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 ÷ f, or n_{4d} = 4d-NH_3 ÷ 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 Un**it

(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)
$= 37{,}113 \times (\text{lake volume in acre-feet})^{-0.98418}$

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

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

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.

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

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.

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

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.

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

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 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.

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

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 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:

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

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 incorrectly 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

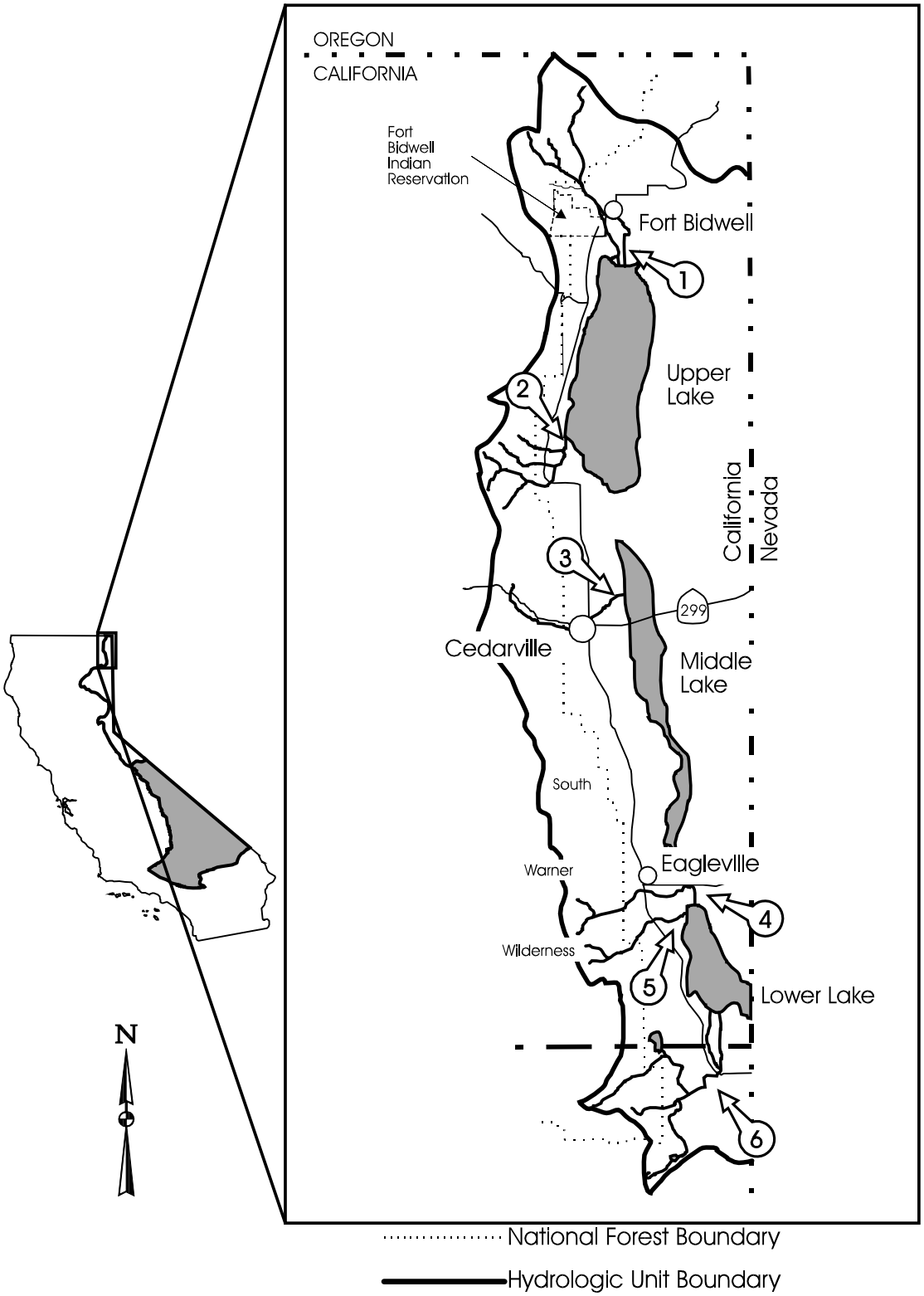

Table 3-8
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SUSANVILLE HU, EAGLE DRAINAGE HA

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

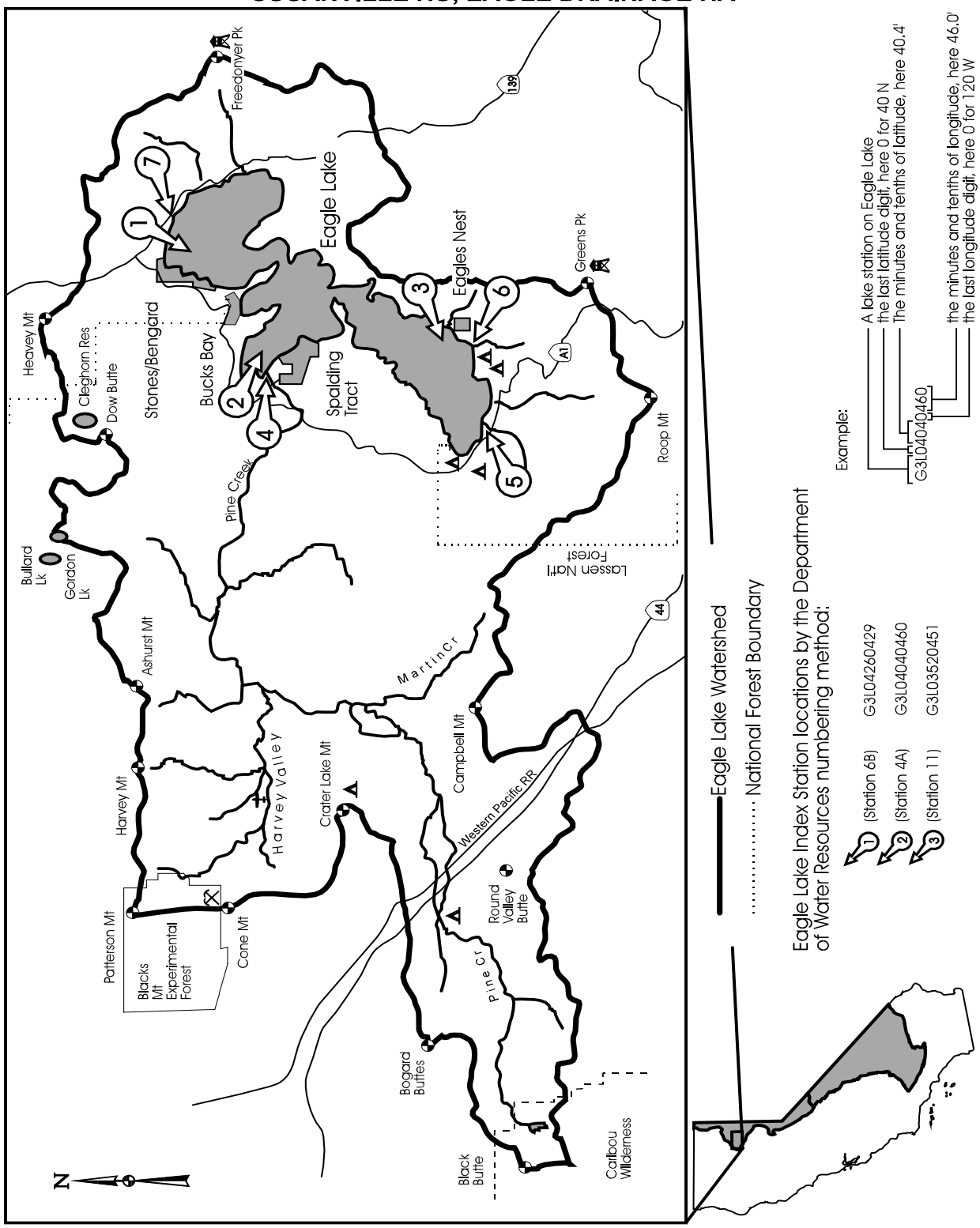

Table 3-9
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SUSANVILLE HYDROLOGIC UNIT

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

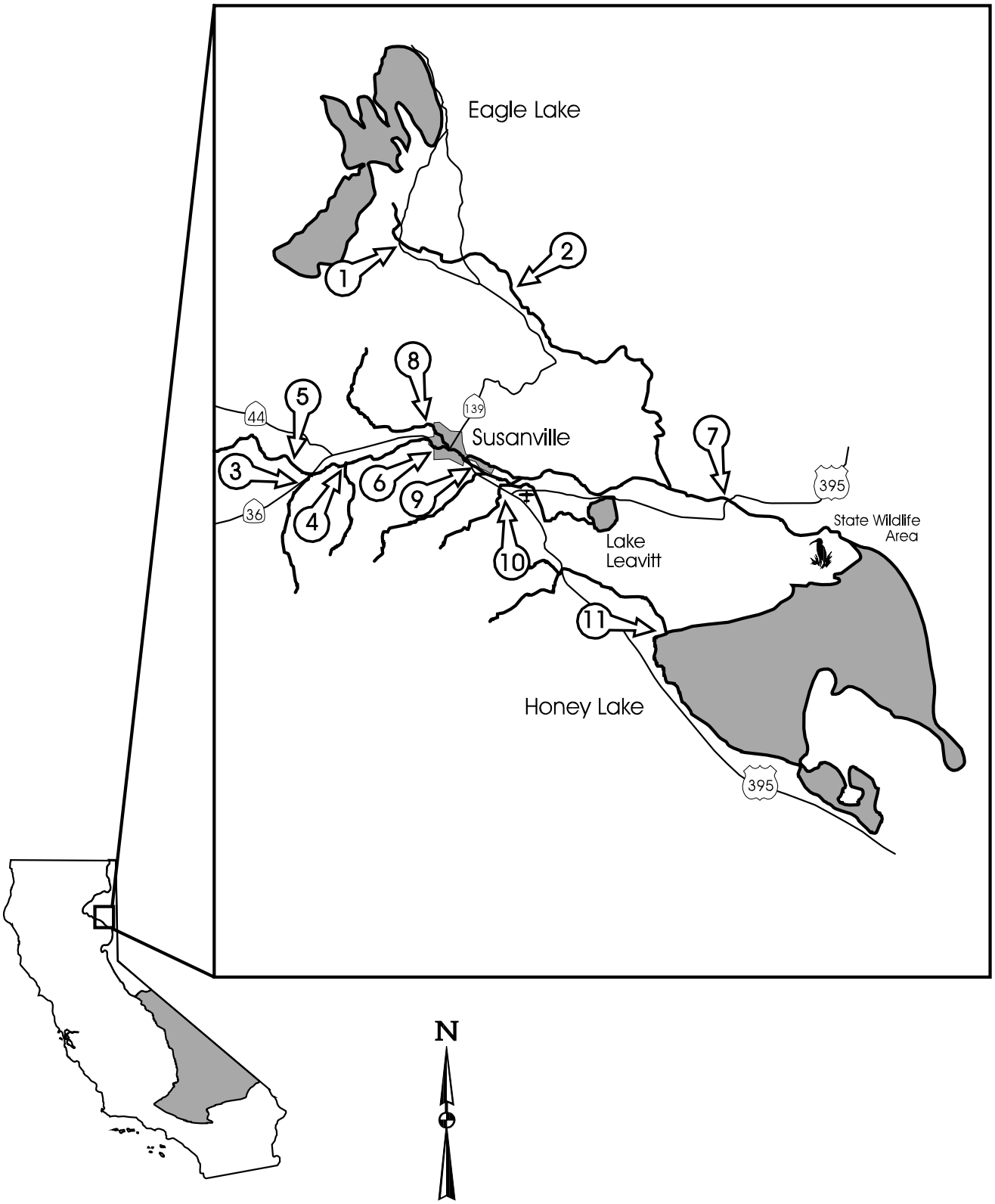

Table 3-10
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LITTLE TRUCKEE RIVER HYDROLOGIC UNIT

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

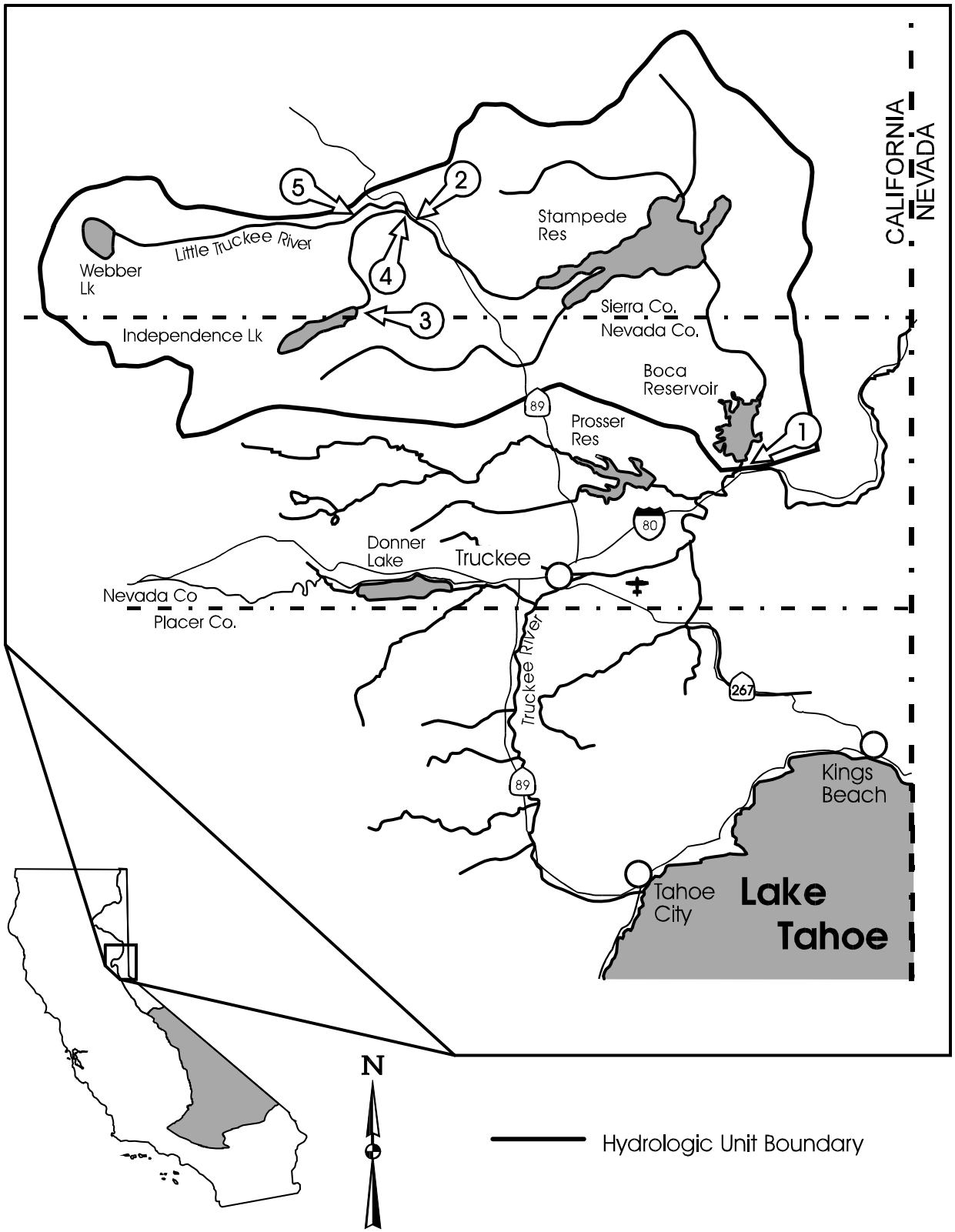

Table 3-11
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
TRUCKEE RIVER HYDROLOGIC UNIT

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

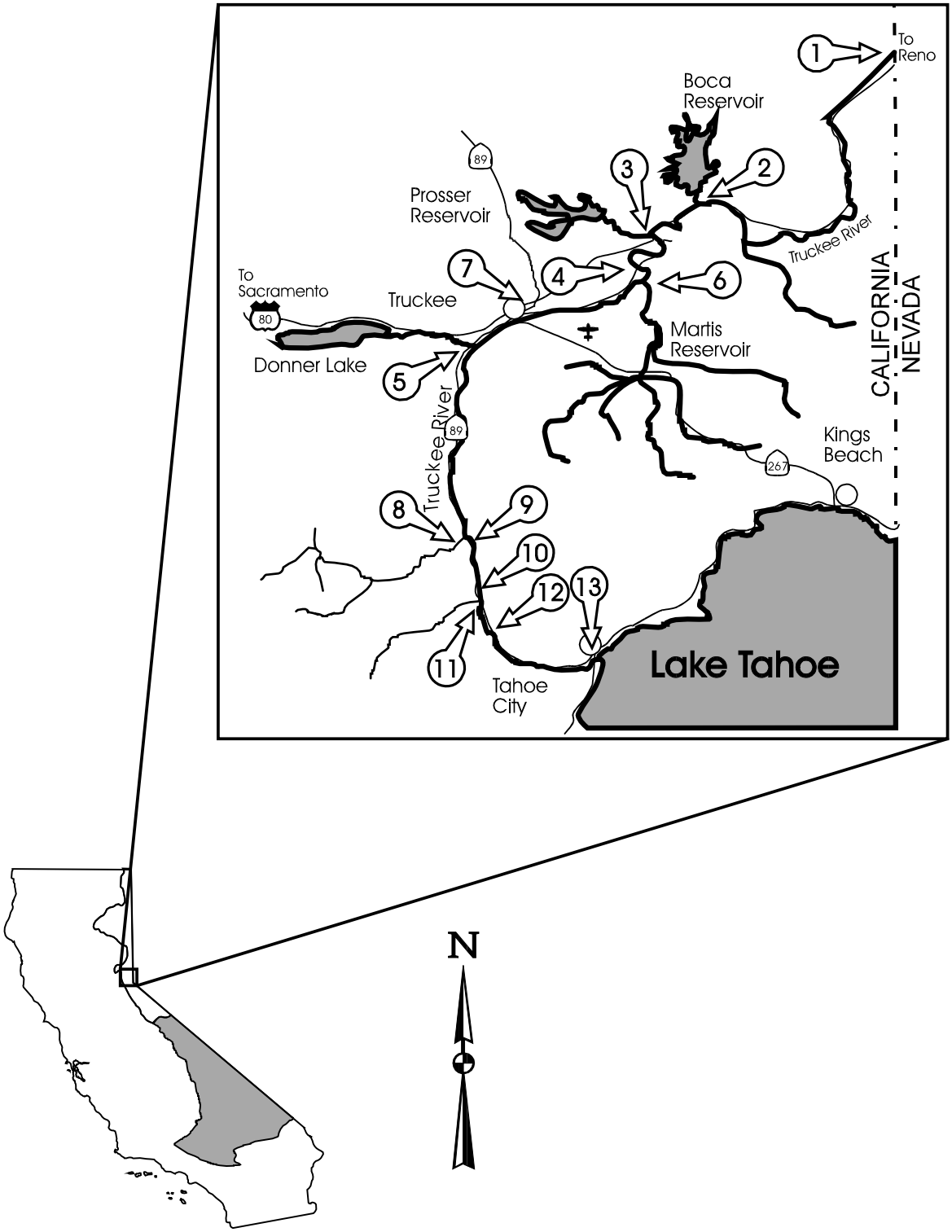

Table 3-12
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LAKE TAHOE HYDROLOGIC UNIT

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°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

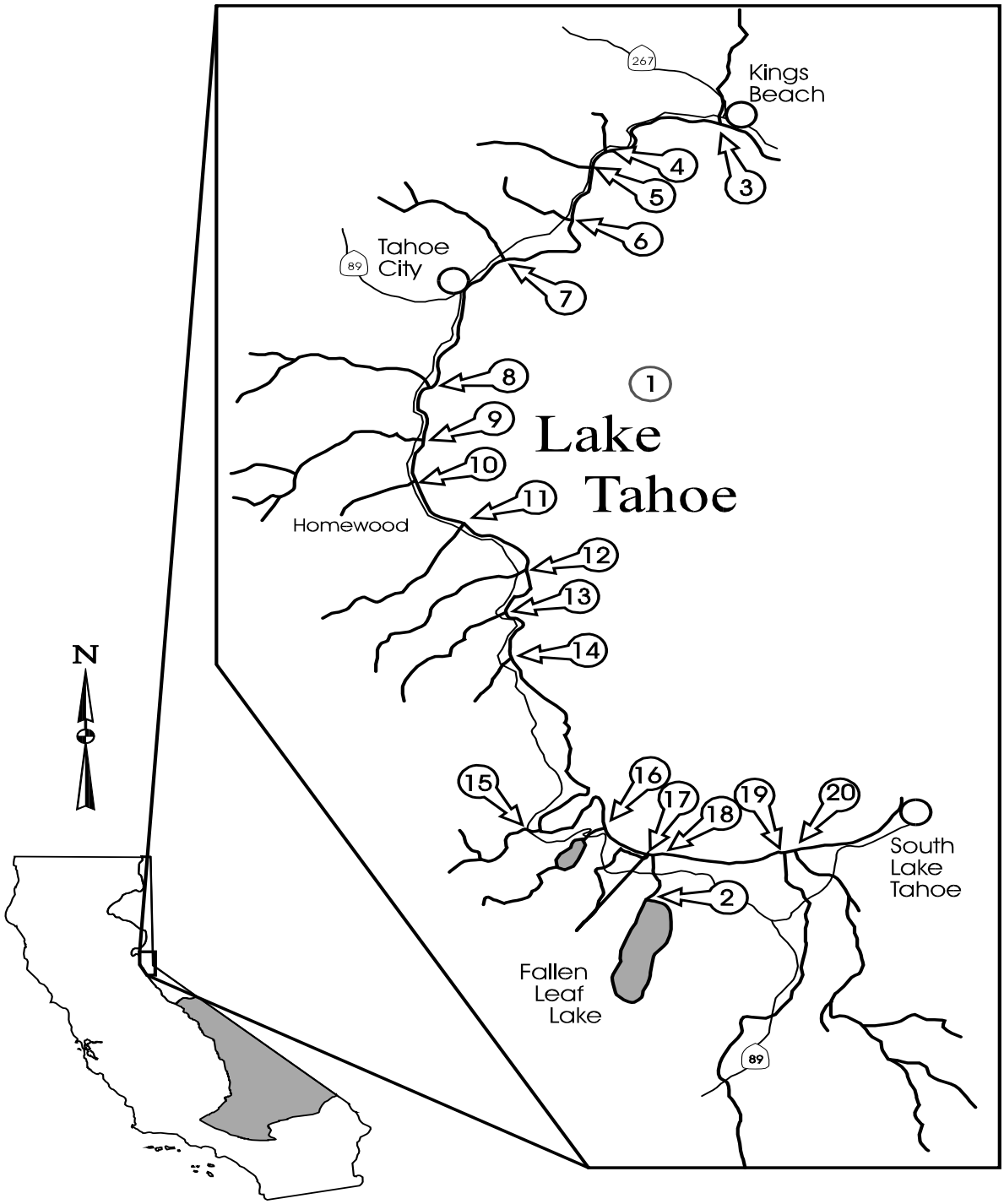

Table 3-14
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
EAST & WEST FORK CARSON RIVER HYDROLOGIC UNITS

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

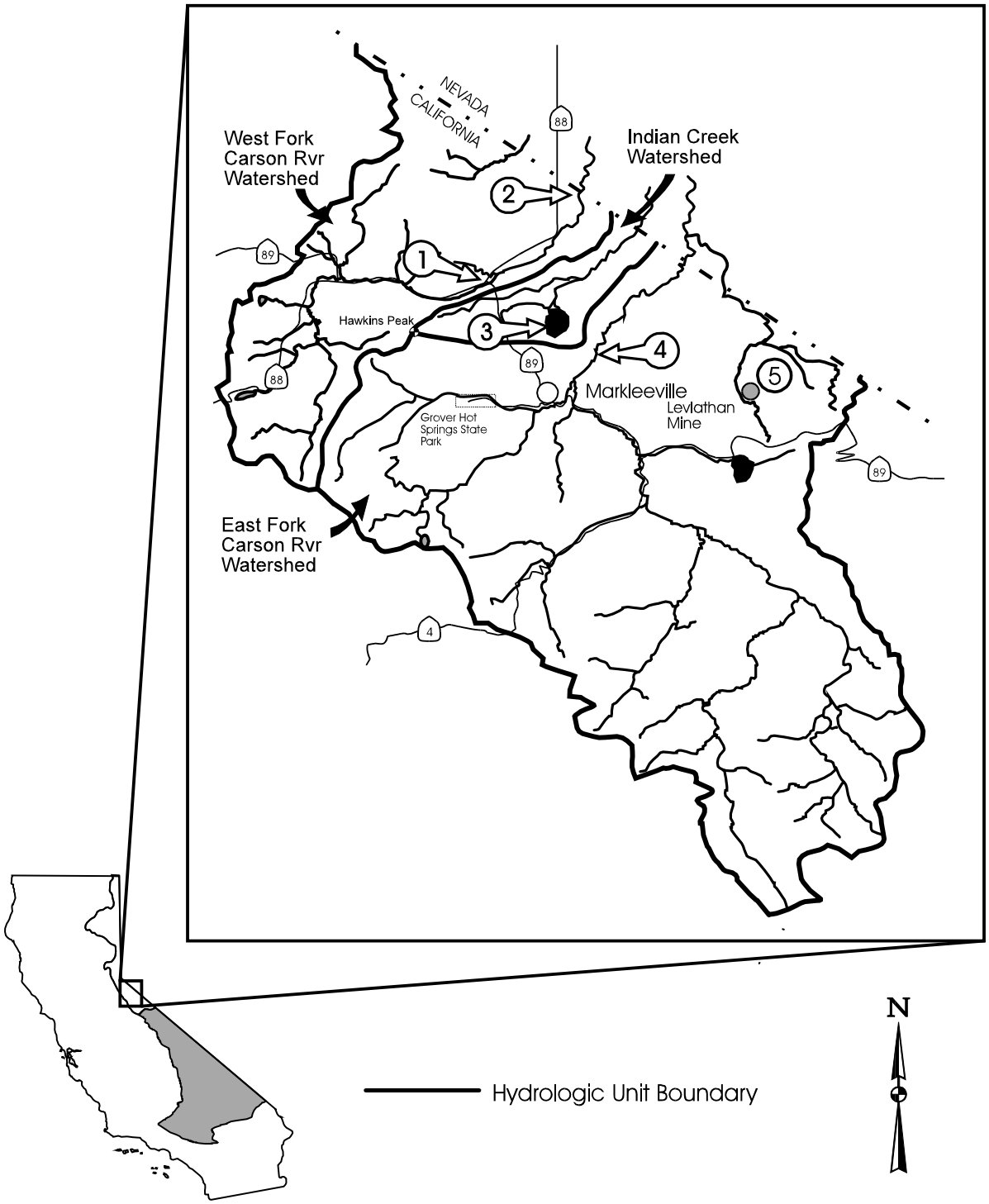

Table 3-15
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
WEST & EAST WALKER RIVER HYDROLOGIC UNITS

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

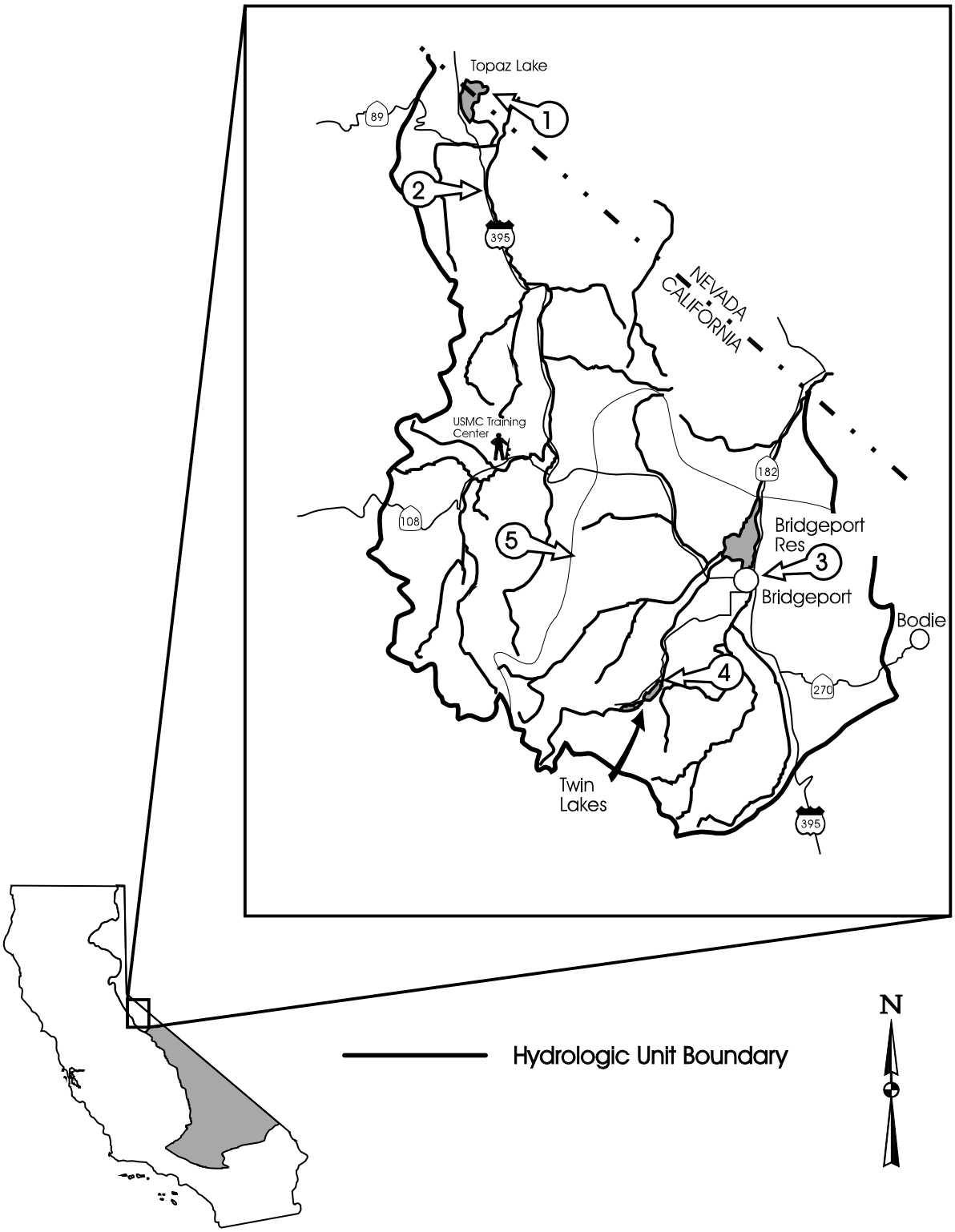

Table 3-16
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
MONO HYDROLOGIC UNIT

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

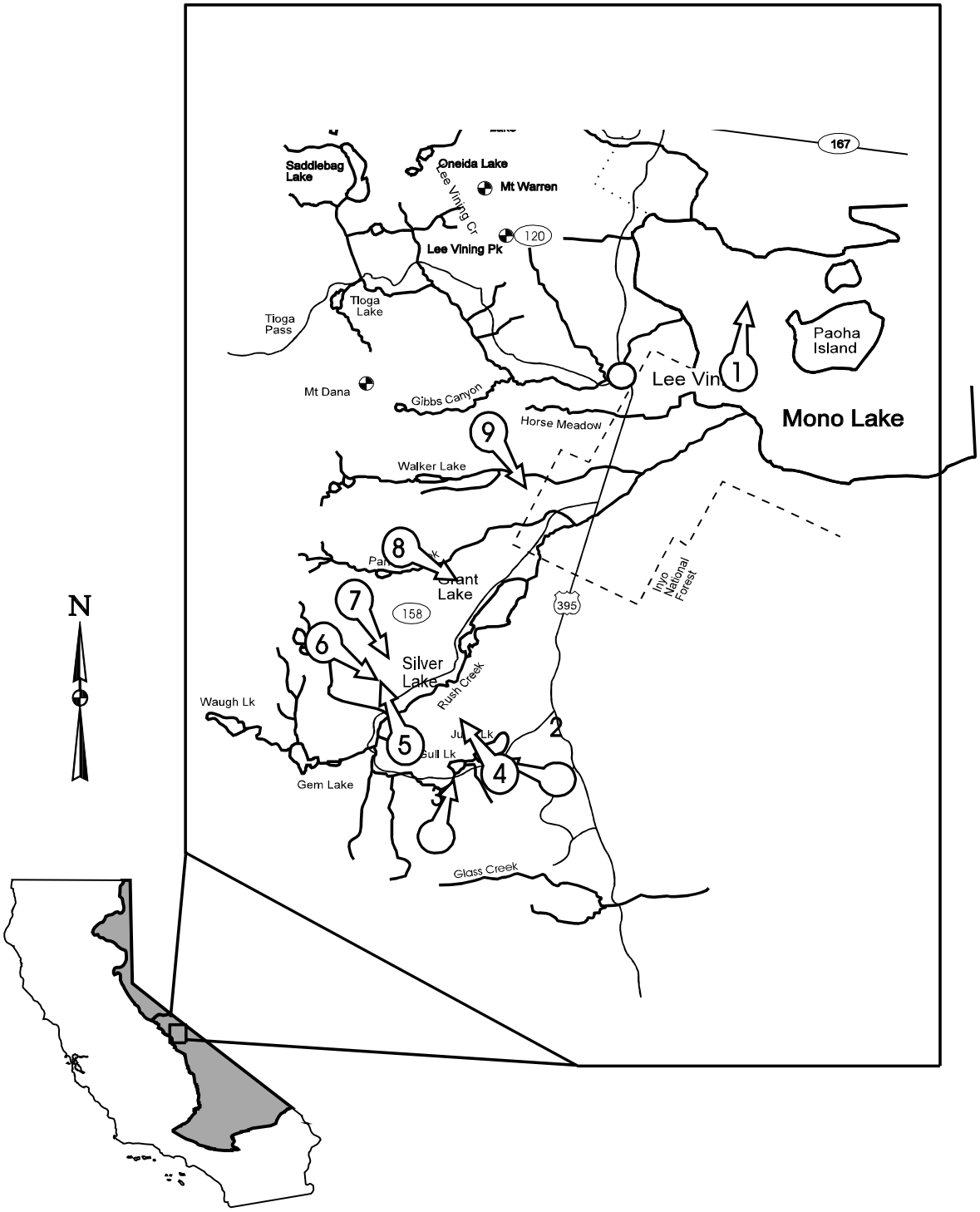

Table 3-17
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
OWENS HYDROLOGIC UNIT

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

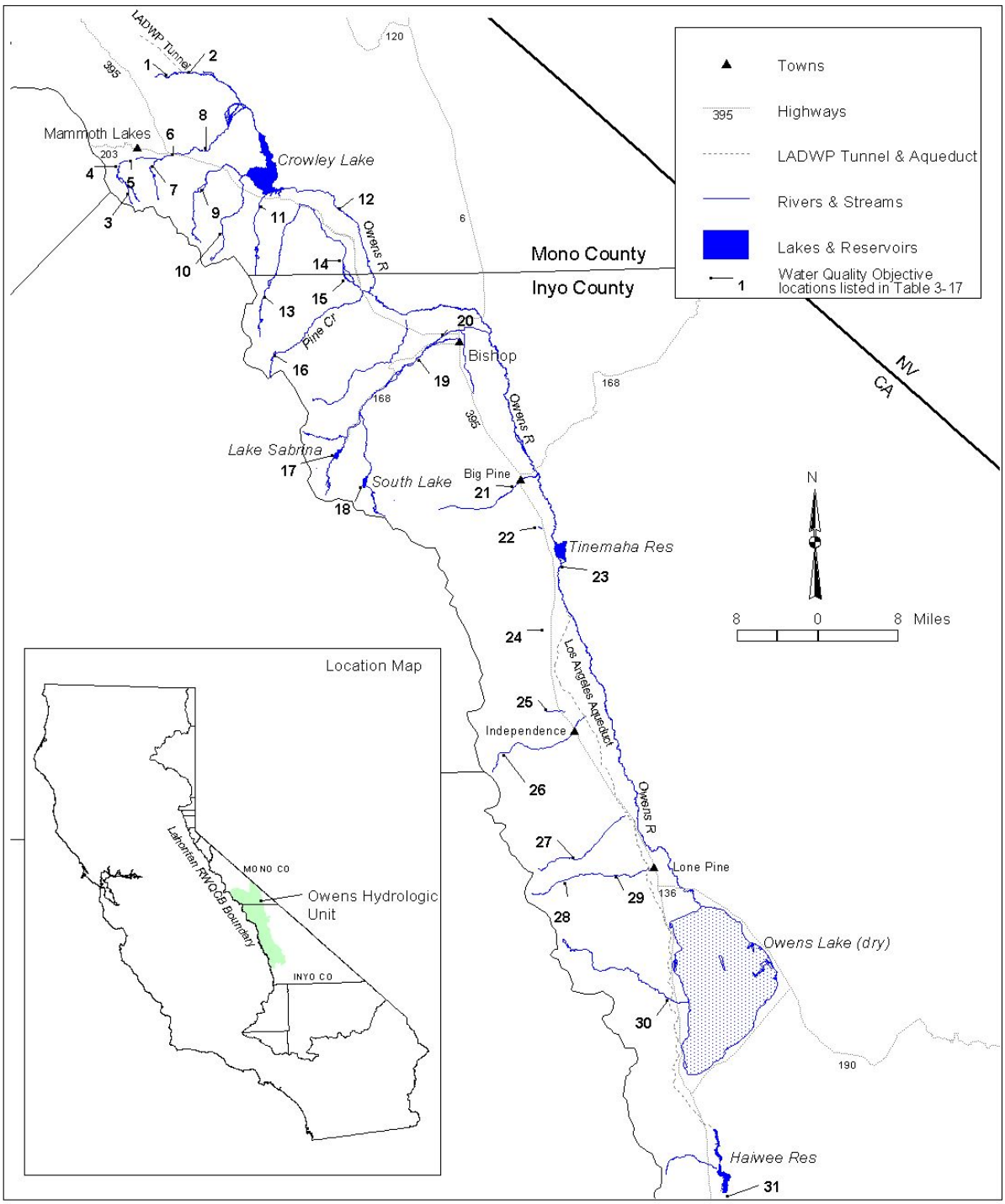

Table 3-18
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
PINE CREEK, INYO COUNTY

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

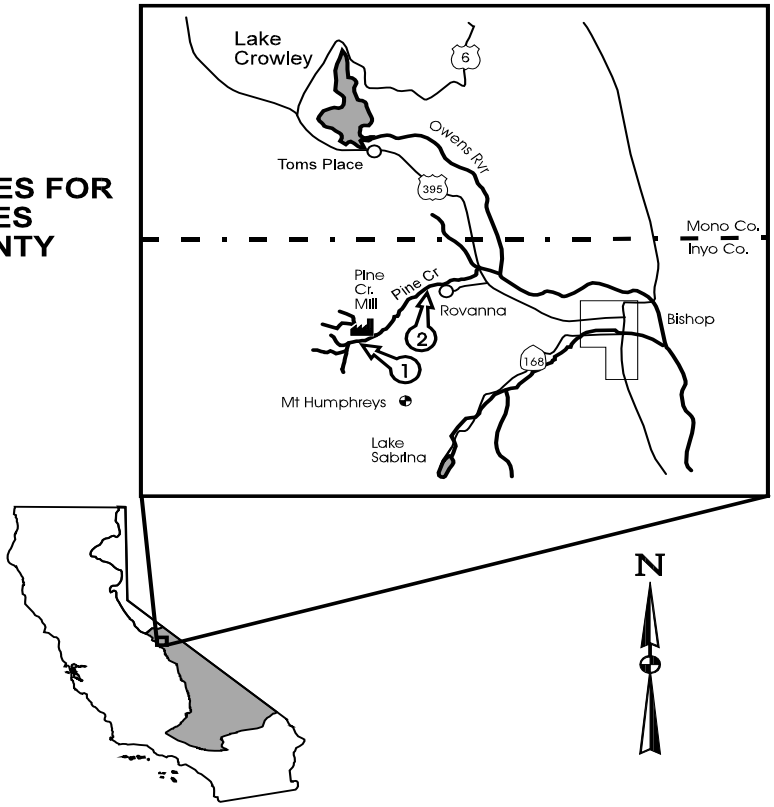

Table 3-19
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
ANTELOPE HYDROLOGIC UNIT

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

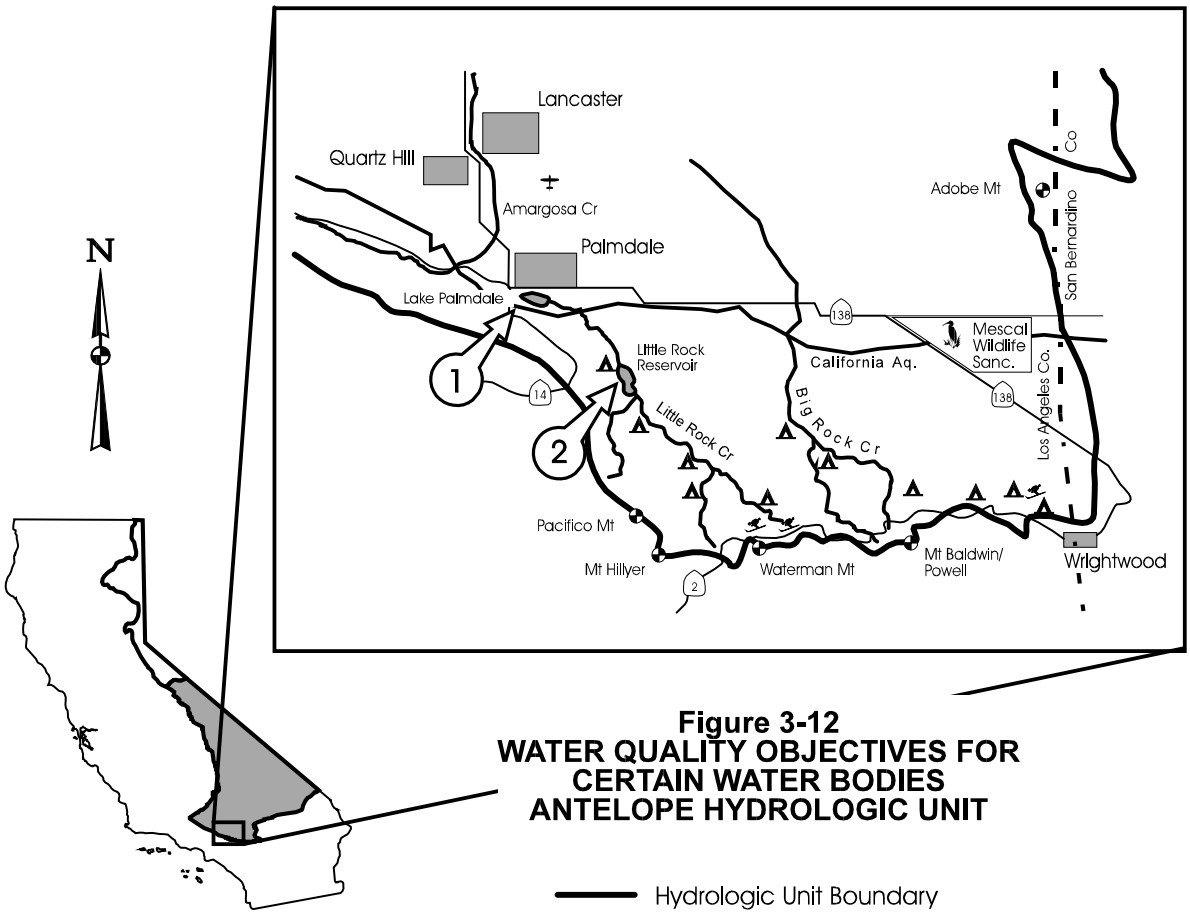

Figure 3-12
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
ANTELOPE HYDROLOGIC UNIT

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

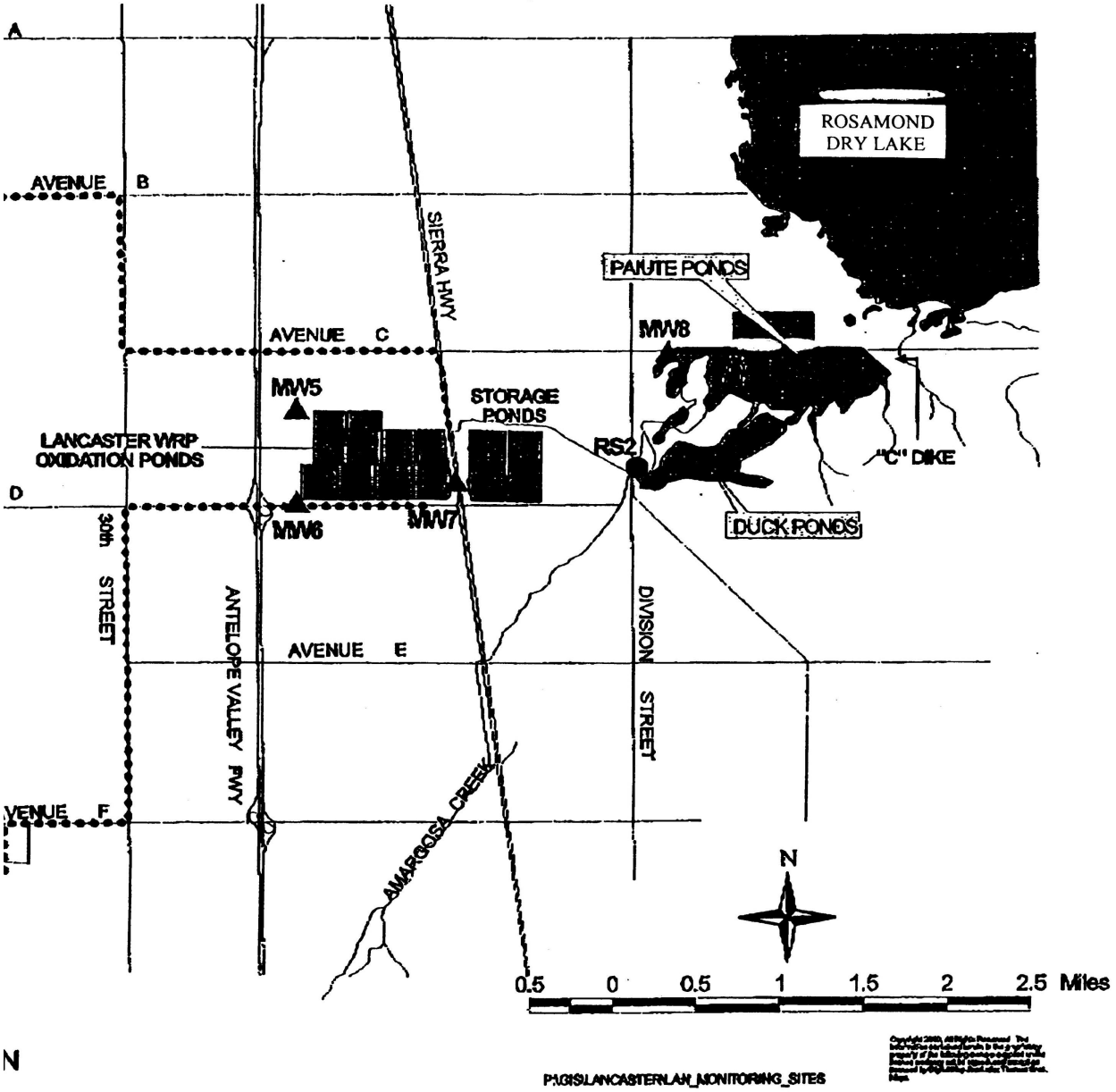

Table 3-19b.
Temperature and pH-Dependent Values of the Chronic (30-Day Average) Ammonia Toxicity Objective for Lower Amargosa Creek and the Piute Ponds and Wetlands (Total Ammonia, mg N/L)

	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.

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

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

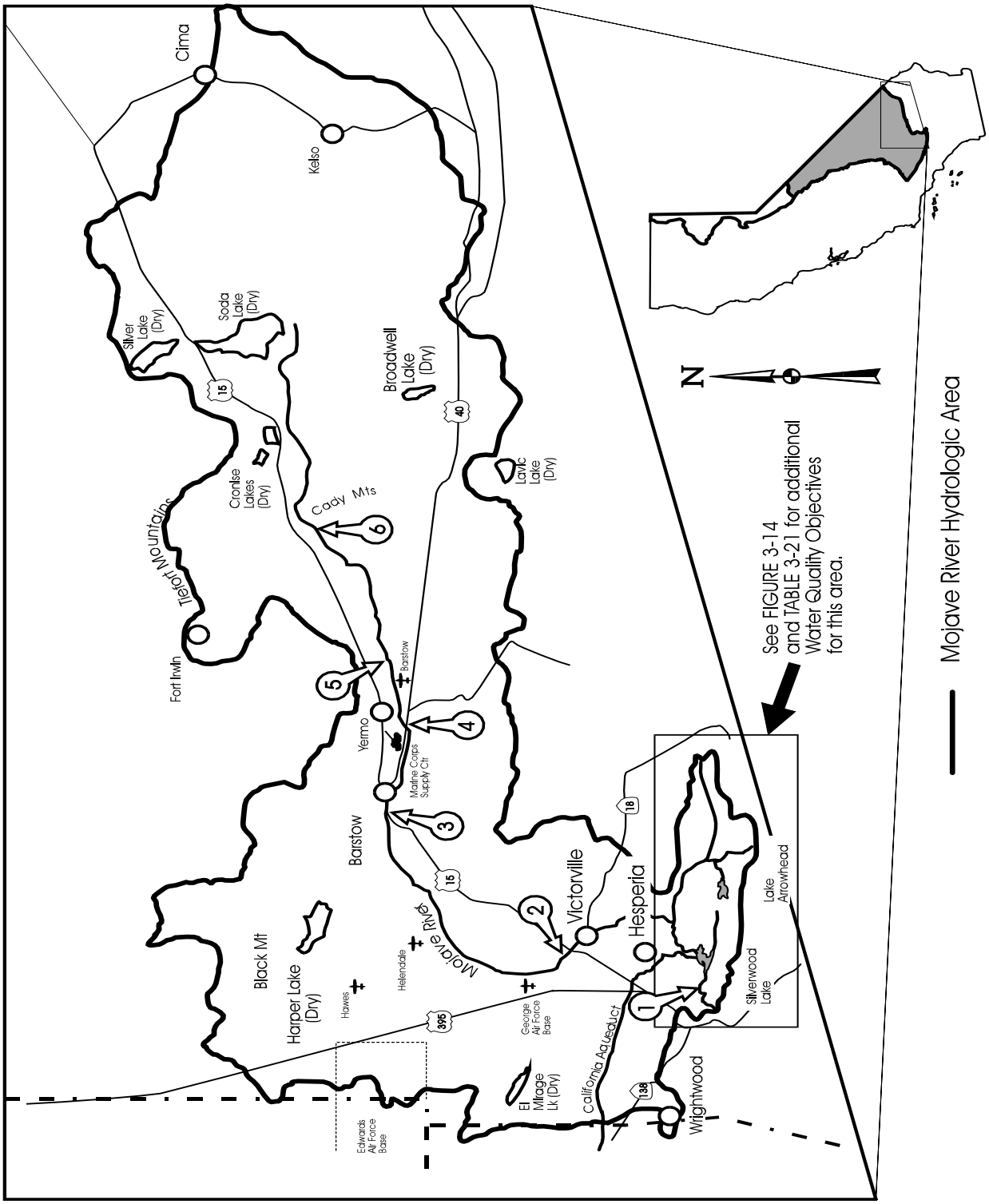

Table 3-21
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
SAN BERNARDINO MOUNTAINS AREA, MOJAVE HYDROLOGIC UNIT

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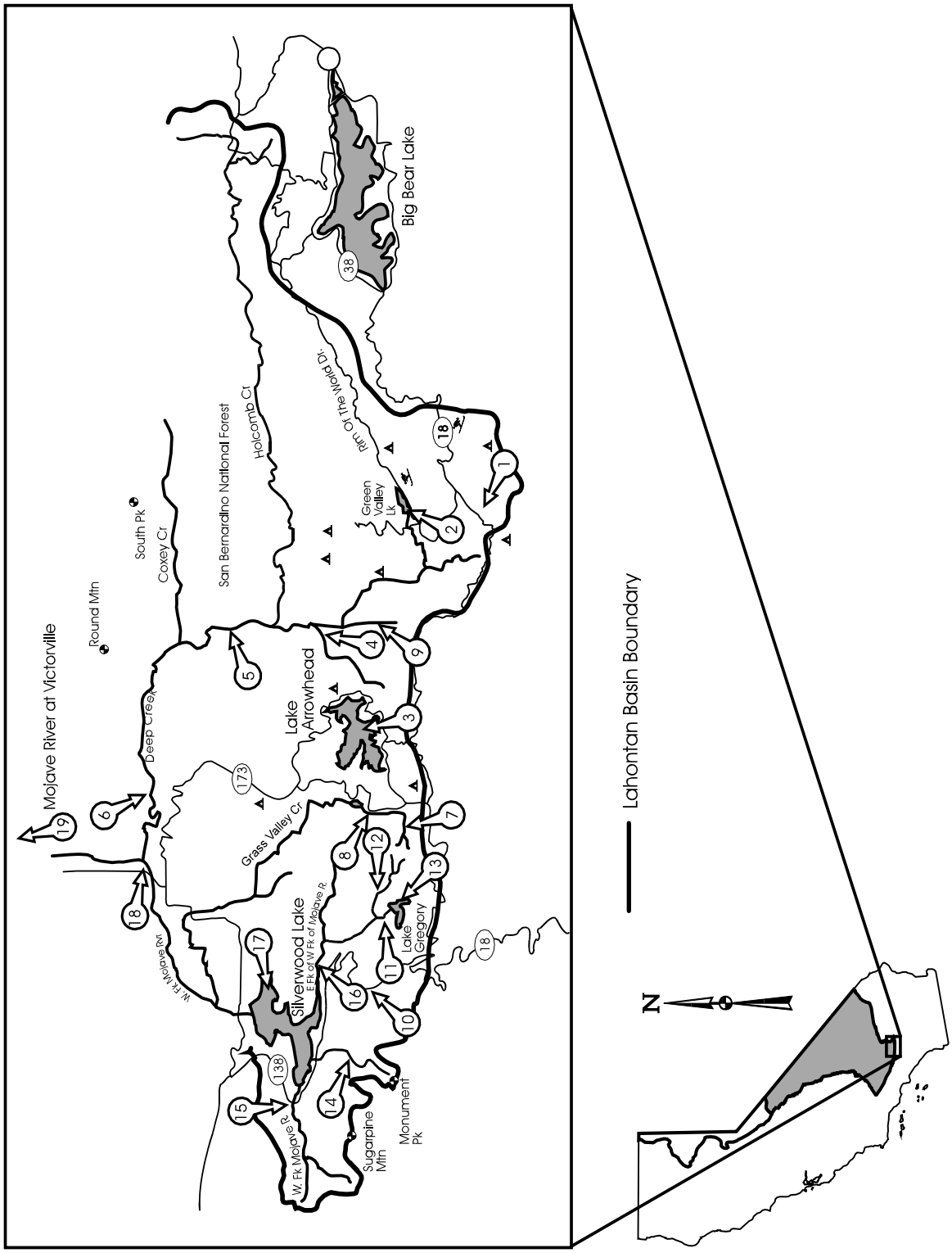
Figure 3-14
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
MOJAVE HYDROLOGIC UNIT
SAN BERNARDINO MOUNTAINS AREA