX, has also issued detailed guidelines for implementation of federal antidegradation regulations for surface waters (40 CFR § 131.12). For more information, see the discussion on “General Direction Regarding Compliance With Objectives” at the end of this Chapter.

The State Board designated Lake Tahoe an Outstanding National Resource Water (ONRW) in 1980, both for its recreational and its ecological value, and stated:

“Viewed from the standpoint of protecting beneficial uses, preventing deterioration of Lake Tahoe requires that there be no significant increase in algal growth rates. Lake Tahoe's exceptional recreational value depends on enjoyment of the scenic beauty imparted by its clear, blue waters. ...Likewise, preserving Lake Tahoe's ecological value depends on maintaining the extraordinarily low rates of algal growth which make Lake Tahoe an outstanding ecological resource.”

Section 114 of the federal Clean Water Act also indicates the need to “preserve the fragile ecology of Lake Tahoe.”

Water Quality Objectives for Surface Waters

(See Tables 5.1-3 through 5.1-6)

Unless otherwise specified, the following objectives (listed alphabetically) apply to all surface waters of the Lahontan Region, including the Lake Tahoe HU (see Figures 5-3 and 5-4):

Ammonia

The neutral, unionized ammonia species ($NH_3°$) is highly toxic to freshwater fish. The fraction of toxic $NH_3°$ to total ammonia species ($NH_4^+ + NH_3°$) is a function of temperature and pH. Tables 5.1-5 and 5.1-6 were derived from USEPA ammonia criteria for freshwater. Ammonia concentrations shall not exceed the values listed for the corresponding conditions in these tables. For temperature and pH values not explicitly in the these tables, the most conservative value neighboring the actual value may be used or criteria can be calculated from numerical formulas developed by the USEPA. For one-hour (1h-NH_3) and four-day (4d-NH_3) unionized ammonia criteria, the following equations apply:

$$1h\text{-}NH_3 = 0.52 \div (FT \times FPH \times 2)$$

$$4d\text{-}NH_3 = 0.80 \div (FT \times FPH \times RATIO)$$

where:

$FT = 10^{[0.03(20\text{-}TCAP)]}$
for: $TCAP \le T \le 30$

$FT = 10^{[0.03(20\text{-}T)]}$
for: $0 \le T \le TCAP$

$FPH = (1+10^{(7.4\text{-}pH)}) \div 1.25$
for: $6.5 \le pH \le 8.0$

$FPH = 1$
for: $8.0 \le pH \le 9.0$

$RATIO = 20.25 \times (10^{(7.7\text{-}pH)}) \div (1+10^{(7.4\text{-}pH)})$
for: $6.5 \le pH \le 7.7$

$RATIO = 13.5$
for: $7.7 \le pH \le 9.0$

and:

T = temperature in °C

TCAP = temperature cap in °C

For 1h-NH_3, TCAP is 20°C with salmonids present and 25°C with salmonids absent. For 4d-NH_3, TCAP is 15°C with salmonids present and 20°C with salmonids absent.

For interpolation of total ammonia ($NH_4^+ + NH_3°$) criteria, the following equations can be used:

$$n_{1h} = 1h\text{-}NH_3 \div f, \text{ or } n_{4d} = 4d\text{-}NH_3 \div f$$

where:

n_{1h} is the one-hour criteria for total ammonia species ($NH_4^+ + NH_3°$)

n_{4d} is the four-day criteria for total ammonia species ($NH_4^+ + NH_3°$)

$$f = 1 \div (10^{(pKa\text{-}pH)}+1)$$

$$pKa = 0.0901821 + [2729.92 \div (T+273.15)]$$

and:

pKa is the negative log of the equilibrium constant for the $NH_4^+ \rightleftharpoons NH_3° + H^+$ reaction

f is the fraction of unionized ammonia to total ammonia species: $[NH_3° \div (NH_4^+ + NH_3°)]$

Values outside of the ranges 0-30°C or pH 6.5-9.0 cannot be extrapolated from these relationships. Site-specific objectives must be developed for these conditions. A microcomputer spreadsheet to calculate ammonia criteria was developed by Regional Board staff. An example of output from this program is given in Table 5.1- 7. Contact the Regional Board if a copy is desired.

Bacteria, Coliform

Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.

The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 ml, nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml. *The log mean shall ideally be based on a minimum of not less than five samples collected as evenly spaced as practicable during any 30-day period. However, a log mean concentration exceeding 20/100 ml for any 30-day period shall indicate violation of this objective even if fewer than five samples were collected.*

Biostimulatory Substances

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.

Chemical Constituents

Waters designated as MUN shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in the following provisions of Title 22 of the California Code of Regulations which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 64444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges). This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Waters designated as AGR shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses (i.e., agricultural purposes).

Waters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses.

Chlorine, Total Residual

For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 mg/L or a maximum value of 0.003 mg/L. Median values shall be based on daily measurements taken within any six-month period.

Color

Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.

Dissolved Oxygen

The dissolved oxygen concentration, as percent saturation, shall not be depressed by more than 10 percent, nor shall the minimum dissolved oxygen concentration be less than 80 percent of saturation.

For waters with the beneficial uses of COLD, COLD with SPWN, WARM, and WARM with SPWN, the minimum dissolved oxygen concentration shall not be less than that specified in Table 5.1-8.

Floating Materials

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect the water for beneficial uses.

For natural high quality waters, the concentrations of floating material shall not be altered to the extent that such alterations are discernable at the 10 percent significance level.

Oil and Grease

Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses.

For natural high quality waters, the concentration of oils, greases, or other film or coat generating substances shall not be altered.

Nondegradation of Aquatic Communities and Populations

All wetlands shall be free from substances attributable to wastewater or other discharges that produce adverse physiological responses in humans, animals, or plants; or which lead to the presence of undesirable or nuisance aquatic life.

All wetlands shall be free from activities that would substantially impair the biological community as it naturally occurs due to physical, chemical and hydrologic processes.

pH

In fresh waters with designated beneficial uses of COLD, changes in normal ambient pH levels shall not exceed 0.5 pH units. For all other waters, the pH shall not be depressed below 6.5 nor raised above 8.5.

The Regional Board recognizes that some waters of the Region may have natural pH levels outside of the 6.5 to 8.5 range. Compliance with the pH objective for these waters will be determined on a case-by-case basis.

Radioactivity

Radionuclides shall not be present in concentrations which are deleterious to human, plant, animal, or aquatic life nor which result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant, animal, or aquatic life.

Waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations which is incorporated by reference into this plan. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Sediment

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses.

Settleable Materials

Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or that adversely affects the water for beneficial uses. For natural high quality waters, the concentration of settleable materials shall not be raised by more than 0.1 milliliter per liter.

Suspended Materials

Waters shall not contain suspended materials in concentrations that cause nuisance or that adversely affects the water for beneficial uses.

For natural high quality waters, the concentration of total suspended materials shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Suspended Sediment

Suspended sediment concentrations in streams tributary to Lake Tahoe shall not exceed a 90th percentile value of 60 mg/L. (This objective is equivalent to the Tahoe Regional Planning Agency's regional "environmental threshold carrying capacity" standard for suspended sediment in tributaries.) *The Regional Board will consider revision of this objective in the future if it proves not to be protective of beneficial uses or if review of monitoring data indicates that other numbers would be more appropriate for some or all streams tributary to Lake Tahoe.*

Taste and Odor

Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses. For naturally high quality waters, the taste and odor shall not be altered.

Temperature

The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such an alteration in temperature does not adversely affect the water for beneficial uses.

For waters designated COLD, the temperature shall not be altered.

Temperature objectives for COLD interstate waters and WARM interstate waters are as specified in the "Water Quality Control Plan for Control of Temperature in The Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" including any revisions. This plan is summarized in Chapter 6 (Plans and Policies) and included in Appendix B.

Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. *Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration and/or other appropriate methods as specified by the Regional Board.*

The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent with the requirements for "experimental water" as defined in *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, et al. 1998).

Turbidity

Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.

Water Quality Objectives for Certain Water Bodies (Figure 5.1-1)

The following objectives (listed alphabetically) are in addition to the regionwide objectives specified above. These objectives apply to certain surface waters of the Lake Tahoe Hydrologic Unit (HU). Tables 5.1-3 and 5.1-4 also contain additional water quality objectives for certain water bodies within the Lake Tahoe HU.

Algal Growth Potential

For Lake Tahoe, the mean algal growth potential at any point in the Lake shall not be greater than twice the mean annual algal growth potential at the limnetic reference station. *The limnetic reference station is located in the north central portion of Lake Tahoe. It is shown on maps in annual reports of the Lake Tahoe Interagency Monitoring Program. Exact coordinates can be obtained from the U.C. Davis Tahoe Research Group.*

Biological Indicators

For Lake Tahoe, algal productivity and the biomass of phytoplankton, zooplankton, and periphyton shall not be increased beyond the levels recorded in 1967-71, based on statistical comparison of seasonal and annual means. *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.*

Clarity

For Lake Tahoe, the vertical extinction coefficient shall be less than 0.08 per meter when measured below the first meter. When water is too shallow to determine a reliable extinction coefficient, the turbidity shall not exceed 3 Nephelometric Turbidity Units (NTU). In addition, turbidity shall not exceed 1 NTU in shallow waters not directly influenced by stream discharges. *The Regional Board will determine when water is too shallow to determine a reliable vertical extinction coefficient based upon its review of standard limnological methods and on advice from the U.C. Davis Tahoe Research Group.*

Conductivity, Electrical

In Lake Tahoe, the mean annual electrical conductivity shall not exceed 95 umhos/cm at 25°C at any location in the Lake.

pH

In Lake Tahoe, the pH shall not be depressed below 7.0 nor raised above 8.4.

Plankton Counts

For Lake Tahoe, the mean seasonal concentration of plankton organisms shall not be greater than 100 per ml and the maximum concentration shall not be greater than 500 per ml at any point in the Lake.

Suspended Sediment

Suspended sediment concentrations in streams tributary to Lake Tahoe shall not exceed a 90th percentile value of 60 mg/L. (This objective is equivalent to the Tahoe Regional Planning Agency's regional "environmental threshold carrying capacity" standard for suspended sediment in tributaries.) *The Regional Board will consider revision of this objective in the future if it proves not to be protective of beneficial uses or if review of monitoring data indicates that other numbers would be more appropriate for some or all streams tributary to Lake Tahoe.*

Transparency

For Lake Tahoe, the annual average Secchi disk deep water transparency shall not be decreased below 29.7 meters, the levels recorded in 1967-71.

Water Quality Objectives That Apply to All Ground Waters

Bacteria, Coliform

In ground waters designated as MUN, the median concentration of coliform organisms over any seven-day period shall be less than 1.1/100 milliliters.

Chemical Constituents

Ground waters designated as MUN shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in the following provisions of Title 22 of the California Code of Regulations which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 64444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges). This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Waters designated as AGR shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses (i.e., agricultural purposes).

Ground waters shall not contain concentrations of chemical constituents that adversely affect the water for beneficial uses.

Radioactivity

Ground waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations which is incorporated by reference into this plan. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Taste and Odor

Ground waters shall not contain taste or odor-producing substances in concentrations that cause nuisance or that adversely affect beneficial uses. For ground waters designated as MUN, at a minimum, concentrations shall not exceed adopted secondary maximum contaminant levels specified in Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges) of Title 22 of the California Code of Regulations which is incorporated by reference into this plan. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

General Direction Regarding Compliance With Objectives

This section includes general direction on determining compliance with the narrative and numerical objectives described in this Chapter. (Specific direction on compliance with certain objectives is included, in italics, following the text of the objective.) It is not feasible to cover all circumstances and conditions which could be created by all discharges. Therefore, it is within the discretion of the Regional Board to establish other, or additional, direction on compliance with objectives of this Plan. Where more than one objective is applicable, the **stricter objective shall apply**. (The only exception is where a regionwide objective has been superseded by the adoption of a site-specific objective by the Regional Board.) Where objectives are not specifically designated, downstream objectives apply to upstream tributaries.

Antidegradation Policy

To implement State Board Resolution No. 68-16, the “Statement of Policy with Respect to Maintaining High Quality Waters in California,” the Regional Board follows guidance such as that in the USEPA's 1993 *Water Quality Standards Handbook* and the State Board's October 7, 1987 legal memorandum titled “Federal Antidegradation Policy” (Attwater 1987). The State Board has interpreted the Resolution No. 68-16 to incorporate the federal antidegradation policy in order to ensure consistency with federal Clean Water Act requirements (see State Board Order No. WQ 86-17, pages 16-24). For detailed information on the federal antidegradation policy, see USEPA Region IX's *Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12* and USEPA's *Questions and Answers on Antidegradation*. The Regional Board's procedures for implementation of State and federal antidegradation policies are summarized below. It is important to note that the federal policy applies only to surface waters, while the State policy applies to both surface and ground waters.

Under the State Antidegradation Policy, whenever the existing quality of water is better than that needed to protect all existing and probable future beneficial uses, the existing high quality shall be maintained until or unless it has been demonstrated to the State that any change in water quality will be consistent with the maximum benefit of the people of the State, and will not unreasonably affect present and probable future beneficial uses of such water. Therefore, unless these conditions are met, background water quality concentrations (the concentrations of substances in natural waters which are unaffected by waste management practices or contamination incidents) are appropriate water quality goals to be maintained. If it is determined that some degradation is in the best interest of the people of California, some increase in pollutant level may be appropriate. However, in no case may such increases cause adverse impacts to existing or probable future beneficial uses of waters of the State.

Where the federal antidegradation policy applies, it does not absolutely prohibit any changes in water quality. The policy requires that any reductions in water quality be consistent with the three-part test established by the policy, as described below.

Part One—Instream Uses

[40 CFR § 131.12(a)(1)]

The first part of the test establishes that “existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.” Reductions in water quality should not be permitted if the change in water quality would seriously harm any species found in the water (other than an aberrational species). Waters of this type are generally referred to as “Tier I” waters.

Part Two—Public Interest Balancing

[40 CFR § 131.12(a)(2)]

The second part of the test applies where water quality is higher than necessary to protect existing instream beneficial uses. This part of the test allows reductions in water quality if the state finds “that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located” **and** existing beneficial uses are protected.

Waters of this type are generally referred to as "Tier II" waters.

Part Three—Outstanding National Resource Waters (ONRWs) [40 CFR § 131.12(a)(3)]

The third part of the test established by the federal policy requires that the water quality of the waters which constitute an outstanding national resource be maintained and protected. No permanent or long-term reduction in water quality is allowable in areas given special protection as Outstanding National Resource Waters (48 Fed. Reg. 51402). Waters which potentially could qualify for ONRW designation are generally classified as "Tier III" waters.

Examples of such waters include, but are not limited to, waters of National and State Parks and wildlife refuges, waters of exceptional recreational or ecological significance, and state and federally designated wild and scenic rivers. To date, the only California waters designated as ONRW are Lake Tahoe and Mono Lake. However, other California waters would certainly qualify.

ONRWs may be designated as part of adoption or amendment of water quality control plans. It is important to note that even if no formal designation has been made, lowering of water quality should not be allowed for waters which, because of their exceptional recreational and/or ecological significance, should be given the special protection assigned to ONRWs.

Narrative and Numerical Objectives

The sections below provide additional direction on determining compliance with the narrative and numerical objectives of this Basin Plan.

Pollution and/or Nuisance

In determining compliance with narrative objectives which include the terms "pollution" and or "nuisance," the Regional Board considers the following definitions from the Porter-Cologne Water Quality Control Act.

Pollution -- an alteration of the waters of the State by waste to the degree which unreasonably affects either of the following:

- such waters for beneficial uses.
- facilities which serve these beneficial uses.

"Pollution" may include "contamination." Contamination means an impairment of the quality of the waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. Contamination includes any equivalent effect resulting from the disposal of waste, whether or not waters of the State are affected.

Nuisance -- Anything which meets all of the following requirements:

- Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
- Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
- Occurs during or as a result of the treatment or disposal of wastes.

References to Taste and Odor, Human Health and Toxicity (also see "acute toxicity" and "chronic toxicity," below):

In determining compliance with objectives including references to Taste and Odor, Human Health or Toxicity, the Regional Board will consider as evidence relevant and scientifically valid water quality goals from sources such as drinking water standards from the California Department of Health Services (State "Action Levels"), the National Interim Drinking Water Standards, Proposition 65 Lawful Levels, National Ambient Water Quality Criteria (USEPA's "Quality Criteria for Water" for the years 1986, 1976 and 1972; "Ambient Water Quality Criteria," volumes 1980, 1984, 1986, 1987 and 1989), the National Academy of Sciences' Suggested No-Adverse-Response Levels (SNARL), USEPA's Health and Water Quality Advisories, as well as other relevant and scientifically valid evidence.

References to Agriculture or AGR designations:

In determining compliance with objectives including references to the AGR designated use, the Regional Board will refer to water quality goals and recommendations from sources such as the Food and Agriculture Organization of the United Nations, University of California Cooperative Extension, Committee of Experts, and McKee and Wolf's "Water Quality Criteria" (1963).

References to "Natural High Quality Waters":

The Regional Board generally considers "natural high quality water(s)" to be those waters with ambient water quality equal to, or better than, current drinking water standards. However, the Regional Board also recognizes that some waters with poor chemical quality may support important ecosystems (e.g., Mono Lake).

References to "10 percent significance level":

A statistical hypothesis is a statement about a random variable's probability distribution, and a decision-making procedure about such a statement is a hypothesis test. In testing a hypothesis concerning the value of a population mean, the null hypothesis is often used. The null hypothesis is that there is no difference between the population means (e.g., the mean value of a water quality parameter after the discharge is no different than before the discharge.) First a level of significance to be used in the test is specified, and then the regions of acceptance and rejection for evaluating the obtained sample mean are determined.

At the **10 percent significance level**, assuming normal distribution, the acceptance region (where one would correctly accept the null hypothesis) is the interval which lies under 90 percent of the area of the standard normal curve. Thus, a level of **significance of 10 percent** signifies that when the population mean is correct as specified, the sample mean will fall in the areas of rejection only 10 percent of the time.

If the hypothesis is rejected when it should be accepted, a Type I error has been made. In choosing a **10 percent level of significance**, there are 10 chances in 100 that a Type I error was made, or the hypothesis was rejected when it should have been accepted (i.e., one is 90 percent *confident* that the right decision was made.)

The **10 percent significance level** is often <u>incorrectly</u> referred to as the 90 percent significance level. As explained above, the significance level of a test should be low, and the confidence level of a confidence interval should be high.

References to "Means" (e.g., annual mean, log mean, mean of monthly means), "Medians" and "90th percentile values":

"Mean" is the arithmetic mean of all data. "**Annual mean**" is the arithmetic mean of all data collected in a one-year period. **"Mean of monthly mean"** is the arithmetic mean of 30-day averages (arithmetic means). A logarithmic or "**log mean**" (used in determining compliance with bacteria objectives) is calculated by converting each data point into its log, then calculating the mean of these values, then taking the anti-log of this log-transformed average. The **median** is the value which half of the values of the population exceed and half do not. The **average value** is the arithmetic mean of all data. For a **90th percentile value**, only 10% of data exceed this value.

Compliance determinations shall be based on available analyses for the time interval associated with the discharge. If only one sample is collected during the time period associated with the water quality objective, (e.g., monthly mean), that sample shall serve to characterize the discharge for the entire interval. Compliance based upon multiple samples shall be determined through the application of appropriate statistical methods.

Standard Analytical Methods to Determine Compliance with Objectives

Analytical methods to be used are usually specified in the monitoring requirements of the waste discharge permits. Suitable analytical methods are:

- those specified in 40 CFR Part 136, and/or
- those methods determined by the Regional Board and approved by the USEPA to be equally or more sensitive than 40 CFR Part 136 methods and appropriate for the sample matrix, and/or
- where methods are not specified in 40 CFR Part 136, those methods determined by the Regional Board to be appropriate for the sample matrix

All analytical data shall be reported uncensored with method detection limits and either practical quantitation levels or limits of quantitation identified. Acceptance of data should be based on demonstrated laboratory performance.

For **bacterial analyses**, sample dilutions should be performed so the range of values extends from 2 to 16,000. The detection method used for each analysis shall be reported with the results of the analysis. Detection methods used for coliforms (total and fecal) shall be those presented in *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association et al. 1998), or any alternative method determined by the Regional Board to be appropriate.

For **acute toxicity**, compliance shall be determined by short-term toxicity tests on undiluted effluent using an established protocol (e.g., American Society for Testing and Materials [ASTM], American Public Health Association, USEPA, State Board).

For **chronic toxicity**, compliance shall be determined using the critical life stage (CLS) toxicity tests. At least three approved species shall be used to measure compliance with the toxicity objective. If possible, test species shall include a vertebrate, an invertebrate, and an aquatic plant. After an initial screening period, monitoring may be reduced to the most sensitive species. Dilution and control waters should be obtained from an unaffected area of the receiving waters. For rivers and streams, dilution water should be obtained immediately upstream of the discharge. Standard dilution water can be used if the above sources exhibit toxicity greater than 1.0 Chronic Toxicity Units. All test results shall be reported to the Regional Board in accordance with the “Standardized Reporting Requirements for Monitoring Chronic Toxicity” (State Board Publication No. 93-2 WQ).

Application of Narrative and Numerical Water Quality Objectives to Wetlands

Although not developed specifically for wetlands, many surface water **narrative objectives** are generally applicable to most wetland types. However, the Regional Board recognizes, as with other types of surface waters such as saline or alkaline lakes, that natural water quality characteristics of some wetlands may not be within the range for which the narrative objectives were developed. The Regional Board will consider site-specific adjustments to the objectives for wetlands (bacteria, pH, hardness, salinity, temperature, or other parameters) as necessary on a case-by-case basis.

The **numerical criteria** to protect one or more beneficial uses of surface waters, where appropriate, may directly apply to wetlands. For example, wetlands which actually are, or which recharge, municipal water supplies should meet human health criteria. The USEPA numeric criteria for protection of freshwater aquatic life, as listed in *Quality Criteria for Water—1986*, although not developed specifically for wetlands, are generally applicable to most wetland types. As with other types of surface waters, such as saline or alkaline lakes, natural water quality characteristics of some wetlands may not be within the range for which the criteria were developed. Adjustments for pH, hardness, salinity, temperature, or other parameters may be necessary. The Regional Board will consider developing site-specific objectives for wetlands on a case-by-case basis.

Variances from Water Quality Objectives

The USEPA allows states to grant variances from water quality standards under the narrow circumstances summarized below (USEPA Water Quality Standards Handbook, Second Edition, 1993, Chapter 5). Such variances must be “built into” the standards themselves, and thus variances cannot be granted in California without Basin Plan amendments.

According to the USEPA, variances from standards “are both discharger and pollutant specific, are time-limited, and do not forego the currently designated use”. The USEPA recommends use of variances instead of removal of beneficial uses when the State believes that standards can ultimately be attained. Variances can be used with NPDES permits to ensure reasonable progress toward attainment of standards without violation of Clean Water Act Section 402(a)(1), which requires NPDES permits to meet applicable water quality standards.

The USEPA “has approved State-adopted variances in the past and will continue to do so if:

- each individual variance is included as part of the water quality standard;
- the State demonstrates that meeting the standard is unattainable based on one or more of the grounds outlined in 40 CFR 131.10(g) for removing a designated use;
- the justification submitted by the State includes documentation that treatment more advanced than that required by sections 303(c)(2)(A) and (B) has been carefully considered, and that alternative effluent control strategies have been evaluated;
- the more stringent State criterion is maintained and is binding upon all other dischargers on the stream or stream segment;
- the discharger who is given a variance for one particular constituent is required to meet the applicable criteria for other constituents;
- the variance is granted for a specific period of time and must be rejustified upon expiration but at least every 3 years (Note: the 3-year limit is derived from the triennial review requirements of section 303(c) of the Act.);
- the discharger either must meet the standard upon the expiration of this time period or must make a new demonstration of “unattainability”;
- reasonable progress is being made toward meeting the standards; and
- the variance was subjected to public notice, opportunity for comment, and public hearing. (See section 303(c)(1) and 40 CFR 131.20.) The public notice should contain a clear description of the impact of the variance upon achieving water quality standards in the affected stream segment.”

(The “section” references in the quoted language above are to the Clean Water Act. As used in this language, “criteria” and “criterion” are equivalent to “water quality objective[s].”)

Key to Table 5.1-1

"HU No." This column contains numbers used by the California Department of Water Resources in mapping surface water Hydrologic Units, Hydrologic Areas, and Hydrologic Subareas (watersheds and subwatersheds). See Plate 1A. The Lake Tahoe Basin is divided into three separate Hydrologic Areas, including the lake itself and "North Tahoe" and "South Tahoe" Hydrologic Areas including tributary waters.

"Hydrologic Unit/Subunit/Drainage Feature" This column contains (in bold type) the names of watersheds and subwatersheds corresponding to the Hydrologic Unit numbers in the preceding column, and the names of surface waterbodies, including lakes, streams, and wetlands. Wetlands of the Lake Tahoe Basin were not delineated by the Regional Board's wetlands identification contractor to the same level of detail as those in other parts of the Lahontan Region such as the Owens River HU. Wetland names in this column are generally indicators of location rather than "official" geographic names. More precise information on wetland locations is available in the Regional Board's wetlands database.

"Waterbody Class Modifier" This column includes descriptive information on each waterbody in the preceding column (i.e., distinction between lakes, streams, and wetlands). The modifiers in the entries for "minor wetlands" indicate that such wetlands may include springs, seeps, emergent wetlands, and marshes. The term "emergent" refers to wetlands dominated by erect, rooted, herbaceous aquatic plants such as cattails, which extend above the water surface (Mitsch and Gosselink 1986). Marshes are one type of emergent wetland.

"Beneficial Uses" The subheadings under this heading are abbreviations of beneficial use names which are defined in the text of Section 5.1. An "x" in a column beneath one of these subheadings designates an existing or potential beneficial use for a given waterbody.

"Receiving Water" This column names the waterbody to which a "drainage feature" named at the far left side of the table is tributary.

TABLE 5.1-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAKE TAHOE HU

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 5.1-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
634.00	**LAKE TAHOE HYDROLOGIC UNIT**																								
634.10	**SOUTH TAHOE HYDROLOGIC AREA**																								
	TAHOE MEADOWS WETLANDS	WETLANDS	X				X				X	X				X		X					X	X	
	HEAVENLY VALLEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X		X	X	X			TROUT CREEK
	COLD CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			TROUT CREEK
	TROUT CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			UPPER TRUCKEE RIVER
	SAXON CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			TROUT CREEK
	GRASS LAKE WETLANDS	WETLANDS	X	X			X				X	X	X			X		X	X			X	X	X	
	GRASS LAKE	LAKE	X	X			X				X	X	X			X		X	X			X			GRASS LAKE CREEK
	GRASS LAKE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			UPPER TRUCKEE RIVER
	MEISS MEADOWS/WETLANDS	WETLANDS	X	X			X				X	X				X		X		X		X	X	X	
	MEISS LAKE	LAKE	X	X			X				X	X	X			X		X		X		X			UPPER TRUCKEE RIVER
	UPPER TRUCKEE RIVER	PERENNIAL STREAM	X	X			X		X		X	X	X			X		X			X	X			LAKE TAHOE
	ECHO LAKES	LAKES	X				X		X		X	X	X			X		X				X			ECHO CREEK/U. TRUCKEE RIVER
	UPPER ANGORA LAKE	LAKE	X	X			X		X		X	X	X			X		X				X			LOWER ANGORA LAKE
	LOWER ANGORA LAKE	LAKE	X	X			X		X		X	X	X			X		X				X			ANGORA CREEK
	GLEN ALPINE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			FALLEN LEAF LAKE
	FALLEN LEAF LAKE	LAKE	X						X		X	X	X			X		X				X			TAYLOR CREEK
	TAYLOR CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			LAKE TAHOE
	TAYLOR CREEK MEADOW MARSH	WETLANDS	X	X			X				X	X				X		X		X	X	X	X	X	
	TALLAC CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	CASCADE LAKE	LAKE	X						X		X	X	X			X		X		X		X			CASCADE CREEK
	CASCADE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	MEEKS CREEK MEADOW/WETLANDS	WETLANDS	X	X			X				X	X				X		X					X	X	
	POPE MARSH/WETLANDS	WETLANDS	X				X				X	X				X		X					X	X	
	OSGOOD SWAMP	WETLANDS	X				X				X	X				X		X	X				X	X	
	EAGLE CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	MINOR SURFACE WATERS		X	X			X				X	X	X			X		X				X			
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X	X	X	X	X	X	X	
634.20	**NORTH TAHOE HYDROLOGIC AREA**																								
	LONELY GULCH CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	MEEKS CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			LAKE TAHOE
	GENERAL CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X			X	X			LAKE TAHOE
634.20	**NORTH TAHOE HYDROLOGIC AREA (continued)**																								
	McKINNEY CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE

TABLE 5.1-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAKE TAHOE HU

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 5.1-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES																						RECEIVING WATER
			MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD	
	MADDEN CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			LAKE TAHOE
	BLACKWOOD CREEK	PERENNIAL STREAM	X								X	X	X			X		X			X	X			LAKE TAHOE
	WARD CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X			X	X			LAKE TAHOE
	BURTON CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			LAKE TAHOE
	DOLLAR CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	WATSON CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			LAKE TAHOE
	SNOW CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	CARNELIAN CREEK	PERENNIAL STREAM	X	X			X				X	X	X			X		X				X			LAKE TAHOE
	GRIFF CREEK	PERENNIAL STREAM	X				X				X	X	X			X		X				X			LAKE TAHOE
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X				X			LAKE TAHOE
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X			X	X	X	X	
634.30	**TAHOE LAKE BODY HYDROLOGIC AREA**																								
	LAKE TAHOE	LAKE	X	X			X		X		X	X	X			X		X	X		X	X			TRUCKEE RIVER
	MINOR SURFACE WATERS		X	X			X	X			X	X	X			X		X	X		X	X			
	MINOR WETLANDS	EMERGENT/MARSHES	X	X			X	X			X	X	X			X		X	X		X	X	X	X	

Table 5.1-2
BENEFICIAL USES FOR GROUND WATERS OF THE TAHOE BASIN

BASIN DWR NO.	BASIN NAME	BENEFICIAL USES					
		MUN	AGR	IND	FRSH	AQUA	WILD
6-5.01	TAHOE VALLEY -SOUTH	X	X	X			
6-5.02	TAHOE VALLEY -NORTH	X	X				

Table 5.1-3
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LAKE TAHOE HYDROLOGIC UNIT

See Fig. 5.1-1	Surface Waters	Objective (mg/L except as noted) [1,2]						
		TDS	Cl	SO_4	B	N	P	Fe
1	Lake Tahoe	60 65	3.0 4.0	1.0 2.0	0.01 -	0.15 -	0.008 -	--
2	Fallen Leaf Lake	50 -	0.30 0.50	1.3 1.4	0.01 0.02	See Table 5.1-4 for additional objectives		
3	Griff Creek	80 -	0.40 -	--	--	0.19 -	0.010 -	0.03 -
4	Carnelian Bay Creek	80 -	0.40 -	--	--	0.19 -	0.015 -	0.03 -
5	Watson Creek	80 -	0.35 -	--	--	0.22 -	0.015 -	0.04 -
6	Dollar Creek	80 -	0.30 -	--	--	0.16 -	0.030 -	0.03 -
7	Burton Creek	90 -	0.30 -	--	--	0.16 -	0.015 -	0.03 -
8	Ward Creek	70 85	0.30 0.50	1.4 2.8	--	0.15 -	0.015 -	0.03 -
9	Blackwood Creek	70 90	0.30 -	--	--	0.19 -	0.015 -	0.03 -
10	Madden Creek	60 -	0.10 0.20	--	--	0.18 -	0.015 -	0.015 -
11	McKinney Creek	55 -	0.40 0.50	--	--	0.19 -	0.015 -	0.03 -
12	General Creek	50 90	1.0 1.5	0.4 0.5	--	0.15 -	0.015 -	0.03 -
13	Meeks Creek	45 -	0.40 -	--	--	0.23 -	0.010 -	0.07 -
14	Lonely Gulch Creek	45 -	0.30 -	--	--	0.19 -	0.015 -	0.03 -
	continued...							

Table 5.1-3 (continued)
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LAKE TAHOE HYDROLOGIC UNIT

See Fig. 5.1-1	Surface Waters	Objective (mg/L except as noted) [1,2]						
		TDS	Cl	SO_4	B	N	P	Fe
15	Eagle Creek	35 -	0.30 -	--	--	0.20 -	0.010 -	0.03 -
16	Cascade Creek	30 -	0.40 -	--	--	0.21 -	0.005 -	0.01 -
17	Tallac Creek	60 -	0.40 -	--	--	0.19 -	0.015 -	0.03 -
18	Taylor Creek	35 -	0.40 0.50	--	--	0.17 -	0.010 -	0.02 -
19	Upper Truckee River	55 75	4.0 5.5	1.0 2.0		0.19 -	0.015 -	0.03 -
20	Trout Creek	50 60	0.15 0.20	--	--	0.19 -	0.015 -	0.03 -

[1] Annual average value/90th percentile value.
[2] Objectives are as mg/L and are defined as follows:
B Boron
ClChloride
SO_4 Sulfate
Fe Iron, Total
N Nitrogen, Total
P Phosphorus, Total
TDS Total Dissolved Solids (Total Filterable Residues)

Table 5.1-4
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
FALLEN LEAF LAKE, LAKE TAHOE HYDROLOGIC UNIT

Constituent	Objective (See Fig. 5.1-1, location 2)
pH[a]	6.5 - 7.9
Temperature[b]	Hypolimnion - ≤15ºC Bottom (105m) - ≤7.5ºC at no time shall water be increased by more than 2.8ºC (5ºF).
Dissolved oxygen[c]	% saturation above 80% and DO >7 mg/L except if saturation exceeds 80% DO at bottom (105m) > 6mg/L
Total nitrogen[d]	0.087[e]/0.114[f]/0.210[g]
Dissolved inorganic - N[h]	0.007 / 0.010 / 0.023
Total phosphorus	0.008 / 0.010 / 0.018
Soluble reactive - P	0.001 / 0.002 / 0.009
Soluble reactive iron	0.004 / 0.005 / 0.012
Total reactive iron	0.005 / 0.007 / 0.030
Chlorophyll-a [ij]	0.6 / 0.9 / 1.5
Clarity - Secchi depth[k] - Vertical extinction coefficient	 18.5 / 16.0[l] / 13.6[m] 0.146 / 0.154 / 0.177[n]
Phytoplankton cell counts[o]	219 / 280 / 450

a 0.5 units above and 0.5 units below 1991 maximum and minimum values. Also reflects stability of this constituent throughout the year.

b Based on 1991 data. Indicates that if temperature in the hypolimnion during the summer exceeds 15ºC or if the water at 105m exceeds 7.5ºC this would constitute a significant change from existing conditions. Unless there is a anthropogenic source of thermal effluent, which does not currently exist, changes in water temperature in Fallen Leaf Lake are natural. Objectives apply at any time during the defining period.

c Based on coldwater habitat protection and 1991 data base. The need for an objective for the bottom (105m) results from the desire to control primary productivity and deposition of organic matter on the bottom. A decline in bottom DO to below 6 mg/L would indicate a fundamental shift in the trophic state of Fallen Leaf Lake.

d Because of the similarity between the mid-lake and nearshore sites, Fallen Leaf Lake objectives for N, P and Fe are based on the combined mid-lake 8 m and 45 m, and nearshore 8 m concentrations. Units are mg N/L, mg P/L and mg Fe/L.

e Mean annual concentration (May - October) unless otherwise noted.

f 90th percentile value unless otherwise noted.

g Maximum allowable value; 1.5 times the maximum 1991 value. No single measurement should exceed this value unless otherwise noted.

h DIN = NO_3+NO_2+NH_4

i Corrected for phaeophytin degradation pigments.

j Units are µg chl-a/L.

k Units are meters.

l 10th percentile since clarity increases with increasing Secchi depth.

m Represents 15% loss of clarity from 10th or 90th percentile value.

n Calculated in the photic zone between 1 m below surface to 35 m. Units are per meter.

o Units are cells per milliliter.

Figure 5.1-1
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LAKE TAHOE HYDROLOGIC UNIT

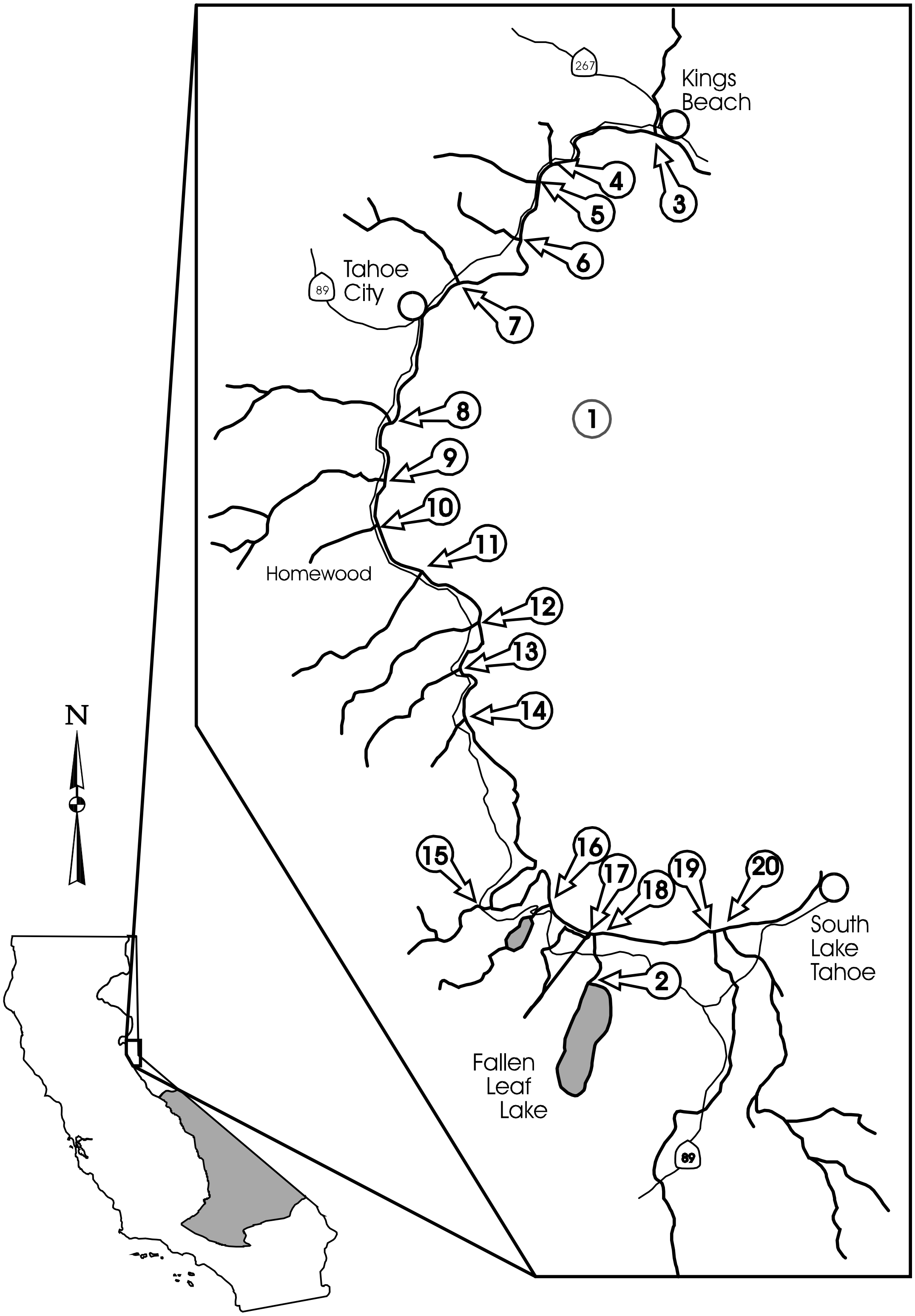


Table 5.1-5
ONE-HOUR AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters Designated as COLD, COLD with SPWN, COLD with MIGR (Salmonids or other sensitive coldwater species present)

	Temperature, °C						
pH	0	5	10	15	20	25	30
Un-ionized Ammonia (mg/liter NH_3)							
6.50	0.0091	0.0129	0.0182	0.026	0.036	0.036	0.036
6.75	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
7.00	0.023	0.033	0.046	0.066	0.093	0.093	0.093
7.25	0.034	0.048	0.068	0.095	0.135	0.135	0.135
7.50	0.045	0.064	0.091	0.128	0.181	0.181	0.181
7.75	0.056	0.080	0.113	0.159	0.22	0.22	0.22
8.00	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.25	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.50	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.75	0.065	0.092	0.130	0.184	0.26	0.26	0.26
9.00	0.065	0.092	0.130	0.184	0.26	0.26	0.26
Total Ammonia (mg/liter NH_3)							
6.50	35	33	31	30	29	20	14.3
6.75	32	30	28	27	27	18.6	13.2
7.00	28	26	25	24	23	16.4	11.6
7.25	23	22	20	19.7	19.2	13.4	9.5
7.50	17.4	16.3	15.5	14.9	14.6	10.2	7.3
7.75	12.2	11.4	10.9	10.5	10.3	7.2	5.2
8.00	8.0	7.5	7.1	6.9	6.8	4.8	3.5
8.25	4.5	4.2	4.1	4.0	3.9	2.8	2.1
8.50	2.6	2.4	2.3	2.3	2.3	1.71	1.28
8.75	1.47	1.40	1.37	1.38	1.42	1.07	0.83
9.00	0.86	0.83	0.83	0.86	0.91	0.72	0.58

1 To convert these values to mg/liter N, multiply by 0.822
2 Source: U. S. Environmental Protection Agency. 1986. Quality criteria for water, 1986. EPA 440/5-86-001.

Table 5.1-6
FOUR DAY AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters Designated as COLD, COLD with SPWN, COLD with MIGR (Salmonids or other sensitive coldwater species present)

	Temperature, °C						
pH	0	5	10	15	20	25	30
Un-ionized Ammonia (mg/liter NH_3)							
6.50	0.0008	0.0011	0.0016	0.0022	0.0022	0.0022	0.0022
6.75	0.0014	0.0020	0.0028	0.0039	0.0039	0.0039	0.0039
7.00	0.0025	0.0035	0.0049	0.0070	0.0070	0.0070	0.0070
7.25	0.0044	0.0062	0.0088	0.0124	0.0124	0.0124	0.0124
7.50	0.0078	0.0111	0.0156	0.022	0.022	0.022	0.022
7.75	0.0129	0.0182	0.026	0.036	0.036	0.036	0.036
8.00	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.25	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.50	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.75	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
9.00	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
Total Ammonia (mg/liter NH_3)							
6.50	3.0	2.8	2.7	2.5	1.76	1.23	0.87
6.75	3.0	2.8	2.7	2.6	1.76	1.23	0.87
7.00	3.0	2.8	2.7	2.6	1.76	1.23	0.87
7.25	3.0	2.8	2.7	2.6	1.77	1.24	0.88
7.50	3.0	2.8	2.7	2.6	1.78	1.25	0.89
7.75	2.8	2.6	2.5	2.4	1.66	1.17	0.84
8.00	1.82	1.70	1.62	1.57	1.10	0.78	0.56
8.25	1.03	0.97	0.93	0.90	0.64	0.46	0.33
8.50	0.58	0.55	0.53	0.53	0.38	0.28	0.21
8.75	0.34	0.32	0.31	0.31	0.23	0.173	0.135
9.00	0.195	0.189	0.189	0.195	0.148	0.116	0.094

1 To convert these values to mg/liter N, multiply by 0.822.

2 Source: U. S. Environmental Protection Agency. 1992. Revised tables for determining average freshwater ammonia concentrations.

Table 5.1-7
EXAMPLE AMMONIA SPREADSHEET OUTPUT
(USEPA AMMONIA CRITERIA CALCULATOR*)

Required user inputs: 1-h Temp. Cap = 20^o; 4-d Temp. Cap = 15^o; Temp., ^{o}C = 10; pH = 7.0

One-hour criteria not to exceed, mg/L as NH_3

	0<T<TCAP			TCAP<T<30		
Parameter	6.5<pH<7.7	7.7<pH<8.0	8.0<pH<9.0	6.5<pH<7.7	7.7<pH<8.0	8.0<pH<9.0
FT	1.995	1.995	1.995	1.000	1.000	1.000
FPH	2.810	2.810	1.000	2.810	2.810	1.000
Unionized NH_3	0.0464	0.0464	0.1303	0.0925	0.0925	0.2600
Total NH_3+NH_4	25.0369	25.0369	70.3414	49.9552	49.9552	140.3495

Four-day criteria not to exceed, mg/L as NH_3

	0<T<TCAP			TCAP<T<30		
Parameter	6.5<pH<7.7	7.7<pH<8.0	8.0<pH<9.0	6.5<pH<7.7	7.7<pH<8.0	8.0<pH<9.0
FT	1.995	1.995	1.995	1.413	1.413	1.413
FPH	2.810	2.810	1.000	2.810	2.810	1.000
RATIO	28.899	13.500	13.500	28.899	13.500	13.500
Unionized NH_3	0.0049	0.0106	0.0297	0.0070	0.0149	0.0420
Total NH_3+NH_4	2.6657	5.7064	16.0322	3.7654	8.0605	22.6461

Chemical thermodynamic constants**
pKa = 9.731432321
f = 0.001852518

* A Microsoft Excel spreadsheet
Use only that temperature and pH column which applies to the input data
T = Temperature, ^{o}C; TCAP = Temperature Cap, ^{o}C

** pKa: -log K; K is equilibrium constant for ammonium
f is the fraction of unionized NH_3/(Total NH_3+NH_4)

Table 5.1-8
WATER QUALITY CRITERIA FOR
AMBIENT DISSOLVED OXYGEN CONCENTRATION[1,2]

	Beneficial Use Class	
	COLD & SPWN[3]	COLD
30 Day Mean	NA[4]	6.5
7 Day Mean	9.5 (6.5)	NA
7 Day Mean Minimum	NA	5.0
1 Day Minimum[5,6]	8.0 (5.0)	4.0

1 From: USEPA. 1986. Ambient water quality criteria for dissolved oxygen. Values are in mg/L.

2 These are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column (SPWN), the figures in parentheses apply.

3 Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching (SPWN).

4 NA (Not Applicable).

5 For highly manipulatable discharges, further restrictions apply.

6 All minima should be considered as instantaneous concentrations to be achieved at all times.

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5.2 WASTE DISCHARGE PROHIBITIONS

Section 13243 of the Water Code gives Regional Boards, in Basin Plans or waste discharge requirements, authority to "specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted." Regional Boards may take enforcement action for violations of waste discharge prohibitions. The Water Code may also contain waste discharge prohibitions that are applicable in the Lahontan Region.

Waste discharge prohibitions applicable within the Lake Tahoe Hydrologic Unit are discussed below. Regionwide prohibitions also apply in the Lake Tahoe Hydrologic Unit. See section 4.1 for regionwide prohibitions.

Waste discharge prohibitions in this chapter do not apply to discharges of stormwater when wastes in the discharge are controlled through the application of management practices or other means and the discharge does not cause a violation of water quality objectives. For existing discharges, waste discharge requirements, including, if authorized, NPDES permits, may contain a time schedule for the application of control measures and compliance with water quality objectives. In general, the Regional Board expects that control measures will be implemented in an iterative manner as needed to meet applicable receiving water quality objectives.

Water Code sections 13950 through 13952.1 include special water quality provisions for the Lake Tahoe Basin related to sewage disposal that function as waste discharge prohibitions. Exemptions to those prohibitions are also identified within those sections of the Water Code.

Discharge Prohibitions for the Lake Tahoe Hydrologic Unit (HU)

1. The discharge attributable to human activities of any waste or deleterious material to surface waters of the Lake Tahoe HU is prohibited.

   An exemption to this prohibition may be granted whenever the Regional Board finds all of the following:

   a. The discharge of waste will not, individually or collectively, directly or indirectly, adversely affect beneficial uses, *and*

   b. There is no reasonable alternative to the waste discharge, *and*

   c. All applicable and practicable control and mitigation measures have been incorporated to minimize potential adverse impacts to water quality and beneficial uses.

2. The discharge attributable to human activities of any waste or deleterious material to land below the highwater rim of Lake Tahoe or within the 100-year floodplain of any tributary to Lake Tahoe is prohibited.

3. The discharge attributable to human activities of any waste or deleterious material to Stream Environment Zones (SEZs) in the Lake Tahoe HU is prohibited.

4. The discharge or threatened discharge attributable to new pier construction of wastes to significant spawning habitats or to areas immediately offshore of stream inlets in Lake Tahoe is prohibited.

The Regional Board may grant exemptions to Prohibitions 2, 3 and 4, above, for projects relocating existing structures below the highwater rim of Lake Tahoe, within the 100-year floodplain, within an SEZ, in spawning habitat or offshore of stream inlets to Lake Tahoe where the area of the structure is relocated on the same parcel or within a defined project area and where the following finding can be made (a "project area" may include multiple adjacent or non-adjacent parcels):

The relocation must result in net or equal water quality benefit. Net or equal benefit is defined as an improvement in or maintenance of function of the associated area below the highwater rim of Lake Tahoe, 100-year floodplain, SEZ, spawning habitat, or stream inlet. Net or equal benefit may include, but is not limited to, one or more of the following:

a. Relocation of structure to an area further away from the stream channel or wetlands;

b. Protection of restored 100-year floodplain or SEZ or an equivalent area (at a 1:1 ratio for floodplain or 1.5:1 for SEZ) of offsite 100-year floodplain or SEZ through deed restriction or conveyance to a mitigation bank or land conservancy or similar. For projects involving disturbance of wetlands, offsite mitigation may involve larger mitigation ratios;

c. For projects involving the relocation of more than 1000 square feet of impervious coverage within a 100-year floodplain or SEZ, a finding, based on a report prepared by a qualified professional, that the relocation will improve the functioning of the floodplain or SEZ and will not negatively affect the quality of existing habitats.

d. For pier relocation projects in spawning habitat, a finding that equivalent or greater area of spawning habitat is restored or created.

The Regional Board may also grant exemptions to Prohibitions 2 and 3, above, under the following circumstances:

(1) For erosion control projects, habitat restoration projects, wetland rehabilitation projects, SEZ restoration projects, and similar projects, programs, and facilities, if all of the following findings can be made:

(a) There is no reasonable alternative, including relocation, that avoids or reduces the extent of encroachment below the highwater rim of Lake Tahoe, within the 100-year floodplain, or within the SEZ; and

(b) Impacts are fully mitigated.

(2) For public outdoor recreation facilities or private piers if all of the following findings can be made:

(a) The project by its nature must be sited below the high water rim of Lake Tahoe, within the 100-year floodplain, or within the SEZ;

(b) There is no feasible alternative that would reduce the extent of encroachment below the highwater rim of Lake Tahoe, within the 100-year floodplain, or within the SEZ;

(c) Impacts are fully mitigated;

(d) SEZs are restored in an amount 1.5 times the area of SEZ disturbed or developed for the project; and

(e) Wetlands are restored in an amount at least 1.5 times the area of wetland disturbed or developed. Certain wetland areas may require restoration of greater than 1.5 times the area disturbed or developed.

(3) For public service facilities if all of the following findings can be made:

(a) The project is necessary for public health, safety or environmental protection;

(b) There is no reasonable alternative, including spans, that avoids or reduces the extent of encroachment;

(c) The impacts are fully mitigated;

(d) SEZ lands are restored in an amount 1.5 times the area of SEZ developed or disturbed by the project; and

(e) Wetlands are restored in an amount at least 1.5 times the area of wetland disturbed or developed. Certain wetlands may require restoration of greater than 1.5 times the area disturbed or developed.

(4) For projects that require access across SEZs or 100-year floodplains to otherwise buildable sites if all of the following findings can be made:

(a) There is no reasonable alternative that avoids or reduces the extent of encroachment within the SEZ or 100-year floodplain;

(b) Impacts are fully mitigated;

(c) SEZ lands are restored in an amount 1.5 times the area of SEZ disturbed or developed by the project; and

(d) Wetlands are restored in an amount at least 1.5 times the area of wetland disturbed or developed by the project. Certain wetland areas may require restoration of greater than 1.5 times the area disturbed or developed.

(5) For repair or replacement of existing structures, provided that the repair or replacement does not involve the loss of additional lake habitat, or SEZ or floodplain function. Prior to granting any such exemption, the Regional Board shall require that all applicable and practicable control and mitigation measures have been incorporated into the project to minimize any discharges of wastes to surface waters during or following construction.

(6) Projects for monitoring or scientific research related to natural resources and

environmental quality. This category includes equipment or structure installation for basic data collection, research, experimental management and resource evaluation activities that do not result in a significant adverse effect on water quality or beneficial uses. Prior to granting any such exemption, the Regional Board shall require that all applicable and practicable control and mitigation measures have been incorporated into the project to minimize any discharges of wastes to surface waters during or following construction.

5. The discharge of garbage or other solid waste to lands within the Lake Tahoe Basin is prohibited.

6. The discharge of industrial waste within the Lake Tahoe Basin is prohibited. Industrial waste is defined as any waste resulting from any process or activity of manufacturing or construction. Stormwater discharges from industrial facilities are not prohibited when wastes in the discharge are controlled through the application of management practices or other means and the discharge does not cause a violation of water quality objectives.

General Guidance for Prohibition Exemptions

Full mitigation of impacts, as used in the findings above, includes, but is not limited to, proper design and implementation of all applicable and practicable control measures and the 1.5:1 restoration requirements for SEZs. However, the 1.5:1 restoration requirement shall not apply to erosion control projects, habitat restoration projects, wetland rehabilitation projects or SEZ restoration projects.

Projects "to control existing sources of erosion or water pollution" are interpreted to include projects that enhance beneficial uses of water bodies, including wetlands. These may include erosion control projects, habitat restoration projects, wetland rehabilitation projects, and similar projects, programs and facilities.

In Regional Board review of proposed exemptions for public or private recreation projects, the determination whether a project, by its very nature, must be built where construction would otherwise be impossible without violation of a prohibition shall be based on the kind of project proposed, not the particular site proposed.

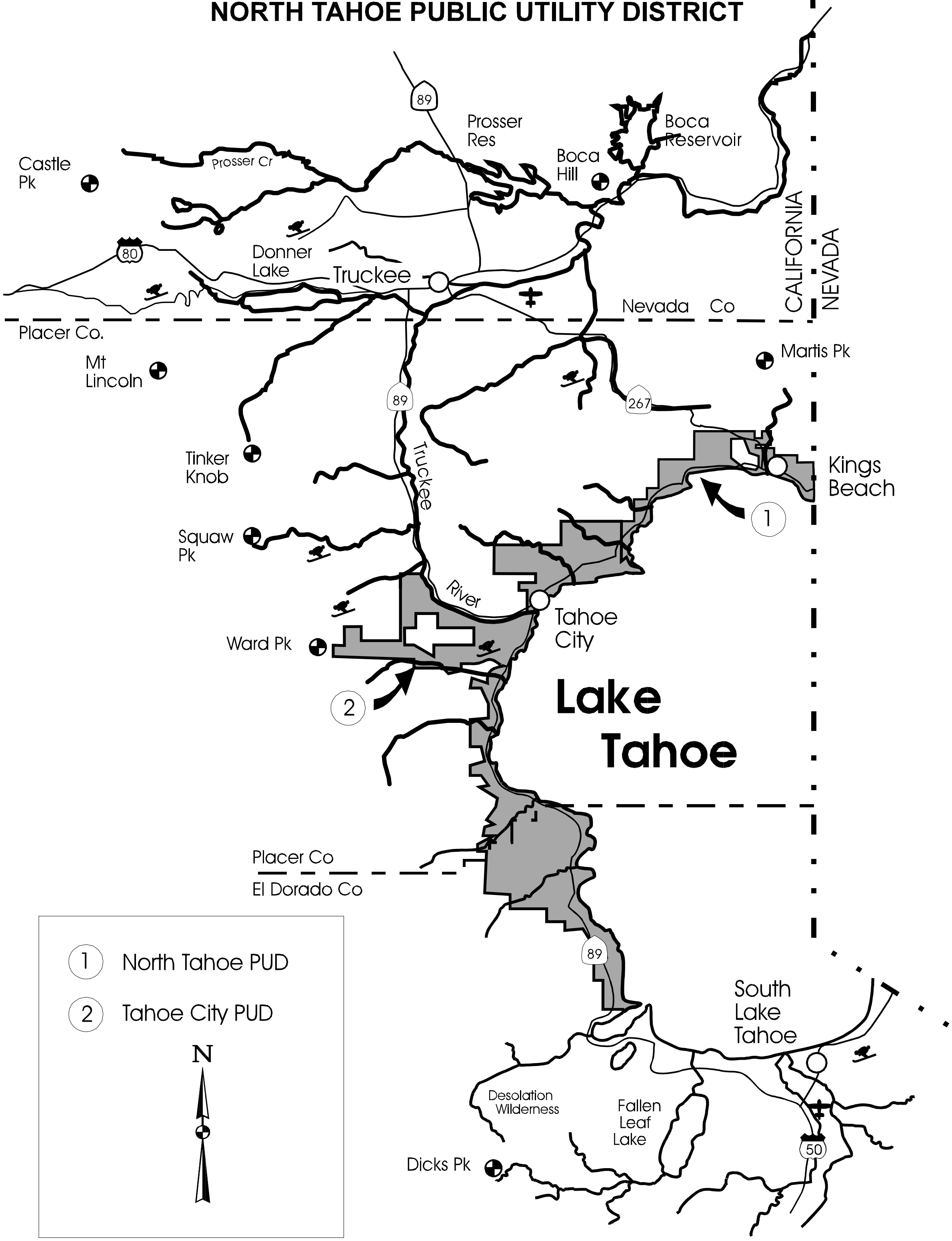
In Regional Board review of proposed exemptions for public health and safety projects, projects necessary to protect public health or safety shall include projects needed to protect the health and safety of occupants of existing structures, including private dwellings, and forest management activities to reduce the risk and severity of wildfires.

Definitions:

"Necessary" shall mean when the appropriate government agency findings that a project is needed to protect public health and safety, or to provide essential services.

"Public recreation" shall mean a project which can be enjoyed by an entire community or neighborhood, or a considerable number of persons. In previously altered floodplain areas (defined as floodplain areas where soils, vegetation and hydrology are found by the Regional Board to have been substantially altered by human activities which occurred prior to June 26, 1975) "public recreation" is limited to public outdoor recreation facilities and/or activities such as hiking trails, bike paths, and similar recreation facilities/activities that do not involve construction of buildings or similar structures.

Figure 5.2-1
TAHOE CITY PUBLIC UTILITY DISTRICT
&
NORTH TAHOE PUBLIC UTILITY DISTRICT



5.3 BEST MANAGEMENT PRACTICES

As noted in the introduction to Chapter 4 of this Basin Plan, Best Management Practices (BMPs) are:

“methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during and after pollution producing activities to reduce or eliminate the introduction of pollutants into receiving waters”

(40 CFR § 103.2[m])

The State Water Resources Control Board has historically certified BMPs for use in California as part of its approval of water quality management plans prepared by other agencies, although they can be approved separately. The State Board first adopted a statewide *Nonpoint Source Management Plan* in 1988. In 2000, this plan was replaced by the *Plan for California’s Nonpoint Source Pollution Control Program.* In 2004 the State Board adopted a “Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program.” This policy summarizes the authority of the State and Regional Boards to control nonpoint source discharges under the Porter-Cologne Act.

All current and proposed nonpoint source discharges that could affect the quality of waters of the state should be regulated under WDRs, waivers of WDRs, waste discharge prohibitions, or some combination of these regulatory tools. The State and Regional Boards also implement a broad program of outreach, education, technical assistance and financial incentives. This program is supplemented by collaborative activities with other agencies and non-governmental organizations to facilitate control of nonpoint sources.

The use of BMPs is required under stormwater NPDES permits, although the State and Regional Boards cannot specify the particular BMPs to be selected. Because of the sensitivity of Lake Tahoe and tributary waters, the State Board adopted the following mandatory requirement for BMPs in 1980:

“For construction in the Tahoe Basin allowed under this plan, the structures or facilities built must incorporate best management practices to control erosion and surface runoff.”

Specific examples of BMPs given were slope stabilization, protective surface cover or vegetation, and adequate drainage facilities.

This Basin Plan continues the 1980 requirement for BMPs, and the endorsement of the Tahoe Regional Planning Agency's *Best Management Practices Handbook*. Most practices in the Handbook are concerned directly with erosion and stormwater control, but it also addresses other topics such as dredging and antifouling coatings on boats.

The use of BMPs does **not** provide assurance of compliance with concentration-based effluent limitations or TMDL load allocation requirements. Compliance with water quality discharge standards can only be determined on a site-by-site basis.

The Regional Board may consider approval of alternative management practices for use in specific projects on a case-by-case basis. TRPA may also approve alternative BMPs to meet water quality standards when special circumstances occur. Such circumstances may include but are not limited to: streets, highways, and bike trails, existence of high water tables, unusual upstream or downstream flow conditions, and the presence of unusual concentrations of pollutants.

Both the Regional Board and TRPA require a regional grading deadline. Grading, filling, and clearing of vegetation that disturbs soil, and other disturbances of soil are prohibited during inclement weather and for the resulting period of time when the site is covered with snow or in a saturated, muddy or unstable condition. Special regulations and construction techniques will apply to construction activities occurring between October 15 and May 1. All project sites must be adequately winterized by October 15 as a condition for continued work on the site. The Executive Officer may permit exceptions to this grading deadline when finding that controls are in place to protect water quality.

The BMP Handbook also identifies the 20-year, 1-hour design storm for stormwater control facilities, as specified in the TRPA Code of Ordinances (see the section of this Chapter on stormwater problems).

The Lahontan Regional Board requires the use of BMPs in its waste discharge permits for new Tahoe Basin projects, and may issue waste discharge permits to require the “retrofit” of BMPs to existing developed or disturbed sites that are causing water quality problems. Retrofit is also addressed in the areawide municipal stormwater NPDES permits (see the discussions of stormwater later in this Chapter). The Regional Board prefers that detailed, design-level mitigation proposals, including proposed BMPs, be submitted as early as possible in the review process for waste discharge permits.

Under TRPA's Regional Plan, all persons who own land, and all public agencies which manage public land, are required to install and maintain BMPs. The Regional Plan requires that TRPA permits for new projects that modify structures or establish land coverage shall require application of BMPs to the area affected by the project. As part of its permitting process, TRPA also requires the preparation of a plan and schedule for retrofit of BMPs to the remainder of the parcel.

BMPs for specific types of water quality problems (e.g., problems associated with livestock grazing) are discussed in greater detail in separate sections of this Chapter, below.

5.4 LAND CAPABILITY AND COVERAGE LIMITATIONS

In 1980, the State Board determined that limits on land disturbance and impervious surface coverage are necessary to prevent further increases in nutrient loading to Lake Tahoe from erosion and stormwater runoff. These limits are implemented largely through the land capability system and associated land use restrictions and discharge prohibitions. The Tahoe Regional Planning Agency implements a complex set of land coverage rules through its Regional Plan ordinances.

A system developed by the USFS in 1971, in cooperation with TRPA, provides a relative quantification of tolerance of land in the Lake Tahoe Basin to human disturbance (Bailey 1974). The Lake Tahoe Basin land capability system should not be confused with the U.S. Department of Agriculture system used to classify the suitability of agricultural lands for growing crops. It should also not be confused with the more recent USFS “Cumulative Watershed Effects” methodology (USFS 1988), which provides a different way to assess the sensitivity of watersheds to disturbance (see the discussion of ski areas later in this Chapter).

The land coverage rules are implemented through TRPA and local government programs. The Regional Board implements prohibitions on waste discharges in 100-year floodplains and Stream Environment Zones that reduce land disturbance and coverage that may adversely affect water quality and the beneficial uses of waters.

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5.5 REMEDIAL PROGRAMS AND OFFSET

The water quality impacts of current watershed disturbance will continue to be felt for years to come unless remedial projects are implemented to offset their impacts. In 1980, the State Board adopted prohibitions against discharges or threatened discharges from new development that is not offset by remedial work, and directed the Lahontan Regional Board to adopt an offset policy or approve such a policy if adopted by another agency.

A variety of TRPA programs function to offset the impacts of past development, including excess coverage mitigation, transfer of development rights, and requirements for remedial work as a condition of approval of permits for new or remodeled development.

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5.6 STORMWATER PROBLEMS AND CONTROL MEASURES

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 and continued soil disturbance associated with developed land_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 fine sediment particles in stormwater. Impervious surfaces collect pollutants from vehicles and atmospheric sources and discharge them in stormwater. Infiltration of precipitation is greatly reduced; surface runoff dramatically increases, and downstream rill and gully erosion are increased. Stormwater from some land use types, such as golf courses and other areas of heavy fertilizer use, may be particularly rich in nutrients.

Chapter 4 of this Basin Plan includes a more general discussion of stormwater problems and regionwide control measures. Most of the control measures discussed in this Chapter (including limits on development of fragile lands and on total impervious surface coverage, remedial erosion control, excess coverage mitigation and SEZ restoration programs, fertilizer management, and requirements for use of BMPs for erosion and drainage control) are meant to prevent or mitigate stormwater impacts.

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, Lake Tahoe TMDL stormwater requirements, stormwater permits and areawide stormwater treatment systems.

Effluent Limitations

In 1980, the State Board adopted an earlier version of the stormwater effluent limitations set forth in Table 5.6-1. 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 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.

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.

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.

In baseline estimates, the largest source of fine sediment particles is runoff from developed urban lands, 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 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 Pollutant Load Reduction Plan (PLRP) to guide stormwater activities and project implementation. The PLRP shall describe how the 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 and all new development projects, existing development retrofit projects, and roadway runoff treatment projects should first evaluate and implement all opportunities to infiltrate stormwater discharges from impervious surfaces.

Municipal and Public Roadway Stormwater Treatment Requirements

Municipal jurisdictions and state highway departments must meet load reduction requirements specified by the Lake Tahoe TMDL (Tables 5.17-2, 5.17-3, and 5.17-4). These agencies will likely consider a variety of different design storms, alternative treatment options, and roadway operations practices, and local ordinances to reduce average annual pollutant loads from selected areas to meet waste load allocation requirements.

The Lake Tahoe TMDL requires Lake Tahoe basin municipalities and the California Department of Transportation to develop and implement comprehensive Pollutant Load Reduction Plans (PLRPs) describing how proposed operations and maintenance activities, capital improvements, facilities retrofit projects, ordinance enforcement, and other actions will meet required pollutant load reduction requirements. PLRPs 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.

New Development, Redevelopment, and Existing Development Stormwater Treatment Requirements

For new development and re-development projects and private property Best Management Practice retrofit efforts, project proponents shall first consider opportunities to infiltrate stormwater runoff from impervious surfaces. At a minimum, permanent stormwater infiltration facilities must be designed and constructed to infiltrate runoff generated by the 20 year, 1-hour storm which equates to approximately one inch of runoff over all impervious surfaces during a 1-hour period.

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 develop and implement 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. For new development or redevelopment projects, site constraints do not include the existing built environment.

In the event that site conditions do not provide opportunities to infiltrate the runoff volume generated by a 20 year, 1-hour storm, project proponents must either (1) meet the numeric effluent limits in Table 5.6-1, or (2) document coordination with the local municipality or state highway department to demonstrate that shared stormwater treatment facilities treating private property discharges and public right-of-way stormwater are sufficient to meet the municipality’s average annual fine sediment and nutrient load reduction requirements.

Stormwater Permits

The Lahontan Regional Board regulates stormwater discharges in the Lake Tahoe Basin through waste discharge requirements for individual dischargers, and through stormwater NPDES permits. As noted in elsewhere in this Chapter, the Regional Board has an active program to ensure the retrofit of BMPs to existing development in the Lake Tahoe Basin. This includes the retrofit of stormwater control measures. The regionwide stormwater NPDES permit program is summarized in Chapter 4; additional information is provided in the statewide BMP Handbooks for municipal, construction, and industrial stormwater NPDES permits (APWA Task Force, 1993).

In 1980, the State Board adopted a requirement that municipal and stormwater NPDES permits be issued for local governments on the California side of the Lake Tahoe Basin (and also recommended that such permits be issued on the Nevada side). This direction preceded the USEPA's development of nationwide regulations for stormwater NPDES permits, and the USEPA was reluctant for such permits to be issued at Lake Tahoe in the early 1980s. The Lahontan Regional Board adopted areawide stormwater waste discharge requirements for local governments (Placer and El Dorado Counties and the City of South Lake Tahoe) in 1984. Following the development of nationwide USEPA stormwater regulations, the Regional Board adopted municipal stormwater NPDES permits for these entities in 1992. (Although the permanent resident populations of these municipalities within the Lake Tahoe Basin are less than 100,000, too small to trigger the automatic requirement for municipal stormwater NPDES permits, the State has determined that stormwater from these areas in a significant contributor of pollutants to Lake Tahoe, and that such permits are necessary.)

Municipal NPDES permits require preparation of stormwater management programs, which must cover the topics summarized in Table 5.6-2. Municipal stormwater management programs must (1) address appropriate planning and construction procedures, (2) ensure BMP implementation, inspection and monitoring at construction sites, and (3) provide for education or training for construction site operators.

Coordination among municipal, industrial and construction stormwater permittees in the same geographic area is expected as part of the NPDES process. As noted in Chapter 4, NPDES permit conditions to control stormwater from state highways may be included in the municipal permit or in a separate permit issued to the highway authority. In 1993, the Regional Board has adopted a separate municipal stormwater NPDES permit for Caltrans to address discharges from California State highways within the Lake Tahoe Basin.

The municipal stormwater NPDES permits for the Lake Tahoe Basin will be important vehicles for ensuring implementation of the remedial Capital Improvements and Stream Environment Zone Restoration Programs and obtaining compliance with BMP retrofit schedules.

The statewide construction stormwater NPDES permit for projects involving one-time or cumulative disturbance of five or more acres does **not** apply within the Lake Tahoe Basin. The Regional Board has the authority to issue individual stormwater NPDES permits for larger Tahoe construction projects, and has adopted a general NPDES permit for such projects, which will be implemented together with current general waste discharge requirements for small commercial, recreation public works, and multifamily residential projects. New projects are reviewed individually, and are required to submit reports of waste discharge before being placed under the general requirements.

There is no heavy manufacturing industry in the Lake Tahoe Basin. However, certain Tahoe dischargers (e.g., recycling facilities, transportation facilities such as the airport and some marinas, and the South Tahoe Public Utility District wastewater treatment plant) are classified as "industrial" for purposes of the statewide industrial stormwater NPDES permit (see the summary of "industrial" categories and the explanation of the statewide NPDES permitting process in Chapter 4). Because of the sensitivity of affected waters, the Regional Board generally adopts and maintains individual stormwater waste discharge requirements for such facilities; individual stormwater NPDES permits may also be issued.

Some of the areas which need surface runoff management systems are on federal land. The sites are operated under special use permits form the USFS, Lake Tahoe Basin Management Unit. The USFS requires, and should continue to require, compliance with BMPs as a condition of these special use permits. The Regional Board may issue individual stormwater NPDES permits to projects on National forest lands if necessary to protect water quality.

Table 5.6-1
Stormwater Effluent Limitations

These limits shall apply in addition to any more stringent effluent limitations for the constituents below, or to limitations for additional constituents, which are necessary to achieve all applicable water quality objectives for specific receiving waters.

Surface Discharges
Surface water runoff which directly enters Lake Tahoe or a tributary thereto, shall meet the following constituent levels:

Constituent	Maximum Concentration
Total Nitrogen as N	0.5 mg/l
Total Phosphate as P*	0.1 mg/l
Total Iron	0.5 mg/l
Turbidity	20 NTU
Grease and Oil	2.0 mg/l

See the text for discussion of the application of these limits to runoff generated on a discharge site in relation to the quality of runoff entering the site.

Runoff Discharged to Infiltration Systems
Waters infiltrated into soils should not contain excessive concentrations of nutrients which may not be effectively filtered out by soils and vegetation. See the text for further discussion of the application of these limits:

Constituent	Maximum Concentration
Total Nitrogen as N	5 mg/l
Total Phosphate as P*	1 mg/l
Total Iron	4 mg/l
Turbidity	200 NTU
Grease and Oil	40 mg/l

Note: *Total phosphate is measured as "total phosphorus."

Table 5.6-2
Activities to be Addressed in Municipal Stormwater Management Programs (Adapted from: APWA Task Force, 1993)

For Residential/Commercial Activities:

- Roadway and drainage facility operations and maintenance programs
- BMP planning for new development and redevelopment projects
- Retrofitting existing or proposed flood control projects with BMPs
- Municipal waste handling and disposal operations
- Pesticide, herbicide, and fertilizer use controls

For Improper Discharge Activities:

- Prevention, detection and removal program for illegal connections to storm drains
- Spill prevention, containment and response program
- Program to promote proper use and disposal of toxic materials
- Reduction of stormwater contamination by leaking/overflowing separate sanitary sewers

For Industrial Activities:

- Inspection and control prioritization and procedures
- Monitoring of significant industrial discharges

For Construction and Land Development Activities:

- Water quality and BMP assessments during site planning
- Site inspection and enforcement procedures
- Training for developers and contractors

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5.7 STREAM ZONES, FLOODPLAINS, SHOREZONES, AND GROUND WATER

Stream Environment Zones

An important component of water quality protection programs in the Lake Tahoe Basin is the preservation and restoration of "Stream Environment Zones" (SEZs). Although SEZs are generally synonymous with "wetlands" and "riparian areas" as discussed elsewhere in this Basin Plan, the criteria for field delineation of SEZs, and SEZ control measures, are unique to the Lake Tahoe Basin (and the Tahoe Regional Planning Agency's "Lake Tahoe Region," which includes part of the Truckee River watershed). One of the differences between the TRPA and federal criteria is the use of both primary and secondary SEZ indicators in the TRPA system.

The Lahontan Regional Board's regionwide control measures for protection and restoration of wetlands are discussed in Chapter 4. In the Lake Tahoe Basin, the Regional Board implements waste discharge prohibitions to protect SEZs; these prohibitions and applicable exemption criteria are discussed in the section of this Chapter on waste discharge prohibitions.

The dense vegetation of SEZs is capable of rapid nutrient uptake and incorporation, while the moist to saturated soils are conducive to denitrification. Studies of nutrient removal by SEZs have shown that:

- Sheet flow across SEZs provides the most effective treatment of water
- The natural treatment capability of SEZs is destroyed where development causes channelization, and
- Channelized SEZs may actually increase sediment and nutrient loading in areas where erosion is caused by concentrated flow.

While SEZs have been found to be very effective in removing nutrients and sediment, during certain rainfall and snowmelt episodes, and following the fall die-off of vegetation, SEZs can also act as a source of nutrients and sediments, especially if they are disturbed. Nevertheless, the effect of an undisturbed SEZ as a sink for nutrients and sediment remains.

In addition to removing nutrients from stormwater, naturally functioning SEZs can reduce flood peaks, diffuse flow, increase evapotranspiration, and increase the retention time of surface water. SEZs also have many other values related to water quality, such as scenic, wildlife, fishery, and vegetation values.

In 1982, following a "threshold study" to evaluate existing environmental conditions, TRPA estimated that 4,376 of the 9,196 acres of SEZs in its jurisdiction had been developed, disturbed or subdivided. In addition to the 9,196 acres of SEZs in the urbanized areas, TRPA reported 15,971 acres existing on public lands. TRPA estimates that development in SEZs has resulted in approximately 10 times the impervious surface coverage that the Bailey coefficients would allow. Because most of the significant SEZ disturbance has occurred in urbanized areas close to Lake Tahoe, the loss of natural treatment capacity for sediment and nutrients in stormwater from these areas, and the consequent increased pollutant loading to Lake Tahoe, is of special concern.

Identification of SEZs and SEZ Setbacks

SEZs are biological communities that owe their characteristics to the presence of surface water or a seasonal high ground water table. Specific criteria for defining SEZs have changed over time and remain subject to future change.

The following criteria are used by TRPA for identification of SEZs. A Stream Environment Zone is determined to be present if any one of the following key indicators is present, or in the absence of a key indicator, if any three of the following secondary indicators are present. Plant communities are identified in accordance with the definitions and procedures contained in the report entitled *Vegetation of the Lake Tahoe Region, A Guide for Planning* (TRPA 1971).

1. **Key Indicators:** Key indicators are:

   (a) Evidence of surface water flow, including perennial, ephemeral, and intermittent streams, but not including rills or man-made channels; or

   (b) Primary riparian vegetation; or

   (c) Near surface groundwater; or

   (d) Lakes or ponds; or

   (e) Beach (Be) soils; or

(f) One of the following alluvial soils:

(i) Elmira loamy coarse sand, wet variant (Ev)

(ii) Marsh (Mh).

2. **Secondary Indicators:** Secondary indicators are:

(a) Designated floodplain

(b) Groundwater between 20-40 inches

(c) Secondary riparian vegetation

(d) One of the following alluvial soils:

(i) Loamy alluvial land (Lo), or

(ii) Celio gravelly loamy coarse sand (Co), or

(iii) Gravelly alluvial land (Gr).

The boundary of a SEZ is the outermost limit of the key indicators; the outermost limit where three secondary indicators coincide; or if Lo, Co or Gr soils are present, the outermost limit where two secondary indicators coincide, whichever establishes the widest SEZ at any point. The outermost boundaries of a stream are the bank-full width of such stream which is defined as the level of frequent high flow, i.e., the level of flood with a recurrence interval of approximately 1.5 years. Other definitions of terms used in the criteria above are given in Table 5.7-1.

Note that SEZs can include bodies of open water as well as wet meadows without defined stream channels. SEZs are generally identical with Bailey land capability Class 1b lands (see the section of this Chapter on land capability, above). One hundred year floodplains are sometimes, but not always, included within SEZs; see the separate section of this Chapter on 100-year floodplain protection for control measures associated with 100-year floodplains which are not also SEZs.

The SEZ criteria can be compared to the federal definition of wetlands (40 CFR § 110.1[f]). Federal “jurisdictional” wetlands are areas which are:

“inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions [including] playa lakes, swamps, marshes, bogs, and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds.”

TRPA's official land capability maps shall be used to identify SEZs initially, but are subject to field verification in every instance.

All new development should be set back from the edge of SEZs to buffer the SEZs from erosion, runoff, alteration, and human activities associated with that development. In addition to preserving the integrity of the SEZ, setbacks preserve the important wildlife and scenic values of the edge zone created by the SEZ and the adjoining vegetation types.

SEZ Protection

During development of the land capability system, TRPA and the U.S. Forest Service recognized the importance of protecting SEZs. Bailey (1974) recommended that no more than 1% impervious surface coverage or permanent disturbance be allowed within SEZs. Although early land use plans for the Lake Tahoe Basin endorsed protection for SEZs, protective measures were not strictly enforced until the State Water Resources Control Board adopted SEZ discharge prohibitions discussed earlier in this Chapter, and TRPA adopted similar land use restrictions.

TRPA's Goals and Policies provide that SEZs shall be protected and managed for their natural values, and that ground water development in SEZs shall be discouraged when such development might impact associated plant communities or instream flow. The Regional Plan recognizes that, because of their importance to water quality, encroachment on SEZs should be severely restricted, and areas of existing encroachment should be restored wherever possible. These preventative BMPs are cost effective ways to protect water quality.

The Regional Board and TRPA exemption findings include requirements for a minimum 1.5:1 restoration offset for new disturbance and development which is permitted in SEZs. Implementation of this offset restoration is expected to help fulfill TRPA's SEZ restoration goals and to provide a margin of safety in the event that restored SEZs are not functionally equivalent to natural SEZs.

Relocation of coverage in SEZs may be permitted when there is a net benefit to the SEZs. The findings that must be made to permit relocation are found in section 5.2 of this Chapter.

Additional restrictions on SEZ disturbance apply to resource management activities such as timber harvest and livestock grazing; see the discussions of these activities elsewhere in this Chapter.

Protection of SEZs is also being achieved through land acquisition under the California Tahoe Conservancy and U.S. Forest Service Santini-Burton programs.

In addition to the SEZ protection and restoration programs, TRPA's regional “environmental threshold carrying capacity” standards for the protection of vegetation resources call for the maintenance of existing species richness by providing for the maintenance of nine plant associations, including the deciduous riparian association, the meadow association, and the wetland associations, and require that at least four percent of the total undisturbed vegetation in the Region remain deciduous riparian vegetation. TRPA's wildlife threshold standards state that a non-degradation standard shall apply to significant wildlife habitat consisting of deciduous trees, wetlands, and meadows while providing for opportunities to increase the acreage of such riparian associations.

SEZ Restoration

The restoration of disturbed SEZs has been carried out by the U.S. Forest Service as part of its watershed restoration program, by the California Tahoe Conservancy, as part of erosion control projects implemented by local governments, and by private parties as mitigation for specific projects.

In 1982, TRPA adopted an “environmental threshold carrying capacity” management standard which directs that agency to:

“...preserve existing naturally functioning SEZ lands in their natural condition and restore 25 percent of the SEZ lands that have been identified as disturbed, developed, or subdivided, to attain a 5 percent total increase in the areas of naturally functioning SEZ lands.”

In addition to the formal SEZ restoration program, SEZ restoration is required as a condition of approval for exemptions from land use and discharge prohibitions for other projects. TRPA's Code of Ordinances also provides incentives for SEZ restoration in the form of “bonus” multifamily residential or tourist accommodation development allocations for developers.

Where full SEZ restoration is not being proposed, BMPs should be used to reduce the impacts of existing development on SEZs and their water quality-related functions. Specific measures which can be used to protect and enhance disturbed SEZs are discussed later in this Chapter in connection with specific problem sources such as livestock grazing.

SEZ Creation

The potential also exists for creation of new SEZs, or expansion of the boundaries of existing SEZs in the Lake Tahoe Basin to increase the potential for stormwater treatment. A few small wetlands have already been created in associations with specific Tahoe Basin projects. As for wetlands restoration, scientific criteria are being developed for wetlands creation (Costlier and Candela 1990), and many of the same concerns about development of natural wetland functions apply. The Regional Board generally encourages additional SEZ creation in the Lake Tahoe Basin, but the impacts of each proposal on water quality and beneficial uses must be carefully evaluated. For example, a water diversion to support a created SEZ could adversely affect beneficial uses at the diversion site.

Created wastewater treatment wetlands designed, built, and operated solely as wastewater treatment systems are generally not considered to be waters of the United States (USEPA 1988). Water quality standards that apply to natural wetlands generally do not apply to such created wastewater treatment wetlands. However, many created wetlands are designed, built, and operated to provide, in addition to wastewater treatment, functions and values similar to those provided by natural wetlands. Under certain circumstances, such created multiple use wetlands may be considered waters of the U.S. and applicable water quality standards would apply. The applicability of water quality standards to created SEZs/wetlands will be determined by the Regional Board on a case-by-case basis. In its determination, the Regional Board will consider factors such as size, location, type of waste to be treated, degree of isolation of the created wetlands, and other appropriate factors. Any discharge from a created wetland which does not qualify as “waters of the U.S.” must meet applicable water quality standards of its receiving water(s).

Floodplain Protection

Flooding in the Lake Tahoe Basin results from rapid surface water runoff from rainfall, snowmelt, or both, that exceeds the capacity of the natural and manmade drainage systems. Localized flooding occurs throughout the urbanized areas of the Lake Tahoe Region, but is most prevalent in low-lying areas of the south shore, with its broad alluvial plain. Flooding from seiches (abnormally large waves generated by earthquakes or landslides) is also possible in the shorezone of Lake Tahoe and other lakes in the Region.

As noted in Chapter 4 of this Basin Plan, development in floodplains contributes to water quality problems as well as exposing people and property to flood hazards. In addition to providing natural treatment capacity for water pollutants, undisturbed floodplains reduce the intensity of downstream flows, and thus the potential for streambank erosion. In developed floodplains, flood waters can also adversely affect water quality by rupturing sewer lines, and mobilizing stored toxic substances.

Control Measures for Floodplain Protection

This Basin Plan includes Regional Board waste discharge prohibitions to protect 100-year floodplains in the Lake Tahoe Basin and the Truckee River watershed that are separate from the prohibitions for protection of Stream Environment Zones (SEZs).

The criteria for definition of SEZs, outlined in the previous section of this Chapter, include 100-year floodplains as secondary indicators, but unless other indicators are also present, a 100-year floodplain is **not** automatically considered to be a SEZ. When a 100-year floodplain **is** considered a SEZ, the SEZ exemption criteria in this Chapter apply. TRPA (has land use restrictions against construction within 100-year floodplains, and has adopted a set of floodplain exemption criteria, which are very similar to the SEZ exemption criteria, for projects in floodplains which are not also SEZs.

In evaluating proposed measures to “minimize” impacts for floodplain projects, the Regional Board should use the regionwide criteria in Chapter 4.

In evaluating proposed exemptions to discharge prohibitions for environmental protection projects that are related to protection or enhancement of parameters other than water quality and beneficial uses (e.g., transportation, noise, energy conservation) the Regional Board should give the highest priority to water quality protection.

All public utilities, transportation facilities, and other necessary public uses located in the 100-year floodplain must be constructed and maintained so as to prevent damage from flooding and not to cause flooding.

In remote locations and other locations where 100-year floodplain maps have not yet been prepared by TRPA, the U.S. Army Corps of Engineers, the U.S. Geological Survey, or the Federal Emergency Management Agency (FEMA), and where there is reason to believe that a flood hazard may exist, the Regional Board will require project applicants to accurately delineate the 100-year floodplain in their applications for waste discharge permits.

The Regional Board's 100-year floodplain prohibitions for the Lake Tahoe HU also apply to the area below the high water rim of Lake Tahoe, which corresponds to part of the area which TRPA considers “shorezone.” TRPA's development restrictions and exemption findings for 100-year floodplains do not apply to the shorezone of Lake Tahoe, except where the project site is determined to be within the 100-year floodplain of a tributary stream. Instead, TRPA uses the shorezone provisions of its Code of Ordinances. See section 5.2 for findings that must be made by the Regional Board to approve exemptions to the floodplain discharge prohibitions for projects affecting the “shorezone” of Lake Tahoe.

Shorezone Protection

The littoral (nearshore) areas of lakes are often the most biologically productive. Warmer temperatures and penetration of light to the bottom encourage plant growth which in turn supports invertebrates and fish. Littoral areas are often very important for fish spawning and the early life-cycle stages of young fish. Human activities in and near the littoral zone can physically alter fish habitat and contribute nutrients leading to eutrophication and the alteration of food webs. Rocky shorezones are generally considered better fish habitat than sandy or silty areas; erosion and sedimentation can degrade habitat quality. Lakeshore areas near tributary stream deltas are important “staging areas” for lake fish which migrate up the streams to spawn. Increased growth of attached algae and rooted plants in the shorezone is the most visible sign of eutrophication to human recreational users of lakes.

Piers, marinas, buoys, breakwaters, floating docks, and jetties are found in the nearshore of Lake Tahoe, along with most “prime fish habitat.” Prime fish habitat consists of areas of rock, rubble, or cobble substrates which provide suitable conditions to support prey organisms and spawning. The shorezone is also particularly attractive to many species of wildlife, including bald eagles, ospreys, and waterfowl. TRPA has adopted regional “environmental threshold carrying capacity” standards for the protection of nearshore fish habitat and wildlife, including waterfowl habitat.

Fish habitat maps have been adopted as part of TRPA's regional land use plan (TRPA 1987). These maps, and the habitat classifications used, differ somewhat from the maps and habitat classifications derived from a joint study by the U.S. Fish and

Wildlife Service, the California Department of Fish and Wildlife, and the Nevada Department of Wildlife.

In 1982, much of the fish habitat in Lake Tahoe rated "good" under the TRPA system experienced moderate to heavy boat traffic, contributing to the decrease in its rating from "excellent" to "good." Siltation and alteration of the lake bottom also contribute to degraded lake habitat.

Shoreline erosion and sediment transport are natural processes, which contribute to beach replenishment; their interruption can result in beach erosion and deep water beaches. Human activities can accelerate shoreline erosion. Tributary streams can create barrier beaches which protect backshore areas from wave action. Encroachment on delta areas can interrupt barrier beach formation and create severe backshore erosion, liberating stored sediment and nutrients. Unnatural fluctuations in lake level may also contribute to water quality problems, eroding large quantities of sediments and nutrients from the shoreline. A dam at the outlet of Lake Tahoe has regulated its maximum level at 6229.1 feet above mean sea level (6.1 feet above the natural level) since 1934.

Shorezone disturbance has the potential to jeopardize the survival of the endangered plant species Tahoe yellow cress, *Rorippa subumbellata,* which is currently found only in the shorezone of Lake Tahoe.

The shorezone of Lake Tahoe is especially vulnerable to the impacts of development, recreation, and underwater construction activities to support recreation (see the separate section of this Chapter on impacts of and control measures for water quality problems related to boating). The following is a general discussion of shorezone protection programs.

Control Measures for Shorezone Protection

Regional Board staff participate in the interagency review process for proposed projects in the shorezone of Lake Tahoe, and may draft waste discharge requirements if necessary to protect water quality. (See the section of this Chapter on recreation for more information on Regional Board regulation of dredging and construction in Lake Tahoe.) The prohibitions against discharges and threatened discharges within SEZs and within 100-year floodplains or below the high water rim of Lake Tahoe apply to portions of the shorezone and are primary measures to protect the shorezone.

Section 401 and 404 Permits

As discussed in Chapter 4 of this Basin Plan, Section 401 of the federal Clean Water Act requires state "water quality certification" for certain types of permits granted by federal agencies such as the Federal Energy Regulatory Commission (FERC) and the U.S. Army Corps of Engineers. In some cases the State Board handles Section 401 certifications directly, and in some cases it delegates authority to the Regional Boards. Applicants for Section 401 certification for Lake Tahoe Basin projects should contact Regional Board staff for information on current certification procedures.

Section 404 of the Clean Water Act requires permits from the U.S. Army Corps of Engineers for dredge and fill activities in "waters of the United States," which include essentially all surface waters and "jurisdictional wetlands" in the Lake Tahoe Basin. In order to simplify its permitting process, the Corps has issued a variety of "nationwide permits" for certain types of activities. To be effective in California, the Corps nationwide permits require Section 401 certification by the State Board.

Protection of Lakes and Streams Tributary to Lake Tahoe

Control measures designed to protect and enhance Lake Tahoe are expected to protect tributary lakes and streams.

The Lake Tahoe Basin includes about 170 lakes and ponds other than Lake Tahoe, most of which are in California. Many of these are within the Desolation Wilderness or in National Forest lands managed for dispersed recreation use, and the major threats to water quality are from human wastes and watershed disturbance due to recreational overuse (see the section of this Chapter on control of recreational impacts). Several of the larger lakes have residential or recreational development within their watersheds (Fallen Leaf, Cascade, and Upper and Lower Echo Lakes). Threats to water quality of tributaries of Lake Tahoe include nutrients from past use of septic systems, watershed disturbance, stormwater runoff from roads and parking areas, livestock grazing, and vessel wastes. Taste and odor problems have been reported in water supplies from Fallen Leaf Lake; they appear to be associated with blooms of an algal species usually associated with eutrophic conditions. The U.S. Forest Service is monitoring water quality in a Desolation Wilderness lake to determine the impacts of atmospheric deposition.

Development around Fallen Leaf Lake has been sewered. Development near other larger lakes discharges toilet wastes to holding tanks; graywater discharges to leachfields are permitted in some circumstances (see the section of this Chapter on wastewater treatment, export, and disposal). The Regional Board should continue to review monitoring data for these lakes to determine the need for further controls on wastewater.

Problems affecting streams tributary to Lake Tahoe, and their beneficial uses (including fish habitat) include siltation, channelization, dredging, removal of rock or gravel, culverts, bridges, diversions, urban runoff, snow disposal and littering. Stream flows for fish habitat may be endangered by diversions for domestic use, irrigation, and snowmaking.

Streams themselves are included in the definition of the term "Stream Environment Zone," and all of the SEZ protection measures discussed in this Chapter apply. TRPA requires development adjacent to tributaries to fully mitigate adverse impacts to the fishery.

The control measures discussed throughout this Chapter, which are implemented by the Regional Board, TRPA, and other agencies, will protect the tributaries of Lake Tahoe as well as the lake itself. See especially the sections on SEZs, shorezone protection, and 100-year floodplain protection.

Ground Water Protection

Ground water contributes an estimated 13 percent of the annual nutrient loading to Lake Tahoe, but is assumed to contribute no fine sediment particles to the lake. 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 5.7-2). Findings by the ACOE study support previously asserted hypotheses that urbanization can significantly increase nitrate concentration in ground water through fertilizer addition, sewer line exfiltration, infiltration of urban runoff, and leachate from abandoned septic systems. Future development and/or continued soil disturbance in already developed areas may 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.

In addition to contributing nutrients, human activities in the Lake Tahoe Basin have led to localized ground water contamination through leaks, spills, and illegal disposal of fuels and solvents. The impacts of infiltration of stormwater containing petroleum products, heavy metals, and deicing chemicals on ground water quality at Lake Tahoe have not been well studied, but are of concern. Local naturally high concentrations of uranium and arsenic in groundwater have also limited the use of some potential municipal supplies. Because of these problems, and because total consumptive use of surface and ground water in the Tahoe Basin is limited by interstate agreement, it is important to protect the remaining good quality ground water for municipal use.

Control Measures for Ground Water Protection

Further increases in nutrient concentrations in Tahoe Basin ground waters can be prevented through control measures discussed elsewhere in this Chapter, including use of alternatives to infiltration in areas with high ground water, fertilizer management, maintenance and upgrading of sewer systems, and vegetation protection and revegetation of denuded areas. Because ground water tables are often very near the surface in Stream Environment Zones, protection of SEZs will also protect ground water quality.

Many of the control measures needed to control erosion and surface runoff are also needed to protect ground water. The surface and ground water systems of the Lake Tahoe Basin are interconnected, and the control measures are directed towards protecting both.

Programs used to control surface runoff will incorporate measures to protect ground water. The prohibitions adopted to prevent development which threatens water quality include prohibitions against discharges to ground water. The limitations on vegetation removal set to prevent erosion from timber harvesting, ski areas, and other sources will also help protect ground water. Programs to enforce BMPs at sites with onsite surface water problems will also incorporate those Best Management Practices adopted to protect ground water.

Controls on solid waste disposal and on toxic leaks and spills (discussed elsewhere in this Chapter, and in greater detail in Chapter 4) will also protect ground water quality in the Lake Tahoe Basin. Because redevelopment of existing urban areas is expected to be an important component of future development in the Basin, Regional Board staff should continue to cooperate with local governments in identification of soil and ground water contamination from past development, and in requiring cleanup of identified problems before new development takes place.

Table 5.7-1
DEFINITIONS OF SEZ TERMINOLOGY

Alluvial Soils - All the following soil types owe their major characteristics to the presence of surface or subsurface water:

(a) Loamy alluvial land (Lo).
(b) Elmira loamy coarse sand, wet variant (Ev).
(c) Celio gravelly loamy course sand (Co).
(d) Marsh (Mh).
(e) Gravelly alluvial land (Gr).
(f) Fill land (Fd)

Confined - Stream types classified under major categories A and B, and stream type C2, as defined in the report entitled "A Stream Classification System", David L. Rosgen, April, 1985.

Designated Flood Plain - The limits of the intermediate Regional Flood where established for creeks by the U.S. Army Corps of Engineers, or the limits of the 100-year flood where established for creeks by the U. S. Army Corps of Engineers.

Ephemeral Stream - Flows sporadically only in response to precipitation, with flows lasting a short time.

Groundwater between 20-40 inches - Evidence of ground water between 20 and 40 inches below the ground surface (somewhat poorly drained soil).

Intermittent Stream- Flows in response to precipitation or snow melt.

Lake - A water body greater 20 acres in size, exceeding two meters deep at low water and lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 20 percent areal coverage.

Man-Made Channel - A channel constructed by man for the purpose of conveying water or a channel created by water being discharged from a man-made source, such as a culvert or pipe.

Near Surface Groundwater - Evidence of ground water within 20 inches of the ground surface (poorly drained soil).

Perennial Stream - Permanently inundated surface stream courses. Surface water flows throughout the year except in years of infrequent drought. Perennial streams shall be those shown as solid blue lines on USGS Quad Maps, or streams determined to be perennial by TRPA.

Pond - A standing water body of less than 20 acres in size and/or less than two meters deep at low water.

Table 5.7-1 (continued)
DEFINITIONS OF SEZ TERMINOLOGY

Primary Riparian Vegetation - the following vegetative community types as identified in the 1971 TRPA report entitled "Vegetation of the Lake Tahoe Region, A Guide for Planning" (see TRPA, 1988, Vol. I, Attachment 4 for species composition):

(a) Type 0: Open water - Open water, swamps and pools and vernal pools.
(b) Type 2: Herbaceous - Wet marsh or meadow and Sphagnum bog.
(c) Type 7: Riparian shrub - Willow thicket and Alder thicket.
(d) Type 9: Broadleaf - Low elevations.

SEZ Setbacks- A strip of land adjacent to the edge of a SEZ, the designated width of which is considered the minimum width necessary to protect the integrity of the various characteristics of the SEZ. The width of the setback shall be established in accordance with the procedure set forth in Subsection 37.3.D of the TRPA Code of Ordinances.

Secondary Riparian Vegetation - The following vegetative types as identified in the 1971 TRPA report entitled "Vegetation of the Lake Tahoe Region, A Guide for Planning" (see TRPA, 1988, Vol. I, Attachment 4 for species composition):

(a) Type 2: Herbaceous - Wet mesic meadow.
(b) Type 9: Broadleaf - High elevations.
(c) Type 19: Lodgepole - Wet type.

Slope Condition - The condition of the slope located adjacent to the steam channel or edge of the SEZ shall be defined as follows. The extent of existing slope protection, which is defined as the percent cover of original duff layer, down logs, low growing vegetation or rock fragments greater than 1-2 inches in diameter, shall be given primary consideration when determining slope condition.

(a) Good - Slopes show little or no evidence of surface (sheet, rill, gully) erosion or mass wasting. Slopes are typically covered 90 percent or more with original duff layer, down logs, slash, low growing vegetation or rock fragments greater than 1-2 inches in diameter. Slope gradient is commonly less than 30 percent. Soil horizons are usually cohesive and consolidated.
(b) Average - Slopes show evidence of surface (sheet, rill, gully) erosion or mass wasting over 5 to 25% of the slope surface. Slopes are typically covered between 50 to 90 percent with original duff layer, down logs, slash, low growing vegetation or rock fragments greater than 1-2 inches in diameter. Slope gradient is commonly between 30 and 70 percent. Soil horizons are typically moderately cohesive and consolidated.
(c) Poor - Slopes show evidence of active and pronounced surface (sheet, rill, gully) erosion or mass wasting over more than 50 percent of the slope surface. Slopes are typically covered less than 50 percent with original duff layer, down logs, slash, low growing vegetation or rock fragments greater than 1-2 inches in diameter. Slope gradient is often greater than 70 percent. Soil horizons are typically non-cohesive and unconsolidated. Evidence of seeping is often present.

Terrace - A moderately flat land area, above the flood plain, generally less than 20 percent slope.

Unconfined - Stream types classified under major categories C (excluding stream type 2), D and E as defined in the report entitled "A Stream Classification System", David L. Rosgen, April 1985.

Table 5.7-2
AVERAGE NUTRIENT CONCENTRATIONS OF GROUNDWATER WELLS BASED ON LAND USE TYPES (USACE 2003)

Land-use	Nitrogen Ammonia + Organic Dissolved (mg/L)	Nitrogen Nitrite plus Nitrate Dissolved (mg/L)	Total Dissolved Nitrogen (mg/L)	Dissolved Orthophosphorus (mg/L)	Total Dissolved Phosphorus (mg/L)
Residential	0.26	0.37	0.63	0.081	0.11
Commercial	0.16	0.51	0.67	0.092	0.12
Recreational	0.40	1.2	1.6	0.073	0.10
Ambient	0.16	0.11	0.27	0.040	0.049

5.8 WASTEWATER TREATMENT, EXPORT, AND DISPOSAL

The Porter-Cologne Act (§ 13950-13952) includes specific language regarding domestic wastewater disposal in the Lake Tahoe Basin. It requires the export of all domestic wastewater from the California portion of the Lake Tahoe Basin; an Executive Order of the Governor of Nevada requires export on the Nevada side. The TRPA also prohibits the discharge of domestic, municipal, or industrial wastewater within its jurisdiction, with the types of exceptions noted below.

Under the Porter-Cologne Act, the Regional Board allows exceptions to the mandate for export for a small number of summer homes in remote areas of the Lake Tahoe Basin where sewering would be environmentally damaging. Toilet wastes must be disposed to holding tanks, or incinerator toilets; holding tank wastes or ashes must be exported from the Lake Tahoe Basin (see the discussion of septage disposal in Chapter 4). Disposal of graywater (sink and shower wastes only) to leachfields may be allowed. Food wastes must be exported or incinerated. Garbage grinders, washing machines, dishwashers, and phosphate-based detergents are not allowed. Proper long-term maintenance of exempted facilities (both holding tanks and greywater systems) is very important. Regional Board staff should continue surveillance of these exempted facilities, and their exemptions should be revoked if the Regional Board cannot continue to find that they will not individually or collectively, directly or indirectly, adversely affect the quality of the waters of Lake Tahoe. The Forest Service periodically reviews its permits for summer home tracts. Regional Board staff should continue to review and comment on proposals for permit extensions, to ensure that wastewater issues are adequately addressed. The Regional Board shall make sure that the conditions of exemptions are complied with before extending the exemptions for septic system discharges. The Regional Board will also reconsider the exemptions in the light of technical advances permitting installation of low pressure sewers in environmentally sensitive areas.

Proper disposal of domestic wastewater from holding tanks and chemical toilets in boats and recreational vehicles is an issue of concern in the Lake Tahoe Basin. See the discussions of control measures for campgrounds and day use areas, and for impacts of boating recreation in the section of this Chapter on recreational impacts, below.

Occasionally, existing structures in more urbanized areas of the Lake Tahoe Basin are found not to be connected to a sewer system. Wastewater collection and treatment agencies should continue to review records and use appropriate field methods to survey for unconnected wastewater discharges within their jurisdictions, and should inform Regional Board staff when such discharges are found. Where necessary, the Regional Board may use enforcement action to prevent discharges from unconnected structures. The Tahoe Regional Planning Agency requires all projects involving a new structure, or reconstruction or expansion of an existing structure, which is designed or intended for human occupancy, and which generates wastewater, to be served by facilities for the treatment and export of wastewater from the Lake Tahoe Basin. To be considered served, a service connection shall be required to transport wastewater from the parcel to a treatment plant.

The Porter-Cologne Act (§ 13952) allows the Regional Board to consider approval of pilot reclamation projects for the use of reclaimed domestic wastewater for beneficial purposes within the Lake Tahoe Basin, provided that such projects will not individually or collectively, directly or indirectly, adversely affect the quality of the waters of Lake Tahoe. The Regional Board shall place conditions on any approved project to include specification of maximum project size. The Regional Board may suspend or terminate an approved project for cause at any time.

In order to prevent raw sewage overflows, all sewerage agencies within the Lake Tahoe Basin are required to have preventative maintenance and spill response programs; enforcement actions may be taken if spills occur. Enforcement orders and grant conditions will require measures such as installation of monitoring equipment and any necessary reconstruction or relocation of sewerlines.

The Regional Board should continue to incorporate requirements for preventative maintenance and spill response programs into waste discharge requirements and National Pollutant Discharge Elimination System (NPDES) permits for all wastewater treatment agencies in the California portion of the Lake Tahoe Basin. These could include requirements for the installation of monitoring equipment, or for the reconstruction or relocation of defective sewerlines. If a sewerline has a series of overflows due to design deficiencies, it should be reconstructed. Bolted down, sealed manhole covers should be added to sewerlines that parallel the Lake Tahoe shoreline or are located in SEZs to prevent spills from exiting via loose manhole covers. In other areas, sewerlines in or adjacent to stream channels should be relocated to high ground and fitted with sealed manhole covers.

Grants, NPDES permits, and waste discharge requirements for wastewater collection and treatment facilities serving the Lake Tahoe Basin should be conditioned to prohibit the sewerage agencies from providing any connection serving new development which is not in accordance with this Basin Plan. This includes development which is not in compliance with the waste discharge prohibitions discussed in section 5.2 of this Chapter. State and federal buyout programs for sensitive lots include payment of wastewater treatment plant assessments for lots which cannot be built upon without violation of these prohibitions. The Regional Board shall require that the necessary information be submitted in reports of waste discharge to determine whether applications are consistent with the waste discharge prohibitions.

Due to aging infrastructure, the likelihood of exfiltration problems in the Tahoe Basin sewer systems may have increased since the early 1980s. Further study of **all** potential sources of nitrogen in Tahoe Basin ground water should be encouraged as part of the ongoing interagency monitoring program. Waste discharge requirements could be used to require correction of sewer exfiltration problems if such problems are shown to be significant in the future. Proposals for study and correction of exfiltration problems could be eligible for grant funding.

Waste discharge requirements for Tahoe Basin sewerage agencies should include a requirement that these agencies submit annual reports providing information needed to update estimates of available capacity, including information on flows, connections during the past year, and remaining unused treatment plant capacity.

The three sewerage agencies on the California side of the Lake Tahoe Basin also function as water purveyors. The State Board has directed that waste discharge requirements for these agencies should include conditions designed to prevent water use in the basin beyond the limits of the California-Nevada Interstate Water Compact (portions of this Compact which deal with the Lake Tahoe Basin were ratified by Congress in 1990 as PL 101-618).

The South Tahoe Public Utility District (STPUD) provides wastewater collection and treatment for the southern part of the Tahoe Basin in California, and exports treated effluent to Alpine County, where it is stored and used for pasture irrigation. The North Tahoe Public Utility District (NTPUD) and Tahoe City Public Utility District (TCPUD) operate collection systems and export sewage for treatment and disposal by the regional Tahoe-Truckee Sanitation Agency (TTSA), located in Truckee in Nevada County. Chapter 4 of this Basin Plan contains additional information on the STPUD and TTSA facilities, including their operations outside of the Lake Tahoe Basin. The following is a summary of important issues related to these facilities and to the Tahoe Basin implementation program.

South Tahoe Public Utility District

The South Tahoe Public Utility District (STPUD) provides collection and treatment for municipal wastewater from most of the El Dorado County portion of the Lake Tahoe Basin. Wastewater is given advanced secondary treatment and pumped over Luther Pass to the East Fork Carson River in Alpine County, where it is stored in Harvey Place Reservoir and used for pasture irrigation.

Tahoe-Truckee Sanitation Agency

The regional wastewater treatment facilities of the Tahoe-Truckee Sanitation Agency (TTSA), located in Truckee in Nevada County, provide tertiary treatment for wastewater collected by the North Tahoe and Tahoe City Public Utility Districts in the Lake Tahoe Basin. (TTSA also serves other member districts outside of the Lake Tahoe Basin.) Wastewater is carried from member districts by an interceptor pipeline which generally parallels the Truckee River. TTSA's member districts formerly operated separate wastewater treatment plants but now operate and maintain collection facilities. Discharge prohibitions for the Truckee River Hydrologic Unit (HU), cited in the prohibition section of this Chapter, include prohibitions affecting further operation of these treatment plants, and discharges from septic tank/leachfield systems from current and future development in the portion of the HU within TRPA's jurisdiction. Additional information on TTSA's treatment and disposal operations in relation to water quality in the Truckee River HU is provided in Chapter 4 of this Basin Plan.

5.9 WATER RIGHTS AND WATER USE

In 1988, there were approximately 57 water purveyors providing domestic supplies to development within the California portion of the Lake Tahoe Basin.

There were about 17 suppliers in California using over 100 acre-feet per annum (afa4). Water supplies are obtained from public and private wells, intakes from Lake Tahoe, and surface water diversions from tributaries. In the past, some water purveyors did not always treat well water prior to distribution, although chlorination might be provided at certain times of the year. Drinking water from surface intakes, both from streams and Lake Tahoe, has historically been filtered and chlorinated prior to distribution. New federal drinking water regulations require higher treatment levels for surface sources; because of these regulations, water purveyors are increasingly changing from surface to ground water sources.

Total water diversion for consumptive use in the Lake Tahoe Basin is limited by the California-Nevada Interstate Water Compact, an agreement which, after 13 years of negotiation, was ratified by the legislatures of both states in 1970 and 1971, and partly ratified by Congress in 1990 as P.L. 101-618. On the California side of the Lake Tahoe Basin, total diversions for consumptive use from all sources (both surface and ground waters) are limited to 23,000 afa.

The State Water Resources Control Board, which is responsible for administering California's water rights program, issued a *Report on Water Use and Water Rights in the Lake Tahoe Basin* in January 1980. The report determined that after water rights held by the USFS, State Parks requirements, and certain exports and depletions are taken into account, 19,000 afa is available for use on private lands on the California side of the Basin. The report also estimated the amount of water used at different levels of projected development.

The State Board has adopted a policy of limiting new water rights permits in accordance with the Compact allocation. The State Board does not have permit authority over all diversions, however. The largest group of diversions not subject to permit is ground water diversions, which made up 54% of the total diversions for use on the California side of the Lake Tahoe Basin in 1980. Local government has authority to regulate ground water pumping, and special ground water districts can be created, but current State law does not require local government to act, even when ground water pumping exceeds available supply.

The water rights study recommended that the State Board issue new water rights permits subject to conditions which ensure that issuance of the permits will not result in use in excess of the amount available under the Interstate Water Compact. It further recommended that water available for use on private lands be allocated among three zones corresponding to the boundaries of the North Tahoe, Tahoe City, and South Tahoe Public Utility Districts. Water rights permits would be issued to the utilities, allowing them to divert amounts equal to the amount allocated to the zone minus the total of all other diversions, including ground water diversions, for use on private lands within the zone.

Current levels of consumptive water use in the Lake Tahoe Basin are unknown. (Most water use is not metered.) State law (AB 2572) enacted in 2004 requires all water suppliers to install water meters on all customer connections by January 1, 2025.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. As of 2010 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.

The State Board's water rights report recommends that local and regional agencies involved in land use planning consider the limitations set by the Interstate Water Compact, and that the State's water quality program take the availability of water into account. The California Water Code directs the State and Regional Boards to take water supply into account during water quality planning, and in issuing waste discharge requirements. The public utility districts provide sewerage service, for which they are subject to waste discharge requirements issued by the Lahontan Regional Board. Any additional development in the Lake Tahoe Basin which will increase water use will not be possible without a connection to the sewerage system. The number of units which may connect to the sewerage systems is limited by sewage collection, treatment, and disposal capacity. Accordingly, this Basin Plan requires that waste discharge requirements issued for these sewerage systems include conditions designed to prevent water use in the Lake Tahoe Basin beyond the Compact limitations. The conditions could take several different forms, ranging from connection limitations to water conservation programs. The precise form the conditions shall take will be determined when waste discharge requirements are renewed or modified.

TRPA requires all projects proposing a new structure, or reconstruction or expansion of an existing structure designed or intended for human occupancy to have adequate water rights or water supply systems. TRPA cannot approve additional development requiring water unless it has, or provides, an adequate water supply within a water right recognized under state law.

TRPA recognizes that many water supply systems are in need of upgrading to insure delivery of adequate quantities of water for domestic and fire suppression purposes. Needed improvements include water lines, storage facilities, and additional hydrants. TRPA requires all additional development requiring water to have systems to deliver an adequate quantity and quality of water for domestic consumption and fire protection. Applicable local, state, federal, or utility district standards determine adequate fire flows, but where no such standards exist, the TRPA Code of Ordinances provides minimum fire flow requirements. TRPA may waive the fire flow requirements for its plan areas which are “zoned” for conservation and recreation uses, and for single family development if fire departments serving the development meet the requirements of the TRPA Code. Individual water suppliers will have to maintain their existing water supply systems, and upgrade them as appropriate to meet fire flow requirements, peak demand, and the need for backup supplies. Water suppliers will also have to provide treatment for drinking water from surface diversions in accordance with state and federal standards and regulations.

This Basin Plan provides exemptions from discharge prohibitions for public health and safety projects, including projects associated with domestic water supply systems. As noted above, new treatment requirements are leading to an increase in ground water diversions. New wells in SEZs may affect SEZ functions both through direct disturbance for construction of wells and distribution lines, and through the impacts of ground water drawdown on SEZ soils and vegetation. When considering exemptions from discharge prohibitions for new or expanded ground water diversions in SEZs, the Regional Board should evaluate the water quality impacts and “reasonableness” of these projects in relation to those of the alternative of continued use of a surface source, even if treatment costs are higher.

The remedial erosion control projects proposed in this Chapter require use of irrigation water for revegetation. However, native plants will be used except for some temporary stabilization, and once established will not require irrigation. To ensure that the irrigation needed for revegetation can be carried out within the limits of water supply, the State Board's water rights decisions should reserve water for revegetation. Once it is determined that reserving water for revegetation is no longer necessary, the water can be made available for municipal and domestic use.

5.10 SOLID AND HAZARDOUS WASTE

Solid Waste Disposal

No solid waste disposal has been permitted in the Lake Tahoe Basin since 1972. To require continued export of all solid waste from the Lake Tahoe Basin, the State Board adopted the following prohibition in 1980:

"The discharge of garbage or other solid waste to lands within the Lake Tahoe Basin is prohibited."

The State Board recommended in 1980 that BMPs be developed for the disposal of excavated soil from construction sites, and that consideration be given to their use to reclaim abandoned mines, quarries, and borrow pits. It also recommended that dredged material should be considered for similar uses. Other construction wastes should be exported from the Basin.

Problems associated with former solid waste disposal in the Lake Tahoe Basin were recognized as early as 1966; they include leachate from the disposal sites, erosion due to lack of vegetation, and uncontrolled runoff from landfill surfaces. There were formerly four disposal sites within the Basin; none were operated as sanitary landfills. The USFS has done extensive erosion and drainage control work at the old Meyers Landfill, and continues to monitor its effects on water quality. All of the closed sites in California are under the ongoing surveillance of the California Integrated Waste Management Board (CIWMB). The Lahontan Regional Water Quality Control Board, in cooperation with the CIWMB and the USFS, shall continue surveillance and monitoring of old disposal sites within the Tahoe Basin to ensure that leachate and eroded sediment do not impair water quality. Where water quality problems at these sites are identified, corrective measures shall be implemented in the same manner as for sites requiring erosion control projects.

It has been estimated that, because of the seasonal nature of the Tahoe Basin's population and the inaccessibility of some homes due to weather and terrain, only 85 percent of the refuse generated in the Basin is collected for export. Illegal dumping and littering impair the visual appeal of surface waters and stream environment zones, and contribute leachate to surface runoff. Efforts should be made to increase the amount of Basin refuse which is actually collected for export or recycling. Local governments are responsible for efforts to increase the effectiveness of refuse collection. Existing anti-litter laws should be strictly enforced. Public education and cleanup programs should be expanded. The California Conservation Corps can assist in cleanup programs.

Industrial Wastes

Except for stormwater, which is addressed elsewhere in this Chapter, no industrial discharges are allowed in the Lake Tahoe Basin. Discharges of industrial wastes into Lake Tahoe or any stream in the Basin are prohibited in both California and Nevada (see the section of this Chapter on prohibitions). Current prohibitions against a discharge of industrial waste in the Lake Tahoe Basin should be continued and enforced.

Toxic and Hazardous Substance Spills

Considering the amount of urbanization and the fact that a major interstate truck route (U.S. Highway 50) passes through the Lake Tahoe Basin, possible spills of hazardous materials such as gasoline, diesel fuels, fuel oil, aviation fuel, pesticides, solvents, chlorine, and other substances create the potential for serious water quality problems. Infrequent spills of petroleum products have resulted from transportation accidents in the Lake Tahoe Basin. Numerous small spills occur at construction sites, usually due to vandalism or improper storage. Spill prevention and abatement programs are necessary to control the risk of spills affecting Lake Tahoe and its tributaries, and the ground waters and lands of the Lake Tahoe Region. In addition, hazardous waste management programs are needed to ensure that potentially hazardous substances such as paints, pesticides, household solvents, and waste motor oil are properly managed and disposed of and not discharged to lands or waters.

The Lahontan Regional Board's regionwide control measures for hazardous waste leaks, spills, and illegal discharges (Chapter 4 of this Basin Plan) are applicable to the Lake Tahoe Basin, as are statewide requirements for the preparation and implementation of local government hazardous waste management plans. When reviewing environmental documents and drafting waste discharge permits for marinas, tour boat and waterborne transit operations, and other activities on or near surface waters which may involve use or storage of fuels, Regional Board staff should give special attention to contingency measures for prevention and cleanup of spills.

The USEPA, Region IX, has prepared a new interagency spill response plan for the Lake Tahoe Basin, as a supplement to its *Mainland Oil and Hazardous Substance Pollution Contingency Plan* (USEPA 1994). This plan addresses topics such as the roles, responsibilities, and jurisdictional boundaries of the agencies involved; priority resources for use by responders; training and response capabilities in the Tahoe Basin and needs for further training; and evacuation/shelter-in-place procedures. It also includes a standardized notification checklist which addresses spill response scenarios.

5.11 ROADS AND RIGHTS-OF-WAY

There are approximately 1000 miles of streets, roads, and highways in the Lake Tahoe Region. Past road construction, both for public streets and highways and for timber harvest and other purposes on USFS and private forest lands, has contributed significantly to sediment and nutrient loading to Lake Tahoe. Sediment loading from new subdivisions and associated roads has been a particular problem (see the section of this Chapter on development restrictions). Existing unpaved roads, and unstabilized cut and fill slopes, drainage ditches, and road shoulders continue to act as sediment sources. Winter road maintenance, including sanding and the use of deicing chemicals including salt, affects stormwater quality. The Lake Tahoe TMDL concluded that all roads, regardless of jurisdiction, have significant impacts on water quality. Roads increase impervious surface, magnifying surface runoff and often direct it toward surface waters. The application and subsequent pulverization of traction abrasive material during the winter months can also adversely affect water quality.

Because of the significance of roads in erosion problems on forest lands, the USFS's Cumulative Watershed Effects methodology for assessing watershed problems (USFS 1988) uses “equivalent roaded acres” as a measure of disturbance. Erosion problems on forest roads are similar to those associated with offroad vehicle use (see the section of this Chapter on outdoor recreation).

Road maintenance requirements are not always proportional to traffic use. In the Lake Tahoe Basin, weather is more likely to increase maintenance needs than the amount of traffic. The use of road deicing chemicals (also discussed in Chapter 4) is of special concern in the Lake Tahoe Basin because the death of vegetation from road salt can contribute to increased erosion.

Control Measures

Erosion Problems

Except where roads are essential for fire control or for other emergency access, erosion from dirt forest roads in the Lake Tahoe Basin should be controlled through closure, stabilization and drainage control, and revegetation.

Wherever possible, roads must be eliminated from high erosion hazard lands and Stream Environment Zones. For some of the roads which are not closed, protective surfacing, relocation, or installation of drainage facilities will be necessary. Best Management Practices should be required for all dirt roads which are not closed, stabilized, and revegetated.

The U.S. Forest Service, Lake Tahoe Basin Management Unit (LTBMU) has an ongoing watershed restoration program which includes closing and revegetating some roads, construction of bridges to prevent erosion at stream crossings, and installation of roadside drainage controls.

Revegetation, resurfacing, or other measures to control erosion from dirt roads on private forest lands should be enforced through regulatory programs adopted by local and regional agencies. Where these agencies have not made a commitment to implement controls, waste discharge requirements and cleanup orders issued by the Lahontan Regional Board shall require landowners to correct erosion problems from dirt roads. Regulatory programs should include an inventory of old forest roads to identify the problems needing correction. TRPA and the Lahontan Regional Board have the authority to require the performance of remedial erosion control work on private forest lands.

Maintenance Problems

Effective street and parking lot sweeping are among the most important maintenance control measures for onsite problems. Street sweeping with high efficiency sweepers (capable of removing particles 10 microns and less) removes many fine sediment particles that could be potentially entrained in urban runoff and reduces the amount of material that can become airborne. Sweeping following traction abrasive application can also prevent abrasive material from being pulverized into finer sediment particles.

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.

Proper management of runoff from areas of intensive vehicular use requires installation of onsite drainage facilities and adherence to operating practices to control water quality deterioration. A program of intensive maintenance, including periodic vacuum sweeping and cleanup of debris, is required in all cases. Drainage systems should be designed to convey runoff to the treatment or infiltration facility and then to a stable discharge point.

Large parking lots have high priority in the Regional Board's strategy for retrofit of BMPs to existing development. The Board regulates road maintenance activities through its municipal stormwater NPDES permits (see the "Stormwater" sections of this Chapter and of Chapter 4).

Snow and Ice Control

The Regional Board may allow the use of road salt to continue in the Lake Tahoe Basin as one component of a comprehensive winter maintenance program. However, the Regional Board should continue to require that it be applied in a careful, well-planned manner, by competent, trained crews. Should even the "proper" application of salt be shown to cause adverse water quality impact, the Regional Board should consider requiring that it no longer be used in the Tahoe Basin. Similarly, should an alternative deicer be shown to be effective, environmentally safe, and economically feasible, its use should be encouraged in lieu of salt. Stormwater permits, which may include controls on deicing chemicals, are discussed earlier in this Chapter.

Remedial erosion and drainage control projects can reduce the need for ice control on roads by collecting snowmelt runoff and conveying it in stable drainage systems rather than allowing it to flow across roadways where it can freeze in thin layers which require ice control for public safety.

State highway departments and other major users of salt and abrasives are required to initiate a tracking program to monitor the use of deicing salt in their jurisdictions. Snow removal from dirt roads is subject to TRPA regulation. When TRPA approves snow removal from an unpaved road it shall specify required winterization practices, BMPs, the specific means of snow removal, and a schedule for either paving the dirt road or ceasing snow removal.

Heavily used roads and driveways requiring winter snow removal should be paved. Less heavily used roads and driveways should be surfaced with gravel. Unneeded dirt roads and driveways should be revegetated.

Snow disposal areas should be located entirely upon high capability land with rapid permeability, should be separated from Stream Environment Zones, and should be contained within berms to avoid surface runoff.

The use of deicing salt and abrasives may be restricted where damage to vegetation in specific areas may be linked to their use, or where their use would result in a violation of water quality standards. Required mitigation for the use of road salt or abrasives may include use of alternative substances, and/or changes in the pattern, frequency, and amount of application. Revegetation of parcels may be required where there is evidence that deicing salts or abrasives have caused vegetation mortality. TRPA may enter into MOUs with highway and street maintenance entities to address the use of salts or abrasives in relation to safety requirements.

Retrofit Requirements and the Capital Improvements Program

As noted in the section of this Chapter on remedial programs and offset, remedial controls for the water quality impacts of past development in the Lake Tahoe Basin are essential for the prevention of further degradation of Lake Tahoe.

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 TRPA Regional Plan has focused on ensuring there are no environmental impacts relating to future growth. 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 through a substantial investment of resources, increases the pace at which the TRPA 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. The CIP includes a project priority system related to the capability of each watershed to deliver sediment and nutrients to Lake Tahoe. TRPA gives high priority for erosion and runoff control to projects which affect SEZs (particularly wetland and riparian areas), which reduce or repair disturbance of seasonally saturated variable source areas, and which attempt to restore a more natural hydrologic response in the watershed.

This Basin Plan designates Caltrans as the agency with primary responsibility for implementing erosion control projects on California state highways. The Lahontan Regional Board will monitor Caltrans' progress to ensure that the projects are properly designed and built on schedule. Some state highways are on National Forest lands and are subject to special use permits issued by the Forest Service. The USFS can require correction of erosion problems as part of these special use permits.

The cities and counties have authority to carry out projects on public streets and roads. When these agencies carry out erosion control projects, their responsibilities will include detailed facilities planning, design, construction, and maintenance. The technical and advisory services of the Resource Conservation Districts can be used to help meet these responsibilities.

To the extent feasible, this Basin Plan will rely on local governments to construct the erosion control projects required on city and county streets and roads, with financial assistance provided by state and federal grants. Local governments may also establish special assessment districts for the purpose of carrying out erosion and runoff control projects.

Where state transportation departments or local agencies fail to carry out erosion and urban runoff control projects, regulatory programs must be adopted to require them to carry out the projects. These agencies own the roads causing erosion; they can be held responsible for correcting the problem.

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5.12 FOREST MANAGEMENT ACTIVITIES

Accessible pine and fir forest lands in the Lake Tahoe Basin were heavily logged by clearcut methods in the middle to late 1800s. Most private timberlands in the basin which had not been harvested earlier were logged between 1950 and 1971. Although the Forest Management Plan for the USFS Lake Tahoe Basin Management Unit (LTBMU) emphasizes watershed restoration and forest health over commercial timber sales, excessive forest fuel build-up, large-scale tree dieoffs from drought-related stresses in the 1980s and early 1990s, and local forest fires have prompted proposals for extensive tree removal and vegetation management to reduce fire hazard and increase forest health throughout the Lake Tahoe Basin on private and public lands. The Regional Board encourages public and private vegetation management to reduce fire hazard and to increase plant community diversity. Because much of the Lake Tahoe Basin is forested, land clearing for development projects often involves timber harvest.

Forest management activities can create water quality problems if sites are left bare of vegetation, if riparian vegetation is disturbed, or if soil is disturbed by road construction, skid trails, or use of vehicles off of roadways. Even if Best Management Practices are followed, some impact on water quality may occur from forest management activities.

Both remedial actions to correct problems from past timber harvest, and controls to prevent problems associated with future forest management activities are necessary for the protection of the waters of the Lake Tahoe Basin. The most important control measures needed on forest lands are remedial erosion control projects and control of erosion on forest dirt roads (see the sections of this Chapter on offset and on roads and rights-of-way). BMPs are also needed to minimize water quality problems from activities on forest lands. Controls should ensure that access roads, which increase drainage density, are well-placed and designed, and that skidding and related practices do not significantly disturb soils and vegetation. Since timber harvesting may take place on steep slopes with poor land capability, required management practices should take slope differences into account. As noted in Section 5.3 (BMPs), no one BMP is 100 percent effective, and the use of BMPs does not provide assurance of compliance with state effluent limitations. BMPs must be monitored and maintained to ensure that measures are effective and that water quality is protected. If monitoring shows that a measure is ineffective, then additional measures must be applied to reduce or prevent addition of fine sediment to the surface waters of the Lake Tahoe Basin.

Control Measures

The Regional Board's general procedures for review of forest management activities on public and private lands are discussed in Chapter 4. The Regional Board has a conditional waiver of waste discharge requirements for timber harvest and vegetation management activities in the Region, with specific conditions that apply to the Lake Tahoe Basin. The following is a summary of special measures which must be used in the Lake Tahoe Basin to protect sensitive watersheds and surface waters.

Forest management activities (in the Lake Tahoe Basin) should follow practices to protect vegetation not being removed, prevent damage to riparian vegetation, and provide for prompt soil stabilization and revegetation where necessary to prevent erosion.

Even stricter controls than the statewide Forest Practice Rules for silvicultural activities adopted by the California Board of Forestry may need to be applied in the Lake Tahoe Basin to take into account the unique conditions of the Basin and the mandate of the federal antidegradation standard. The Forest Practice Rules will not be certified as the BMPs applicable to silvicultural activities in the Tahoe Basin until they are revised to include the controls necessary to protect Lake Tahoe water quality.

Timber harvesting on National Forest land in the Lake Tahoe Basin is implemented by the LTBMU. The LTBMU uses the “Cumulative Watershed Effects” (CWE) method (USFS 1988) and the Watershed Erosion Prediction Program (WEPP) to evaluate the impacts of logging together with those of other disturbances in a watershed.

Private and State timber harvesting and other forms of tree removal in the Lake Tahoe Basin are regulated by the Regional Board’s waiver, state forestry departments, and by the Tahoe Regional Planning Agency.

The TRPA Code sets requirements for timber harvesting. In cases of substantial tree removal, the applicant is required to submit a harvest plan or tree removal plan prepared by a qualified forester. The plan shall set forth prescriptions for tree removal, water quality protection, vegetation protection, reforestation, and other considerations, and shall become part of the project's conditions of approval.

Management techniques for tree removal shall be consistent with the objectives of SEZ restoration, protection of sensitive lands, minimization of new road construction, revegetation of existing temporary roads, minimization of SEZ disturbance, and provisions for revegetation.

TRPA requires that sufficient trees shall be reserved and left uncut to meet minimum acceptable stocking standards, except where patch cutting is necessary for regeneration harvest or early successional stage management. Patch cuts shall be limited in size to less than five acres.

Tree cutting within SEZs may be permitted to allow for early successional stage vegetation management (forest health or riparian improvement), sanitation cuts, fire prevention (fuel reduction) and fish and wildlife habitat improvement, provided that:

- all vehicles shall be restricted to areas outside the SEZ or to existing roads within SEZs, except for over-snow tree removal or use of low impact technology where permanent disturbance does not occur or where the Regional Board has granted an exemption to the prohibitions on discharges within SEZs, and

- work within SEZs shall be limited to times of year when soils are dry and stable or when snow depth is adequate for over-snow removal, and

- felled trees and harvest debris shall be kept out of all perennial and intermittent streams, and

- crossing of perennial streams or other wet areas shall be limited to improved crossings or to temporary bridge spans that can be removed upon project completion or the end of the work season, whichever is sooner, and damage to the SEZ associated with a temporary crossing shall be restored within one year of removal (unless the Regional Board has granted an exemption to the SEZ and floodplain discharge prohibitions), and

- special conditions shall be placed on tree harvest within SEZs or edge zones adjoining SEZs as necessary to protect instream values and habitat.

5.13 LIVESTOCK GRAZING AND CONFINEMENT

Water quality problems related to livestock grazing and livestock confinement facilities in the Lake Tahoe Basin are similar to those described in the sections of Chapter 4 on resource management and agriculture, but the number of animals involved is generally lower than in other parts of the Lahontan Region. Range grazing occurs on National Forest lands and on some other large publicly and privately owned parcels; there are several riding stables, and some "backyard horses." Because of the sensitivity of Lake Tahoe to sediment and nutrient loading, and the importance of SEZs, which have received the greatest historical grazing use, the following control measures have been adopted for the Tahoe Basin in addition to the regionwide control measures in Chapter 4.

Control Measures

The State Board adopted the following control measures in 1980: Existing stables and corrals in SEZs should be relocated outside of SEZs on low erosion hazard lands with surface slopes of five percent or less. Livestock confinement areas should have runoff management systems designed to prevent drainage from flowing through these areas or through manure storage sites. All surface runoff from the facility should be contained and disposed of through an infiltration system [or if high ground water is present, by other appropriate means approved by the Regional Board]. The intensity of grazing on private lands should be monitored and controlled to prevent water quality problems, and the Forest Service should continue to observe Best Management Practices to prevent overgrazing on National Forest lands.

A special use permit from the Forest Service is required to use National Forest lands for stables or livestock grazing. These permits can require compliance with the Best Management Practices needed to control erosion and runoff from livestock confinement areas or to prevent overgrazing.

The Regional Board shall consider adopting waste discharge requirements or taking other appropriate action if livestock grazing on public or private lands in the Lake Tahoe Basin is shown to result in degradation of water quality.

TRPA approval is required for any new livestock grazing or confinement project involving ten or more head of stock, expansion of existing activity outside of the current range, or an increase in livestock numbers of ten or more head at one time. An applicant for a grazing permit shall submit a grazing management plan prepared by a qualified range consultant. The grazing plan shall include pertinent information and a certification by the range consultant that the grazing plan complies with the TRPA Code of Ordinances.

Programs adopted by local governments to control onsite surface runoff problems under municipal stormwater permits should also set controls for stormwater from grazing and livestock confinement on private lands (see the discussions of municipal stormwater NPDES permits earlier in this Chapter and in Chapter 4). The Lahontan Regional Board shall issue waste discharge requirements or cleanup orders where local governments fail to set adequate controls.

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5.14 OUTDOOR RECREATION

Water quality problems and control measures related to dispersed and developed recreation throughout the Lahontan Region are discussed in Chapter 4 of this Basin Plan. Impacts of recreation are of special concern in the Lake Tahoe Basin, which receives as many as 20 million visitors annually.

The Regional Board may issue waste discharge permits to developed recreation facilities and/or take appropriate enforcement action to address the impacts of new construction, stormwater discharges, and maintenance activities such as fertilizer and pesticides use. Some recreational facilities may be subject to stormwater NPDES permits.

Public outdoor recreation projects may be exempted from TRPA's restrictions on development of land capability Class 1, 2, and 3 and SEZ lands, and from the Regional Board's discharge prohibitions related to floodplains and SEZs if specific findings regarding necessity, lack of reasonable alternatives, and mitigation can be made. The exemption criteria are set forth in the Section 5.2 of this Chapter. Exemptions are granted only for public outdoor recreation projects which “by their very nature” must be sited on sensitive lands; Table 5.2-1 provides specific guidance to be used in making this finding.

Campgrounds and Day Use Areas

The potential exists for construction and expansion of campground and day use facilities on both public and private lands in the Tahoe Basin.

Construction of new campgrounds should be subject to the same restrictions as apply to other development in the Tahoe Basin, including:

- Development shall not be permitted on high erosion hazard lands or in Stream Environment Zones, unless required exemption findings can be made.
- Coverage shall conform to the land capability system, unless required exemption findings can be made.
- Drainage, infiltration and sediment control facilities must be installed wherever water is concentrated by compacted or impervious surfaces.
- Best Management Practices for construction sites and temporary runoff management must be followed.

The Regional Board should continue to issue and enforce waste discharge permits for the construction, remodeling, and expansion of campgrounds and day use areas in the Tahoe Basin where there may be discharges of waste to water. The need for retrofit of BMPs, especially for facilities in SEZs, shorezone areas, and near tributary lakes and streams, should be evaluated, and WDRs can be used to require retrofit where necessary. Campgrounds and day use projects which involve one-time or cumulative soil disturbance of one acre or more will be subject to construction stormwater NPDES permits. Campground and day use facilities that accommodate large numbers of recreational vehicles should have properly designed and operated wastewater dumping stations, to discourage illegal dumping. (See the section of this Chapter on wastewater treatment, export, and disposal for a discussion of the requirement to export sewage from the Lake Tahoe Basin.) The Nevada Division of Environmental Protection should ensure that similar controls are enforced in Nevada.

Local or regional ordinances adopted to require surfacing or revegetation of private driveways or forest roads should also apply to dirt roads in campgrounds. Other control measures for existing campgrounds would require review of existing sites.

Construction of a developed campground on private land in the Lake Tahoe Basin requires permits from the city or county where the campground is built, and from TRPA. Permits for private campgrounds should prohibit development in SEZs or in excess of land capability, and should enforce the BMPs needed to prevent water pollution. Local governments in the Tahoe Basin should consider control of stormwater discharges from existing and potential private campgrounds and day use sites as part of their planning activities under their municipal stormwater NPDES permits.

Ski Areas

Water quality problems and control measures associated with ski areas are discussed in a regionwide context in Chapter 4 of this Basin Plan. Special provisions apply to ski areas in the Lake Tahoe Basin.

Ski areas are subject to the TRPA land use restrictions, State discharge prohibitions and exemption criteria related to floodplain and SEZ protection which are discussed elsewhere in this

Chapter. One of the required exemption findings for a recreational project is that “by its very nature,” it must be located on sensitive lands.

Proposals for ski resort expansion must be carefully reviewed to prevent increases in erosion and surface runoff. New road construction must be kept to an absolute minimum, and is prohibited in Stream Environment Zones unless the exemption findings for public recreation projects can be made. (Modern construction techniques permit ski lift construction without road construction.) These provisions will limit the extent of disturbance of sensitive lands for the expansion of ski areas, and will thus protect water quality.

In 1980, the State Board provided the following additional direction for ski area maintenance activities:

“Ski run and trail maintenance vehicles and equipment must not be operated in a manner that disturbs the soil. Snow moving, packing, and grooming must not be conducted when the snow cover is insufficient to protect the underlying soil from disruption.”

The Regional Board has adopted waste discharge requirements for all ski areas in the California portion of the Lake Tahoe Basin. These requirements address stormwater control (especially for large parking lots), and ongoing operation, maintenance, and remedial watershed restoration activities. They are periodically updated to reflect proposed new projects and activities within the ski area. Stormwater NPDES permits may be necessary for future ski area construction projects. Local governments in the Lake Tahoe Basin must address the stormwater impacts of ski facilities on private lands under their municipal stormwater NPDES permits.

Regional Board staff should continue to participate in interagency review of proposed ski area master plans, and should update waste discharge permits as necessary for new projects carried out under master plans.

Golf Courses

Many of the existing golf courses in the Lake Tahoe Basin were constructed in Stream Environment Zones, and have thus disrupted the natural capability of these areas to provide treatment for nutrients in stormwater. Some golf courses are located within or very near the shorezone of Lake Tahoe, or in areas with high ground water tables. Proposals have been made for expansion and/or remodeling of some Tahoe Basin golf courses. General control measures for water quality problems associated with golf courses are discussed in Chapter 4 of this Basin Plan. Existing and future golf course development in the Lake Tahoe Basin requires special control measures to prevent further eutrophication of surface waters and contamination of drinking water supplies.

Waste discharge requirements issued by the Lahontan Regional Board for golf courses in the California portion of the Lake Tahoe Basin implement policies to prevent wastes, such as fertilizer nutrients, pesticides, herbicides, and products of erosion from entering surface waters of Lake Tahoe. They also require use of BMPs for control of stormwater from parking lots, rooftops, and other impervious areas, and for prevention and control of erosion problems.

Each golf course in the Tahoe Basin should follow a control plan detailing nutrient loads, pathways, and control strategies. The control strategies for golf courses shall include:

- strict annual, monthly, and daily fertilizer limitations;
- controlled drainage, including holding ponds where necessary;
- maintenance of drainage systems; and
- surface and ground water monitoring programs.

TRPA also considers existing golf courses high priorities for retrofitting with BMPs because of their potential for significant water quality impacts from fertilizer and runoff. It encourages the states to issue waste discharge requirements or NPDES permits for these facilities.

Offroad Vehicles

Water quality impacts of offroad vehicle (ORV) use are discussed as a regionwide problem in Chapter 4 of this Basin Plan. Erosion, soil compaction and damage to vegetation from ORVs are of special concern in the Lake Tahoe Basin because of the high erodibility of many of its soils, the difficulty of revegetation, and the sensitivity of surface waters. ORV damage to SEZs disturbs their capacity to treat sediment and nutrients in stormwater.

In addition to the summer use of wheeled ORVs, snowmobile use during the winter can also affect water quality. Compacted snow on heavily traveled snowmobile routes is a good thermal conductor which can cause underlying soil to freeze readily. Rapid soil freezing and thawing loosens the soil surface and can dislodge small plants, contributing to the risk of erosion upon snowmelt.

Control Measures for ORVs

Offroad vehicle use in the Lake Tahoe Basin must be restricted to designated areas where high erosion hazard lands, stream environment zones, and sensitive vegetation are not threatened.

To ensure that vehicles stay out of areas where ORV use is not permitted, some old roads must be closed or blocked off. The USFS is conducting a program of blockading roads and trails used in violation of its offroad vehicle plan. National Forest areas damaged by ORV use will be restored and revegetated as part of the ongoing USFS watershed restoration program.

To the extent that ORV use in the Lake Tahoe Basin is confined to existing dirt roads, the water quality impacts can generally be contained by the application of standard BMPs for erosion and runoff control. However, if the ORV use damages the control devices (e.g., water bars) or aggravates erosion of the road surface, additional controls may be necessary.

More vigorous enforcement of local and regional ordinances to control ORV use on private lands is necessary. Private landowners need to post land so that local law enforcement officials can enforce offroad vehicle restrictions.

The Regional Board can issue waste discharge permits to operators of commercial ORV facilities (e.g., snowmobile courses) to prevent and control water quality problems. In some cases, waste discharge requirements and cleanup orders may be issued to property owners requiring them to prevent or correct water quality problems caused by offroad vehicle use on their property.

Boating and Shorezone Recreation

The “Shorezone Protection” section of this Chapter (see Section 5.7) summarizes water quality problems related to shorezone development, TRPA's general shorezone protection programs, and guidelines for Regional Board use in evaluation of shorezone projects. Chapter 4 of this Basin Plan includes a general discussion of water quality problems and control measures related to boating and shorezone recreation activities. Problems include wastewater disposal from boats, fuel spills from boats and marinas, marina stormwater pollutants, and resuspension of sediment and associated pollutants through dredging and underwater construction. These problems are of special concern in the Lake Tahoe Basin because of the sensitivity of the Lake and the heavy recreational use it receives. The following is a summary of special control measures by problem type.

Vessel Wastes

The discharge of vessel wastes to Lake Tahoe is prohibited, but violations still occur. Many of the boats in use have built-in toilets and holding tanks or portable toilets, creating a large potential for intentional or unintentional dumping of wastewater into Lake Tahoe. Many boats are not equipped with self-contained heads, and there is no inspection program. Discharge of vessel toilet wastes introduces pollution that can affect domestic wastewater intakes from Lake Tahoe and other lakes such as Fallen Leaf and Echo Lakes. Although not in themselves a serious threat to the clarity of Lake Tahoe, vessel wastes contribute cumulatively to nutrient loading and present a public health risk.

In California, the Harbors and Navigation Code authorizes the State Board to require marinas or other marine terminals to install pumpout facilities. The State Board has adopted procedures by which the Regional Boards can determine the need for pumpout facilities, and request the State Board to require specific terminals to install them. Under these provisions, the Lahontan Regional Board shall continue to determine the need for additional pumpout facilities at Lake Tahoe, and request the State Board to require installation where such facilities are necessary. The Regional Board currently requires that all public marinas on the California side of Lake Tahoe have pumpout facilities available.

The U.S. Coast Guard is primarily responsible for enforcing prohibitions against vessel waste discharges to Lake Tahoe, and should include an inspection program as part of its enforcement effort. Other federal and state agencies should assist the Coast Guard. Permits issued by the U.S. Army Corps of Engineers, state lands agencies, and TRPA for marinas, buoys, and other facilities serving vessels on Lake Tahoe should require compliance with the prohibitions against discharge of vessel wastes. These agencies should also assist in the inspection program. The Regional Board shall assist the Coast Guard in the program to enforce the discharge prohibitions and shall bring its own enforcement actions where necessary.

The Regional Board has adopted waste discharge requirements for existing marinas at Lake Tahoe which include provisions for vessel waste pumpout facilities, and should continue to adopt waste discharge requirements for new and expanded marinas.

Piers

In recognition of the potential adverse impacts of continued proliferation of piers and other mooring structures in Lake Tahoe, the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (DFW), and the Nevada Department of Wildlife have adopted policies recommending strongly against the approval of new facilities within sensitive fish habitat (USFWS 1979 & 1980, DFW 1978). See Figure 5.8-1.

Piers and jetties should not be allowed to block currents. They must be constructed so as to allow current to pass through. Pier construction must be prohibited in significant spawning habitat. Pier construction should also be prohibited in waters in or immediately offshore of biologically important stream inlets. Pier construction must be discouraged in prime fish habitat areas. Further study of the effects of piers should be continued. The controls called for here may be modified, or additional controls required, based on the findings of that study.

Section 5.2 contains the following prohibition against new pier construction in significant spawning habitat or offshore of biologically important stream inlets:

"The discharge or threatened discharge, attributable to new pier construction, of wastes to significant spawning habitats or to areas immediately offshore of stream inlets in Lake Tahoe is prohibited."

The prohibition against discharges immediately offshore of stream inlets shall apply up to a thirty-foot contour. Discharges to the inlets themselves are subject to the prohibition against discharges to Stream Environment Zones.

The determination whether an area is significant spawning habitat shall be made on a case-by-case basis by permitting agencies, in consultation with the USFWS and state fish and wildlife agencies. Maps which have been produced by these agencies may be used as a guide. Because of the scale on which the maps have been produced, however, and the possibility that additional information may become available, the maps will not necessarily be determinative. [TRPA has adopted fish habitat maps for Lake Tahoe which differ somewhat from those prepared by the fish and wildlife agencies, and has designated additional important stream inlets by ordinance.]

The term "pier," as used in the prohibition above, includes any fixed or floating platform extending from the shoreline over or upon the water. The term includes docks and boathouses. The prohibition does not apply to maintenance, repair, or replacement of piers at the same site.

Under Section 401 of the federal Clean Water Act, the U.S. Army Corps of Engineers cannot issue any permit if the state water quality agency denies certification that the permitted discharge is in compliance with the applicable state water quality standards (see the separate section of this Chapter on 401 and 404 permits). The prohibitions in this plan are part of California's water quality standards for Lake Tahoe, effectively precluding the Corps of Engineers from issuing permits for pier construction in violation of the prohibitions.

This plan does not prohibit the use of mooring buoys, which are now used as alternatives to piers in many cases, although the USFWS (1979) has recommended against their approval in sensitive fish habitat because of the adverse effects of powerboat use.

Permitting agencies should also discourage construction of new piers in prime fish and aquatic habitat, emphasizing alternatives such as use of existing facilities. These permitting agencies include the Corps of Engineers, state lands agencies, the Tahoe Regional Planning Agency, and the Lahontan Regional Board. Where permits for pier construction are issued, they should require construction practices to contain any sediment disturbed by placing structures in Lake Tahoe. When piers or other structures are placed in Lake Tahoe, they should be surrounded by vertical barriers to contain any disturbed sediment. The permits should also prohibit any construction that will alter the flow of currents in Lake Tahoe. If necessary, the Lahontan Regional Board shall issue permits to require compliance with practices to prevent water quality problems from construction of piers and other shorezone structures. In addition to the special considerations above, such permits should reflect the regionwide criteria for piers and shorezone construction in Chapter 4 of this Basin Plan.

In reviewing pier projects, the California State Lands Commission generally requires that construction be done from small boats, and that construction wastes be collected on these vessels or on tarps and disposed of properly. The State Lands Commission also implements a special plan for protection of the endangered shorezone plant, Tahoe yellow cress. Pier construction, and other underwater/shorezone construction activities, are subject to all applicable water quality standards contained in this Basin Plan.

Dredging

Chapter 4 of this Basin Plan includes additional discussion of water quality problems related to dredging, and regionwide dredging guidelines. Construction (e.g., of piers) and dredging in Lake Tahoe can cause localized pollution problems, by disturbing sediments: this increases turbidity and reintroduces nutrients that had settled out of the water. The sediments may also be redeposited elsewhere. Construction in Lake Tahoe may also affect current flow, causing currents to disturb bottom sediments. If disposal of dredged material is done improperly, nutrients from these wastes could cause water quality problems. Dredging and disposal of marina sediments are of special concern because very high levels of tributyltin (an antifouling ingredient of boat paint) have been detected in sediments and biota of one Lake Tahoe marina.

Methods of dredging that stir up bottom sediments, as when backhoes or drag lines are used, should not be permitted. Under most circumstances, only suction dredging should be allowed. However, even with turbidity barriers, suction dredging followed by interim storage of dredged material in an “inner harbor” situation may create more problems than bucket dredging. Localized problems related to turbidity may result from repeated disturbance of stored dredged material for final disposal. Regional Board staff should evaluate proposed dredging methods based on site-specific circumstances and require the method that results in the lowest degree of threat to water quality. Disposal of dredged materials must follow practices to prevent sediments from being discharged into Lake Tahoe. The Best Management Practices Handbook includes BMPs for the dredging process and for disposal of dredged material. Consideration should be given to the use of dredged material in reclamation of abandoned mines, quarries, and borrow pits outside of the Tahoe Basin.

The Regional Board staff review all proposed dredging projects in the California portion of the Lake Tahoe Basin and should not permit the dredging unless the practices called for in this plan are followed.

Dredging and filling activities are subject to the Regional Board discharge prohibitions and exemption criteria discussed elsewhere in this Chapter.

Dredged material may be disposed of inside or outside of the Lake Tahoe Basin, but the Regional Board will set effluent limitations based on the numbers in Table 5.6-1 and on appropriate receiving water standards. Proposals for dredged material disposal in shorezones, floodplains or SEZs will be evaluated against the relevant discharge prohibitions (see the section of this Chapter on development restrictions).

TRPA's regulations on dredging techniques and discharge standards are set forth in the BMP Handbook.

Marinas

The Lahontan Regional Board has maintenance waste discharge requirements on all marinas in the California portion of the Lake Tahoe Basin which address stormwater discharges, fueling and sewage disposal operations. New or revised requirements should be adopted to address any new marina construction activity or changes in the nature of discharges or threatened discharges from existing marinas. A detailed discussion of water quality problems and control measures associated with marina discharges is provided in a regionwide context in Chapter 4 of this Basin Plan. As noted in that Chapter, some marinas may require stormwater NPDES permits.

TRPA regulates the creation, expansion, and remodeling of marinas in the Lake Tahoe Basin through its Regional Plan limits on recreation capacity (in “People at One Time,” or PAOT) and through its master planning and permitting processes. Following a lengthy interagency review period, which included Regional Board staff input, TRPA adopted detailed guidelines for the preparation of marina master plans (TRPA 1990). These guidelines require each master plan to include a physical plan, an operations plan, a mitigation plan, and a monitoring plan. Water quality-related topics to be addressed include land coverage, fish habitat, shoreline stability, inspection and maintenance of boat washing and fueling facilities, wastewater pumpout facilities, stormwater control, spill prevention and response, dredging, and marina water treatment systems. The guidelines also summarize shorezone development standards for new and expanded marinas from TRPA's Code of Ordinances, and provide guidance on the design of breakwaters, jetties, and shoreline protection structures.

Although conceptual proposals have been made for marina water treatment systems, none are currently operating in the Lake Tahoe Basin. TRPA's guidelines state that, in the broad sense, “any treatment which is employed to improve and maintain water quality would be a component of the water treatment system.” Possible treatment methods discussed include artificial circulation and aeration, pretreatment of stormwater discharges, and interception of stormwater constituents from driveways, launching ramps, and boat washing facilities by slotted drains directed into sumps which can be pumped and possibly equipped with absorbent material. If tributyltin is found to be a problem, marina sediments containing it may have to be removed.

The TRPA guidelines state that commercial marinas and harbors are required to have public restrooms, fueling facilities, chemical fire retardant distribution systems, and pumpout facilities for boat sewage. Disposal facilities for portable sewage containers should also be provided. Prevention of boat sewage waste pollution will be in accordance with an enforcement program to be developed by the Marina Owners Association and approved by TRPA. Boat washing facilities, if any, must be connected to a sewer system or an acceptable alternative such as a debris trap and sump which will be emptied regularly. Connections to sewer systems may require special arrangements with the service district such as permits, pretreatment of discharges, and fees for service. Gas pumping facilities are required to have emergency and standard shut-off systems. A water treatment system for waters contained within the marina must be provided.

Fuel, sewage pumpout and portable sanitation flushing facilities at marinas need to be carefully placed. The TRPA guidelines state that they should be located in a convenient place to encourage use by all boaters (including boaters from private piers and non-commercial moorings. Emergency spill containment equipment must be at hand at such facilities, not stored ashore.

TRPA's marina master plan guidelines also provide guidance on environmental analysis, including directions for cumulative impacts analysis. In 1994, a regionwide study and environmental document were in preparation to evaluate the cumulative impacts of potential marina expansion on Lake Tahoe.

Regional Board staff should continue to participate in interagency review of proposed marina master plans and marina development projects. Proposals for “experimental” facilities such as marina water treatment systems should be carefully evaluated on a case-by-case basis.

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5.15 OTHER WATER QUALITY PROBLEMS

Fertilizer Use

Water quality problems and control measures associated with fertilizer use are discussed in the section on agriculture in Chapter 4 of this Basin Plan. However, fertilizer use on golf courses, other large turf areas, and in home landscaping is of special concern in relation to the sensitive surface waters of the Lake Tahoe Basin. Nutrients in fertilizer can reach surface waters through stormwater or by percolation through ground water, and can contribute to eutrophication. Nitrogen from fertilizer which accumulates in ground water can contribute to violation of the drinking water standard. Fertilizer impacts can occur cumulatively with nutrient loading from other sources such as urban runoff.

As noted in the section of this Chapter on golf courses, the Regional Board has placed all golf courses on the California side of the Lake Tahoe under waste discharge requirements which include conditions related to fertilizer management. Other types of projects involving significant fertilizer use should be considered for similar types of permits.

While the use of fertilizer may be necessary in some applications, such as establishing erosion control vegetation, management practices are necessary to limit the addition of fertilizer which may leach from the soil and become a component of runoff waters. The use of fertilizer in within the Tahoe Region shall be restricted to uses, areas, and practices identified in the Best Management Practices Handbook.

Fertilizer use, except as necessary to establish and maintain plants, is not recommended in the Tahoe Basin; that fertilizers shall not be used in or near stream channels and in the shorezone areas; and that fertilizer use shall be lowered in stream environment zones and eliminated if possible. This BMP includes discussion of appropriate fertilizer types and practices. It states that maintenance applications of fertilizers should be made when loss of vigor or slow growth indicates a possible nutrient deficiency. At least one additional application is required following the original grass seeding and should be applied in the spring immediately following snow melt.

According to the TRPA Code of Ordinances, projects that include landscaping or revegetation shall, as a condition of approval, be required to prepare fertilizer management plans that address: the appropriate type of fertilizer to avoid the release of excess nutrients, the rate and frequency of application, appropriate watering schedules; preferred plant materials, landscape design that minimizes the impacts of fertilizer applications, critical areas, the design and maintenance of drainage control systems, and surface and ground water monitoring programs, where appropriate.

In planning for compliance with municipal stormwater permits, local governments in the Lake Tahoe Basin should consider control of cumulative nutrient contributions from urban fertilizer use. Areawide landscape design guidelines should be revised to emphasize low maintenance plant species rather than turf and other fertilizer intensive plantings. Since they have negligible capital costs and may actually reduce operating costs, fertilizer management practices are cost-effective means of protecting water quality.

Local government ordinances requiring the use of drought-tolerant landscaping (xeriscaping) may, by encouraging the use of native plants, result in lower urban fertilizer use. Educational programs promoting xeriscaping should also emphasize BMPs for fertilizer use.

Pesticides

Although there is no agricultural use of pesticides in the Lake Tahoe Basin, potential water quality problems from pesticide use in landscaping, turf management, silviculture, and wood preservatives are of concern. High levels of tributyltin (TBT), an antifouling compound formerly used in boat paint, have been measured in and near a marina in Lake Tahoe. Rotenone has been used for fisheries management in some waters of the Tahoe Basin.

The Lahontan Regional Board's regionwide prohibition for pesticides and control measures for pesticides, discussed in Chapter 4 of this Basin Plan, are applicable in the Lake Tahoe Basin. Exemptions to this this regionwide prohibition may be granted as described in Chapter 4.1 provided the application of aquatic pesticides is proposed for the circumstances described under the section entitled “Circumstances Eligible for Prohibition Exemption” and according to the criteria under the section entitled “Exemption Criteria for Aquatic Pesticide Use.” As described in Chapter 4.1, projects proposing to use rotenone for use in waters of the Tahoe Basin must comply with the “Exemption Criteria for Fisheries Management,” which require compliance with criteria described in Chapter 3 in the section entitled “Water Quality Objectives for Fisheries Management Using the Fish Toxicant Rotenone.”

Because of its harsh climate, short growing season, and high elevation, the Lake Tahoe Basin has fewer insect and fungal pests than many other areas in California and Nevada; however, there is some pesticide use for silviculture and turf management.

Prior to applying any pesticide, potential users shall consider integrated pest management (IPM) practices, including alternatives to chemical applications, management of forest resources in a manner less conducive to pests, and reduced reliance on potentially hazardous chemicals.

Only chemicals registered with the USEPA and the state agency of appropriate jurisdiction shall be used for pest control, and then only for their registered application. No detectable concentration of any pesticide shall be allowed to enter any SEZ unless TRPA finds that the application is necessary to attain or maintain its “environmental threshold carrying capacity” standards. Pesticide storage and use must be consistent with California and Nevada water quality standards and TRPA thresholds.

Antifouling substances painted on the hulls of boats, such as TBT, may contribute to water quality problems. California legislation in 1988 prohibited the use of TBT paints except on aluminum vessel hulls and vessels 25 meters or more in length. Vessels painted with TBT before January 1, 1988 may still be used, but may not be repainted with TBT so long as they comply with other applicable requirements. The USEPA has also banned the use of TBT on non-aluminum hulls of vessels less than 82 feet in length and has limited the release rate of TBT from other hulls to 0.4 $\mu g/cm^2$/day. [The prohibition against discharges of pesticides to surface waters in this Basin Plan is more stringent than this effluent limitation.] Controls on antifouling coatings and boat and marina maintenance practices are necessary to protect Lake Tahoe from the addition of toxic substances from this source. Antifouling coatings shall be regulated in accordance with California and federal laws, by the Lahontan Regional Board and TRPA.

Additional monitoring of water, sediment, and biota should be done at other marinas within Lake Tahoe to determine the extent of TBT problems. TBT should be considered an issue in permits for dredging at or near marinas, and for dredged material disposal.

Atmospheric Deposition

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 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). The Lake Tahoe TMDL concluded that atmospheric deposition contributes an estimated 63 percent of total average annual nitrogen to the lake. Atmospheric deposition also contributes an estimated 16 percent of the average annual fine sediment particle load and about 18 percent of the average annual total phosphorus load.

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 contribute an estimated 218 metric tons of total nitrogen to Lake Tahoe, most of it in the 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 16 percent 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 dust from paved and unpaved roadways, dust from construction sites and other unpaved surfaces, and organic soot from residential wood burning.

The Tahoe Regional Planning Agency has adopted a regional “environmental threshold carrying capacity” standard to reduce annual “vehicle miles traveled” (VMT) within the Lake Tahoe Basin by 10% from the 1981 level in order to reduce nitrogen oxide emissions and consequent atmospheric deposition to the Lake. The TRPA Regional Plan outlines control measures to be implemented by TRPA and local governments to reduce atmospheric nutrient deposition. These include increased and improved mass transit; redevelopment, consolidation, and redirection of land uses to make transportation systems more efficient; controls on combustion heaters and other stationary sources of air pollution; protection of vegetation, soils, and the duff layer, and controls on offroad vehicles to control suspension of nutrient-laden dust.

Regional Board staff should continue to review reports on atmospheric deposition in the Lake Tahoe Basin, long-distance transport of airborne pollutants to the Basin, and impacts of acid deposition on beneficial uses of Tahoe Basin waters. Where data gaps exist, additional monitoring and research should be encouraged. The results of ongoing CARB-sponsored research on acid deposition impacts elsewhere in the Sierra Nevada should be useful in evaluating data from the Lake Tahoe Basin.

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5.16 MONITORING

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 has documented the deep water transparency and primary productivity measurements 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.

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). For example, the U.S. Forest Service's Lake Tahoe Basin Management Unit monitors a variety of land use activities on National Forest lands.

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 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. 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.

The TRPA currently has responsibility for coordinating the Lake Tahoe Interagency Monitoring Program, with the advice of an interagency technical advisory committee. Recent additions to the program include monitoring of “other lakes” than Lake Tahoe (including Fallen Leaf, Echo, and Cascade Lakes). TRPA has also sponsored a study on fish habitat in Lake Tahoe and the impacts of nearshore human activities on habitat quality.

The Lake Tahoe TMDL effort addressed research needs associated with 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 water quality.

Together with long-term continuation of the basic Lake Tahoe Interagency Monitoring Program, such special studies will enable evaluation of the adequacy of existing control programs and the need for new control measures to ensure attainment and maintenance of standards. Additional monitoring and research will also provide the basis for: (1) the establishment of numerical nutrient objectives for additional water bodies, (2) the establishment of biological, and possibly sediment quality objectives, and (3) the update of the regional runoff guidelines to include priority pollutants.

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5.17 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 deep water 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 Report and associated documentation for additional details regarding the state of Nevada's role in the Lake Tahoe TMDL effort.

Problem Statement: Continuous, long term, deep water transparency monitoring at Lake Tahoe has documented a decline of approximately 30 feet from 1968 to 2000. The deep water 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 deep water transparency decline.

Lake Clarity Model results show that approximately two thirds of the deep water transparency condition is driven by the number of inorganic fine sediment particles less than 16 micrometers in diameter. Consequently, the Lake Tahoe TMDL effort has focused on the number of fine sediment particles as the primary pollutant causing deep water transparency decline.

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

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 sources contributing the largest annual pollutant loads that affect the deep water transparency are runoff from upland areas (both urbanized and undeveloped), atmospheric deposition, and stream channel erosion. Table 5.17-1 presents the pollutant load estimates for all of the identified fine sediment particle, total nitrogen, and total phosphorus sources, including groundwater and shoreline erosion inputs. 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, 47 percent of the average annual total phosphorus load, and 18 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, 32 percent, and 18 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 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 16 percent of the basin-wide total load and is the dominant source of total nitrogen, contributing approximately 63 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 5.17-1
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 deep water 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 deep water 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 5.17-2, 5.17-3, and 5.17-4 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.

Because there are no explicit load reduction requirements assigned to groundwater and shoreline erosion sources of fine sediment particles, total nitrogen and total phosphorus, the Regional Board is implicitly allowing these sources to continue at their present baseline conditions.

Daily Load Analysis: Throughout the TMDL analysis pollutant loads have been expressed on an average annual basis. The United States Environmental Protection Agency (US EPA) requires that allowable load allocations also be expressed as daily loads.

Following EPA guidelines described in the *Options for Expressing Daily Loads in TMDLs* (US EPA 2007), the Regional Board has developed daily load estimates for the Lake Tahoe TMDL as a function of total hydraulic inflow. The Lake Tahoe Watershed Model analysis provided daily output of simulated daily loads, supplying the needed daily data sets. Tables 5.17-5, 5.17-6, and 5.17-7 list ranges of total hydraulic inputs to Lake Tahoe, (expressed in liters per second) and an associated range of pollutant concentrations. Because the majority of the pollutant loads discharged to Lake Tahoe are carried by upland runoff, the derived daily load estimates are for upland runoff and stream channel erosion sources. The daily load estimate for the atmospheric source may be estimated by dividing the average annual pollutant loading estimate by 365 days.

Although the daily load estimates for each pollutant are required by EPA, the average annual load expression remains the basis for developing storm water permits and determining compliance for the Lake Tahoe basin. The deep water transparency standard is based on average annual conditions and the most meaningful measure of Lake Tahoe's transparency is generated by averaging the Secchi depth data collected during a given year. The modeling tools used to predict load reduction opportunity effectiveness as well as the lake's response are all driven by annual average conditions. An emphasis on average annual fine sediment particle and nutrient loads also addresses the hydrologic variability driven by inter-annual variability in precipitation amounts and types. Average annual estimates also provide a more consistent regulatory metric to assess whether urban implementation partners are meeting established load reduction goals. Finally, by emphasizing annual average conditions rather than instantaneous concentrations, implementers will have the incentive to focus action on the areas of greatest pollutant loads to cost effectively achieve required annual reduction requirements.

Table 5.17-2
FINE SEDIMENT PARTICLE LOAD ALLOCATIONS BY POLLUTANT SOURCE

	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 5.17-3
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 5.17-4
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%	1%	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%

Table 5.17-5
FINE SEDIMENT PARTICLE DAILY LOADING ESTIMATE

Flow Range	Associated Flow (Liters/Second)			Pollutant Concentration (Number of Particles/L)		
Percentile	Mean	Min	Max	Mean	Min	Max
0-10	1375.7	1011.6	1588.1	6.6E+07	2.1E+07	5.8E+08
10-20	1763.1	1588.7	1950.2	1.0E+08	1.7E+07	9.4E+08
20-30	2211.6	1950.5	2522.4	2.1E+08	1.9E+07	1.1E+09
30-40	2858.7	2523.8	3245.2	3.1E+08	3.1E+07	1.5E+09
40-50	3853.9	3246.4	4585.4	3.8E+08	3.1E+07	1.9E+09
50-60	5541.2	4591.3	6688.8	4.7E+08	4.2E+07	2.7E+09
60-70	8640.3	6696.0	11006.6	5.7E+08	5.3E+07	4.6E+09
70-80	14260.5	11022.9	18204.7	6.0E+08	7.2E+07	2.6E+09
80-90	24350.5	18209.9	34290.9	5.9E+08	1.2E+08	2.6E+09
90-100	60418.5	34368.2	165776.2	7.9E+08	2.7E+08	3.5E+09

Table 5.17-6
TOTAL PHOSPHORUS DAILY LOADING ESTIMATE

Flow Range	Associated Flow (Liters/Second)			Pollutant Concentration (mg/L)		
Percentile	Mean	Min	Max	Mean	Min	Max
0-10	1375.7	1011.6	1588.1	0.041	0.031	0.097
10-20	1763.1	1588.7	1950.2	0.044	0.027	0.133
20-30	2211.6	1950.5	2522.4	0.055	0.019	0.170
30-40	2858.7	2523.8	3245.2	0.064	0.023	0.214
40-50	3853.9	3246.4	4585.4	0.069	0.022	0.224
50-60	5541.2	4591.3	6688.8	0.075	0.025	0.229
60-70	8640.3	6696.0	11006.6	0.078	0.029	0.320
70-80	14260.5	11022.9	18204.7	0.073	0.034	0.202
80-90	24350.5	18209.9	34290.9	0.067	0.035	0.208
90-100	60418.5	34368.2	165776.2	0.062	0.036	0.185

Table 5.17-7
TOTAL NITROGEN DAILY LOADING ESTIMATE

Flow Range	Associated Flow (Liters/second)			Pollutant Concentration (mg/L)		
Percentile	Mean	Min	Max	Mean	Min	Max
0-10	1375.7	1011.6	1588.1	0.10	0.06	0.70
10-20	1763.1	1588.7	1950.2	0.13	0.05	1.06
20-30	2211.6	1950.5	2522.4	0.23	0.05	1.36
30-40	2858.7	2523.8	3245.2	0.32	0.05	1.58
40-50	3853.9	3246.4	4585.4	0.38	0.06	1.64
50-60	5541.2	4591.3	6688.8	0.44	0.07	1.80
60-70	8640.3	6696.0	11006.6	0.43	0.07	1.81
70-80	14260.5	11022.9	18204.7	0.36	0.08	1.85
80-90	24350.5	18209.9	34290.9	0.28	0.08	1.81
90-100	60418.5	34368.2	165776.2	0.23	0.09	1.55

Margin of Safety: A Margin of Safety is included in a TMDL to account for any lack of knowledge and uncertainties inherent to the TMDL development process. Uncertainty is an expression commonly used to evaluate the confidence associated with sets of data, approaches for data analysis, and resulting interpretations. Determining uncertainty is notably difficult in studies of complex ecosystems when data are extrapolated to larger scales or when project specific data do not exist and best professional judgment, based on findings from other systems, must be employed. The Regional Board addressed uncertainty within the Lake Tahoe TMDL by using:

1. A comprehensive science program and science-based analysis developed to (a) enhance monitoring to fill key knowledge gaps and (b) develop pollutant loading and lake response modeling tools specifically for Lake Tahoe to help reduce estimate uncertainty.

2. More than 150 conservative, implicit assumptions in the loading, load reduction, lake response, and load allocation analyses when necessary to address modeling uncertainty or limited input data.

Future Growth Potential: The potential for future growth in the Tahoe basin remains limited. As of 2009, a total of 4,841 parcels in the Tahoe basin were undeveloped and may become eligible for future development. Assuming that the 4,841 undeveloped lots have an average size of 0.25 acres and that each lot will be developed, these parcels would comprise 1210 total acres of additional developed land. Coverage on the highest capability land is limited to 30 percent (TRPA 1987, Section 20.3.A). This means that a maximum of 373 acres would be made impervious. Active conservation efforts, such as the California Tahoe Conservancy urban lot program and the Forest Service Burton-Santini acquisition program are expected to prevent a number of the lots in question from being developed by converting the private lots to public open space. Retiring these lots from development potential reduces the potential total new coverage.

Analysis conducted during Lake Tahoe TMDL development indicates that a complete, worst-case build-out scenario of remaining parcels could potentially increase fine sediment particle loading by up to two percent. Given the inherent uncertainty in the watershed modeling analysis and the conservative assumptions of the worst-case build out scenario, the potential pollutant load increase associated with future development will likely be less than the worst-case estimate.

Any activity, such as new development, re-development, or other land disturbing management actions, has the potential to increase localized (i.e. on a parcel scale) pollutant loading. To ensure that future growth does not increase pollutant loads, the City of South Lake Tahoe, El Dorado County, and Placer County must reduce fine sediment particle, total nitrogen, and total phosphorus loads as described in Tables 5.17-2, 5.17-3, and 5.17-4 from the established baseline condition. A municipality must annually demonstrate on a catchment (i.e. sub-watershed) basis that no increased loading in fine sediment particle, total nitrogen, and total phosphorus will result from any land disturbing activity permitted in the catchment. Efforts to eliminate the increased loads from these land disturbing activities will not be counted towards the annual load reduction requirements.

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 Report (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 Pollutant Reduction Opportunity Report concluded that continued implementation of measures to address disturbances in undeveloped areas, control eroding stream banks, and reduce atmospheric deposition are critical to meeting required load reductions. Therefore, a regulatory policy that maintains the current implementation approaches for these source categories is appropriate to meet TMDL load allocations.

The most significant and currently quantifiable load reduction opportunities are within the urban uplands source. Because urbanized areas discharge the overwhelming bulk of the average annual fine sediment particle load reaching Lake Tahoe, much of the load reductions must be accomplished from this source. Even if it were feasible to completely eliminate the fine sediment particle load from the other three sources, the transparency standard would never be met.

Consequently, the Lake Tahoe TMDL implementation plan emphasizes actions to reduce fine sediment particle and associated nutrient 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 following sections briefly describe the implementation approaches for each of the four major pollutant source categories. Due to the relative magnitude of the pollutant source and the importance of reducing loads from the developed upland area, the most detailed policy and regulatory changes are for managing urban stormwater.

The tools for estimating the expected average annual fine sediment particle load reduction associated with actions to address stream channel erosion, atmospheric deposition, and forest upland sources are less advanced than the methods to estimate urban upland control measure effectiveness. Acknowledging the science that indicates that stream channel erosion, atmospheric deposition, and forest upland sources contribute less fine sediments and phosphorus overall 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 these sources. The Regional Board will, however, require responsible entities to report on load reduction activities to ensure ongoing implementation of forest, stream channel, and atmospheric load reduction efforts.

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 waste load allocations and track compliance with required load reduction milestones.

The Lake Tahoe TMDL expresses waste load allocations for the urban upland source as percent reductions from a basin-wide baseline load. The baseline basin-wide pollutant loads for the TMDL reflect conditions as of water year 2003/2004 (October 1, 2003 – September 30, 2004). To translate basin-wide urban runoff waste load allocations into jurisdiction-specific waste load allocations for municipalities and state highway departments, the Regional Board will require those agencies to conduct a jurisdiction-scale baseline load analysis as the first step in the implementation process. For each five year milestone, jurisdiction-specific waste 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 waste load estimates and the jurisdiction-scale baseline waste 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, land development conditions, and operations and maintenance practices representative of those implemented in October 2004.

The Lake Clarity Crediting Program 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 implement watershed management programs on their lands. As part of these watershed management programs, land managers maintain existing facilities (including unpaved roads and trails), restore disturbed lands, implement and maintain stormwater treatment facilities for all paved/impervious surfaces, prevent pollutant loading from fuels management work, and take other actions to reduce fine sediment particle, total nitrogen, and total phosphorus loads. These agencies are responsible for implementing forest fuels reduction projects to reduce the threat of wildfire in the Lake Tahoe basin. These projects must include best management practices and appropriate monitoring to ensure fuels reduction efforts do not cause this source to exceed its load allocation for fine sediment particle and nutrient loads and must comply with any applicable state or federal permits regulating stormwater discharges from roads created for silvicultural activities.

The California Department of Forestry and Fire Protection is responsible for regulating forest practices on private forest lands and works directly with Regional Board staff to minimize the water quality impacts associated with vegetation management. The Emergency California-Nevada Tahoe Basin Fire Commission Report (May 2008) provides guidance to the Regional Board and the Tahoe Regional Planning Agency to facilitate projects that address Lake Tahoe's wildfire vulnerability.

The Ninth Circuit federal Court of Appeals has found that "stormwater runoff from logging roads associated with silviculture that is collected in a system of ditches, culverts, and channels and is then discharged into streams and rivers" is not exempt from the National Pollutant Discharge Elimination System permitting process because it is considered a point source discharge of stormwater "associated with industrial activity" (Northwest Environmental Defense Center v. Brown, 2010 WL 3222105 (2010)). If, in conformance with this decision, the Water Board reclassifies a portion of the forest load allocation as a waste load allocation, such a regulatory shift would not change the implementation approach.

The forest upland load reductions are expected to be accomplished through continued implementation of existing watershed management programs described above. The Regional Board will require forest management agencies to track and report load increases and load reduction activities to assess whether required basin-wide forest load reductions are occurring. Some activities, including fuels reduction and associated administrative road construction, have the potential to increase pollutant loading at a project scale. Forest management agencies responsible for these actions must demonstrate that other project activities, including restoration efforts and temporary and/or permanent best management practices, will be implemented to compensate for any anticipated project-scale loading increase. These agencies must ensure that no increased loading occurs on a sub-watershed or catchment scale and that the basin-wide fine sediment particle, total nitrogen, and total phosphorus load from the forest uplands is reduced as required by Tables 5.17-2, 5.17-3, and 5.17-4.

Stream Channel Erosion: Fine sediment from stream channel erosion represents four percent of the total fine 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 stream environment zone (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 to Lake Tahoe from stream channels. These projects are expected to achieve the needed pollutant load reductions from this source category.

Atmospheric Deposition: Atmospheric deposition contributes the majority of the nitrogen and approximately 16 percent of the fine sediment particle load that reaches the lake. The TMDL implementation plan emphasizes reducing atmospheric deposition of fine sediment particles and associated phosphorus by addressing dust sources from paved and unpaved roadways and other unpaved areas within the developed and undeveloped landscape. TRPA programs for reducing emissions from residential wood burning are also expected to provide some particle reduction from this source.

Control measures for reducing dust in developed areas (such as street sweeping, and construction site good housekeeping practices) are the same as measures taken to reduce fine sediment particles in urban stormwater runoff. Similarly, some actions taken to control runoff from unpaved roadways (such as armoring unpaved roads with gravel or asphalt) within the forested uplands may reduce dust from these areas. Although allocations for atmospheric pollutant loads are independent of forest and urban upland allocations, load reduction actions taken to control surface runoff pollutants are expected to achieve the required atmospheric fine sediment particle and phosphorus load reductions. Other than supporting research to confirm that actions taken to reduce fine sediment particles in runoff effectively reduce atmospheric pollutant loads, the Regional Board does not expect to track and account for atmospheric load reductions on a jurisdiction scale.

The atmospheric deposition of total nitrogen must be reduced by two percent over 65 years to achieve the deep water 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 beyond reducing bed and channel erosion associated with stream restoration, a project to provide more quantitative information on the effects of various forest management actions and association mitigation measures, 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 achieve the TMDL required load reductions and meet the numeric target and is 65 years. The Lake Clarity Model showed that basin-wide loads of fine sediment particles, nitrogen, and phosphorus must be reduced by 65 percent, 10 percent, and 35 percent, respectively, to attain the numeric target of 97.4 feet average annual Secchi depth. Since the greatest reductions must occur in fine sediment particle loads, an implementation plan that achieves, on average over the entire implementation plan time frame, a one percent load reduction of fine sediment particles per year is reasonable. Though the first 20-year implementation phase is expected to achieve roughly one-half of the needed 65 percent total load reduction in fine sediment particle load, this load reduction would only improve the transparency by about ten feet, which is about one-third of the progress to the numeric target. Each successive 20-year implementation phase is expected to achieve roughly ten more feet of transparency improvement towards the numeric target, adding up to about 65 years for complete implementation to achieve the numeric target. The 65-year schedule also assumes that the rate of achieving load reductions is expected to decrease over time after the first 20-year phase as load reduction opportunities become increasingly scarce and likely more difficult to attain.

The TMDL attainment 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. The Regional Board expects all implementing agencies to pursue both self-funded and external funding sources. Should funding and implementation constraints impact the ability to meet load reduction milestones the Regional Board will consider amending the implementation and load reduction schedules.

Progress toward meeting the targets will be evaluated by the Regional Board in periodic milestone reports. The implementation schedule for the Lake Tahoe TMDL to make needed changes in urban stormwater policy and implementation actions is shown in Table 5.17-8.

Table 5.17-8
LAKE TAHOE TMDL URBAN UPLAND IMPLEMENTATION/REPORTINGSCHEDULE

Action	Schedule***	Responsible Party
Submit Pollutant Load Reduction 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 5.17-2, 5.17-3, and 5.17-4	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 Model, or an equivalent method acceptable to the Regional Board that uses a continuous hydrologic simulation process (or other modeling method that demonstrably produces similar results), incorporates stormwater discharge characteristics from established land uses, includes the effectiveness of stormwater treatment best management practices, and accounts for the changes in roadway and stormwater treatment facility condition.

***These due dates are not imposed by virtue of the Basin Plan. The due dates will be established in Regional Board orders consistent with the schedule noted herein.

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: The Regional Board is committed to operating a TMDL Management System throughout the implementation timeframe of the TMDL. Through the Management System process, the Regional Board may evaluate information such as the relative accuracy of baseline load estimates and the efficacy of load reduction actions, and will compare the anticipated transparency response to average annual Secchi depth measurements. The Management System framework will also support regular assessments of relevant research and monitoring findings. Based on Management System findings, the Regional Board may consider reopening the TMDL to adjust load reduction milestones and/or the TMDL implementation approach if needed. Following the first fifteen year implementation period of this TMDL, the Regional Board will evaluate the status and trend of the lake's deep water transparency relative to the load reductions achieved. The Regional Board, in partnership with implementation, funding, and regulatory stakeholders, anticipates conducting this adaptive management process as needed to ensure the deep water transparency standard will be met by year 65.

The Regional Board evaluated the anticipated changes in temperature and precipitation associated with global climate change. An extensive review of available literature and climate change model results concluded that by the year 2050, Lake Tahoe basin temperatures may increase by up to two degrees Celsius and average annual precipitation may decrease by approximately ten percent. This shift may influence local stormwater hydrology and stormwater dischargers may need to adjust future stormwater practices to ensure management measures are sufficient to meet the load reduction requirements described in Tables 5.17-2, 5.17-3, and 5.17-4.

Monitoring Plan: The Regional Board expects funding, implementing, and regulatory agencies to assist in developing a comprehensive TMDL monitoring plan within the first two years following TMDL adoption by USEPA. Once developed, the monitoring program will assess progress of TMDL implementation and provide a basis for reviewing, evaluating, and revising TMDL implementation actions as needed. The following sections describe both ongoing and anticipated monitoring activities for each of the major pollutant sources and tributary and in-lake monitoring efforts.

<u>Urban Upland</u>

In 2007 the Tahoe Science Consortium began planning a Lake Tahoe Regional Stormwater Monitoring Program (RSWMP) to better understand local urban runoff conditions, evaluate the impact of erosion control and stormwater treatment efforts, and coordinate and consolidate an urban stormwater monitoring work. The RSWMP has been organized in three phases. The first phase, completed in 2008, focused on collaboratively framing the elements of a comprehensive stormwater monitoring program. The framework includes relevant agency, implementer and science considerations, an outline of the required elements for a monitoring program, the design for structural (administrative) elements, and goals and objectives for a sustainable program. Identified monitoring goals include (1) monitoring to quantify load reduction progress at a subwatershed scale; (2) data collection to support improvements in best management practice design, operation, and maintenance; and (3) efforts to identify and quantify specific sources of urban stormwater pollutants to refine load reduction model input parameters.

The second phase of RSWMP will build on the conceptual framework by designing a specific monitoring program that will include: a quality assurance project plan; specific monitoring goals and data quality objectives; monitoring design specifications; detailed sampling and analysis plan; stormwater database development, data management and analysis details; organizational structure of RSWMP; operational costs; funding arrangements; agency roles and responsibilities; and internal and external peer-review processes.

The last RSWMP phase will be the funding and implementation of the actual stormwater monitoring program. This phase includes selecting monitoring sites and equipment, and developing the detailed processes and protocols for reporting monitoring results. Since the RSWMP will largely provide information for the local municipal jurisdictions and state transportation agencies to meet regulatory or other monitoring needs, RSWMP participation or implementation of an equivalent monitoring program is expected to be a condition of NPDES municipal stormwater permits.

Atmospheric Deposition

UC Davis scientists regularly measure atmospheric deposition of nitrogen (nitrate, ammonium and total Kjeldahl nitrogen) and phosphorus (soluble reactive phosphorus, total dissolved phosphorus and total phosphorus). The atmospheric deposition monitoring is expected to continue and several research studies, focused on fine sediment particles, are anticipated to be completed by 2011. The results from these studies will fill knowledge and data gaps in fine sediment particle deposition on Lake Tahoe, including better estimates of loading from atmospheric deposition. To assess project effectiveness for reduction of fine sediment particles by individual atmospheric source, targeted air quality control monitoring should be conducted in association with selected project implementation.

Forest Upland

The stream monitoring network will play a key role in evaluating load reduction from these land-uses, while management practice effectiveness will be assessed on a project basis. Monitoring is needed to ensure forest management actions, including fuels reduction efforts, are evaluated at either the project and/or sub-basin level to determine whether the measures are reducing fine sediment particle and nutrient loading.

Responsible parties will be required to document and report previous year activities that may have increased or reduced pollutant loads and describe how the reported loading assessment was determined. Forest management agencies will also be required to annually submit plans for next year’s management activities that are expected to influence fine sediment particle, total nitrogen, and total phosphorus loading rates. The anticipated activities are expected to include, but not be limited to: fuel reduction projects, BMPs on unpaved roads and trails, ski area revegetation, routine BMP maintenance, and effective road decommissioning.

Stream Channel Erosion

Similar to the forest upland monitoring approach, the relative impact of restoration activities will be evaluated on a project basis. Responsible agencies are encouraged to use permanent survey markers and monitor changes in stream cross-sections in relation to erosion or aggregation of sediment for stream reaches of interest.

Research projects have been funded to assess the benefits of stream restoration project components that reconnect the stream to its natural floodplain in reducing fine sediment particles and nutrients. The Water Board anticipates that these efforts will provide consistent protocols useful for quantifying the load reductions from certain streams under specified flow conditions.

Tributary Monitoring

Stream water quality monitoring and suspended sediment load calculations are regularly done as part of the Lake Tahoe Interagency Monitoring Program (LTIMP). LTIMP is a cooperative program including both state and federal partners and is operationally managed by the United States Geological Survey, UC Davis – Tahoe Environmental Research Center, and the Tahoe Regional Planning Agency. LTIMP was formed in 1978 and one of its primary objectives is to monitor discharge, nutrient load, and sediment loads from representative streams that flow into Lake Tahoe. Cumulative flow from these monitored streams comprises about 50 percent of the total discharge from all tributaries. Each stream is monitored on 30 - 40 dates each year and sampling is largely based on hydrologic events. Nitrogen and phosphorus loading calculations are performed using the LTIMP flow and nutrient concentration database. This data is stored on the USGS website at http://wdr.water.usgs.gov/.

Lake Monitoring:

Lake sampling is done routinely at two permanent stations. At the Index Station (location of the Lake Tahoe Profile or LTP), samples are collected between 0 - 105 meters in the water column at 13 discrete depths. This station is the basis of the > 40 year continuous data set and monitoring is done on a schedule of 25-30 times per year. The Mid-Lake Station has been operational since 1980 and has been valuable for comparison with the Index Station. At this location, samples are taken down a vertical profile to the bottom of the lake (0 - 450 meters) at 11 discrete depths on the order of once per month. Sampling along the complete vertical depth profile allows for the analysis of whole-lake changes. In addition, the lake monitoring program also includes phytoplankton and zooplankton taxonomy and enumeration, algal growth bioassays (using natural populations), and periphyton (attached) algae. Much of this monitoring is summarized in a report entitled, *Tahoe: State of the Lake Report* published by UC Davis (UC Davis - TERC 2009).

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Chapter 6
PLANS AND POLICIES

The State Water Resources Control Board (State Board) has adopted a number of statewide or area-specific water quality plans which complement the Regional Boards' Basin Plans and which may supersede previously adopted provisions of Basin Plans to the extent that any inconsistencies occur; the most stringent plan provisions take precedence. Both the State Board and Regional Boards may adopt policies, separate from the Basin Plans, which provide detailed direction on the implementation of certain plan provisions. A Regional Board plan, policy, or guideline adopted to implement, interpret or make specific the Basin Plan prior to October 14, 1994, is superseded by this revised plan unless it is expressly mentioned in this plan. The following is a summary of all important plans and policies affecting the Lahontan Region Basin Plan. Citation of these documents is not meant to imply incorporation-by-reference. Copies of Regional and State Board policies are included in Appendix B of this plan.

State Board Plans

Several of the State Board's plans concern types of water bodies not found in the Lahontan Region, and thus do not affect Regional Board activities. These include: the *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin* (December 2006, Res. 2006-0098, the *Water Quality Control Plan for Ocean Waters of California* (amended September 2009, Res. 2009-0072) and the *Water Quality Control Plan for Enclosed Bays and Estuaries* (Part 1 Sediment Quality, Res. 2008-0070. The following are summaries of plans which are applicable to the Lahontan Region:

1. **Thermal Plan**

   The *Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* was adopted by the State Board in 1972 and amended in September 1975 (Res. 75-89). It specifies water quality objectives, effluent quality limits, and discharge prohibitions related to thermal characteristics of interstate waters and waste discharges. The portions of this plan applicable to the Lahontan Region are those concerning interstate waters.

2. **Nonpoint Source Program Plan**

   In December 1999 (Res. 99-114), the State Board adopted a *Nonpoint Source Program Plan* pursuant to Section 319 of the federal Clean Water Act. The plan is composed of two volumes – *Volume I: Nonpoint Source Program Strategy and Implementation Plan for 1998-2013* and *Volume II: California Management Measures for Polluted Runoff*. The plan identifies nonpoint source control programs and milestones for their accomplishment. It emphasizes cooperation with local governments and other agencies to promote the implementation of Best Management Practices and remedial projects.

3. **California Rangeland Water Quality Management Plan**

   The California Rangeland Water Quality Management Plan (Rangeland Plan) was developed by the Rangeland Management Advisory Committee (RMAC), a statutory committee which advises the California Board of Forestry on rangeland resources. The Rangeland Plan was accepted by the State Board in 1995 (Res. No. 95-43). It summarizes authorities and mandates for water quality and watershed protection, and specifies a framework for the voluntary and cooperative development of ranch management strategies for water quality protection under Tier I of the State Board's 1988 Nonpoint Source Management Plan, which has been superseded by the 2000 *Plan for California's Nonpoint Source Pollution Control Program* and the 2004 *Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program*. Certain provisions of the Rangeland Plan are no longer applicable due to the new State Board's new Program and Policy. (See the Introduction to Chapter 4 of this Basin Plan for an explanation of the Nonpoint Source Plan.)

4. **Strategic Plan**

   After comprehensive formal strategic planning efforts involving State and Regional Board staff and external stakeholders, the State Board adopted a Strategic Plan in 1995 and updated it last in 2008 (Res. 2008-0063). The plan includes goals, objectives, and performance measures to guide ongoing decision-making and appropriate allocation of scarce resources. The strategic planning process is recognized as an ongoing and inherent function of management.

State Board Policies

Again, certain State Board policies are not applicable to the water bodies of the Lahontan Region. These include: the Water Quality Control Policy for Enclosed Bays and Estuaries of California (Res. 74-43), and the Pollutant Policy Document for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Res. 90-67). The following are summaries of important policies that **are** applicable to the Lahontan Region:

1. **Statement of Policy with Respect to Maintaining High Quality of Water in California**

   The State Board adopted this policy in 1968 (Res. No. 68-16). The Policy restricts the Regional Board and dischargers from reducing the water quality of surface or ground waters even though such a reduction in water quality might still allow the protection of the beneficial uses associated with the water prior to the quality reduction. The goal of the policy is to maintain high quality waters, and the Regional Board must enforce it.

   Changes in water quality are allowed only if the Regional Board finds the change: (1) is consistent with maximum benefit to the people of the State, (2) does not unreasonably affect present and anticipated beneficial uses, and (3) does not result in water quality less than that prescribed in water quality control plans or policies. USEPA regulations require each state to adopt an “antidegradation” policy and to specify the minimum requirements for its implementation. The federal view is that an antidegradation policy is a critical component of surface water quality standards. Policy 68-16 preceded the federal regulations and is more complete in that it applies to both ground and surface waters.

2. **The State Policy for Water Quality Control**

   This policy declares the State Board's intent to protect water quality through the implementation of water resources management programs and serves as the general basis for subsequent water quality control policies. It was adopted by the State Board by motion on July 6, 1972.

3. **Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling**

   This policy was adopted by the State Board in June 1975 (Res. No. 75-58). Its purpose is to provide consistent principles and guidance for supplementary waste discharge or other water quality control actions for thermal powerplants using inland waters for cooling. The Regional Board is responsible for its enforcement.

4. **Policy and Action Plan for Water Reclamation in California**

   This policy was adopted in January 1977 (Res. No. 77-1). Among other things, it requires the Regional Boards to conduct reclamation surveys and specifies reclamation actions to be implemented by the State and Regional Boards and other agencies. The policy and action plan are contained in the State Board report entitled *Policy and Action Plan for Water Reclamation in California.*

5. **Policy on the Disposal of Shredder Waste**

   This State Board Resolution (No. 87-22), adopted in March 1987, permits the disposal into certain landfills of wastes, produced by the mechanical destruction of car bodies, and old appliances and similar castoffs, under specific conditions designated and enforced by the Regional Boards.

6. **Sources of Drinking Water Policy**

   This policy was adopted in May 1988 (Res. No. 88-63). It specifies which ground and surface waters are considered to be suitable or potentially suitable for the beneficial use of water supply (MUN). It allows the Regional Board some discretion in making MUN determinations.

7. **Policy for Regulation of Discharges of Municipal Solid Waste**

   This policy (Res. No. 93-62) directs the Regional Water Boards to amend waste discharge requirements for municipal solid waste landfills to incorporate pertinent provisions of the federal “Subtitle D” regulations under the Resource Conservation and Recovery Act (RCRA).

8. **Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304 *(as amended on April 21, 1994 and October 2, 1996)***

   This policy (Res. Nos. 92-49 and 1996-0079) sets forth procedures to be followed by all Regional Boards in preliminary site assessment, including: soil and water investigations, proposal, selection, and implementation of cleanup actions, and monitoring to determine the effectiveness of cleanup and abatement. (See the Section 4.2 of Chapter 4 on “Spills, Leaks, Complaint Investigations, and Cleanup” for a more detailed summary of this resolution.)

9. **Policy for the Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP)**

   This policy (Res. Nos. 2000-0015, 2000-0030, and 2005-0019) contains implementation provisions for 126 priority toxic pollutant criteria found within the National Toxics Rule, the California Toxics Rule, and for priority pollutant objectives in the Basin Plan. The SIP applies to discharges of toxic pollutants and allows for a standardized approach for permitting, maintaining statewide consistency.

10. **Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program**

    This policy (Res. No. 2004-0030) explains how the Water Code mandates and authorities will be used to implement the State Board’s Nonpoint Source Program Plan. The policy also provides a bridge between the Program Plan and the State Board’s Water Quality Enforcement Policy (see below).

11. **Water Quality Control Policy for Developing California’s Clean Water Act Section 303(d) List**

    This policy (Res. No. 2004-0063) describes the process by which the State Board and Regional Boards will comply with the listing requirements of section 303(d) of the federal Clean Water Act. The objective of this policy is to establish a standardized approach for developing California’s section 303(d) list in order to achieve the overall goal of achieving water quality standards and maintaining beneficial uses in all of California’s surface waters.

12. **Water Quality Control Policy for Addressing Impaired Waters: Regulatory Structure and Options**

    This policy (Res. No. 2005-0050) and the associated guidance document “A Process for Addressing Impaired Waters in California” are intended to ensure that the impaired waters of the state are addressed in a timely and meaningful manner. The policy identifies various options for addressing impaired waters, including adoption of Total Maximum Daily Load, (TMDLs) and site-specific water quality objectives, modifying beneficial use designations, and leveraging the actions of other agencies or entities.

13. **Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits**

    The policy (Res. No. 2008-0025) provides uniform provisions authorizing compliance schedules in NPDES permits, including the conditions under which a compliance schedule may be granted.

14. **Policy for Water Quality Control for Recycled Water**

    The policy (Res. No. 2009-0011, as amended by Res. No. 2013-0003) provides direction to the Regional Boards, proponents of recycled water projects, and the public regarding the appropriate criteria to be used by the Water Boards in issuing permits for recycled water projects. The policy describes permitting criteria that are intended to streamline the permitting of the vast majority of recycled water projects. The intent of this streamlined permit process is to expedite the implementation of recycled water projects in a manner that implements state and federal water quality laws while allowing the Regional Boards to focus their limited resources on projects that require substantial regulatory review due to unique site-specific conditions. The policy requires the development of salt/nutrient management plans to address the sustainable use of recycled water while protecting the groundwater basins.

15. **Policy on Supplemental Environmental Projects**

    Supplemental Environmental Projects (SEPs) are projects that enhance the beneficial uses of the waters of the State, that provide a benefit to the public at large and that, at the time they are included in the resolution of an administrative civil liability action, are not otherwise required of the discharger. The policy (Res. No. 2009-0013) addresses the State Board’s interest in monitoring the use of funds for SEPs that would otherwise be paid into accounts for which it has statutory management and disbursement responsibilities.

16. **Water Quality Enforcement Policy**

    This policy (Res. No. 2009-0083) directs that enforcement actions throughout the state shall be consistent, predictable, and fair. It provides direction on types of violations that shall be brought to the attention of Regional Board members, on escalation of enforcement procedures from less formal to more formal levels, on cooperation and coordination with other agencies and referrals of violations to the Attorney General, and on factors to be considered in setting amounts for Administrative Civil Liabilities (ACLs). The policy supports the concept of supplemental environmental projects (e.g., mitigation measures) in exchange for suspension of a portion of an ACL or other monetary assessment (see the Policy on Supplemental Environmental Projects, above).

17. **Water Quality Control Policy for Low-Threat Underground Storage Tank Case Closure**

    This policy (Res. No. 2012-0016) establishes consistent statewide case closure criteria for low-threat petroleum underground storage tank (UST) sites. The policy seeks to increase UST cleanup process efficiency to preserve limited resources for mitigation of releases posing a greater threat to human and environmental health.

18. **Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems**

    This purpose of this policy (Res. No. 2012-0032) is to allow the continued use of onsite wastewater treatment (septic) systems (OWTS) while protecting water quality and public health. The policy establishes a statewide, risk-based, tiered approach for the regulation and management of OWTS installations and replacements and sets the level of performance and protection expected from OWTS. The policy also conditionally waives the requirement for owners of OWTS to apply for and receive Waste Discharge Requirements in order to operate their systems when they meet the conditions set forth in the policy.

Regional Board Policies

The Lahontan Regional Board has adopted a large number of policy statements over the years. The following are summaries of all of the policies that are in effect as of the date of adoption of this plan, and which the Regional Board will use to implement this plan. A Regional Board plan, policy, or guideline adopted to implement, interpret or make specific the Basin Plan prior to October 14, 1994, is superseded by this revised plan unless it is expressly mentioned in this plan.

1. **Policies Delegating Authority (Resolutions 6-90-72 and 6-91-938)**

   Under Resolution 6-90-72, the Regional Board delegated to the Executive Officer, under the general direction and control of the Board, all of the powers and duties of the Board under Division 7 of the California Water Code except those specified in Section 13223(a). (This section lists powers and duties that may not be delegated.) Resolution 6-90-72 also reserves to the Regional Board the authority to state policy and create procedure to be followed by the Executive Officer. Resolution 6-91-938 delegates authority to the Executive Officer to approve closure plans for waste management units, with certain exceptions.

2. **Exemption Policies for Basin Plan Prohibitions**

   Chapter 4 includes prohibitions against discharges from septic systems, and from other sources, that affect certain areas within the Lahontan Region. In some cases, detailed sets of exemption criteria for prohibitions were adopted as Basin Plan amendments, and are now included in the body of this Basin Plan. Board Orders 6-70-48, 6-71-17, and 6-74-139 describe sewage export variances for the Lake Tahoe Basin.

   Exemption criteria for discharge prohibitions related to Stream Environment Zones and 100-year floodplains in the Lake Tahoe Basin, and for the 100-year floodplain prohibitions in the Truckee River and Little Truckee River watersheds, are set forth in Chapters 4 and 5. These criteria require specific findings described in Chapters 4 and 5. The Regional Board has at various times delegated authority to the Executive Officer to make exemption findings for these prohibitions under certain circumstances. Because the Regional Board may delegate or remove the authority of the Executive Officer to grant waste discharge prohibition exemptions at any time with appropriate public notice, generally, this Basin Plan will not explicitly list delegations for prohibition exemptions.

3. **Interpretation of the High Water Line for Eagle Lake, Susanville Hydrologic Unit (Resolution 82-6)**

   This Basin Plan's minimum siting criteria for septic tanks, sewer lines, leaching fields, and seepage pits include minimum distances of separation from lakes and reservoirs as measured from the high water line (see Table

4.4-1). This Resolution defines the high water line for Eagle Lake to be 5117.5 feet, a definition used in prohibiting the discharge of wastes from subsurface disposal systems on a lot with an elevation of less than 5130 feet. A copy of this Resolution is included in Appendix B. (See Section 4.1 of this Basin Plan for waste discharge prohibitions for Eagle Lake.)

4. **Policy on Geothermal Development in the Eagle Lake Basin, Lassen County (Resolution 82-7)**

   This resolution states the policy of the Regional Board to oppose any further consideration of geothermal exploration or development in the Eagle Lake Basin until it can be shown that such activities can be conducted without any risk of significant water quality degradation. This resolution is included in Appendix B.

Water Quality Management Plans Adopted by Other Agencies

In the 1970s, funds were provided for water quality management planning under Section 208 of the federal Clean Water Act. A number of Section 208 Plans affecting the Lahontan Region were completed. Other plans adopted by federal, state, and local agencies may also affect the Regional Board's activities. The following is a summary of important plans:

1. **U.S. Forest Service, Pacific Southwest Region, *Water Quality Management Handbook* for National Forest System Lands in California**

   This handbook was completed in 2011 and is a chapter in the larger USFS Region 5 Forest Service Handbook. It identifies water quality problems associated with silviculture and other Forest Service land management activities, and sets forth programmatic Best Management Practices.

2. **U.S. Bureau of Land Management, *208 Water Quality Management Report***

   This plan was completed in 1979. It identifies BLM management activities that affect water quality, water quality concerns of BLM's Districts within California, and includes recommendations for development of Best Management Practices to correct existing problems.

3. **California Department of Transportation, *Best Management Practices Manuals* and *Statewide Storm Water Pollution Prevention Plan***

   Caltrans regularly updates its Best Management Practices Manual and its Statewide Storm Water Pollution Prevention Plan. These documents summarize procedures within Caltrans's planning, construction, and operation and maintenance programs that can be used to control water quality problems.

4. **Local Government Plans**

   Several local governments in the Region completed Section 208 water quality management planning studies to identify problems, followed by governing body action to commit the local government to improve effectiveness of its regulatory structure to prevent similar problems in the future. These studies include:

   California City:
   - Use of individual wastewater disposal systems and alternatives

   City of Bishop:
   - Surface flow management/urban runoff
   - Erosion control and abatement

   Inyo County:
   - Use of individual wastewater disposal systems and alternatives
   - Surface flow management/urban runoff
   - Erosion control and abatement

   Los Angeles County:
   - Use of individual wastewater disposal systems and alternatives
   - Surface flow management/urban runoff
   - Erosion control and abatement

5. **Tahoe Regional Planning Agency, *Water Quality Management Plan for the Lake Tahoe Region* (“208 Plan”)**

   In the 1970s, the bistate Tahoe Regional Planning Agency (TRPA) was designated the 208 planning agency for the “Lake Tahoe Region,” which includes most of the Lake Tahoe Hydrologic Unit and a small portion of the Truckee River Hydrologic Unit. TRPA's “208 Plan,” which incorporated portions of the State Board's *Lake Tahoe Basin Water Quality Plan,* was certified by the states of California and Nevada and the USEPA in 1981. The 208 Plan was substantially revised and recertified in 1989.

In 2012, the 208 Plan was again updated, along with its implementing Code of Ordinances. It identifies water quality problems that have contributed to the degradation of Lake Tahoe and sets forth a series of control measures including land use restrictions, wetland protection and restoration, use of a Best Management Practices Handbook, and a “Capital Improvements Program” of remedial erosion and surface runoff control projects to be implemented by state and local government agencies. (See Chapter 5 for a summary of important control measures from this plan.)

6. **Other Plans**

   A number of other plans adopted by state, federal, and local government agencies affect the Regional Board's activities. These include the solid waste management and hazardous waste management plans adopted by counties, and land and resource management plans adopted by National Forests and BLM Districts. Regional Board staff review and comment on new and revised plans by other agencies as they are proposed and attempt to maximize coordination in implementation of water quality related measures.

Interagency Agreements

The State and/or Regional Boards have entered into Management Agency Agreements (MAAs) and Memoranda of Understanding (MOUs) or of Agreement (MOAs) with a number of other agencies to define procedures for implementation of the plans summarized above, or to clarify each agency's authority and responsibility in implementing water quality control measures where overlaps of jurisdiction occur. Some of the more important MAAs, MOUs, and MOAs are with the following agencies:

1. **U.S. Forest Service**

   In February 1981 the State Board Executive Director signed a MAA with the U.S. Forest Service (USFS) which waives discharge requirements for certain USFS nonpoint source discharges provided that the Forest Service implements State Board approved Best Management Practices (BMPs) and procedures and additional provisions of the MAA. The MAA covers all USFS lands in California. Implementation of BMPs, in conjunction with monitoring and performance review requirements approved by the State and Regional Boards, is the primary method of meeting the Basin Plan's water quality objectives for the activities to which the BMPs apply. The MAA does not include USFS point source discharges and in no way limits the authority of the Regional Board to carry out its legal responsibilities for management or regulation of water quality.

2. **California Department of Forestry and Fire Protection**

   In February 1988, the State Board signed a MAA with the California Department of Forestry and Fire Protection (CALFIRE) and the California Board of Forestry (BOF), for the purpose of carrying out, pursuant to Section 208 of the federal Clean Water Act, the *Water Quality Management Plan For Timber Operations on Nonfederal Lands* (WQMP). As with the USFS MAA, the CALFIRE agreement requires the Department to implement certain BMPs to protect water quality from timber harvest and associated activities. However, the MAA obligates the Regional Boards to ensure that harvest operations incorporate BMPs and comply with applicable water quality standards. Appendix F of the MAA also calls for the preparation of a Memorandum of Understanding (MOU) for the Regional Boards, the State Board, and CALFIRE to prescribe interagency procedures for implementing BMPs. In 2003, the State and Regional Boards and CALFIRE entered into an MOU identifying procedures that will be used by each agency in carrying out their statutory activities to prevent adverse effects on beneficial uses of water from silvicultural activities on non-federal lands in California and to assist in restoring beneficial uses of water in watersheds where beneficial uses of water have been determined to be impaired.

3. **California Department of Conservation, Division of Oil and Gas**

   In March 1988, the State Board amended a February 1982 MOA with the State Department of Conservation, Division of Oil and Gas (CDOG), to regulate discharges from oil, gas, and geothermal fields. The agreement requires CDOG to notify the Regional Boards of all new operators, all pollution problems associated with operators, and proposed discharges. CDOG and Regional Boards must also work together, within certain time-lines, to review and prepare discharge permits.

4. **Department of Toxic Substances Control – Hazardous Waste**

   To expedite the cleanup of hazardous waste sites and to eliminate duplication of effort, in 1990 the State Board entered into an MOU with the State Department of Health Services (which at that time contained the Toxic Substances Control Program now called the Department of Toxic Substances Control). The Regional Boards will be the lead agency when contamination is associated with inactive mines, leaking underground storage tanks, agricultural activities, surface impoundments, and non-hazardous waste landfills. The MOU defines the responsibilities of the lead agency for coordinating and communicating cleanup activities with support agencies. Lead agencies must also notify support agencies before enforcement and settlement activities are implemented at hazardous waste sites.

5. **Department of Toxic Substances Control – Brownfields**

   To improve coordination regarding the oversight of investigation and cleanup activities at “brownfield” sites, in 2005, a Memorandum of Agreement (MOA) was entered between the Department of Toxic Substances Control (DTSC), the State Water Board, the Regional Water Boards, and the California Environmental Protection Agency. Brownfields are “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence of potential presence of a hazardous substance, pollutant, or contaminant.” The MOA was developed to ensure effective and expeditious cleanup of brownfield sites in a manner that is protective of public health and safety and the environment.

6. **Tahoe Regional Planning Agency (TRPA)**

   In 1994, the Regional Board entered into a MOU with the TRPA in order to reduce regulatory duplication in review and permitting of certain types of projects in the California portion of the Lake Tahoe watershed. The MOU was updated in 2003. The MOU assigns primary responsibility for permitting and enforcement for certain types of projects to only one agency, but does not limit the authority of either agency. It also provides for reporting by each agency to the other on permits issued under the MOU, and for ongoing discussions on possible expansion of the scope of the MOU.

7. **Local Governments**

   The Lahontan Regional Board has entered into MOUs with local governments regarding the following subjects:

   - Implementation of regionwide septic system criteria, including density limits. (The criteria are set forth in Chapter 4.) Implementation of the State Board’s Onsite Wastewater Treatment System Policy will result in revision or rescission of these MOUs, as local agencies will either adopt Local Area Management Plans or permit septic systems per the criteria in the OWTS Policy.

   - Closure, installation, repair, and soils investigations associated with underground tanks. Under these MOUs the Regional Board agrees to waive waste discharge requirements if the local government implements Best Management Practices for the activities listed above.

   - On August 13, 1993 the Regional Board adopted a Memorandum of Understanding between the Regional Board, Inyo County, and the Mesa Community Services District regarding the implementation of the Mesa Wastewater Management Plan. This plan provides for the treatment of individual sewage discharges necessary to comply with Regional Board water quality objectives at the Mustang Mesa/Alta Vista (Mesa) Community in Inyo County. The plan was necessary in order to allow the community to develop its remaining lots which had been encumbered since a Regional Board prohibition was established in 1975. The plan calls for the pretreatment of septic effluent with intermittent sand filters and a ground water monitoring and reporting program.

8. **Military Facilities (Federal Facilities Site Remediation Agreements)**

   High priority hazardous waste sites scheduled for cleanup under the federal “Superfund” program are placed on the National Priority List (NPL). The Superfund program provides funding and guidelines for cleanup of NPL sites. In California, a significant proportion of the NPL sites are military installations. Federal facilities in California, including military installations, which are **not** on the NPL can sign into a state compliance agreement called a Federal Facilities Site Remediation Agreement (FFSRA). A FFSRA is a document which formalizes a working agreement between the federal facility and state agencies. It establishes a schedule for site investigations and any necessary cleanup, and it provides the enforcement mechanism in cases where commitments are not met. More information on water quality control measures for military installations can be found in Section 4.12 of the Basin Plan.

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Chapter 7
MONITORING AND ASSESSMENT

An ongoing water quality surveillance and monitoring program is essential for implementation of a Basin Plan. It allows characterization of ambient water quality and the degree of support for beneficial uses on both a short-term and a long-term basis. “Baseline” data can be used to set standards for water bodies which currently do not have site-specific standards. “Trend” information defines the need for and allows prioritization of regulatory actions. Monitoring can document compliance with permit conditions, and the success of remedial activities.

The U.S. Environmental Protection Agency (USEPA) requires states to submit biennial reports on the quality of their water bodies under Section 305(b) of the federal Clean Water Act. It also requires identification of water bodies with any of several specific problem types (§ 131.11, 304(*l*), 314, and 319 “lists”). Beginning in 1989, the State Water Resources Control Board (State Board) and the Regional Boards have supplemented the “305(b) Report” with a detailed computer database. The assessment, which will be updated on an ongoing basis, will be used as part of the Watershed Management Initiative to provide the background for funding decisions.

The Porter-Cologne Act (Section 13267) authorizes Regional Boards to investigate water quality and to require dischargers to submit monitoring reports. It also (Section 13383) authorizes the State and Regional Boards to establish discharger monitoring requirements.

Because of the large size of the Lahontan Region, the large number of water bodies in it, the difficulties of sampling in remote terrain and severe weather, and ongoing funding constraints, detailed monitoring data are available for only a few of the Region's waters. The following is a summary of the kinds of monitoring information which are used by Regional Board staff in their ongoing planning, assessment, regulatory, and enforcement activities. Additional information on the assessment process is also provided. Because of expected year-to-year changes, no attempt has been made to provide a detailed list of monitoring stations, or to include monitoring results in this Chapter. Readers who wish to obtain information on monitoring or assessment data for a particular water body should contact Regional Board staff.

Water Quality Monitoring

Baseline and Trend Monitoring

The State Board has several ongoing monitoring programs which are statewide, or which involve sampling within the jurisdiction of more than one Regional Board. Programs such as the State Mussel Watch, and the Striped Bass Study (which affects the San Francisco Bay and Delta) are of little relevance to the Lahontan Region. However, the statewide Toxic Substances Monitoring Program (TSMP) samples several stations in the Lahontan Region every year.

Under the TSMP, the Department of Fish and Game collects fish or other organisms at each station, preserves and prepares specimens according to a rigorous protocol, and analyzes them for a spectrum of metals and/or toxic organic chemicals. Results are reported to the State Board, which prepares an annual report interpreting the data on a geographic and historical basis. Because of the small sample numbers and (in some cases) the lack of water quality criteria, results do not necessarily indicate impairment of beneficial uses. However, elevated toxic levels do indicate a need for more specific study of possible problems and their causes. In the Lahontan Region, elevated metals levels have been detected in fish from streams affected by past mining activity.

Another statewide program which has involved monitoring is the Well Investigation Program (WIP), which was initiated in 1986 to document sources of organic chemical degradation in public drinking water supply wells. This program is implemented at both the State and Regional Board levels. As of 1989, only 12 degraded wells (less than 1% of the total) had been identified in the Lahontan Region. Funding is no longer available for Regional Board monitoring under this program. Monitoring may be resumed in the future. Additional discussion on the enforcement-related aspects of the WIP is provided in Chapter 4.

The State Board has conducted shorter special studies in response to legislative mandates, on topics such as selenium in agricultural drainage waters and nitrate in ground water. The State Board has also contributed funding to cooperative studies by other state and federal agencies, such as the Lake Tahoe Interagency Monitoring Program (see Chapter 5).

The Regional Board also periodically conducts or manages special studies which provide baseline or trend monitoring data. Funds for these studies have come from the federal Section 205(j) grant program and the State Board special studies budget. Other potential funding sources are the Section 314 Clean Lakes Grant program and the Section 319 Nonpoint Source program.

The Regional Board makes use of monitoring data collected by other agencies such as the U.S. Geological Survey, the U.S. Forest Service, the California Department of Fish and Game, the California Department of Water Resources, and the Nevada Division of Environmental Protection. “Basic research” projects are also useful in assessing baseline/trend conditions. Ongoing research by California universities takes place at Lake Tahoe, Mono Lake, and Eagle Lake. The University of Nevada also conducts research in Lahontan Region waters.

Volunteer monitoring programs may involve data collection by school classes or citizens' groups who have been provided with training and equipment by Regional Board staff or other agencies such as the Department of Fish and Game. Quality assurance/quality control (QA/QC) programs must be implemented to ensure that data will be useful for Regional Board programs. An interagency program to encourage citizen monitoring is active in the Lake Tahoe Basin, and volunteer monitoring by stakeholders is expected to be an important part of the Watershed Management Initiative.

Compliance Monitoring

Waste discharge requirements and NPDES permits adopted by the Regional Board include discharger self-monitoring programs. Monitoring reports and technical reports may also be required of dischargers independently of waste discharge requirements (CA Water Code § 13267[d]). Dischargers may be required to monitor surface waters upstream and downstream of the discharge, as well as at the discharge point. Ground water monitoring, including installation of monitoring wells, may be required where appropriate. Monitoring programs range from the simple (periodic visual inspections of erosion and drainage control facilities at shopping centers) to the complex (physical, chemical, and biological analyses by municipal wastewater treatment plants and industrial dischargers). Parameters to be analyzed may be as varied as turbidity associated with dredging, toxic metals in geothermal discharges, and nutrients and pesticides in ground water underlying golf courses. Self-monitoring report submittal is tracked and report results are evaluated by Regional Board staff on an ongoing basis. The Board also receives monitoring data as a result of other regulatory programs (e.g., various toxics control programs).

Because many of the self-monitoring programs in the Lahontan Region do not require the collection of quantitative information, or require monitoring of only a few parameters, discharger monitoring data cannot be relied upon to provide quantitative background information on most of the receiving waters of the Region. This is particularly true of nonpoint source discharges.

Regional Board staff conduct periodic inspections of dischargers, and may collect samples for separate analysis of compliance with permit conditions. Occasionally, split samples may be taken to test the accuracy of the discharger's laboratory. Sampling of certain types of dischargers is required under state administrative procedures.

The California Environmental Quality Act (Public Resources Code § 21081.6) requires that monitoring and reporting programs be set up for any mitigation measures adopted as conditions of project approval. In general, the Regional Board's discharger monitoring programs fulfill the CEQA requirements. However, when the Regional Board acts as lead agency for the adoption of Basin Plan amendments or policies, additional monitoring may be necessary to document the accomplishment of mitigation conditions.

Remedial Project Monitoring

Regional Board staff are also involved in monitoring to measure the impacts of state-funded remedial projects. The Regional Board is responsible for oversight of the Leviathan Mine Pollution Abatement Project in the Bryant Creek drainage in Alpine County (See Section 4.7 of this Basin Plan). This includes periodic sampling of an established surface and ground water station network for selected toxic metals and related parameters, monitoring of the success of specific remedial measures such as revegetation, and bioassessment of streams affected by the discharge.

Monitoring for TMDLs

Monitoring data are essential for the development of Total Maximum Daily Loads (TMDLs) for impaired water bodies, and for evaluation of the accuracy of TMDL models and the success of remedial measures which are implemented as a result of the adoption of TMDLs. The development and implementation of TMDLs may involve the use of historical monitoring data, and monitoring by

Regional Board staff, Regional Board contractors, other agencies, and/or dischargers.

Complaint and Enforcement Monitoring

When investigating a reported water quality problem, Regional Board staff may collect samples and take photographs to document the extent of the problem and provide a basis for enforcement or remedial action. Monitoring is also performed by staff and/or the discharger as a follow-up to an enforcement action (e.g., underground tank cleanup). The existence of previous “baseline/trend” data is an important factor in documenting and correcting pollution.

Aerial Surveillance

The Regional Board's annual budget includes funds for aerial surveillance. Flights are made in chartered aircraft at least once a year over portions of the Region to take photographs for documentation of current conditions and detection of problems. Because of the large size and remote nature of much of the Lahontan Region, aerial surveillance allows the detection of problems which might not be apparent to inspectors on the ground.

The Regional Board also uses aerial photographic mapping by contractors and other agencies as the basis for special studies and remedial programs. For instance, aerial photographs of the Leviathan Mine were used in design of the Pollution Abatement Project. Historical and current aerial photographs also are being used to document shoreline erosion problems at Lake Tahoe.

Quality Control and Data Management

Federal regulations and state policy require the preparation and implementation of Quality Assurance/Quality Control (QA/QC) Plans for almost all monitoring carried out by the Regional Board's staff or its contractors. Dischargers must use laboratories approved by the Regional Board's Executive Officer and/or certified by the State Department of Health Services. The Regional Board's laboratory has an approved QA/QC program, and staff follow a standard “chain of custody” process in collection, transport, and shipment of samples.

Discharger monitoring reports are kept in the Regional Board's files; older files are microfiched. The Board has increasingly sophisticated computer facilities for analysis of data collected in special studies. “Raw” data are periodically made available to the State Board for entry into the STORET and/or SWQIS databases for use by other agencies.

The results of special studies are generally summarized in Regional Board staff reports and are discussed at public meetings of the Regional Board. The results of complaint monitoring are provided to the person or agency submitting the complaint. Copies of Regional Board planning documents and special studies reports are provided to public and university libraries.

Water Quality Assessment

The State Board has been preparing “Section 305(b) Reports” since the mid-1970s. Most of these reports have been fairly general in nature, highlighting a few significant problem areas and estimating total area or stream mileage of waters statewide which were classified as “good,” “medium,” or “poor” quality. In 1989, the State Board began a more detailed Water Quality Assessment (WQA) process to fulfill USEPA reporting requirements and to provide the basis for prioritizing funding under the State's Clean Water Strategy. The concepts of the Clean Water Strategy have since been incorporated into the Watershed Management Initiative Process.

The WQA process involves ongoing update of information in a computer database, which is now linked to Geographic Information System (GIS) data from a number of other agencies. The database provides qualitative information on water quality problems and threats, including causes, sources, and severity, and degree of beneficial use support. The database also allows inclusion of other information, such as remedial projects in progress, and attached files of monitoring data. The information used in update of the database includes the types of monitoring data discussed earlier in this Chapter, records of past Regional Board enforcement actions, professional judgement of Regional Board staff and other State and federal agency scientists and engineers, and public comments. In addition to its use in Section 305(b) reporting, the WQA database is used in update of the Clean Water Act Section 303(d) list of impaired water bodies. (See Section 4.13 of this Basin Plan.)

Future Monitoring and Assessment Needs

The completeness and accuracy of the WQA, and the validity of decisions based upon it, depend to a great extent on the availability of good monitoring data. As noted above, monitoring data are not available for most water bodies in the Lahontan Region. Regional Board staff will continue to submit funding proposals for special studies to increase knowledge of background water quality, and understanding of water quality problems. Staff will also encourage monitoring and research by other agencies and universities to fill the many significant data gaps in the Lahontan Region.