

APPENDIX A. Categorization of Existing Water Quality Standards and Regulatory Objectives with Potential Application For Status and Trends Assessment of Nearshore Conditions at Lake Tahoe.

#	Parameter or objective	TRPA standard	Nevada standard	California standard	NeST recommendation
1	Total nitrogen (TN)		AA≤0.25 mg/L; SV≤0.32 mg/L	AA≤0.15 mg/L	An important nearshore parameter.
2	Total soluble inorganic nitrogen		AA≤0.025 mg/L		An important nearshore parameter. It is equivalent to dissolved inorganic nitrogen (DIN).
3	Ammonia (NH ₃)		SV≤3.0 µg/L	One-hour and four-day temperature and pH dependent standards. See Tables 5.1-5,6,7 for numeric values.	A less relevant nearshore parameter. It is included in DIN concentration (#2), but sometimes may be important to the health of aquatic biological communities.
4	Nitrite (NO ₂)		SV≤0.06 mg/L		A less relevant nearshore parameter. It is included in DIN concentration (#2), and is generally found at low values in oxygenated waters.
5	Dissolved inorganic nitrogen (DIN) loading	Reduce dissolved inorganic nitrogen loading to Lake Tahoe from all sources by 25 percent of the 1973-81 annual average. (Reduce dissolved inorganic nitrogen loads from surface runoff by approximately 50 percent, from groundwater by approximately 30 percent, and from atmospheric sources by approximately 20 percent of the 1973-81 annual average.)			A relevant nearshore parameter (for management purposes). But measurement of nearshore DIN concentration is better (#2).

#	Parameter or objective	TRPA standard	Nevada standard	California standard	NeST recommendation
6	Total phosphorus (TP)			AA≤0.008 mg/L	An important nearshore parameter.
7	Soluble phosphorus		AA≤0.007 mg/L		An important nearshore parameter. It is equivalent to total dissolved phosphorus (TDP), but would be better represented by orthophosphate.
8	Biostimulatory substances	Reduce the loading of dissolved inorganic nitrogen, dissolved phosphorus, iron, and other algal nutrients from all sources to meet the 1967- 71 mean values for phytoplankton primary productivity and periphyton biomass in the littoral zone.		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.	An important nearshore parameter (for management purposes). But it is too general, and would be better represented by DIN (#2) and dissolved phosphorus (#7) concentrations.
9	Clarity	Decrease sediment loads as required to attain turbidity values not to exceed three NTU. In addition, turbidity shall not exceed one NTU in shallow waters of the Lake not directly influenced by stream discharges.	Vertical extinction coefficient (VEC) < 0.08/m when measured at any depth below first meter. Turbidity must not exceed 3 NTU at any point too shallow to determine reliable VEC.	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	An important nearshore parameter. It links directly to plankton (#10) and suspended materials (#13).
10	Phytoplankton		Counts: Jun-Sep average ≤100/mL; SV≤500/mL	Counts: mean annual average ≤100/mL; max ≤500/mL	An important nearshore parameter. It links directly to nearshore clarity (#9).
11	Algal growth potential			Mean Algal Growth Potential – at any point ≤ 2x MAAGP at limnetic reference station	A relevant nearshore parameter. AGP hasn't been measured routinely since the late 1960s or early 70s.

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12	Biological indicators			Lake Tahoe algal productivity and 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. <i>The “1967-71 levels” are reported in the annual summary reports of the “California-Nevada-Federal Joint Water Quality Investigation of Lake Tahoe.”</i>	An important set of nearshore parameters (for management purposes). But it is better represented by plankton counts (#10), algal growth potential (#11), and periphyton biomass measurements.
13	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.	An important nearshore parameter. It is equivalent to suspended sediment and links directly to clarity (#9). Also related to suspended sediment (#15).
14	Settleable materials		Waters must be free from substances attributable to domestic or industrial waste or other controllable sources that will settle to form sludge or bottom deposits in amounts sufficient to be unsightly, putrescent or odorous or in amounts sufficient to interfere with any beneficial use....	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.	Generally applied as a wastewater treatment requirement. It is less relevant to nearshore assessment at Lake Tahoe. Related to suspended sediment loading (#15) and nondegradation objectives (#38), as well as to aquatic habitat.

#	Parameter or objective	TRPA standard	Nevada standard	California standard	NeST recommendation
15	Suspended sediment loading			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.	An important nearshore parameter (for management purposes). But measurement of nearshore suspended sediment concentration (#13) is better for assessment of nearshore conditions.
16	Total filterable residue (TDS)		AA≤60.0 mg/L; SV≤70.0 mg/L	60/65 mg/L	A relevant nearshore parameter. It is related to conductivity (#17), DO (#29) and habitat. Can affect clarity at high concentrations (#9).
17	Conductivity		AA≤95 umho/cm; SV≤105.0 umho/cm	≤95 umho/cm at 50°C at any location in the Lake	A relevant nearshore parameter. It may be useful in some cases to identify input sources.
18	pH		SV: 7.0-8.4	In fresh waters with designated beneficial uses of COLD, changes in normal ambient pH levels shall not exceed 0.5 pH units; single value, 7.0 - 8.4	A relevant nearshore parameter. It can affect the health of aquatic biological communities.
19	Sodium absorption ratio		AA≤8.0		Generally applied as a waste discharge requirement. Less relevant to nearshore assessment at Lake Tahoe.
20	Chloride		AA≤3.0 mg/L; SV≤5.0 mg/L	3.0/4.0 mg/L	Generally applied as a waste discharge requirement. Less relevant to nearshore assessment at Lake Tahoe.

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21	Sulfate (SO ₄)		SV≤2.0 mg/L	1.0/2.0 mg/L	Generally applied as a waste discharge requirement. Less relevant to nearshore assessment at Lake Tahoe.
22	Boron			0.01 mg/L	Generally applied as a waste discharge requirement. Less relevant to nearshore assessment at Lake Tahoe.
23	Chemical constituents		Wastes from municipal, industrial or other controllable sources containing arsenic, barium, boron, cadmium, chromium, cyanide, fluoride, lead, selenium, silver, copper and zinc that are reasonably amenable to treatment or control must not be discharged untreated or uncontrolled into the waters of Nevada. In addition, the limits for concentrations of the chemical constituents must provide water quality consistent with the mandatory requirements of the 1962 Public Health Service Drinking Water Standards.	California Toxics Rule (CTR) numeric maximum contaminant levels	Generally applied as a waste discharge requirement. Less relevant to nearshore assessment of Lake Tahoe, unless chemical spills or known inputs are identified. Related to aquatic toxicity (#35) and nondegradation objectives (#38).
24	<i>E. Coli</i>		SV≤ 126 colonies/100 ml		An important nearshore parameter. EPA recommends this as the best indicator of fecal contamination.

#	Parameter or objective	TRPA standard	Nevada standard	California standard	NeST recommendation
25	Coliform bacteria			Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.	A relevant nearshore parameter. Related to fecal coliform (#24) and <i>E. coli</i> (#26), which are both members of the coliform group.
26	Fecal coliform		<p>A density not greater than the values shown in the following table (MPN/100mL):</p> <p style="text-align: center;"><u>(Median / Maximum)</u></p> <p>Undeveloped Lake Front Areas 10 yards offshore (5.0 / 32) 100 yards offshore (3.0 / 15)</p> <p>Developed Lake Front Areas 10 yards offshore (240 / 700) 100 yards offshore (15 / 64)</p> <p>Directly Influenced by Streams 10 yards offshore (240 / 700) 100 yards offshore (32 / 240)</p>	Concentration during any 30-day period shall not exceed a log mean of 20/100mL, nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100mL.	A relevant nearshore parameter. But studies have shown correlation with occurrence of digestive system illness at swimming beaches is not as strong as the correlation between <i>E. coli</i> (#24) and digestive system illness.
27	Temperature		SV≤10.0°C from Oct-May; SV≤20.0°C from Jun-Sep		A relevant nearshore parameter. It is linked to habitat, ecological processes, and climate change. Related to temperature change (#28).

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28	Temperature change		0°C (temperature increase above natural receiving water temperature)	For waters designated COLD, the temperature shall not be altered. Additionally, governing coastal and interstate waters: "Elevated temperature waste discharges into cold interstate waters is prohibited."	Generally applied as a waste discharge requirement. May be relevant to nearshore assessment of species distributions and habitat at inflow points. Related to temperature (#18).
29	Dissolved oxygen (DO)		SV \geq 90%		A relevant nearshore parameter. DO influences habitat and some chemical transformations.
30	Aesthetic condition	Improve nearshore aesthetic quality such that water transparency and the biomass of benthic algae are deemed acceptable at localized areas of significance.	Waters of extraordinary ecological or aesthetic value. The unique ecological or aesthetic value of the water must be maintained.	Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses.	An important nearshore parameter (for management purposes). Related to clarity (#9) and periphyton.
31	Color			Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses	A less relevant nearshore parameter. Although color from chlorophyll and DOC may link to phytoplankton (#10) and clarity (#9).

#	Parameter or objective	TRPA standard	Nevada standard	California standard	NeST recommendation
32	Taste and odor		Waters must be free from materials attributable to domestic or industrial waste or other controllable sources in amounts sufficient to produce taste or odor in the water or detectable off-flavor in the flesh of fish or in amounts sufficient to change the existing color, turbidity or other conditions in the receiving stream to such a degree as to create a public nuisance or in amounts sufficient to interfere with any beneficial use of the water.	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.	Relevant to all municipal (MUN) designated waters that are drinking water sources. Less relevant to nearshore assessment at Lake Tahoe. Some algae blooms in lakes and reservoirs have been known to cause taste and odor problems.
33	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	A less relevant nearshore parameter. It is not likely to be of concern at Lake Tahoe, unless there is a known spill or specific inputs are identified.

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34	Oil and grease		Waters must be free from floating debris, oil, grease, scum and other floating materials attributable to domestic or industrial waste or other controllable sources in amounts sufficient to be unsightly or in amounts sufficient to interfere with any beneficial use of the water.	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.	A less relevant nearshore parameter linked to boating and urban runoff. It should have a broader designation such as hydrocarbons and PAHs. Measurements may be required if there are spills or when specific inputs are identified. Potential linkage to toxicity (#35)

#	Parameter or objective	TRPA standard	Nevada standard	California standard	NeST recommendation
35	Toxicity		<p>Waters must be free from high temperature, biocides, organisms pathogenic to human beings, toxic, corrosive or other deleterious substances attributable to domestic or industrial waste or other controllable sources at levels or combinations sufficient to be toxic to human, animal, plant or aquatic life or in amounts sufficient to interfere with any beneficial use of the water. Compliance with the provisions of this subsection may be determined in accordance with methods of testing prescribed by the Department. If used as an indicator, survival of test organisms must not be significantly less in test water than in control water.</p>	<p>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. <i>Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration and/or other appropriate methods as specified by the Regional Board. The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent with the requirements for “experimental water” as defined in Standard Methods for the Examination of Water and Wastewater (American Public Health Association, et al., 1998).</i></p>	<p>Generally applied to waste discharges. Less relevant to nearshore assessment at Lake Tahoe, unless chemical spills or known inputs are identified.</p>

#	Parameter or objective	TRPA standard	Nevada standard	California standard	NeST recommendation
36	Radioactivity		Radioactive materials attributable to municipal, industrial or other controllable sources must be the minimum concentrations that are physically and economically feasible to achieve. In no case must materials exceed the limits established in the 1962 Public Health Service Drinking Water Standards (or later amendments) or 1/30th of the MPC values given for continuous occupational exposure in the “National Bureau of Standards Handbook No. 69.” The concentrations in water must not result in accumulation of radioactivity in plants or animals that result in a hazard to humans or harm to aquatic life.	Radionuclides shall not be present in concentrations which are deleterious to human, plant, animal, or aquatic life nor which result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant, animal, or aquatic life. Waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations which is incorporated by reference into this plan.	Less relevant to nearshore assessment. This is unlikely to be an issue to the Lake Tahoe nearshore, unless there is a known spill or specific inputs are identified.
37	Aquatic Communities and Populations	Prevent the introduction of new aquatic invasive species into the region’s waters and reduce the abundance and distribution of known aquatic invasive species. Abate harmful ecological, economic, social and public health impacts resulting from aquatic invasive species.		All wetlands shall be free from substances attributable to wastewater or other discharges that produce adverse physiological responses in humans, animals, or plants; or which lead to the presence of undesirable or nuisance aquatic life. All wetlands shall be free from activities that would substantially impair the biological community as it naturally occurs....	Generally important for management of aquatic communities. Although useful habitat assessment parameters are needed, this is too broad and wetlands are not defined as part of the nearshore.

#	Parameter or objective	TRPA standard	Nevada standard	California standard	NeST recommendation
38	Nondegradation	It shall be the policy of the TRPA Governing Body in development of the Regional Plan to preserve and enhance the high quality recreational experience including preservation of high quality undeveloped shorezone and other natural areas. In developing the Regional Plan, the staff and Governing Body shall consider provisions for additional access, where lawful and feasible, to the shorezone and high quality undeveloped areas for low density recreational uses.	The specified standards are not considered violated when the natural conditions of the receiving water are outside the established limits, including periods of extreme high or low flow. Where effluents are discharged to such waters, the discharges are not considered a contributor to substandard conditions provided maximum treatment in compliance with permit requirements is maintained.	Lake Tahoe is subject to State Board Resolution 68-16, which establishes a Nondegradation Objective, requires continued maintenance of existing high quality waters. Additionally, in reference to Lake Tahoe’s designation as an ONRW, our Basin Plan reads: The State Board designated Lake Tahoe an Outstanding National Resource Water (ONRW) in 1980, both for its recreational and its ecological value, and stated: “Viewed from the standpoint of protecting beneficial uses, preventing deterioration of Lake Tahoe requires that there be no significant increase in algal growth rates. Lake Tahoe’s exceptional recreational value depends on enjoyment of the scenic beauty imparted by its clear, blue waters. ...Likewise, preserving Lake Tahoe’s ecological value depends on maintaining the extraordinarily low rates of algal growth which make Lake Tahoe an outstanding ecological resource.” Section 114 of the Federal Clean Water Act also indicates the need to “preserve the fragile ecology of Lake Tahoe.”	Too broad to serve as nearshore indicators or metrics. However, there are important conceptual elements that should be incorporated into other assessment parameters.