3.12 HYDROLOGY AND WATER QUALITY

This section identifies the regulatory context and policies related to hydrology and water quality, describes the existing hydrologic conditions and water quality in the program area, and evaluates potential hydrology and receiving water quality impacts of the proposed program. Hydrologic resources include surface waters and groundwater. Federal, state, and local regulations related to hydrology and water quality are summarized. Potential impacts of the proposed Tahoe PTEIR implementation are analyzed, and mitigation measures are provided for those impacts determined to be significant.

The primary issues raised in comments on the notice of preparation that pertain to water quality and hydrology were:

- A request by California Department of Fish and Wildlife (CDFW) to include discussion of potential impacts related to the following:
  - Assessment of drainage impacts including pre and post project runoff, soil erosion and/or sedimentation in streams and waterbodies, and the fate of runoff; and
  - Cumulative effects analysis.
- Lahontan Regional Water Quality Control Board (Lahontan RWQCB) expressed support for the project and recognized the statewide need to address the threat of catastrophic wildlife and impacts from climate change. Implementation of later treatment activities under the Tahoe PTEIR are expected to have multiple important environmental benefits, including protection of water quality, by reducing the risk of high intensity wildfire and associated post-fire sedimentation and restoring forest health.
- A request by League to Save Lake Tahoe (League) to include discussion of potential impacts, mitigation measures, and best management practices (BMPs) including the following:
  - Return seasonal flooding to meadows and floodplains to enable natural capture and filtration of sediment and nutrients that would otherwise reduce lake clarity.
  - Detail all protection and mitigation measures needed to protect sensitive meadow and riparian habitat while conducting restoration and fuels reduction efforts.
  - Incorporate BMPs when managing, maintaining, and decommissioning access roads, minimizing erosion risk, and stabilizing all slopes and surfaces impacted by program activities.
  - Address the potential for increased generation of fine sediments through erosion, runoff, and dust (leading to atmospheric deposition).

Implementation of the proposed program would not create impermeable surfaces (i.e., new roads), build new structures, or withdraw water from groundwater supplies. Therefore, the potential for impacts related to the following significance thresholds from the State CEQA Guidelines are not discussed further: place structures that would impede or redirect flows; place structures in flood hazard, tsunami, or seiche zones; risk release of pollutants as a result of project inundation; and substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

3.12.1 Regulatory Setting

FEDERAL

Federal Antidegradation Policy

The U.S. Environmental Protection Agency (EPA) has designated Lake Tahoe an Outstanding National Resource Water (ONRW). ONRWs are provided the highest level of protection under the EPA Antidegradation Policy, stipulating that

states may allow temporary and short-term changes to water quality but that such changes should not adversely affect existing uses or alter the essential character or beneficial uses for which the water was designated an ONRW. EPA interprets this provision to mean that no new or increased discharges to ONRWs shall be permitted if that discharge would result in lower or poorer long-term water quality.

Clean Water Act

The federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation's waters. Applicable sections of the CWA are summarized below.

Section 404

Section 404 of the CWA prohibits the discharge of fill material into waters of the United States, including wetlands, except as permitted under separate regulations by the U.S. Army Corps of Engineers (USACE) and EPA. To discharge dredged or fill material into waters of the United States, including wetlands, Section 404 requires projects to receive authorization from the Secretary of the Army, acting through USACE. Waters of the United States are generally defined as "waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; territorial seas and tributaries to such waters." Under Section 404 of the CWA, Lake Tahoe is considered waters of the United States.

Section 401

Section 401 of the CWA requires certification of activities through a federal license or permit for discharges of a pollutant into waters of the United States. The certification must be obtained from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over the affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with Section 401. Water quality certification requires evaluation of potential impacts considering water quality standards and CWA Section 404 criteria governing discharge of dredged and fill materials into waters of the United States. EPA delegates water pollution control authority under Section 401 to the states. Within the project area, this authority is delegated to the Lahontan Regional Water Quality Control Board.

Section 402

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permit program to regulate discharges of pollutants into waters of the United States. An NPDES permit sets specific discharge limits for point source discharges of pollutants into waters of the United States and establishes monitoring and reporting requirements, as well as special conditions. EPA delegates water pollution control authority under Section 402 to the states.

Section 303(d)

Section 303(d) of the CWA requires states to develop lists of water bodies that do not attain water quality objectives after implementation of required levels of treatment by point source dischargers (municipalities and industries). Section 303(d) requires that a state develop a total maximum daily load (TMDL) for each of the listed pollutants. A TMDL is the amount of an identified pollutant that a water body can receive and still comply with water quality objectives. A TMDL is also a plan to reduce loading of a specific pollutant from various sources to achieve compliance with water quality objectives. The EPA must either approve a TMDL prepared by a state or disapprove a state's TMDL and issue its own. A TMDL represents a goal that may be implemented by adjusting pollutant discharge requirements in individual NPDES permits or by establishing nonpoint source controls. NPDES permit limits for listed pollutants must be consistent with the waste load allocation prescribed in the TMDL. After implementation of a TMDL, it is anticipated that the problems that led to placement of a given pollutant on the Section 303(d) list would be remediated.

TAHOE REGIONAL PLANNING AGENCY

Tahoe Regional Plan

Tahoe Regional Planning Agency (TRPA) was designated as an areawide planning agency under Section 208 of the CWA in 1974. Under the Tahoe Regional Planning Compact, TRPA has established environmental threshold standards, goals and policies, and ordinances directed at protecting and improving water quality in Lake Tahoe and the Tahoe Region. The focus of water quality enhancement and protection is to minimize the effects of human-made disturbances to the watershed and reduce or eliminate pollutants that result from existing and proposed development. The Tahoe Regional Planning Compact includes the following statements and direction related to water quality:

- The waters of Lake Tahoe are threatened with deterioration or degeneration, which endangers the natural beauty and economic productivity of the Region (Article (I)(a)(1));
- TRPA shall develop an enforceable land use plan for, among other purposes, the uses of water and other natural resources within the region (Article (V)(c)(1));
- The Threshold Standards Regional Plan (Regional Plan) shall provide for attaining and maintaining federal, state, or local water quality standards, whichever are the strictest, in the respective portions of the region for which the standards are applicable (Article (V)(d)); and
- The Regional Plan shall, by ordinance, identify the means and time schedule by which water quality standards will be attained (Article (V)(d)).

Goals and Policies

Goals and policies of the Regional Plan that are related to water quality are located in the Land Use Element (TRPA 2012a). Relevant excerpts are included below.

GOAL WQ-1: Federal, state, regional, local and private water quality management programs should be implemented in a coordinated manner to restore and maintain Lake Tahoe's unique transparency, color, and clarity in accordance with environmental threshold carrying capacity standards.

- **Policy WQ-1.1:** Achieve and maintain water quality thresholds through comprehensive regional planning and through coordination with other public agencies and the private sector.
- **Policy WQ-1.2:** Coordinate a multi-agency effort to prioritize and fund water quality improvement projects in the Lake Tahoe Region through the environmental improvement program (EIP).
- **Policy WQ-1.3:** Require that development and other activities in the Lake Tahoe Region mitigate anticipated water quality impacts.
- **Policy WQ-1.5:** Support the Lake Tahoe TMDL programs in California and Nevada and the TMDL pollutant/stormwater load reduction plans for each local government in the region.
- **Policy WQ-1.6:** Support federal, state, local and private water quality improvement programs that improve water quality in the region.
- **Policy WQ-1.7:** Coordinate with public and private entities to maximize the efficiency and effectiveness of water quality programs.

GOAL WQ-2: Reduce or eliminate point sources of pollutants which affect, or potentially affect, water quality in the Tahoe Region.

- **Policy WQ-2.1:** Discharge of municipal or industrial wastewater to Lake Tahoe, its tributaries, or the groundwaters of the Tahoe Region is prohibited, except for existing development operating under approved alternative plans for wastewater disposal, and for fire suppression efforts in accordance with applicable state laws.

- **Policy WQ-2.5:** TRPA shall cooperate with other agencies with jurisdiction in the Lake Tahoe Region in the preparation, evaluation, and implementation of toxic and hazardous spill control plans.

GOAL WQ-3: Reduce or eliminate nonpoint sources of pollutants which affect, or potentially affect, water quality in the Tahoe region in a manner consistent with the Lake Tahoe TMDL, where applicable.

- **Policy WQ-3.1**: Reduce loads of sediment, nitrogen, and phosphorus to Lake Tahoe; and meet water quality thresholds for tributary streams, surface runoff, and groundwater.
- **Policy WQ-3.2**: Restore at least 80 percent of the disturbed lands within the region (from the 1983 baseline; excluding hard coverage).
- **Policy WQ-3.3**: States that the implementing agencies shall restore 25 percent of the SEZ (stream environment zone) lands that have been disturbed, developed, or subdivided in accordance with the Environmental Improvement Program. SEZs have beneficial effects on the fisheries thresholds.
- **Policy WQ-3.8**: Off road motorized vehicle use is prohibited in the Lake Tahoe Region except on specified roads, trails, or designated areas where the impacts can be mitigated.
- **Policy WQ-3.10:** Implement land use, transportation and air quality measures aimed at reducing airborne nitrogen emissions and entrained dust in the Tahoe Region.
- **Policy WQ-3.11:** Require all persons who own land and all public agencies which manage public lands in the Lake Tahoe Region to install and maintain BMPs improvements in accordance with a BMP manual that shall be maintained and regularly updated by TRPA. BMP requirements shall protect vegetation from unnecessary damage; restore the disturbed soils and be consistent with fire defensible space requirements. As an alternative, area-wide water quality treatment facilities and funding mechanisms may be implemented in lieu of certain site specific BMPs where area-wide treatments can be shown to achieve equal to or greater water quality benefits.
- **Policy WQ -3.12:** Projects shall be required to meet TRPA BMP requirements as a condition of approval for all projects.

Thresholds

The TRPA Governing Board adopted Resolution 82-11, which established water quality threshold standards for six indicator categories: (1) Lake Tahoe pelagic (deep) waters, (2) Lake Tahoe littoral (nearshore) waters, (3) tributaries, (4) direct surface runoff and stormwater discharge to surface waters, (5) stormwater discharge to groundwater, and (6) other lakes (i.e., lakes in the Tahoe basin other than Lake Tahoe). Resolution 82-11 sets numerical and management standards for water quality. Some of these threshold standards are referenced to state standards, and in other cases, target reference conditions related to specific time periods are noted. The following value statements are used in setting the threshold standards and targets for water quality:

- Attain levels of water quality in the lakes and streams within the Tahoe region suitable to maintain the identified beneficial uses of Lake Tahoe.
- Restrict algal productivity (rate of growth) to levels that do not impair beneficial uses or deteriorate existing water quality conditions in the Tahoe region.
- Prevent degradation of the water quality of Lake Tahoe and its tributaries to preserve the lake for future generations.
- Restore all watersheds in the Tahoe region so that they respond to runoff in a natural hydrologic function.

Water quality threshold standards adopted by TRPA set a target to return the lake to the transparency observed in the late 1960s. Within the six major indicator categories, TRPA uses water quality standards to assess the water quality of Lake Tahoe and its tributaries. Table 3.12-1 lists indicator categories and associated threshold water quality

standards applicable to the analysis of Tahoe PTEIR impacts. The status and trend of each threshold relative to the associated numerical standard or management standard is described in Section 3.12.2, "Environmental Setting."

Table 3.12-1 Applicable TRPA Water Quality Threshold Standards for Tahoe PTEIR Impacts

Indicator Category	Standard	Numerical Standard and/or Management Standard
Pelagic Lake Tahoe (deep water)	Annual average transparency	Annual average deep-water transparency as measured by a Secchi disk shall decrease below 29.7 meters (97.4 feet).
Littoral Lake Tahoe (nearshore)	Turbidity	Decrease sediment load as required to attain turbidity values not to exceed 3 Nephelometric Turbidity Units (NTUs) in littoral Lake Tahoe. In addition, turbidity shall not exceed 1 NTU in shallow waters of Lake Tahoe not directly influenced by stream discharges.
Tributaries	Nutrients and metals	Attain applicable state standards for concentrations of dissolved inorganic nitrogen, dissolved phosphorus, and dissolved iron.[1]
Tributaries	Suspended sediment	Decrease sediment load as required to attain a 90th percentile value for suspended sediment concentration of 60 milligram per liter.
Other lakes	Water quality	Attain existing water quality standards.[2]
Stormwater runoff quality	Surface discharge to surface water	Pollutant concentrations in surface runoff discharged to surface water shall not exceed the following concentrations at the 90th percentile: ▶ 0.5 milligram per liter dissolved inorganic nitrogen as N, ▶ 0.1 milligram per liter dissolved phosphorus as P, ▶ 2.0 milligram per liter grease and oil, ▶ 0.5 milligram per liter dissolved iron, and ▶ 250 milligram per liter suspended sediment.
Groundwater	Nutrients and metals	Surface runoff infiltration into the groundwater shall comply with the uniform Regional Runoff Quality Guidelines as set forth in Table 4-12 of the Draft Environmental Threshold Carrying Capacity Study Report, May 1982. Where there is a direct and immediate hydraulic connection between ground and surface waters, discharges to groundwater shall meet the guidelines for surface discharges, and the Uniform Regional Runoff Quality Guidelines shall be amended accordingly.[1, 3]
Stormwater runoff quality	Surface discharge to surface water	Pollutant concentrations in surface runoff discharged to surface water shall not exceed the following concentrations at the 90th percentile: ▶ 0.5 milligram per liter dissolved inorganic nitrogen as N, ▶ 0.1 milligram per liter dissolved phosphorus as P, ▶ 2.0 milligram per liter grease and oil, ▶ 0.5 milligram per liter dissolved iron, and ▶ 250 milligram per liter suspended sediment.
Load reductions	Surface discharge to surface water	Reduce total annual fine sediment particle (inorganic particle size <16 micrometers in diameter), phosphorus, nitrogen, suspended sediment, dissolved phosphorus, iron, and other nutrients to achieve pelagic and littoral water quality standards.

[1] Annual mean total nitrogen concentration less than 0.15 to 0.23 milligram per liter depending on the water body. Annual mean total phosphorus concentration less than 0.005 to 0.015 milligram per liter, depending on the water body. Annual mean iron concentration less than 0.01 to 0.03 milligram per liter, depending on the water body.

[2] California standards for Fallen Leaf Lake: mean total nitrogen (May to October) less than 0.087 milligram per liter. Annual mean total phosphorus concentration (May to October) less than 0.008 milligram per liter. Annual mean iron concentration (May to October) less than 0.005 milligram per liter. Annual mean Secchi depth (May to October) greater than or equal to 18.5 meters (60.7 feet).

[3] Attain a 90th percentile value for suspended sediment concentration 60 milligram per liter.

Source: TRPA 2016

Code of Ordinances

The TRPA Code of Ordinances (TRPA Code) contains the requirements and standards intended to achieve water quality thresholds, and the goals and policies of the TRPA Regional Plan. Chapter 60 of the TRPA Code is directed specifically at water quality protection (Table 3.12-2) (TRPA 2012b). Chapter 61 of the TRPA Code contains minimum standards related to tree cutting within stream environment zones.

Table 3.12-2 Code Requirements Related to Water Quality Protection

Code Section	Requirements
Chapter 60.1	Sets discharge standards for runoff to surface water and groundwater. Includes numerical pollutant concentrations standards for dissolved inorganic nitrogen, dissolved phosphorus, dissolved iron, grease and oil, and suspended sediment.
Chapter 60.2	Sets requirements that new residential, commercial, and public projects completely offset their water quality impacts.
Chapter 60.3	Contains regulations pertaining to recognition of source water, prevention of contamination to source water, and protection of public health relating to drinking water.
Chapter 60.4	Sets standards for installation of BMPs for the protection or restoration of water quality.
Chapter 61.1.1.6	Establishes minimum standards for tree cutting within stream environment zones.

Note: BMP = best management practice.

Source: TRPA 2012b

STATE

Lahontan Regional Water Quality Control Board

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) created the California State Water Resources Control Board (SWRCB) and nine regional water quality control boards (RWQCBs) in California. The SWRCB protects water quality by setting statewide policy, coordinating and supporting RWQCB efforts, and reviewing petitions that contest RWQCB actions. The RWQCBs issue waste discharge permits, take enforcement action against violators, and jointly administer federal and state laws related to water quality in coordination with EPA and USACE.

The Tahoe region is located within the jurisdiction of the Lahontan RWQCB. On the California side of the Tahoe region, the Lahontan RWQCB implements the CWA, the California Water Code (including the Porter-Cologne Act), the California Lake Tahoe and other regional TMDLs, and a variety of laws related to control of solid waste and toxic and hazardous wastes. The Lahontan RWQCB has authority to set and revise water quality standards and discharge prohibitions. It issues federal permits, including NPDES permits and Section 401 water quality certifications, and state waste discharge requirements or waivers of waste discharge requirements. Its planning and permitting actions require compliance with CEQA.

Water Quality Control Plan for the Lahontan Region

Water quality standards and control measures for surface water and groundwater within the Lahontan Region are contained in the Water Quality Control Plan for the Lahontan Region (Basin Plan) (Lahontan RWQCB 2016). The Basin Plan was first adopted in 1975 and was most recently updated in 2016. It designates beneficial uses for surface waters within the region, including the South Lake Tahoe, North Tahoe, and Tahoe Lake Body hydrological units. Table 3.12-3 lists the beneficial uses identified for surface water in South Lake Tahoe, North Tahoe, and Tahoe Lake Body hydrological units and ground water in the Tahoe Valley South and Tahoe Valley North Basins. The Basin Plan contains both narrative and numeric water quality objectives to protect the designated beneficial uses listed for the region. Table 3.12-4 lists applicable narrative and numeric surface water and groundwater quality objectives for waterbodies. The Basin Plan amendments include additional language related to "mixing zones" for dilution of discharged water, compliance schedules for NPDES permits, discharge prohibition exemptions, simplification of existing prohibition exemptions, and the removal of language describing programs administered by TRPA (Lahontan RWQCB 2016). Chapter 5 of the Basin Plan, "Water Quality Standards and Control Measures for the Tahoe region," summarizes a variety of control measures for the protection and enhancement of Lake Tahoe.

Table 3.12-3 Beneficial Uses of Water

Human Activity-related	Natural Habitat-related
Surface Water[1]	
▶ Municipal and Domestic Supply (MUN) ▶ Agricultural Supply (AGR) ▶ Ground Water recharge (GWR) ▶ Freshwater Replenishment (FRSH) ▶ Navigation (NAV) ▶ Water Contact Recreation (REC-1) ▶ Noncontact Water Recreation (REC-2) ▶ Commercial and Sport Fishing (COMM)	▶ Cold Freshwater Habitat (COLD) ▶ Wildlife Habitat (WILD) ▶ Preservation of Biological Habitats of Special Significance (BIOL) ▶ Rare, Threatened, or Endangered Species (RARE) ▶ Fish Migration (MIGR) ▶ Fish Spawning (SPWN) ▶ Water Quality Enhancement (WQE) ▶ Flood Peak Attenuation/Flood Water Storage (FLD)
Groundwater	
▶ Municipal and Domestic Supply (MUN) ▶ Agricultural Supply (AGR) ▶ Industrial Process Supply (PROC)[2] ▶ Industrial Service Supply (IND)	(not applicable)

1. Beneficial uses vary by waterbody within the South Lake Tahoe, North Tahoe, and Tahoe Lake Body hydrological units.
2. Beneficial use for Tahoe Valley-South Basin only.

Source: Lahontan RWQCB 2016

Table 3.12-4 Water Quality Objectives Applicable to Waterbodies within the Program Area and Additional Objectives Applied to the Truckee River and Lake Tahoe Hydrologic Units (HU)

Pollutant	Narrative Objective	Numeric Objective[1]
Surface Water		
Algal Growth Potential	—	Truckee River HU: The mean monthly algal growth potential shall not be altered to the extent that such alterations are discernible at the 10 percent significance level (excluding Martis Creek). Lake Tahoe HU: 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.
Ammonia	The neutral, unionized ammonia species is highly toxic to freshwater fish. The fraction of toxic to total ammonia species is a function of temperature and pH. Tables were derived from EPA 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 EPA.	Ammonia concentrations shall not exceed the values listed for the corresponding conditions derived from EPA ammonia criteria.
Bacteria, Coliform	Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.	Water Contact Recreation MCLs ▶ Fecal Coliform ■ < 20/100 milliliter (log mean of at least five samples collected within a 30-day period) ■ < 10 percent of the total number of samples taken shall exceed 40/100 milliliter

Pollutant	Narrative Objective	Numeric Objective[1]
Biological Indicators	—	Lake Tahoe HU: 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.
Biostimulatory Substances	Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.	Truckee River HU: 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 (excludes Martis Creek and Truckee River downstream of Martis Creek).
Chemical Constituents	Waters designated as MUN shall not contain concentrations of chemical constituents in excess of the MCL or secondary maximum contaminant level SMCL based upon drinking water standards specified in the following provisions of Title 22 of the California Code. 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 chemical constituents in concentrations that adversely affect beneficial uses.	**Municipal MCLs** **Constituent — MCL (milligram per liter dissolved)** Arsenic 0.01 Barium 0.1 Copper 0.01 Cyanide 0.01 Iron 0.3 Manganese 0.05 Silver 0.01 Zinc 0.1
Chlorine, Total Residual	—	Median value of 0.002 milligram per liter or a maximum value of 0.003 milligram per liter. Median values shall be based on daily measurements taken within any six-month period.
Clarity	—	Lake Tahoe HU: 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 NTU. In addition, turbidity shall not exceed 1 NTU in shallow waters not directly influenced by stream discharges.
Color	Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.	Truckee River HU: The color shall not exceed an eight (8) Platinum Cobalt Unit mean of monthly means.
Conductivity, Electrical	—	Lake Tahoe HU: The mean annual electrical conductivity shall not exceed 95 micromhos per centimeter (µmhos/cm) at 25 degrees Celsius at any location in the Lake.
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, the minimum dissolved oxygen concentration shall not be less than that specified in the Basin Plan Table 5.1-8. Truckee River HU: The dissolved oxygen concentrations shall not be depressed by more than 10 percent, below 80 percent saturation, or below 7.0 milligram per liter at any time, whichever is more restrictive.

Pollutant	Narrative Objective	Numeric Objective[1]
Floating Material	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.	—
Non-degradation 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. The pH shall not be depressed below 6.5 nor raised above 8.5.[2] Truckee River HU: Changes in normal ambient pH levels shall not exceed 0.5 unit. Lake Tahoe HU: The pH shall not be depressed below 7.0 nor raised above 8.4.
Plankton Counts	—	Lake Tahoe HU: The mean seasonal concentration of plankton organisms shall not be greater than 100 per milliliter and the maximum concentration shall not be greater than 500 per milliliter at any point in the Lake.
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.	At a minimum, waters designated for use as domestic or MUN shall not contain concentrations of radionuclides in excess of the MCLs specified in CCR Title 22.
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.	—
Suspended Sediment	—	Lake Tahoe HU: Suspended sediment concentrations in streams tributary to Lake Tahoe shall not exceed a 90th percentile value of 60 milligram per liter.
Settleable Material	Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.	For natural high quality waters, the concentration of settleable materials shall not be raised by more than 0.1 milliliter per liter

Pollutant	Narrative Objective	Numeric Objective[1]
Species Composition	—	Truckee River HU: The species composition of aquatic organisms shall not be altered to the extent that such alterations are discernible at the 10 percent significance level (Excludes Martis Creek and the Truckee River stations downstream of Martis Creek).
Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.	For natural high quality waters, the concentration of total suspended materials shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.
Suspended Sediment	—	Suspended sediment concentrations in streams tributary to Lake Tahoe shall not exceed a 90th percentile value of 60 milligram per liter.[3]
Taste and Odors	Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses. For naturally high quality waters, the taste and odor shall not be altered. Truckee River HU: The taste and odor shall not be altered.	—
Temperature	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses. For waters designated COLD, the temperature shall not be altered.	A maximum increase of no more than 5 degrees Fahrenheit.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.	—
Transparency	—	Lake Tahoe HU: 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	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. Truckee River HU: The turbidity shall not be raised above 3 NTU mean of monthly means.
Groundwater		
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 shall not contain chemical constituents in concentrations that adversely affect beneficial uses.	Where designated for domestic supply or MUN must not exceed pertinent MCLs defined in CCR Title 22.
Radioactivity	—	Where designated for domestic supply or MUN must not exceed pertinent MCLs.

Pollutant	Narrative Objective	Numeric Objective[1]
Tastes and Odors	Ground waters shall not contain taste- or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses. Truckee River HU: taste and odor shall not be altered.	Where designated for domestic supply or MUN must not exceed pertinent MCLs.

Notes: MCL = Maximum Contaminant level; SMCL = Secondary Maximum Contaminant Level.

1. Numerical Objectives included in the Basin Plan Tables 3-12 and 3-13 are not included in this table.
2. Lahontan RWQCB 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 are determined on a case-by-case basis.
3. This objective is equivalent to TRPA's threshold standard for suspended sediment in tributaries. Lahontan RWQCB 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.

Source: Lahontan RWQCB 2016

Timber Waiver for the Lahontan Region

The Conditional Waiver of Waste Discharge Requirements for Waste Discharges Resulting from Timber Harvest and Vegetation Management in the Lahontan Region (Timber Waiver) (Lahontan RWQCB 2019a) was created by Lahontan RWQCB to implement the State of California Nonpoint Source Pollution Control Program. The Timber Waiver was first adopted in 2009, replaced by the 2014 Timber Waiver, and subsequently renewed for five years in 2019. The Timber Waiver waives discharge requirements resulting from eligible timber harvest and vegetation management activities, subject to certain conditions and requirements. The eligibility conditions, implementation requirements (e.g., application, notification, and reporting), and monitoring requirements are based on the activities and the potential risk to water quality. Activities are divided into six categories:

- Category 1: Defensible space, fire prevention, dead-dying-diseased tree removal, and construction activities;
- Category 2: Activities conducted by hand crews including thinning operations and prescribed fire;
- Category 3: Post-fire emergency rehabilitation;
- Category 4: Activities that rely on existing roads and may include winter-period operations;
- Category 5: CAL FIRE approved Plans (including Timber Harvest Plans, Non-industrial Management Plans, other Plans, and Amendments); and
- Category 6: Activities that do not qualify for Categories 1–5 and may include burning or equipment operations within Waterbody Buffer Zones, 100-year Floodplains, or Stream Environment Zones.

The Timber Waiver also provides for the exemption of certain timber harvest and vegetation management activities from Basin Plan waste discharge prohibitions that would otherwise apply within 100-year floodplains, SEZs, and high erosion lands (Bailey Land Capability classes 1a, 1c, or 2) in the Lake Tahoe, Truckee River, and Little Truckee River hydrologic units (Lahontan RWQCB 2019a, Attachment N). Exempt activities include timber harvest and vegetation management activities to reduce fuel loading that are identified in a community wildfire protection plan, and projects necessary to protect public health or safety or to provide essential public services. Timber harvest and vegetation management activities intended to protect forest values such as wildlife habitat, and those intended to promote aspen regeneration or improve riparian habitat would also qualify for exemption from waste discharge prohibitions. To qualify for exemption, activities must meet the eligibility criteria and comply with the conditions of the applicable waiver category.

Total Maximum Daily Load

In accordance with Section 303(d) of the CWA, Lahontan RWQCB has listed several water bodies in the vicinity of the program area as impaired for sediment, turbidity, nitrogen, phosphorus, iron, chloride, indicator bacteria, or benthic community effects (Lahontan RWQCB 2019b). This designation is assigned to waterbodies where established water quality objectives as specified in the Basin Plan are not being met or where beneficial uses are not protected (Lahontan RWQCB 2016). Placement of a waterbody on the 303(d) list acts as the trigger for developing a pollution

control plan, called a TMDL, for each water body and associated pollutant/stressor on the list. The TMDL serves as the means to attain and maintain water quality standards for the impaired water body. During each 303(d)-listing cycle, the water bodies on the list are prioritized and a schedule is established for completing the TMDLs (Lahontan RWQCB 2014). As shown in Table 3.12-5, TMDLs were developed by Lahontan RWQCB and approved by the EPA for Blackwood Creek, Heavenly Valley Creek, Truckee River, and Lake Tahoe. TMDLs for five water bodies within the program area (General Creek, Heavenly Valley Creek, Tallac Creek, Trout Creek, Ward Creek, and Upper Truckee River) have not yet been developed and one waterbody (Cold Creek) will be addressed by an action other than a TMDL. Although TMDLs do not exist for every 303(d) listed water body in the Tahoe region, some may be addressed through revisions of the water quality objectives for iron and chloride rather than through a TMDL, and others may be addressed by demonstrating that implementation of the Lake Tahoe TMDL also achieves the necessary load reductions to manage those impairments.

Table 3.12-5 303(d) Impaired Waterbodies and Total Maximum Daily Loads in the Program Area

Water Body	Sub-Watershed	Pollutant	TMDL	Expected TMDL Completion Date[1]
Blackwood Creek	Blackwood Creek	Iron[2], nitrogen, phosphorus, sedimentation/siltation	Sediment/siltation[3] (Lahontan RWQCB 2007), approved 2008	2022
General Creek	General Creek	Iron[2], phosphorus	—[4]	2031 (iron)
Tallac Creek	Tallac Creek	Indicator bacteria	—	2031
Trout Creek (above and below US 50)	Trout Creek	Iron[2], nitrogen, Indicator bacteria, phosphorus	—[4]	2031 (iron, Indicator bacteria)
Heavenly Valley Creek	Trout Creek	Chloride[2], sedimentation/siltation, phosphorus[4], benthic community effects	Sediment/siltation (Lahontan RWQCB 2000), approved 2002	2028 (chloride), 2031 (benthic community effect)-
Cold Creek	Trout Creek	Total nitrogen	—[4]	2031
Middle Truckee River[5]	Truckee River	Sedimentation/siltation	Sediment/siltation[3] (Lahontan RWQCB 2008), approved 2009	—
Upper Truckee River	Upper Truckee River	Iron[2], phosphorus	—[4]	2031 (iron)
Ward Creek	Ward Creek	Iron[2], nitrogen, phosphorus, turbidity	—[4]	2031 (iron)
Lake Tahoe	N/A	Nitrogen, phosphorus, sedimentation/siltation	Sediment/siltation and nutrients (Lahontan RWQCB and NDEP 2010), approved 2011	—

Note: N/A = not applicable.

[1] The TMDL completion date is the date the Environmental Protection Agency approved or is expected to approve the Total Maximum Daily Load

[2] This listing may be addressed through revision of the water quality objective rather than through a TMDL.

[3] TMDL will address nitrogen, phosphorus and iron.

[4] Sediment/siltation, turbidity, nitrogen, and phosphorus addressed in the Lake Tahoe TMDL.

[5] Outflow of Lake Tahoe at Tahoe City to California/Nevada state line.

Source: Lahontan RWQCB 2014, Lahontan RWQCB 2019b

LOCAL

El Dorado County General Plan

The El Dorado County General Plan includes a Conservation and Open Space Element and an Agriculture and Forestry Element that addresses the conservation, management, and utilization of the County's natural resources and open space and agricultural and forest lands, respectively.

The El Dorado County General Plan Conservation and Open Space Element includes the following statements and direction related to water quality:

GOAL 7.3 Water Quality and Quantity: Conserve, enhance, and manage water resources and protect their quality from degradation.

Objective 7.3.1 Water Resource Protection: Preserve and protect the supply and quality of the County's water resources including the protection of critical watersheds, riparian zones, and aquifers.

- Policy 7.3.1.1: Encourage the use of BMPs, as identified by the Soil Conservation Service, in watershed lands as a means to prevent erosion, siltation, and flooding.

Objective 7.3.2 Water Quality: Maintenance of and, where possible, improvement of the quality of underground and surface water.

- Policy 7.3.2.1: Stream and lake embankments shall be protected from erosion, and streams and lakes shall be protected from excessive turbidity.
- Policy 7.3.2.2: Projects requiring a grading permit shall have an erosion control program approved, where necessary.
- Policy 7.3.2.5: As a means to improve the water quality affecting the County's recreational waters, enhanced and increased detailed analytical water quality studies and monitoring should be implemented to identify and reduce point and non-point pollutants and contaminants. Where such studies or monitoring reports have identified sources of pollution, the County shall propose means to prevent, control, or treat identified pollutants and contaminants.

Objective 7.3.3 Wetlands: Protection of natural and man-made wetlands, vernal pools, wet meadows, and riparian areas from impacts related to development for their importance to wildlife habitat, water purification, scenic values, and unique and sensitive plant life.

- Policy 7.3.3.1: For projects that would result in the discharge of material to or that may affect the function and value of river, stream, lake, pond, or wetland features, the application shall include a delineation of all such features. For wetlands, the delineation shall be conducted using the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual.
- Policy 7.3.3.3: The County shall develop a database of important surface water features, including lake, river, stream, pond, and wetland resources.

Placer County General Plan

The Placer County General Plan includes a Natural Resources section and an Agriculture and Forestry Resources section that includes goals, policies, and implementation programs for natural resources and agricultural and forestry resources, respectively.

The Placer County General Plan, Chapter 6 Natural Resources includes the following statements and direction related to water quality:

GOAL 6.A: To protect and enhance the natural qualities of Placer County's rivers, streams, creeks and groundwater.

- Policy 6.A.1. The County shall require the provision of sensitive habitat buffers which shall, at a minimum, be measured as follows: 100 feet from the centerline of perennial streams, 50 feet from centerline of intermittent streams, and 50 feet from the edge of sensitive habitats to be protected, including riparian zones, wetlands, old growth woodlands, and the habitat of special status, threatened or endangered species. Based on more detailed information supplied as a part of the review for a specific project or input from state or federal regulatory agency, the County may determine that such setbacks are not applicable in a particular instance of should be modified based on the new information provided. The County may, however, allow exceptions, such as in the following cases:

1. Reasonable use of the property would otherwise be denied;
2. The location is necessary to avoid or mitigate hazards to the public;
3. The location is necessary for the repair of roads, bridges, trails, or similar infrastructure; or,
4. The location is necessary for the construction of new roads, bridges, trails, or similar infrastructure where the County determines there is no feasible alternative and the project has minimized environmental impacts through project design and infrastructure placement.

- **Policy 6.A.10.** The County shall discourage grading activities during the rainy season, unless adequately mitigated, to avoid sedimentation of creeks and damage to riparian habitat.
- **Policy 6.A.13.** The County shall protect groundwater resources from contamination and further overdraft by pursuing the following efforts:
  a. Identifying and controlling sources of potential contamination;
  b. Protecting important groundwater recharge areas;
  c. Encouraging the use of surface water to supply major municipal and industrial consumptive demands;
  d. Encouraging the use of treated wastewater for groundwater recharge; and
  e. Supporting major consumptive use of groundwater aquifer(s) in the western part of the County only where it can be demonstrated that this use does not exceed safe yield and is appropriately balanced with surface water supply to the same area.
- **Policy 6.A.14.** The County shall help ensure that open space located in reservoir is preserved and protected to assure adequate performance of those reservoirs. The watershed is defined as those lands draining into a reservoir and having an immediate effect upon the quality of water within that reservoir. Those lands located within the watershed and within 5,000 feet of the reservoir shall be considered as having an immediate effect.
- **Policy 6.A.15**. The County shall encourage the protection of floodplain lands and, where appropriate, acquire public easements for purposes of flood protection, public safety, wildlife preservation, groundwater recharge, access and recreation.

3.12.2 Environmental Setting

REGIONAL HYDROLOGY AND CLIMATE

The Tahoe Basin was formed approximately 2–3 million years ago by geologic faulting and volcanic activity. Geologic faults running in a north-south direction allowed the formation of a valley between the uplifting Sierra Nevada and the Carson Range. The northern portion of the valley was blocked and dammed by volcanic activity that created the 506-square-mile basin that lies along the California-Nevada border. Precipitation and runoff eventually filled a portion of the basin to create Lake Tahoe, which has a water surface area covering nearly two-fifths of the total Basin area (191 square miles).

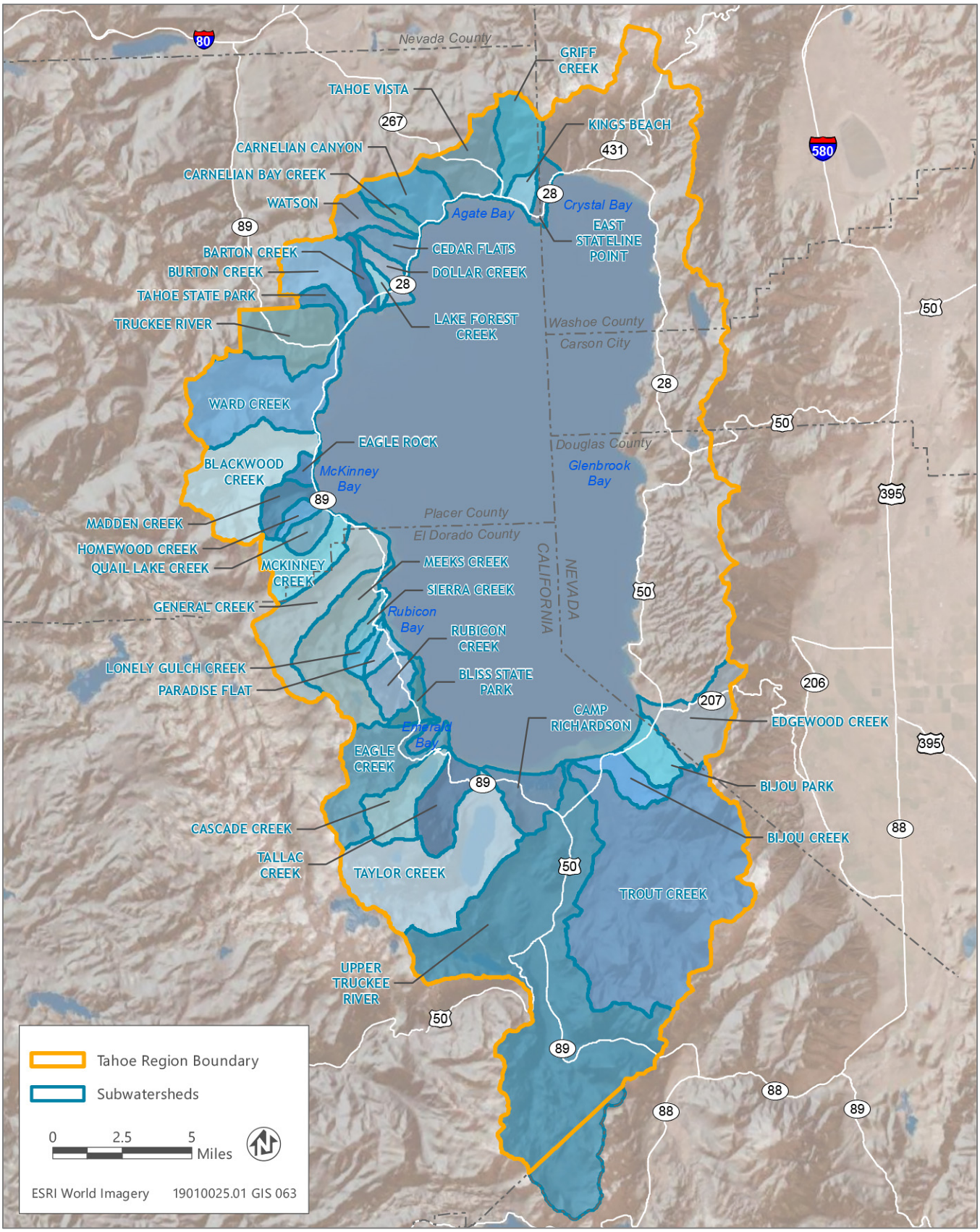
Lake Tahoe is fed by 63 tributary streams and intervening zones that drain directly to the lake. The largest tributary is the Upper Truckee River, which accounts for 25 percent of the annual inflow to Lake Tahoe (TERC 2018). The Truckee River is the lake's only outlet, flowing to Pyramid Lake in Nevada. A dam constructed at Tahoe City in the early 1900s regulates water flow to the Truckee River from the natural rim at 6,223.0 feet (1,896.8 meters) above sea level to the maximum legal lake level of 6,229.1 feet (1,898.6 meters) (Lake Tahoe Datum). Lake Tahoe's current water surface elevation is considerably higher than it was during extended historical periods when the climate was more arid (Lindstrom 1990).

Regional topography is characterized by steep mountain slopes at higher elevations, transitioning to more moderately sloped terrain near the lakeshore. Average minimum and maximum air temperatures in 2017 were 32.8 degrees Fahrenheit (0.4 degrees Celsius) and 57.1 degrees Fahrenheit (13.9 degrees Celsius), respectively (TERC 2018). Average precipitation, measured at almost 32 inches (81.3 centimeters) annually at Tahoe City (TERC 2018), generally falls as snow in the higher elevations and as snow and rain in the lower elevations, including the lake shore from October to May. The fraction of precipitation that is snow has declined in the Lake Tahoe Basin from an average of 52 percent in 1910 to 32 percent in 2017 (TERC 2018). Peak stream runoff in the watersheds of interest is typically triggered by spring snowmelt in March through July (TERC 2018) or by rain-on-snow events (Berg et al. 1991). The snowpack near the lakeshore predominantly melts before the peak in snowmelt and runoff from the higher elevations. Land cover within the Lake Tahoe Basin is primarily forest, with areas of granitic outcrops and meadows.

LOCAL HYDROLOGY

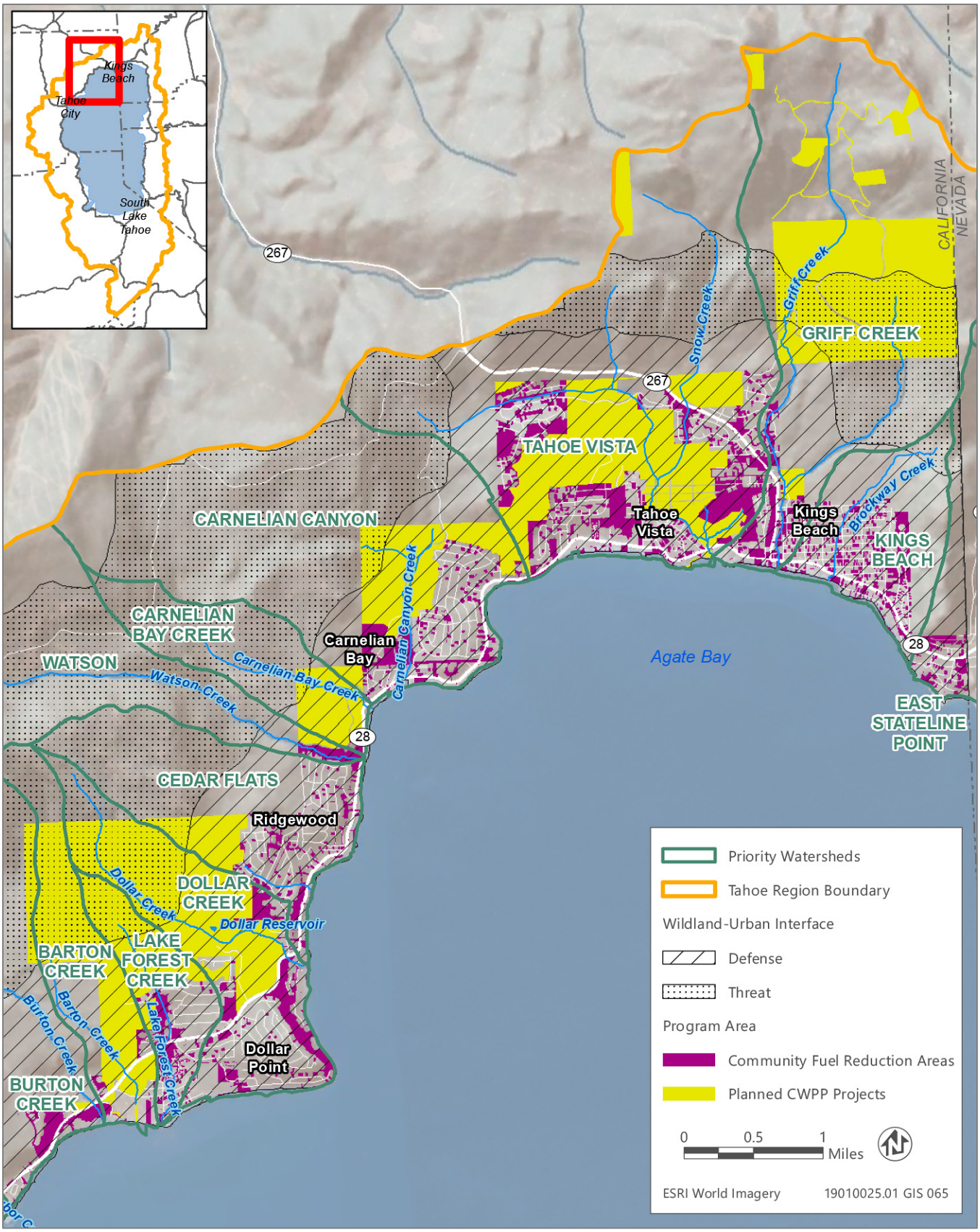
Surface Water

The program area overlaps with 38 subwatersheds within the Lake Tahoe Basin (Figures 3.12-1 through 3.12-7). Table 3.12-6 lists characteristics of the sub-watersheds including elevation range, total area, area of the watershed within the program area (both square miles and percent), drainage density, and total length of streams within the program area. The program area contains 183.5 miles of stream, including segments of Rubicon Creek, Truckee River, Incline Creek, Edgewood Creek, and Blackwood Creek (Table 3.12-6). These subwatersheds and associated streams vary in slope, geology, surrounding land-use, and precipitation resulting in variable susceptibility to erosion, pollutants (i.e., sediments and nutrients) and water quality degradation. Other waterbodies in the program area include 20.8 miles of shoreline along the perimeter of 49 lakes, including Lake Tahoe, Cascade Lake, Fallen Leaf Lake, Lake Louise, Dollar Reservoir, Lake Christopher, and Lower Echo Lake. Table 3.12-7 presents lake elevations and the total perimeters in the program area. The Truckee Marsh comprises approximately 220.4 acres of the program area (wetland area defined by National Hydrography Dataset (NHD) (USGS 2019a). Disturbances in the watersheds surrounding streams, lakes, and wetlands may lead to increased erosion and nutrient pollution (i.e., nitrogen and phosphorus), which may result in degraded water quality (Lahontan RWQCB and NDEP 2010).



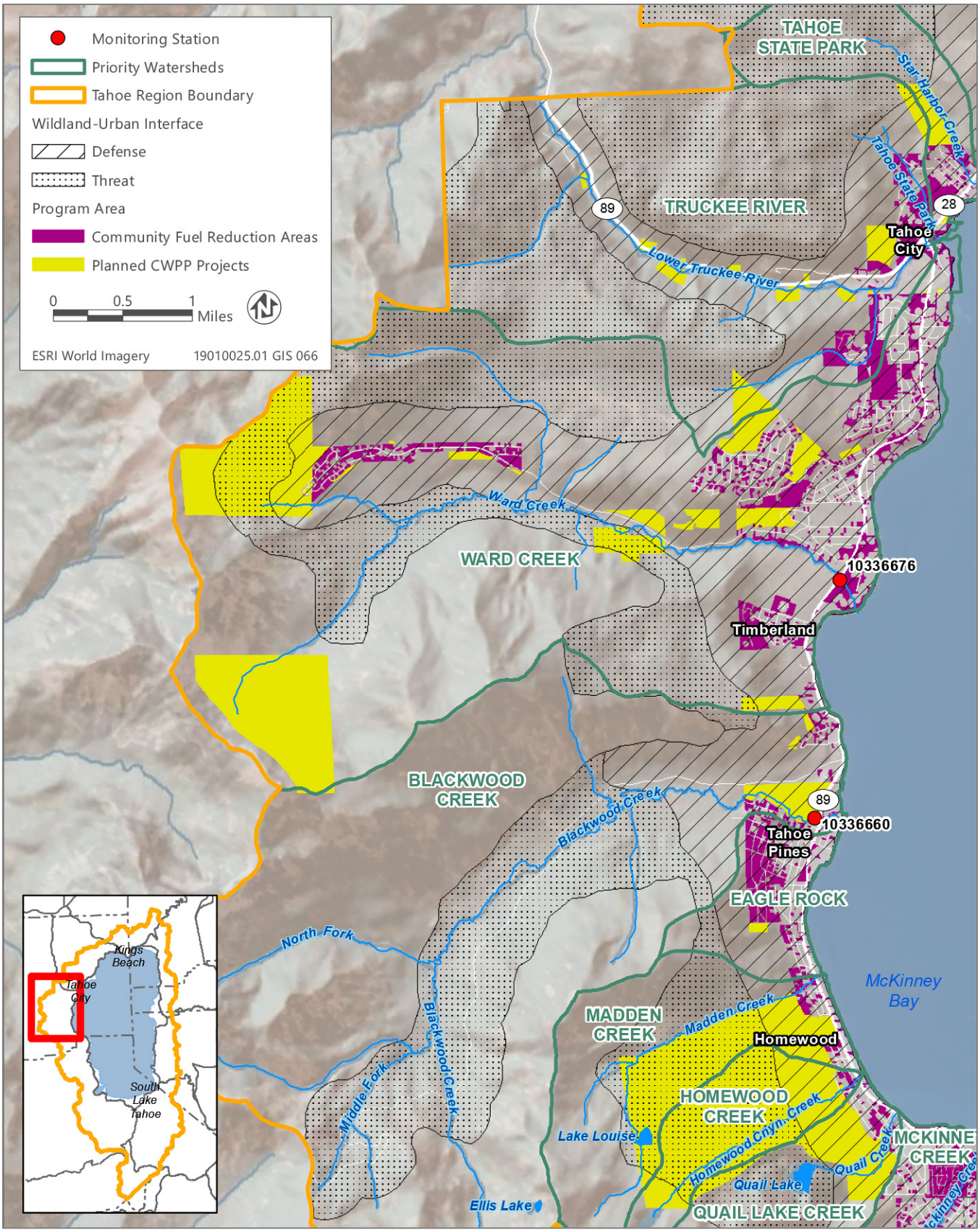
Source: Data received from Stillwater in 2019

Figure 3.12-1 Overview of the Subwatersheds and Hydrological Features within the Program Area



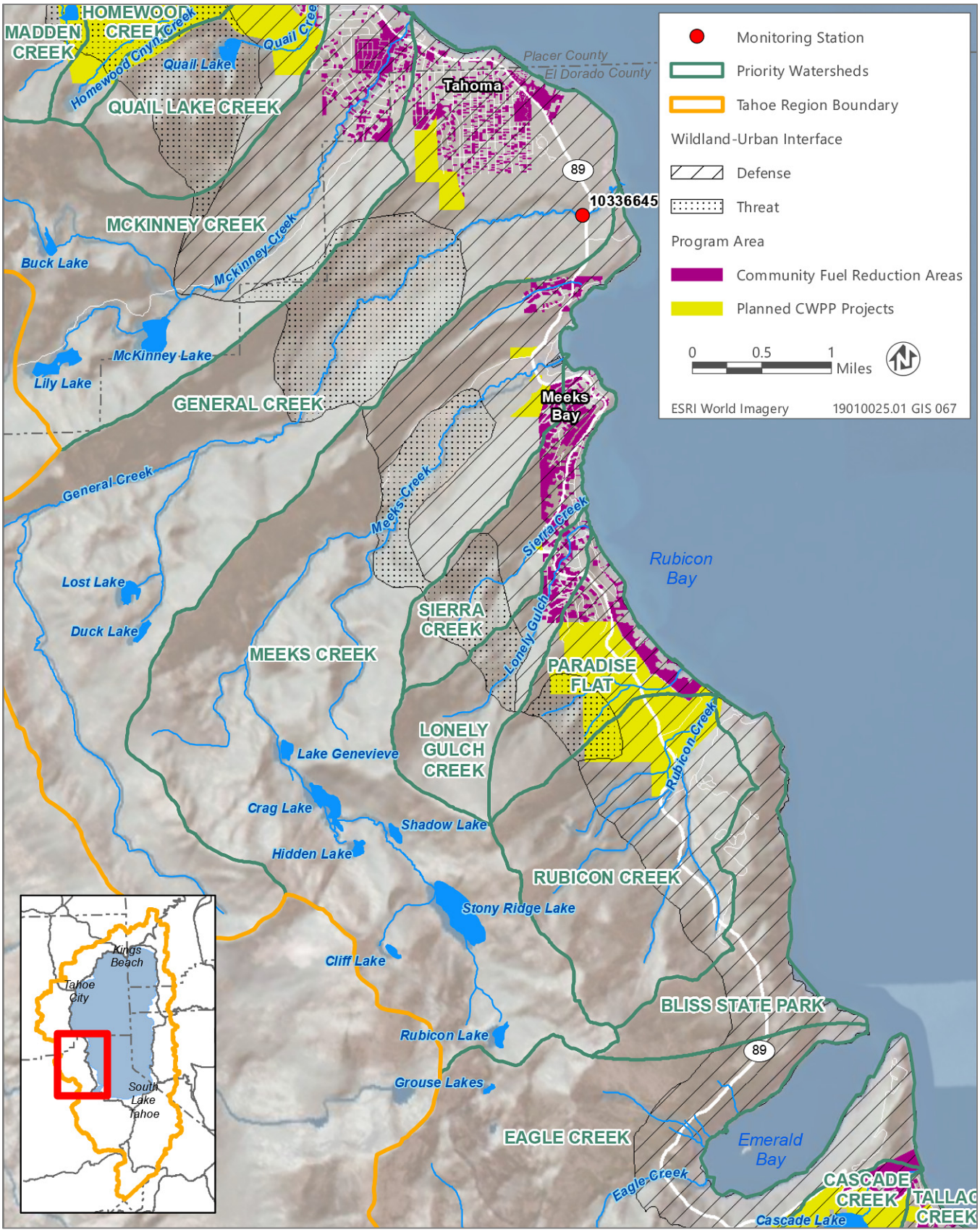
Source: Data received from CTC, Stillwater, and TRPA in 2019

Figure 3.12-2 Subwatersheds, Hydrological Features, and Lake Tahoe Interagency Monitoring Program Stations within the Program Area: Kings Beach to Dollar Point



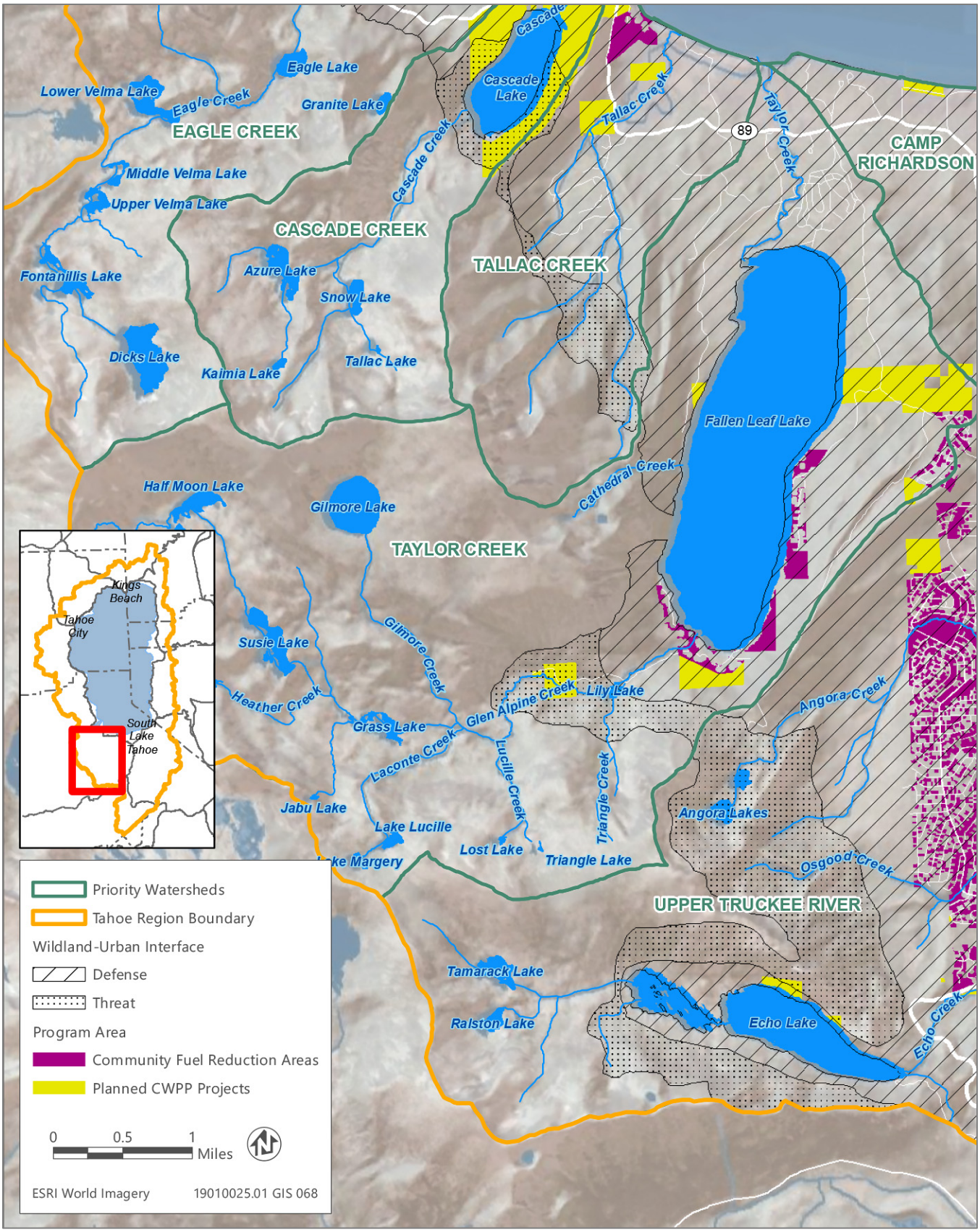
Source: Data received from CTC, Stillwater, and TRPA in 2019

Figure 3.12-3 Subwatersheds, Hydrological Features, and Lake Tahoe Interagency Monitoring Program Stations within the Program Area: Tahoe City to Homewood



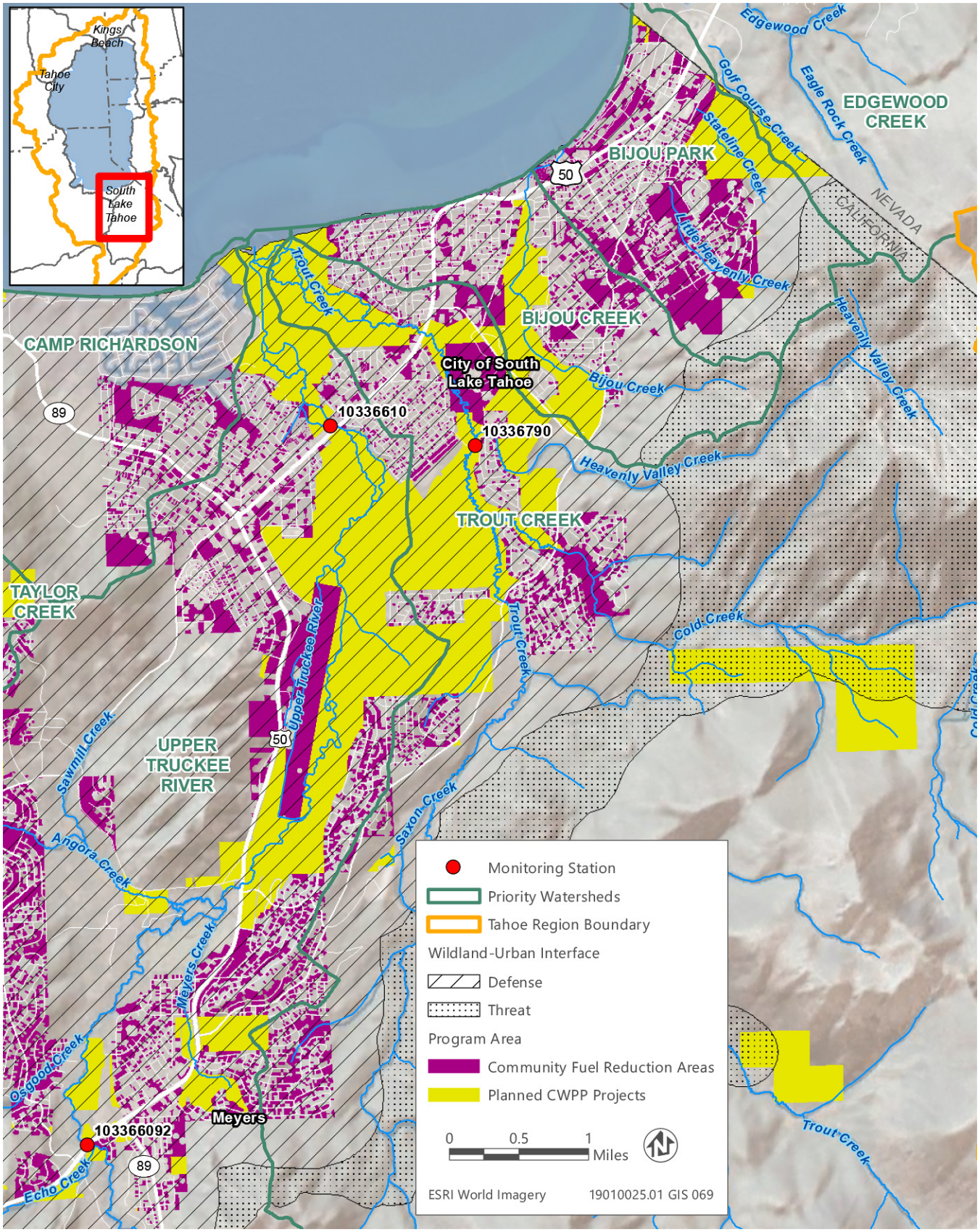
Source: Data received from CTC, Stillwater, and TRPA in 2019

Figure 3.12-4 Subwatersheds, Hydrological Features, and Lake Tahoe Interagency Monitoring Program Stations within the Program Area: Tahoma to Emerald Bay



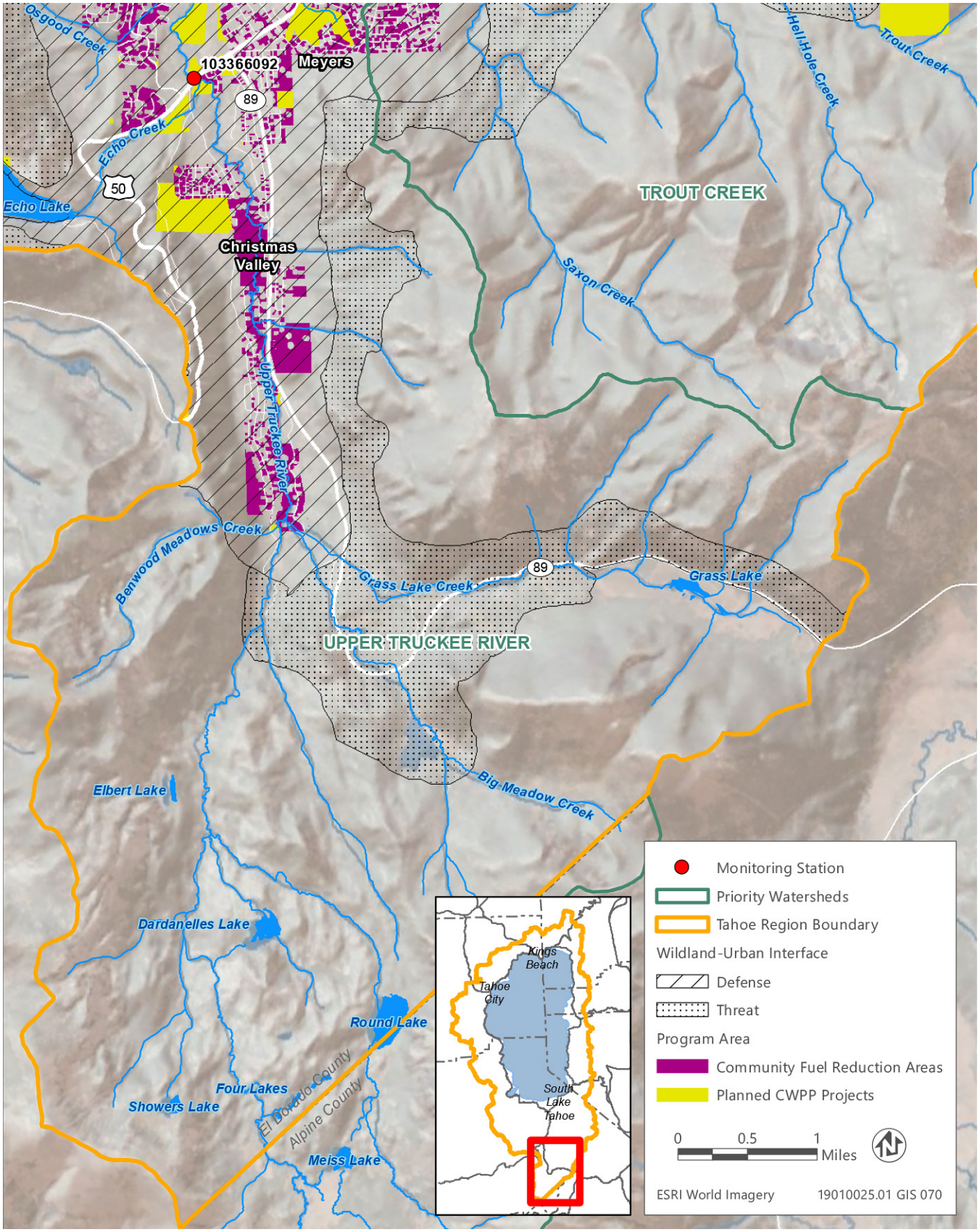
Source: Data received from CTC, Stillwater, and TRPA in 2019

Figure 3.12-5 Subwatersheds, Hydrological Features, and Lake Tahoe Interagency Monitoring Program Stations within the Program Area: Cascade Lake to North Upper Truckee



Source: Data received from CTC, Stillwater, and TRPA in 2019

Figure 3.12-6 Subwatersheds, Hydrological Features, and Lake Tahoe Interagency Monitoring Program Stations within the Program Area: South Lake Tahoe



Source: Data received from CTC, Stillwater, and TRPA in 2019

Figure 3.12-7 Subwatersheds, Hydrological Features, and Lake Tahoe Interagency Monitoring Program Stations within the Program Area: Christmas Valley

Table 3.12-6 Subwatershed Elevation, Total Area, Area within the Program Area, Drainage Density and Total Length of Streams in the Program Area

Subwatershed	Elevation (feet)	Total Sub-Watershed Area (square mile)	Sub-Watershed Area within the Program Area (square mile)	Percent Sub-Watershed Area within the Program Area	Drainage Density (mile stream/square mile watershed area)	Total Length of Streams in Program Area (miles)
Barton Creek	6,226–8,294	1.1	0.6	56.9	2.6	2.9
Bijou Creek	6,225–8,364	2.8	0.9	30.9	0.9	2.6
Bijou Park	6,225–9,200	3.1	1.1	36.3	1.0	3.1
Blackwood Creek	6,228–8,826	11.6	0.2	1.5	0.1	1.5
Bliss State Park	6,225–9,164	1.5	0.01	0.4	0.0	0.0
Burton Creek	6,231–8,424	5.7	0.2	2.8	0.2	1.0
Camp Richardson	6,225–7,244	4.2	0.4	8.9	0.0	0.01
Carnelian Bay Creek	6,240–8,097	1.0	0.2	22.1	0.8	0.8
Carnelian Canyon	6,228–8,331	4.2	0.7	16.3	0.7	2.9
Cascade Creek	6,238–9,698	4.7	0.5	11.3	0.7	3.3
Cedar Flats	6,228–7,951	1.8	0.3	15.2	1.1	2.0
Dollar Creek	6,227–7,950	1.8	1.1	60.5	4.0	7.4
Eagle Creek	6,225–9,972	8.8	0.04	0.4	0.0	0.01
Eagle Rock	6,227–7,727	0.8	0.2	20.9	3.0	2.5
East Stateline Point	6,228–7,881	1.3	0.1	3.5	0.0	0.1
Edgewood Creek	6,226–9,591	6.7	0.1	1.2	0.1	0.6
General Creek	6,228–8,705	9.0	0.3	3.6	0.2	1.4
Griff Creek	6,227–9,196	4.6	1.6	35.1	2.8	12.6
Homewood Creek	6,230–8,456	1.0	0.9	88.0	4.9	4.9
Kings Beach	6,227–7,362	1.2	0.2	14.4	1.1	1.3
Lake Forest Creek	6,234–7,080	0.7	0.4	63.1	2.8	1.9
Lonely Gulch Creek	6,228–9,177	1.1	0.1	6.5	0.5	0.5
Madden Creek	6,229–8,734	2.3	0.7	31.3	1.0	2.4
McKinney Creek	6,228–8,631	4.9	0.2	3.6	0.3	1.3
Meeks Creek	6,225–9,285	8.8	0.1	1.3	0.1	0.5
Paradise Flat	6,225–9,152	1.1	0.5	45.7	4.5	5.1
Quail Lake Creek	6,229–8,399	1.6	0.3	19.4	1.4	2.3
Rubicon Creek	6,225–9,252	2.9	0.4	13.2	1.8	5.1
Sierra Creek	6,225–8,196	1.2	0.2	14.2	0.4	0.5
Tahoe State Park	6,229–7,566	1.2	0.2	12.4	0.8	1.0
Tahoe Vista	6,225–8,425	5.5	1.7	30.4	1.6	8.7
Tallac Creek	6,225–9,730	4.6	0.2	5.0	0.6	2.9
Taylor Creek	6,225–9,975	18.4	0.6	3.3	0.4	7.3
Trout Creek	6,225–10,880	41.3	3.6	8.8	0.6	24.1
Truckee River	5,884–7,730	6.8	0.4	6.2	0.2	1.4
Upper Truckee River	6,225–10,060	56.6	5.9	10.3	0.6	35.0
Ward Creek	6,227–8,880	12.8	2.3	18.0	2.5	31.8
Watson	6,235–8,611	2.3	0.1	2.4	0.4	0.8
Total	—	**443.2**	**27.32**	—	—	**183.5**

Note: Sub-watersheds defined by TRPA. Stream length defined by SFEI.

Source: Prepared by Stillwater Sciences in 2020, TRPA 2017, SFEI 2016

Table 3.12-7 Lake Elevations and Total Perimeters in the Program Area

Lake	Elevation (feet)	Total Perimeter of Lakes within the Program Area (miles)
Cascade Lake	6,467	0.66
Dollar Reservoir	6,566	0.14
Echo Lake	7,414	0.04
Fallen Leaf Lake	6,379	0.40
Lake Christopher	6,273	0.65
Louise, Lake	7,711	0.27
Tahoe, Lake	6,226	11.3
Unnamed Lakes[1]	6,228–6,826	7.3
Total	—	**20.8**

Note: Lake perimeter defined by National Hydrography Dataset (NHD).

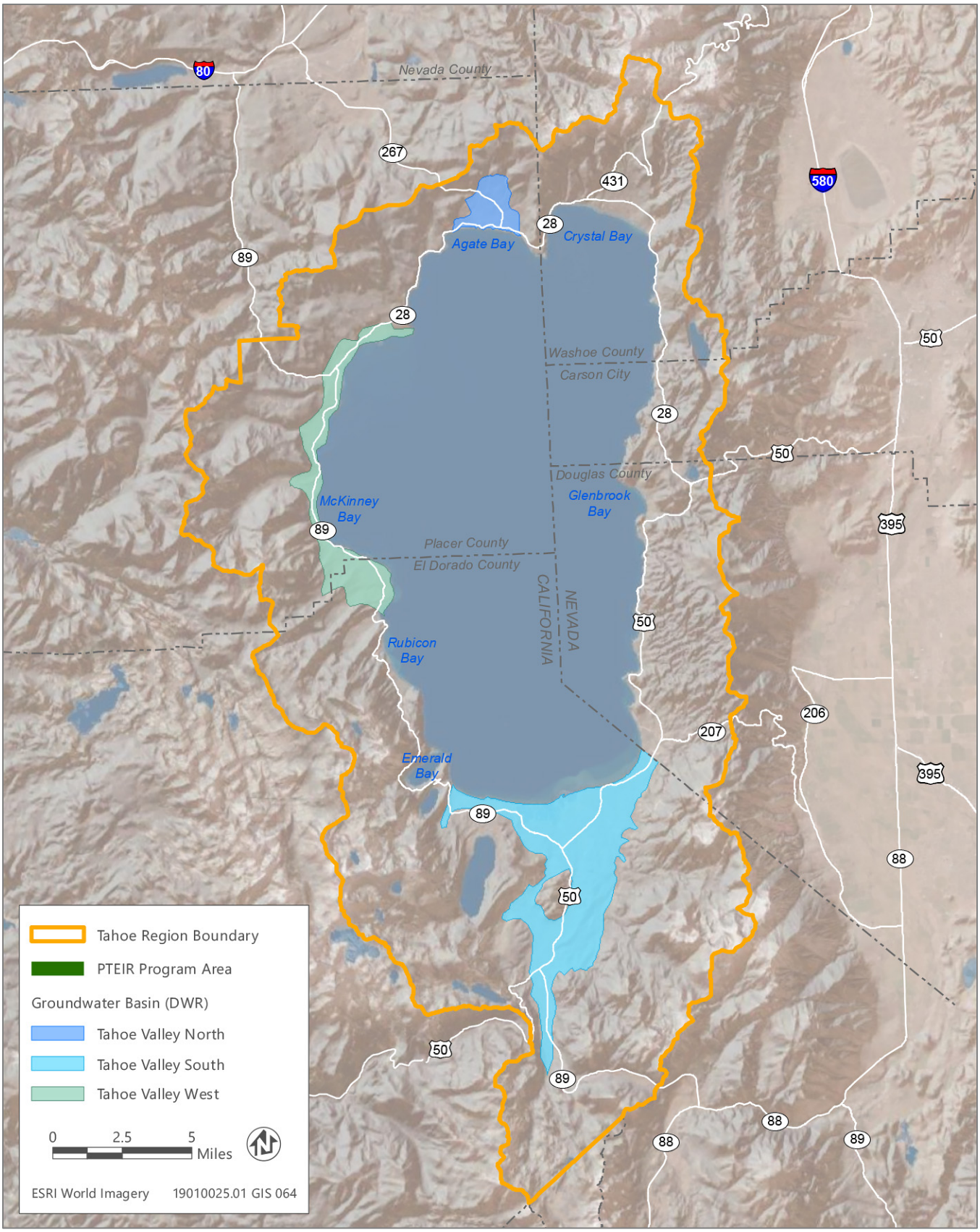
[1] Includes 42 lakes within the program area.

Source: Prepared by Stillwater Sciences in 2020; USGS 2019a

Groundwater

The program area is located within the Lake Tahoe Hydrological Basin, which includes three groundwater subbasins: Tahoe Valley South (Basin Number 6-005.01), Tahoe Valley West (Basin Number 6-005.02), and Tahoe Valley North (Basin Number 6-005.03) (DWR 2016; Figure 3.12-8). Of these basins, Tahoe Valley South is the largest, with a 14,800-acre (23-square mile) surface area and an estimated groundwater storage of 936,760 acre-feet (DWR 2003). Primary boundaries bordering the subbasin are Lake Tahoe, the Sierra Nevada, and the California-Nevada state line. The second largest subbasin is Tahoe Valley West which has a surface area of more than 6,000 acres (9 square miles) and an estimated ground water storage of 827,627 acre-feet (DWR 2003). Primary boundaries bordering the subbasin include Lake Tahoe, Sierra Nevada, Dollar Point, and Meeks Bay. The smallest subbasin is Tahoe Valley North, which extends over 2,000 acres (4 square miles) and its boundaries include Lake Tahoe and the Sierra Nevada mountains (DWR 2003). The general direction of groundwater flow in the subbasin is into Lake Tahoe.

Groundwater is the primary source of municipal and domestic water supply and supplies water to Lake Tahoe. Groundwater is recharged by direct infiltration of precipitation and streamflow (DWR 2003, DWR 2016). Long-term reductions in groundwater have not been observed within the Lake Tahoe groundwater subbasins (DWR 2003, DWR 2016, STPUD 2018). Annual fluctuations in groundwater elevation occur seasonally, with rising groundwater elevations during winter, highest groundwater levels during the spring (early April through mid-June) and lowest groundwater levels during the summer and fall when precipitation is low and groundwater demands are high (STPUD 2018).



Source: Data received from Stillwater in 2019

Figure 3.12-8 Lake Tahoe Groundwater Subbasins within the Program Area

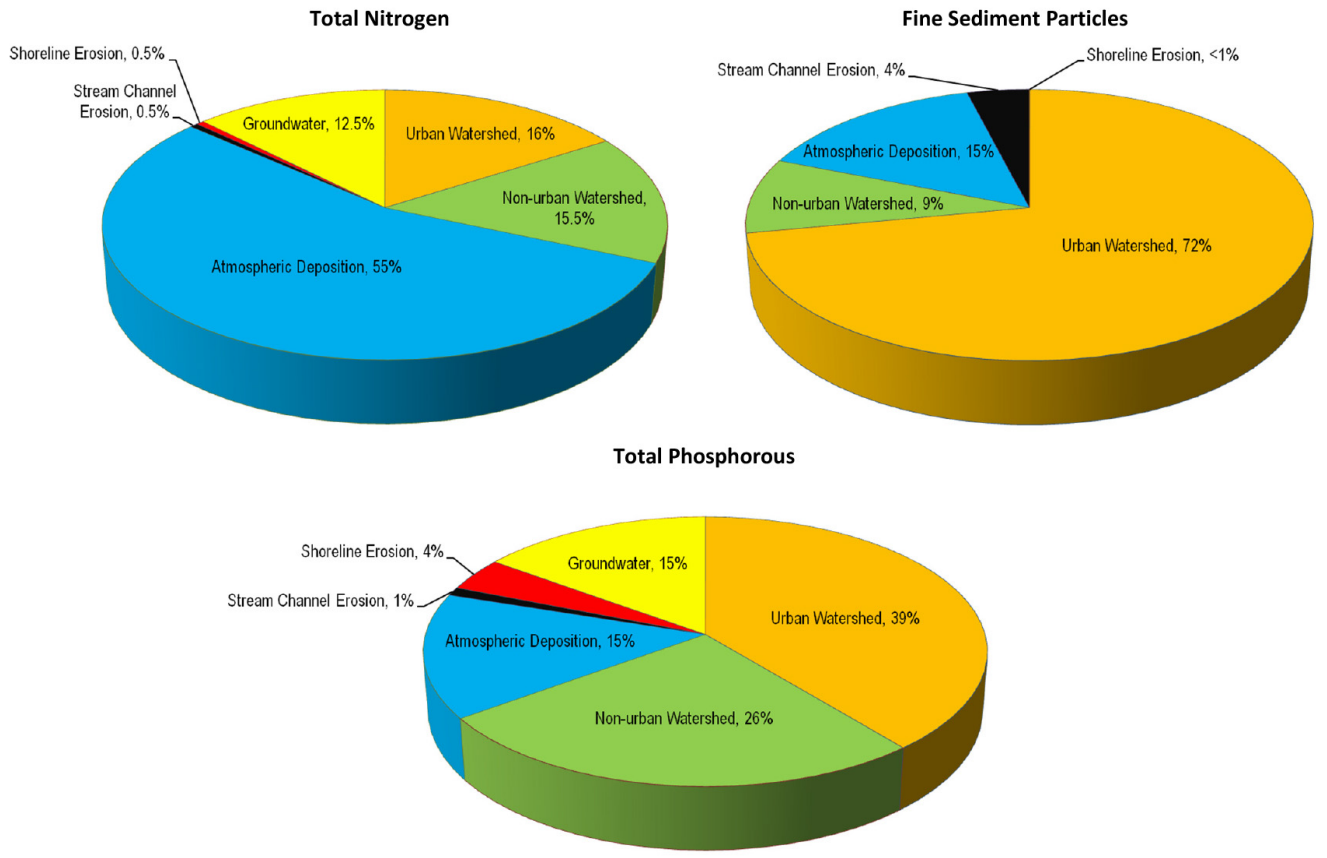
WATER QUALITY

Lake Tahoe, an ONRW under the CWA, is classified as an oligotrophic lake, which means the lake has very low concentrations of nutrients that can support algal growth, leading to clear water and high levels of dissolved oxygen (TERC 2011). The exceptional transparency of Lake Tahoe results from naturally low inputs of nutrients and sediment from the surrounding watersheds. Currently, water managers in Lake Tahoe are concerned about the tributary nutrient and suspended sediment concentrations and loads observed under existing conditions (status), the trends in nutrient and sediment concentrations and loads (trends), and the factors that influence the observed status and trends (USGS 2019b).

Pollutants of Concern

Primary pollutants of concern in the Tahoe region are fine sediment particles (<16 micrometers) and nutrients that support algal growth (nitrogen and phosphorus) (TRPA 2016). These are considered pollutants of concern in the Tahoe Region because of the negative impact on transparency (Lahontan RWQCB and NDEP 2010) and, in the case of nutrients, the blueness of the lake (Watanabe et al. 2016). Additionally, many components of the aquatic system are thought to be adversely affected by these pollutants (Reuter et al. 2009).

Research for the Lake Tahoe TMDL included an analysis of pollutant sources to identify the magnitude of pollutant loads to Lake Tahoe from various source categories. These pollutant sources are defined as surface runoff from urban watershed, atmospheric deposition, non-urban watershed, stream channel erosion, groundwater, and shoreline erosion. Figure 3.12-9 displays the relative distribution of average annual pollutant loading to Lake Tahoe for each pollutant of concern among the source categories (Lahontan RWQCB and NDEP 2010). As shown in Figure 3.12-9, the Lake Tahoe TMDL identifies surface runoff from urban watershed as the most significant source of pollutant loading for fine sediment particles (the primary pollutant of concern) and phosphorus. Surface runoff from urban watersheds is estimated to deliver 72 percent of the average annual fine sediment particle load and roughly 39 percent of the average annual phosphorus load to the lake. For nitrogen, atmospheric deposition is identified as the most significant source of loading to the lake, contributing 55 percent of the average annual nitrogen load, with urban watershed only contributing 16 percent of the average annual nitrogen load.



Source: Adapted by Ascent from Lahontan RWQCB and NDEP 2010

Figure 3.12-9 Sources of Pollutants of Concern to Lake Transparency

Lake Tahoe Water Quality

This section summarizes the Lake Tahoe TMDL, load reduction milestones, and status and trends of TRPA indicator categories and associated standards applicable to Lake Tahoe water quality.

Total Maximum Daily Load

The Lake Tahoe TMDL was developed collaboratively by the Lahontan RWQCB and Nevada Department of Environmental Protection (NDEP) as the framework for comprehensive water quality restoration planning to address identified pollutant sources and ultimately achieve the Lake Tahoe transparency and clarity water quality objectives for pelagic waters (Lahontan RWQCB and NDEP 2010).

The Lake Tahoe TMDL indicates that to achieve TRPA's transparency standard, total basinwide loads of fine sediment particles, phosphorus, and nitrogen need to be reduced by 65 percent, 35 percent, and 10 percent, respectively (Lahontan RWQCB and NDEP 2010). Load reductions are expressed as a percentage of baseline pollutant loads calculated for conditions in the year 2004.

Through the Lake Tahoe TMDL, Lahontan RWQCB and NDEP have established 5-year load reduction milestones to help assess progress toward meeting overall load reduction goals. The Lake Tahoe TMDL sets an interim goal for the year 2026, termed the Clarity Challenge, to reduce basinwide loading from all sources for fine sediment particles, phosphorus, and nitrogen by 32 percent, 17 percent, and 4 percent, respectively. Attainment of the Clarity Challenge is estimated to return the lake to an average annual transparency of 78.7 feet (24 meters) (Lahontan RWQCB and NDEP 2010).

Given that the majority of pollutant loads for fine sediment particles and phosphorus are delivered to the lake from urban watershed (developed lands), the Lahontan RWQCB and NDEP have prioritized this source category as the

greatest opportunity for pollutant control. Pollutant load allocations and load reduction targets are specified for each jurisdiction in the Tahoe region through NPDES permits for El Dorado County, Placer County, the City of South Lake Tahoe, and the California Department of Transportation. For local jurisdictions in Nevada (Washoe County and Douglas County), NDEP has developed Memoranda of Agreements (MOAs) that set load reduction goals and guide the implementation of projects and actions to achieve Lake Tahoe TMDL milestones. NDEP defines pollutant load allocations and load reduction targets for the Nevada Department of Transportation through an NPDES permit. Through either an NPDES permit or a MOA, each jurisdiction has developed stormwater/pollutant load reduction plans that prioritize water quality projects and actions to reduce loading from developed lands to meet Lake Tahoe TMDL milestones. The 2017 Lake Tahoe Report Card indicates that the conditions are improving in Lake Tahoe, including the achievement of the first 5-year load reduction milestone in fine sediment particles for local government and state highway departments (5 percent reduction) and continued clarity improvement (Lahontan RWQCB 2017). Upcoming milestones are provided in Table 3.12-8.

Table 3.12-8 Upcoming Load Reduction Milestones from Developed Lands[1]

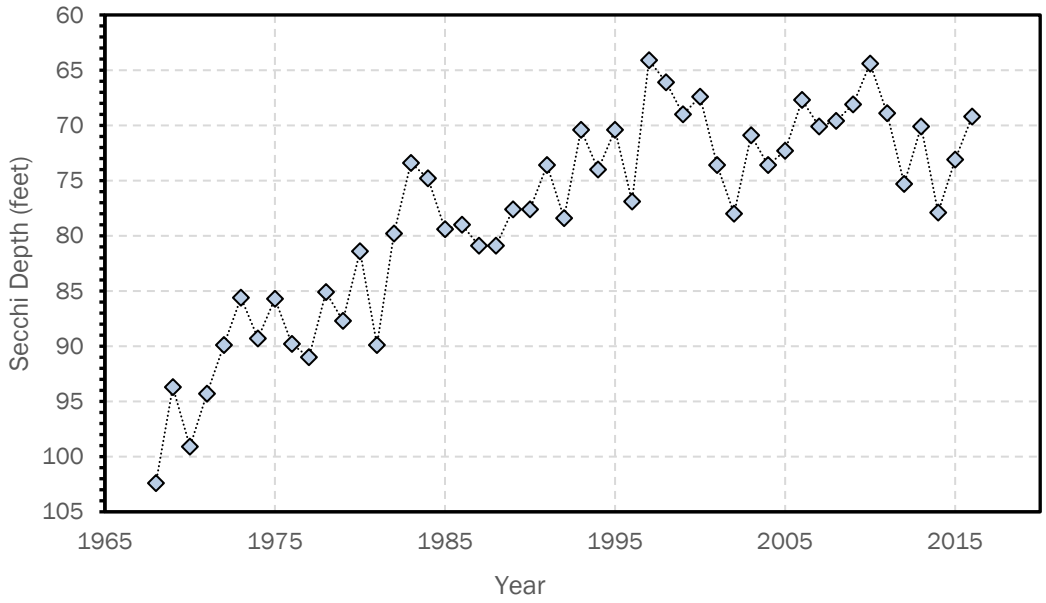
Pollutant of Concern	2021 Target	2026 Clarity Challenge	Standard Attainment
Fine sediment particles	21%	34%	71%
Total phosphorus	14%	21%	46%
Total nitrogen	14%	19%	50%

[1] Load reductions are expressed as percent reductions of baseline pollutant loads calculated for conditions in 2004. Percent reductions shown are for the developed lands source category (i.e., stormwater runoff), which differs from load reductions expressed as percent reductions for basinwide loads from all sources.

Source: Adapted from Lahontan RWQCB and NDEP 2010 by Ascent in 2020

Pelagic Lake Tahoe Water Quality: Secchi Depth Transparency

Transparency in the lake is measured every 7–10 days by submerging a Secchi disk, a 10-inch (25.4 centimeters) white, circular plate, and recording the depth at which the plate is no longer visible to the human eye. These readings, or Secchi depths, suggest the relative transparency of the lake increases with deeper measurements of Secchi depth. Lower readings of Secchi depths occur as the plate's visibility is impaired by the light-scattering effects of inorganic particles (e.g., sediment) and the light absorption of organic particles (e.g., algae) in the lake. The TRPA numerical standard for average annual Secchi depth is 97.4 feet (29.7 meters). Researchers from TERC have collected measurements of Secchi depth since 1968. Average annual values for Secchi depth from 1968 through 2016 are presented in Figure 3.12-10.



Source: Adapted from TERC 2017 by Ascent in 2018

Figure 3.12-10 Average Annual Secchi Depth in Lake Tahoe

The 2016 value of 69.2 feet (21.1 meters) is 5.1 feet (1.6 meter) greater than the lowest average annual Secchi depth (64.1 feet, 19.5 meters) recorded in 1997. The 2016 value is approximately 28 feet (8.5 meters) below attainment of the TRPA numerical standard. The 2015 TRPA Threshold Evaluation (TRPA 2016) reports the status of Secchi depth for the TRPA numerical standard as somewhat worse than the target, with the trend categorized as having little or no change. Statistical analysis of the data shown in Figure 3.12-10 indicates that the decline in Lake Tahoe's transparency has slowed in recent years. For over a decade, the average annual transparency has hovered around 70 feet (21.3 meters), but sizable interannual and seasonal variability is observed.

Littoral Water Quality: Turbidity

The quality of water in the nearshore area is tracked by measuring turbidity, which is an indication of the cloudiness of water expressed in NTUs. Higher turbidity measurements indicate cloudier water. TRPA maintains standards for nearshore turbidity of 3 NTU in areas influenced by stream discharge and 1 NTU in areas not influenced by stream discharge.

Pilot-scale implementation of optical (clarity and transmissivity) monitoring protocols recommended in the Lake Tahoe Nearshore Evaluation and Monitoring Framework Report (Heyvaert et al. 2013) were conducted in 2014 and 2015 (Heyvaert et al. 2016). The pilot monitoring effort completed five nearshore surveys from November 2014 through November 2015, using flow-through (*in situ*) sensors mounted to a research vessel that followed a consistent path-line around the nearshore at approximately the 7-meter (23 feet) depth contour. The following findings and observations were reported (Heyvaert et al. 2016):

- No single turbidity measurement exceeded the existing TRPA threshold standard of 1 NTU. However, the measurements were conducted during non-storm periods, and elevated turbidity would likely be expected during times of increased stormwater runoff.
- The highest turbidity, while still below the existing TRPA threshold standard, was typically observed near urban areas along the south shore, northeast shore, and northwest shore. However, attempts to correlate the density of urban development to turbidity measurements within the nearshore produced a weak correlation (R2 = 0.214). The weak correlation could be influenced by a lack of notable stormwater runoff from urban areas during the monitoring period.

- Transmissivity measurements used to identify the status and trend of nearshore clarity are theoretically promising given the near linear relationship between transmissivity and clarity. However, the collected transmissivity data demonstrated disparate results in certain areas from unknown factors.

Based primarily on the data summarized above, the 2015 TRPA Threshold Evaluation reports the status of turbidity as somewhat better than the target, with insufficient data to determine a trend attributable to a lack of a long-term monitoring program and associated data (TRPA 2016).

Tributaries

All the tributary streams within the Tahoe Basin deliver sediment and nutrients to Lake Tahoe. The Lake Tahoe Interagency Monitoring Program (LTIMP) monitors streamflow and water quality at six locations in Lake Tahoe Basin tributaries to estimate nutrient and sediment loads entering Lake Tahoe and assess trends in stream water quality. The six LTIMP monitoring stations are within five California streams: Trout Creek, General Creek, Blackwood Creek, Ward Creek, and the Upper Truckee River. These five streams produce approximately 45 percent of the total tributary inflow into Lake Tahoe (TRPA 2016). LTIMP routinely monitors these stream sites for flow, *in situ* parameters (temperature, specific conductivity, pH, dissolved oxygen), fine sediment, turbidity, nutrients (nitrogen and phosphorus), and suspended sediment, as listed in Table 3.12-9. Monitoring stations are shown in Figures 3.12-1 through 3.12-5. This section summarizes the status and trends of TRPA indicator categories and associated applicable standards related to tributary water quality, including suspended sediments and nutrients (i.e., nitrogen and phosphorus).

Table 3.12-9 Lake Tahoe Interagency Monitoring Program Tributary Water Quality Monitoring Stations

Station Name (ID)	USGS Gage	Latitude/ Longitude	Selected Parameters Monitored
Blackwood Creek near Tahoe City, CA	10336660	39°06'27"N 120°09'40"W	Streamflow, stage, temperature, specific conductivity, pH, dissolved oxygen, fine sediment, turbidity, nitrogen, phosphorus, suspended sediment, continuous temperature, continuous suspended sediment
General Creek near Meeks Bay, CA	10336645	39°03'07"N 120°07'03"W	Streamflow, stage, temperature, specific conductivity, pH, dissolved oxygen, fine sediment, turbidity, nitrogen, phosphorus, suspended sediment, continuous suspended sediment
Trout Creek near Tahoe Valley, CA	10336790	38°55'12"N 119°58'17" W	Streamflow, stage, temperature, specific conductivity, pH, dissolved oxygen, fine sediment, turbidity, nitrate, phosphorus, suspended sediment, continuous suspended sediment
Upper Truckee River at South Lake Tahoe, CA	10336610	38°55'21"N 119°59'26"W	Streamflow, stage, temperature, specific conductivity, pH, dissolved oxygen, fine sediment, turbidity, nitrogen, phosphorus, suspended sediment, continuous suspended sediment
Upper Truckee River at Highway 50 above Meyers, CA	103366092	38°50'55"N 120°01'34" W	Streamflow, stage
Ward Creek at Highway 89 near Tahoe Pines, CA	10336676	39°07'56"N 20°09'24" W	Streamflow, stage, temperature, specific conductivity, pH, dissolved oxygen, fine sediment, turbidity, nitrogen, phosphorus, suspended sediment, continuous suspended sediment

Note: LTIMP= Lake Tahoe Interagency Monitoring Program.

Source: USGS 2019c

Suspended Sediment

Sedimentation is a result of erosion and the transport of eroded fine materials to a waterbody and may result in elevated levels of turbidity, total dissolved solids and total suspended solids. Erosion and sedimentation are natural phenomena but are influenced by land management practices and land disturbance activities. Several factors control suspended sediment in streams, including climate, hydrology, geology, fire regimes, and land management practices. As discussed in Section 3.8, Geology, Soils, and Land Capability, sediment can also be eroded through erosion of riverbanks which remove floodplain soils and transport that material downstream. Sediment budgets calculated by Nolan and Hill (1991) found that nearly all mobilized sediments were derived from stream channels (i.e., stream banks or streambeds) and that hillslope erosion was a minor component of these sediment budgets (< 5 to 11 percent). Additional research by Simon (2006) suggested that a substantial portion of the fine sediment eroding from Tahoe

Basin drainages originated from stream bank erosion. Bank erosion could occur due to either direct disturbance and tree removal along streams or changes to the watershed that increase the magnitude of peak flows. Sediment in surface runoff would potentially increase turbidity in receiving water bodies. Degradation of stream environment zones can contribute to sediment and nutrient inputs into Lake Tahoe and its tributaries. High sediment loads are detrimental to beneficial water uses of water and aquatic habitat.

Fine sediment particles (particles less than 16 micrometers in diameter) tend to stay suspended in the water column for an extended time which causes reduced visibility. These particles are considered to be a primary driver of the observed decline in Lake Tahoe clarity (Lahontan RWQCB and NDEP 2010).

The suspended sediment concentration standard for both California and TRPA states that the stream must attain a 90th percentile value for suspended sediment concentration of 60 milligram per liter. This is interpreted to mean that no more than ten percent of the stream's suspended sediment concentration measurements for the water year can exceed 60 milligrams per liter. Generally, Trout Creek and General Creek meet the water quality standards while Blackwood Creek, Upper Truckee River, Ward Creek usually exceed the standards (TRPA 2016). Based on the 2015 TRPA Threshold Evaluation, trends in monitored riverine sediment concentrations in Trout Creek, General Creek, Blackwood Creek, Ward Creek, and the Upper Truckee River exhibited little or no change in suspended sediment concentrations between 1980 and 2014 (TRPA 2016).

The watersheds that are the greatest contributors of fine sediment in the Lake Tahoe Basin are the Upper Truckee River, Blackwood Creek, Trout Creek, and Ward Creek (Simon 2006, TRPA 2016). Sediment loads based on the 2015 TRPA Threshold Evaluation are presented in Table 3.12-10.

Table 3.12-10 Annual Average Fine Sediment Particle Yield and Load for California Streams in the Lake Tahoe Basin

Stream	Drainage Area (square kilometers)	Average Fine Sediment Particle Yield Expressed as Log (Fine Sediment Particles)1 (number of particles per square kilometer per year)	Average Total Fine Sediment Particle Load Expressed as Log (Fine Sediment Particles)[1] (number of particles per year)	Percent Annual Fine Sediment Particle Load to Lake Tahoe[2]
Blackwood	28.8	17.3	18.7	18%
Upper Truckee	139.9	17.1	19.2	51%
Ward	25.3	17.0	18.4	8%
General	19.1	16.7	18.0	3%
Trout	104.6	16.6	18.6	14%

[1] The log (Fine Sediment Particles) can be expressed as the number of fine sediment particles by calculating 10 to the power of the specified log (Fine Sediment Particles) (i.e., $10^{\log[\text{Fine Sediment Particles}]}$).

[2] Percent annual fine sediment loads included other major tributaries in Nevada (i.e., Incline Creek and Third Creek); therefore, the total percent included in the table are less than 100 percent.

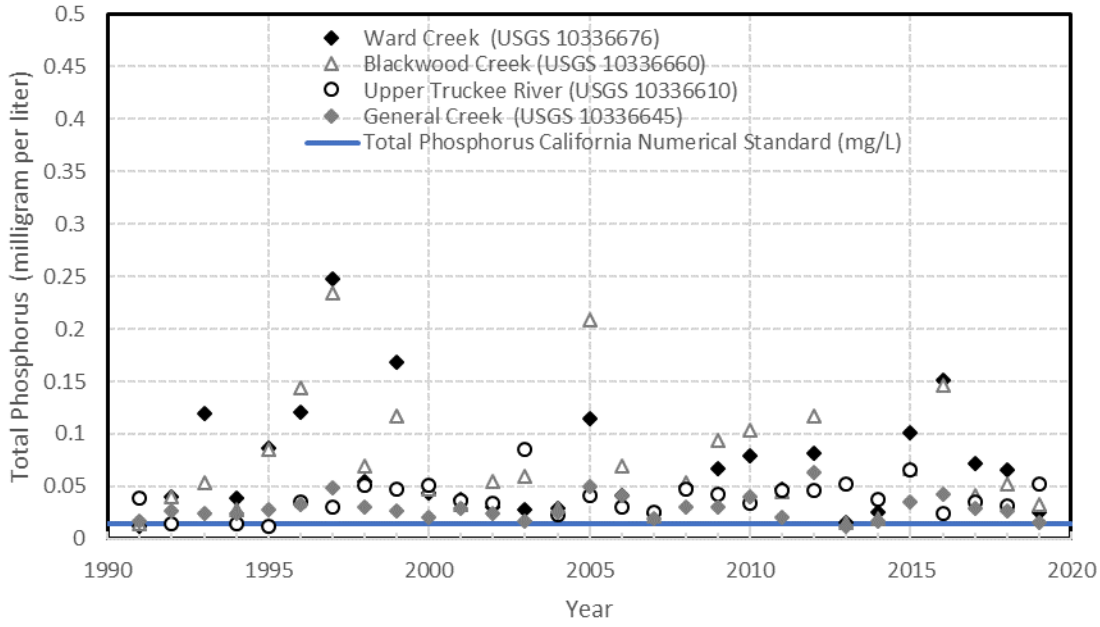
Source: Adapted from TRPA 2016

Nutrients

Phosphorus and nitrogen are naturally occurring in the Lake Tahoe Basin and provide a pathway to support the food web; however, high nutrient loads can cause water quality degradation. Elevated nutrient concentrations cause increased algae (i.e., phytoplankton and periphyton) and thus reduce lake transparency and nearshore aesthetics. Reduced transparency and increased nutrients have resulted in phosphorus and nitrogen becoming pollutants of concern in the Lake Tahoe Basin (Lahontan RWQCB and NDEP 2010). Average annual values for phosphorus and total nitrogen at tributary sites from 1991 through 2019 are presented in Figures 3.12-9 and 3.12-10, respectively.

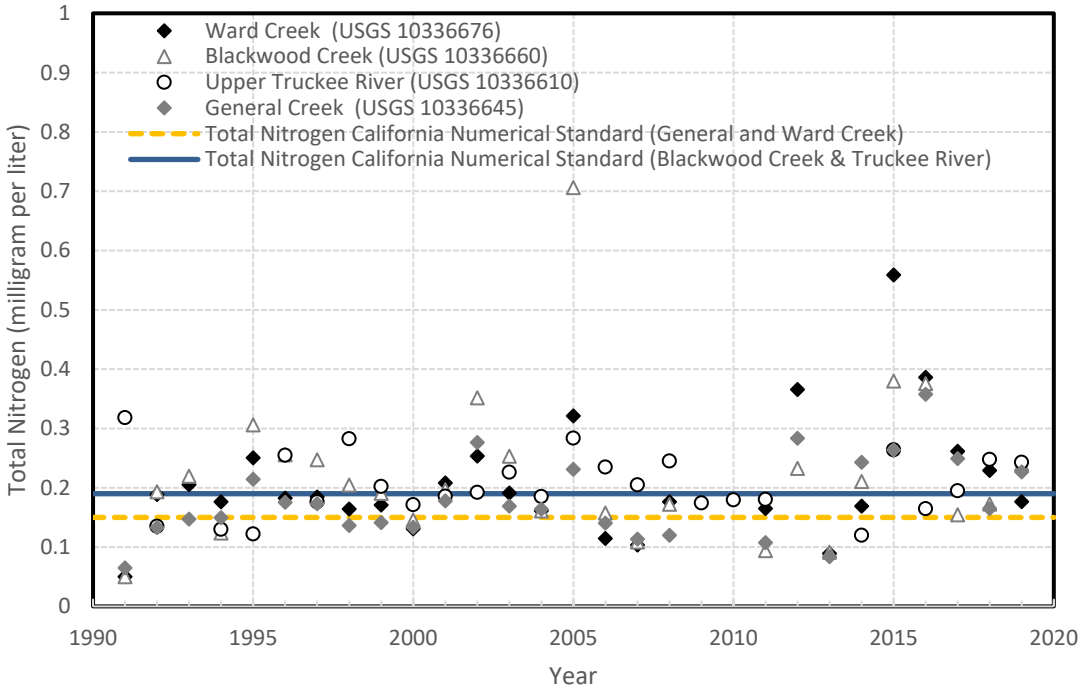
The California and TRPA numerical standards for total phosphorus state that the stream must attain a 90th percentile phosphorus concentration of 0.015 milligram per liter (Lahontan RWQCB 2016), so no more than ten percent of the stream's total phosphorus concentration measurements for a year can exceed 0.015 milligram per liter. Figure 3.12-11 presents average annual total phosphorus concentrations data collected by the LTIMP along with the California and

TRPA numerical standard for phosphorus. Analysis by TRPA indicates that the Upper Truckee River, Trout Creek, and Blackwood Creek generally exceed the target for total phosphorus and General Creek is near the target (TRPA 2016). For total nitrogen, the California and TRPA numerical target is 0.15 milligram per liter for General Creek and Ward Creek and 0.19 milligram per liter for Blackwood Creek, Trout Creek, and the Upper Truckee River. Figure 3.12-12 presents average annual total nitrogen concentrations. Generally, Upper Truckee River, and General Creek exceed the numerical standards for total nitrogen and Blackwood Creek and Wood Creek are better than this target. Based on the 2015 TRPA Threshold Evaluation (TRPA 2016) and data presented in Figure 3.12-11 through 3.12-12, riverine phosphorus and total nitrogen concentrations exhibited little or no change during the monitoring period. Of the seven tributaries regularly monitored the Lake Tahoe Basin, the five California tributaries (i.e., Upper Truckee Creek, Blackwood Creek, Trout Creek, Ward Creek, and General Creek) were the largest contributors of phosphorus and nitrogen loads within the Tahoe Basin between 1981 and 2014 (TRPA 2016).



Source: USGS 2019c

Figure 3.12-11 Average Annual Total Phosphorus Concentrations in Ward Creek, Blackwood Creek, Upper Truckee River, and General Creek as Measured by USGS and California Numerical Standards



Source: USGS 2019c

Figure 3.12-12 Average Annual Total Nitrogen Concentrations in Ward Creek, Blackwood Creek, Upper Truckee River, and General Creek as Measured by USGS and California Numerical Standards

Other Lakes

The lakes in the Tahoe Basin other than Lake Tahoe are evaluated using a separate TRPA indicator category based on water quality and ecology of these systems. Impacts to other lakes include development impacts, land management activities, recreation, and other watershed impacts (i.e., atmospheric deposition). Data collection in other lakes is limited and the few data that exist are only for the larger lakes within the program area (i.e., Fallen Leaf Lake and Echo Lake). Data collected in the 1990s indicate that nutrients (i.e., nitrate, ammonia, Total Kjeldahl nitrogen, orthophosphate, total phosphorus) and iron concentrations are low (Lico 2004). Trend analysis for other lakes was not included in the 2015 TRPA Threshold Evaluation due to insufficient data (TRPA 2016).

Groundwater

Groundwater quality in the Lake Tahoe subbasins is generally excellent. Sources of nutrient pollution in groundwater include fertilizers, septic systems, and human and animal waste. Nutrient (i.e., nitrogen and phosphorus) concentrations are generally low in groundwater within the Lake Tahoe subbasins; however, it remains a source of nutrients into Lake Tahoe (USGS 2012, Naranjo et al. 2017). The delivery of nutrients from groundwater has been correlated with nearshore periphyton growth in Lake Tahoe (Naranjo et al. 2017).

Man-made contaminants and naturally occurring inorganic constituents are occasionally detected in groundwater above numerical standards. Man-made contaminant sources include historical contamination from regulated industrial and commercial chemicals. Naturally occurring inorganic constituents include trace elements and materials that are present in minerals and rocks and radioactivity that is emitted from decay of unstable radionuclides. Contaminants and naturally occurring inorganic constituents that have been occasionally detected above numerical standards include: arsenic, iron, manganese, radionuclides (uranium), petroleum and chlorinated hydrocarbons (i.e., Methyl-tertiary-Butyl Ether [MTBE], and Tetrachloroethylene [PCE]), and total dissolved solids (TDS) (USGS 2012, STPUD 2018).

3.12.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

Analysis of potential impacts of the Tahoe PTEIR on hydrology and water quality is based on a review of documents and modeling results pertaining to the Lake Tahoe Basin, including previous studies of hydrology and water quality in Lake Tahoe and tributaries, Lake Tahoe West Restoration Partnership (Lake Tahoe West) Water Erosion Prediction Project (WEPP) and LANDIS-II modeling results, previous environmental impact statements/reports, and existing regulations and ordinances. The information obtained from these sources was reviewed and summarized to understand existing conditions and to identify potential environmental effects, based on the significance criteria defined below. In determining the level of significance, the analysis assumes that the project would implement the standard project requirements (SPRs) developed for the project and the following analysis assumes their incorporation into later treatment activities under the Tahoe PTEIR; it also assumes that the project would comply with relevant federal and state laws, regulations, and ordinances. The SPRs would also include applicable California Forest Practice Rules (CFPRs) that apply to timber operations for commercial purposes (PRC Section 4527(a)), as well as additional measures that apply to all projects. Relevant SPRs include the following:

- SPR AQ-3 Create Burn Plan: The project proponent or project implementer will create a burn plan using the CAL FIRE burn plan template for all prescribed burns. The burn plan will include a fire behavior model output of First Order Fire Effects Model and BEHAVE or other fire behavior modeling simulation and that is performed by a qualified fire behavior technical specialist that predicts fire behavior, calculates consumption of fuels, tree mortality, predicted emissions, greenhouse gas emissions, and soil heating. The project implementer will minimize soil burn severity from understory burning to reduce the potential for runoff and soil erosion. The burn plan will be created with input from a qualified technician or certified State burn boss. This SPR applies only to prescribed burning.
- SPR AQ-4 Minimize Dust: To minimize dust that has the potential to transport fine sediment to waterbodies during treatment activities, the project implementer will implement the following measures:
  - Limit the speed of vehicles and equipment traveling on unpaved areas to 15 miles per hour to reduce fugitive dust emissions, in accordance with the California Air Resources Board (CARB) Fugitive Dust protocol.
  - If road use creates excessive dust, the project implementer will wet appurtenant, unpaved, dirt roads using water trucks or treat roads with a non-toxic chemical dust suppressant (e.g., emulsion polymers, organic material) during dry, dusty conditions. Any dust suppressant product used will be environmentally benign (i.e., non-toxic to plants and will not negatively impact water quality) and its use will not be prohibited by CARB, EPA, or SWRCB. The project implementer will not over-water exposed areas such that the water results in runoff. The type of dust suppression method will be selected by the project implementer based on soil, traffic, site-specific conditions, and air quality regulations.
  - Remove visible dust, silt, or mud tracked-out on to public paved roadways where sufficient water supplies and access to water is available. The project implementer will remove dust, silt, and mud from vehicles at the conclusion of each workday, or at a minimum of every 24 hours for continuous treatment activities, in accordance with Vehicle Code Section 23113.
  - Suspend ground-disturbing treatment activities, including land clearing and bulldozer lines, when there is visible dust transport (particulate pollution) outside the treatment boundary, if the particulate emissions may "cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endanger the comfort, repose, health, or safety of any of those persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property," per Health and Safety Code Section 41700.

- SPR BIO-1 Review and Survey Project-Specific Biological Resources: The project proponent will require a qualified RPF or biologist to conduct a data review and reconnaissance-level survey prior to treatment. The data reviewed will include the biological resources setting, species and sensitive natural communities tables, and habitat information in this PTEIR for the ecoregion(s) where the treatment will occur. It will also include review of the best available, current data for the area, including vegetation mapping data, species distribution/range information, California Natural Diversity Database, California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California, relevant BIOS queries, and relevant general and regional plans. Reconnaissance-level biological surveys will be general surveys that include visual and auditory inspection for biological resources to help determine the setting present on a treatment site. The qualified surveyor will 1) identify and document sensitive resources, such as riparian or other sensitive habitats, sensitive natural community, wetlands, or wildlife nursery site or habitat (including bird nests); and 2) assess the suitability of habitat for special-status plant and animal species. The surveyor will also record any incidental wildlife observations. Habitat assessments will be completed at a time of year that is appropriate for identifying habitat and no more than one year prior to the submittal of the Project Consistency Checklist (Appendix A) for each treatment activity, unless it can be demonstrated that habitat assessments older than one year remain valid. Based on the results of the data review and reconnaissance-level survey, the project proponent, in consultation with a qualified RPF or biologist, will determine which one of the following best characterizes the treatment:

    1. Suitable Habitat Is Present but Adverse Effects Can Be Clearly Avoided. If, based on the data review and reconnaissance-level survey, the qualified RPF or biologist determines that suitable habitat for sensitive biological resources is present but adverse effects on the suitable habitat can clearly be avoided through one of the following methods, the avoidance mechanism will be implemented prior to initiating treatment and will remain in effect throughout the treatment:

        a. by physically avoiding the suitable habitat, or

        b. by conducting treatment outside of the season when a sensitive resource could be present within the suitable habitat or outside the season of sensitivity (e.g., outside of special-status bird nesting season, during dormant season of sensitive annual or geophytic plant species, or outside of maternity and rearing season at wildlife nursery sites).

        Physical avoidance will include flagging, fencing, stakes, or clear, existing landscape demarcations (e.g., edge of a roadway) to delineate the boundary of the avoidance area around the suitable habitat. For physical avoidance, a buffer may be implemented as determined necessary by the qualified RPF or biologist.

    2. Suitable Habitat is Present and Adverse Effects Cannot Be Clearly Avoided. Further review and surveys will be conducted to determine presence/absence of sensitive biological resources that may be affected, as described in the SPRs below. Further review may include contacting U.S. Department of Fish and Wildlife, National Oceanic and Atmospheric Administration Fisheries, CDFW, CNPS, or local resource agencies as necessary to determine the potential for special-status species or other sensitive biological resources to be affected by the treatment activity. Focused or protocol-level surveys will be conducted as necessary to determine presence/absence. If protocol surveys are conducted, survey procedures will adhere to methodologies approved by resource agencies and the scientific community, such as those that are available on the CDFW webpage at: https://www.wildlife.ca.gov/Conservation/Survey-Protocols. Specific survey requirements are addressed for each resource type in relevant SPRs (e.g., additional survey requirements are presented for special-status plants in SPR BIO-7).

- SPR BIO-4 Design Treatment to Avoid Loss or Degradation of Riparian Habitat Function: The project proponent, in consultation with a qualified RPF or qualified biologist, will design treatments in riparian habitats to retain or improve habitat functions by implementing the following within riparian habitats:

    - Retain at least 75 percent of the overstory and 50 percent of the understory canopy of native riparian vegetation within the limits of riparian habitat identified and mapped during surveys conducted pursuant to SPR BIO-3. Native riparian vegetation will be retained in a well distributed multi-storied stand composed of a diversity of species similar to that found before the start of treatment activities.

- Treatments will be limited to removal of uncharacteristic fuel loads (e.g., removing dead or dying vegetation), trimming/limbing of woody species as necessary to reduce ladder fuels, and select thinning of vegetation to restore densities that are characteristic of healthy stands of the riparian vegetation types characteristic of the region. This includes hand removal (or mechanized removal where topography allows) of dead or dying riparian trees and shrubs, invasive plant removal, selective thinning, and removal of encroaching upland species.
- Removal of large, native riparian hardwood trees (e.g., willow, ash, maple, oak, alder, sycamore, cottonwood) will be minimized to the extent feasible and 75 percent of the pretreatment native riparian hardwood tree canopy will be retained. Because tree size varies depending on vegetation type present and site conditions, the tree size retention parameter will be determined on a site-specific basis depending on vegetation type present and setting; however, live, healthy, native trees that are considered large for that type of tree and large relative to other trees in that location will be retained.
- Removed trees will be felled away from adjacent streams or waterbodies and piled outside of the riparian vegetation zone (unless there is an ecological reason to do otherwise that is approved by applicable regulatory agencies, such as adding large woody material to a stream to enhance fish habitat, e.g., see *Accelerated Wood Recruitment and Timber Operations: Process Guidance from the California Timber Harvest Review Team Agencies and National Marine Fisheries Service*).
- Vegetation removal that could reduce stream shading and increase stream temperatures will be avoided.
- Ground disturbance within riparian habitats will be limited to the minimum necessary to implement effective treatments.
- The project proponent will notify CDFW pursuant to California Fish and Game Code Section 1602 prior to implementing any treatment activities in riparian habitats. Notification will identify the treatment activities, map the vegetation to be removed, identify the impact avoidance identification methods to be used (e.g., flagging), and appropriate protections for the retention of shaded riverine habitat, including buffers and other applicable measures to prevent erosion into the waterway.
- In consideration of spatial variability of riparian vegetation types and condition and consistent with CFPR (14 CCR Section 956.9[v]), a different set of vegetation retention standards and protection measures from those specified in the above bullets may be implemented on a site-specific basis if the qualified RPF and the project proponent demonstrate through substantial evidence that alternative design measures provide a more effective means of achieving the treatment goals and would result in effects to the Beneficial Functions of Riparian Zones equal or more favorable than those expected to result from application of the above measures. Deviation from the above design specifications, different protection measures and design standards will only be approved when the treatment plan incorporates an evaluation of beneficial functions of the riparian habitat and with written concurrence from CDFW.

- SPR BIO-5 Water Drafting: Water drafting involves drawing water from sources such as a lake, pond, or stream into a pump and could serve to provide a supply of water for dust abatement or fire suppression in treatment areas that are inaccessible to water trucks or are not in close proximity to fire hydrants. The project proponent and project implementer, as applicable, will comply with the following requirements and best management practices:
  - Water drafting operations shall follow CFPR requirements in 14 CCR Section 963.7(l), which are intended to apply to water drafting operations in watersheds with listed anadromous salmonids but for this PTEIR are proposed to apply throughout the program area.
  - Vehicles used for water drafting shall only access drafting sites through existing watercourse crossings and will not enter WLPZs/SEZs where they would otherwise be prohibited.
  - Water drafting shall be subject to all applicable requirements of Fish and Game Code Section 1600, as determined in consultation with CDFW.

- Water drafting will not impact beneficial uses listed in the Water Quality Control Plan for the Lahontan Region (Basin Plan) (Lahontan RWQCB 2016).
- In addition to the above (if not required for Section 1600 compliance), the following requirements shall be met for all water drafting operations in the program area:

    a. The project proponent shall consult with CDFW prior to any water drafting operation to convey and receive any information relevant to the drafting operation.

    b. Water shall not be drafted by more than one truck simultaneously at the same site.

    c. In Class I watercourses, streambed or bank material shall not be excavated for intakes or any other purposes related to drafting.

    d. All water drafting vehicles shall be checked each day used, and shall be repaired as necessary to prevent leaks of deleterious materials from entering the watercourse, the Watercourse and Lake Protection Zone (WLPZ), or the stream environment zone (SEZ).

    e. Pumps used for drafting shall be capable of being adjusted to comply with specified withdrawal rates.

    f. Operators shall follow all applicable requirements and guidelines to prevent the introduction and spread of aquatic invasive species (AIS). This shall include: (i) inspecting truck tires, hoses, screens, and any equipment entering the water before and after each drafting operation and removing and properly disposing of any aquatic plants or other aquatic organisms; (ii) decontaminating prior to initiation of drafting any truck or equipment that has come into contact with any waterbody outside the Tahoe Basin; and (iii) applying water only within the same watershed in which it originated. Inspection and decontamination shall follow the latest protocols endorsed by the Lake Tahoe Aquatic Invasive Species Coordination Committee, and may be accomplished at existing boat decontamination stations located throughout the Tahoe Basin.

    g. Intake screens shall be kept in good repair and shall be used wherever water is drafted. Intakes shall be inspected periodically and kept clean and free of accumulated algae, leaves, or other debris that could block portions of the screen surface and increase approach velocities at any point on the screen.

    h. Intakes shall be at least 6 inches above the bottom of the channel and away from submerged vegetation, where practicable. Where not practicable, intakes shall maximize these clearances.

    i. At the end of drafting operations, intakes shall be completely removed from the watercourse and disturbed ground, including exposed soil, shall be treated according to CFPR requirements or Fish and Game Code Section 1600 requirements to minimize erosion.

- **SPR GEO-1 Suspend Disturbance during Heavy Precipitation:** The project implementer will suspend mechanical treatments if the National Weather Service forecast is a "chance" (30 percent or more) of rain within the next 24 hours. Activities that cause mechanical soil disturbance may resume when precipitation stops and soils are no longer saturated (i.e., when soil and/or surface material pore spaces are filled with water to such an extent that runoff is likely to occur). Indicators of saturated soil conditions may include, but are not limited to: (1) areas of ponded water, (2) pumping of fines from the soil or road surfacing, (3) loss of bearing strength resulting in the deflection of soil or road surfaces under a load, such as the creation of wheel ruts, (4) spinning or churning of wheels or tracks that produces a wet slurry, or (5) inadequate traction without blading wet soil or surfacing materials. This SPR applies only to mechanical treatment methods.
- **SPR GEO-2 Limit High Ground Pressure Vehicles:** The project implementer will use heavy equipment only where the ground is dry, frozen, or covered in snow to limit soil disturbance or compaction. Machinery will be kept off moist soils to reduce compaction and/or damage to soil structure. Saturated soil means that soil and/or surface material pore spaces are filled with water to such an extent that runoff is likely to occur. If use of heavy equipment is required in moist areas, other measures such as operating on organic debris, using low ground pressure vehicles, or operating on frozen soils/snow covered soils will be implemented to minimize soil

compaction. Existing compacted road surfaces are exempt as they are already compacted from use. This SPR applies only to mechanical treatment methods.

- SPR GEO-3 Stabilize Disturbed Soil Areas: The project implementer will stabilize soil disturbed during mechanical treatments with mulch or equivalent immediately after treatment activities, to the maximum extent practicable, to minimize the potential for substantial sediment discharge. If mechanical treatment activities could result in substantial sediment discharge from soil disturbed by machinery or animal hooves, organic material from mastication or mulch will be incorporated onto at least 75 percent of the disturbed soil surface where the soil erosion hazard is moderate or high, and 50 percent of the disturbed soil surface where soil erosion hazard is low to help prevent erosion. Where slash mulch is used, it will be packed into the ground surface with heavy equipment so that it is sufficiently in contact with the soil surface to disrupt overland flow but does not compact the soil.
- SPR GEO-4 Erosion Monitoring: The project implementer will inspect treatment areas for the proper implementation of erosion control SPRs and mitigations before the rainy season. Additionally, the project proponent will inspect for evidence of erosion a sufficient number of times during the extended wet weather period, particularly after large winter storm events (i.e., ≥ 1.5 inches in 24 hours) and at least once annually, to evaluate the function of drainage facilities and structures. Any area of erosion that will result in substantial sediment discharge will be remediated. This SPR applies to mechanical and understory burning treatment methods.
- SPR GEO-5 Drain Stormwater via Water Breaks: The project proponent will drain compacted and/or bare linear treatment areas capable of generating storm runoff (i.e., roads and skid trails) via water breaks using the spacing and erosion control guidelines contained in Section 954.6 of the CFPR. Where waterbreaks cannot effectively disperse surface runoff, including where waterbreaks cause surface runoff to be concentrated on downslopes, other erosion controls will be installed as needed to comply with 14 CCR Sections 954 et seq.
- SPR GEO-6 Minimize Burn Pile Size: The project proponent will not create burn piles that exceed 20 feet in length, width, or diameter, except when on landings, road surfaces, or on contour to minimize the spatial extent of soil damage. In addition, burn piles will not occupy more than 15 percent of the total treatment area. The project proponent will not locate burn piles in a WLPZ as defined in 14 CCR Section 956.5 of the CFPR, in a SEZ as defined in TRPA Code of Ordinances Section 61.1.6.C, or in another area where existing regulations limit ground disturbance to reduce erosion and protect beneficial uses of water.
- SPR GEO-7 Minimize Erosion on Steep Slopes: To minimize erosion, the project proponent will limit mechanical treatments on steep slopes. If TRPA regulations are not changed, mechanical treatments as described will not occur in slopes exceeding 30 percent. If TRPA regulations are changed, mechanical treatments will not occur in slopes exceeding the new threshold, or the CFPR for the Southern District, whichever is lower.
- SPR GEO-8 Unstable Soils and Active and Dormant Landslide Exclusion: The project proponent will require a Registered Professional Forester (RPF) or licensed geologist to evaluate treatment areas for unstable areas and unstable soils including active or dormant landslides. If unstable areas or soils are identified within the treatment area, are unavoidable, and will be potentially directly or indirectly affected by the treatment, a licensed geologist (P.G. or C.E.G.) will determine the potential for landslide, erosion, of other issue related to unstable soils and identity measures that will be implemented by the project proponent such that substantial erosion or loss of topsoil would not occur.
- SPR GEO-10 Limit Intensity of Prescribed Burns: To limit erosion following prescribed burns by maintaining >50% litter and duff, prescribed burns will be limited to the fall through spring months when forest duff is sufficiently moist to maintain low severity fires. This SPR applies to pile and understory burning.
- SPR HAZ-1 Maintain All Equipment: The project implementer will maintain all diesel- and gasoline-powered equipment per manufacturer's specifications, and in compliance with all state and federal emissions requirements. Maintenance records will be available for verification. Prior to the start of treatment activities, the project implementer will inspect all equipment for leaks and inspect everyday thereafter until equipment is

removed from the site. Any equipment found leaking will be promptly removed. This SPR applies to all treatment activities and treatment methods.

- SPR HYD-1 Comply with Water Quality Regulations: The project implementer will comply with all applicable water quality requirements adopted by Lahontan Regional Water Quality Control Board (Lahontan RWQCB) and approved by the SWRCB (i.e., Basin Plan). If applicable, this includes compliance with the conditions of general waste discharge requirements (GWDR) and waste discharge requirement waivers for timber or silviculture activities where these waivers are designed to apply to non-commercial fuel reduction and forest health projects. In general, GWDR and Conditional Waiver of Waste Discharge Requirements for Waste Discharges Resulting From Timber Harvest and Vegetation Management Activities in the Lahontan Region (Timber Waiver; Lahontan RWQCB 2019a) for fuel reduction and forest health activities require that wastes, including petroleum products, soil, silt, sand, clay, rock, felled trees, slash, sawdust, bark, ash, and pesticides must not be discharged to surface waters or placed where it may be carried into surface waters; and that Lahontan RWQCB staff must be allowed reasonable access to the property in order to determine compliance with the waiver conditions.
- SPR HYD-2 Avoid Construction of New Roads: The project implementer will not construct or reconstruct (i.e., cutting or filling involving less than 50 cubic yards/0.25 linear road miles) any new roads (including temporary roads). This SPR applies to all treatment activities and treatment methods.
- SPR HYD-3 Identify and Protect Watercourse and Lake Protection Zones and Waterbody Buffer Zones: The project proponent will establish WLPZs as defined in 14 CCR Section 956.5 of the CFPR and Waterbody Buffer Zones as defined in Attachment B of the Timber Waiver (Lahontan RWQCB 2019a). WLPZs and Waterbody Buffer Zones are classified based on the uses of the stream and the presence of aquatic life. Wider zones are required for steep slopes. Waterbody Buffer Zone widths for Class I and II watercourses are equivalent to WLPZs. Whereas WLPZ widths or other watercourse protections for Class III and IV watercourses are determined on a site-specific basis (see 14 CCR Section 956.4), Waterbody Buffer Zone widths for Class III and IV watercourses are fixed and correspond with the steepness of adjacent slopes, as defined in Attachment B of the Timber Waiver (Lahontan RWQCB 2019a). The following protections will be applied for all treatments:
    - Treatment activities within Waterbody Buffer Zones and WLPZs will meet the overstory and understory vegetation retention guidelines and ground disturbance limitations described in the Timber Waiver (Lahontan RWQCB 2019a) and in 14 CCR Section 956.4 Subsection (b) and Section 956.5, including retention of at least 75 percent surface cover and undisturbed area.
    - Equipment, including tractors and vehicles, must not be driven in wet areas, Waterbody Buffer Zones, or WLPZs, except over existing roads or watercourse crossings where vehicle tires or tracks remain dry.
    - Equipment used in vegetation removal operations will not be serviced in Waterbody Buffer Zones or WLPZs, within wet meadows or other wet areas, or in locations that would allow grease, oil, or fuel to pass into lakes, watercourses, or wet areas.
    - Watercourses will be kept free of slash, debris, and other material that harm the beneficial uses of water. Accidental deposits will be removed immediately.
    - Burn piles will be located outside of WLPZs or other applicable watercourse protection zones unless all applicable Timber Waiver and/or Basin Plan exemption requirements are met.
    - No fire ignition will occur within WLPZs or other applicable watercourse protection zones unless all applicable Timber Waiver and/or Basin Plan exemption requirements are met; however, low intensity backing fires may be allowed to enter or spread into watercourse protection zones.
    - Within the WLPZs, mulch treatments to stabilize soils, minimize soil erosion, and prevent significant sediment discharge, as described in 14 CCR Section 956.9(n)(1), will be as follows:
        - Soil stabilization is required for areas where timber operations have exposed bare soil exceeding 100 contiguous square feet.

    - Where straw or slash mulch is used, the minimum straw coverage shall be 90 percent, and any treated area that has been reused or has less than 90 percent surface cover shall be treated again by the end of timber operations.
    - Where slash mulch is packed into the ground surface through the use of a tractor or equivalent piece of heavy equipment the minimum slash coverage shall be 75 percent.
  - Equipment limitation zones (ELZs) will be designated adjacent to Class III and Class IV watercourses with minimum widths of 25 feet where side-slope is less than 30 percent and 50 feet where side-slope is 30 percent or greater. An RPF will describe the limitations of heavy equipment within the ELZ and, where appropriate, will include additional measures to protect the beneficial uses of water.
- SPR HYD-4 Identify and Protect Stream Environment Zones: Prior to conducting treatment activities, an RPF or qualified biologist or botanist will flag SEZ areas within the treatment site. Project implementers will comply with TRPA requirements for tree cutting within SEZ areas. These requirements, described in detail under TRPA Code of Ordinances Section 61.1.6.C and Attachment N of the Timber Waiver (Lahontan RWQCB 2019a), include:
  - Vehicle use is restricted in SEZs with exceptions for use of vehicles in over-snow tree removal operations and use of "innovative technology" vehicles or "innovative techniques," provided that no significant soil disturbance or significant vegetation damage will result from the use of equipment;
  - Work within SEZs shall be limited to times of the year when soil conditions are dry and stable, when conditions are adequate for over-snow tree removal operations, or when conditions are consistent with TRPA and Lahontan RWQCB standards for tree removal operations on frozen ground;
  - Felled trees and harvest debris will be kept out of all watercourses classified as Class I through IV including perennial streams, intermittent streams, man-made waterbodies, and ephemeral (unclassified) streams;
  - Crossings of perennial streams or other wet areas, shall be limited to improved crossings meeting Best Management Practices or to temporary bridge spans that can be removed upon project completion or at the end of the work season, whichever is sooner;
  - New waterholes will not be constructed within the 100-year floodplain or SEZ;
  - Permanent disturbance or fill within SEZs will be avoided;
  - Activities conducted within 100-year floodplains or in SEZs that would require a Timber Waiver exemption granted by the Lahontan RWQCB include: enlargement of existing permanent watercourse crossings and/or roads, construction of temporary roads, construction of temporary watercourse crossings and associated approaches in place longer than one season, construction of skid trails, slash piling and burning not conducted in accordance with Timber Waiver, and conventional equipment operated off-road in SEZs or floodplains; and
  - Discharge or threatened discharge, attributable to human activities, of solid or liquid waste materials including soil, silt, clay, sand, and other organic or earthen materials to lands within the highwater rim of Lake Tahoe or 100-year floodplains of any tributary (including the Truckee River and Little Truckee River and tributaries) to Lake Tahoe and to SEZs in the Lake Tahoe Basin is prohibited.
- SPR HYD-5 Protect Existing Drainage Systems: If a treatment activity is adjacent to a roadway with stormwater drainage infrastructure, the existing stormwater drainage infrastructure will be marked prior to ground disturbing activities. If a drainage structure or infiltration system is inadvertently disturbed or modified during treatment activities, the project proponent will coordinate with owner of the system or feature to repair any damage and ensure that pre-project drainage conditions are restored.

THRESHOLDS OF SIGNIFICANCE

The thresholds of significance are based on Appendix G of the State CEQA Guidelines, applicable TRPA threshold standards, and the water quality and hydrology criteria from the TRPA Initial Environmental Checklist, as applicable, and other factors.

An impact on hydrology or water quality would be significant if implementation of later fuel reduction activities under the Tahoe PTEIR would:

- violate any water quality standards or waste discharge requirements (WDRs) or otherwise substantially degrade surface water or groundwater quality;
- conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would:
  - result in substantial erosion, siltation, or flooding on- or off-site;
  - substantially increase the rate or amount of surface runoff in a manner that would create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
  - impede or redirect flood flows.
- substantial change in the amount of surface water in any water body;
- discharge pollutants into surface waters, or in any substantial adverse alteration of indicators of surface water quality, including but not limited to nutrients, temperature, dissolved oxygen, or turbidity, that would result in an exceedance of federal, TRPA, state, or local water quality numerical standards;
- discharge contaminants to the groundwater or cause substantial adverse alteration of groundwater quality; or
- result in an effect on drinking water sources.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.12-1: Substantially Degrade Water Quality Through the Implementation of Manual or Mechanical Treatment Activities

The proposed program includes manual and mechanical (i.e., cut-to-length, whole-tree yarding, and mastication) treatment activities to reduce wildfire risk mostly within the Wildland Urban Interface (WUI). All manual and mechanical treatments implemented under the Tahoe PTEIR would integrate SPRs into treatment design to protect water bodies, limit equipment use on wet soils and steep slopes, stabilize highly disturbed areas, and prevent spills or leaks from equipment. Implementation of SPRs would minimize the risk of substantial degradation to water quality from manual or mechanical treatment activities. Therefore, this impact would be **less than significant**.

Vegetation treatment activities may alter water quality within a watershed since these activities would potentially disturb soils, transport nutrients as disturbed soils erode, accelerate nutrient leaching due to increased infiltration, and increase the rate of nitrogen mineralization as soils are exposed to more direct sunlight. Surface water quality is most likely to be altered by silviculture practices when erosion of soils following timber harvest transports suspended sediment and nutrients (i.e., nitrogen and phosphorus) into waterbodies (Stednick 2010). The magnitude of sediment and nutrient exports to waterbodies and associated water quality impacts is influenced by the specific timber harvest practices (e.g., selective cutting and thinning or clear cutting) and vegetation (e.g., streamside buffers), with more intensive timber harvest practices (i.e., clear cutting) typically increasing surface runoff, soil erosion, and associated transport of sediment and nutrients and more vegetation decreasing the transport of sediment and nutrients into

waterbodies. Manual and mechanical treatment activities generally result in much less soil disturbance and associated soil erosion than more intensive timber harvest practices since these activities have less repeated traffic that would compact or disturb soils. For example, cut-to-length methods on slopes less than 35 percent can result in spatially dispersed traffic patterns that show fewer surface impacts (e.g., soil displacement or visible machine tracks) if operators can choose their route to a landing (Page-Dumrose et al. 2010). Monitoring of the Heavenly Creek SEZ Fuels Reduction Project indicates that treatment with cut-to-length forwarder/harvester technology in many areas of the Tahoe Basin classified as SEZ can be implemented under dry soil conditions without causing adverse impacts to soils and water quality (Norman et al. 2008). Furthermore, mastication appears to be an effective thinning treatment for overstocked forests with few discernible negative impacts on soil compaction or lake-polluting runoff in the Lake Tahoe Basin (Hatchet et al. 2006).

Ground cover/soil litter also is frequently increased by manual and mechanical treatment activities as chippers and mulchers reduce woody material to an organic layer. Soil disturbance and erosion is more likely to occur on bare soil, so the increase in the organic layer generally reduces the magnitude of soil disturbance from timber harvest activities, including equipment traffic. The increase of ground cover/soil litter would increase surface roughness and protect the surface from impact of raindrops, decreasing the velocity of surface runoff, increasing infiltration of surface runoff, and ultimately decreasing soil particle detachment and soil erosion that would transport sediment and nutrients to water bodies (Stednick 2010, Harrison et al. 2016, Neary et al. 2005, Robichaud et al. 2010). Riparian vegetation is also especially effective at reducing water quality impacts to streams in forested areas by intercepting surface runoff and filtering fine sediment, removing sediments that would contribute to suspended sediments and turbidity (Dwire et al. 2010, Stednick 2010) and removing sediment associated phosphorus that would cause nutrient enhancement (Rashin et al. 2006, Liquori and Benda 2008, Stednick 2010). Sediment filtration distances from several studies show a rapid rise in effectiveness of filtration within riparian zones at 35–50 feet (11–15 meters) wide and a leveling off at longer distances (up to about 150 feet [46 meters] wide) (CH2M Hill and Western Watershed Analysts 1999). Additionally, nitrogen uptake can occur through the riparian root zone, further reducing bioavailable forms of nitrogen (i.e., nitrate, ammonium) that would otherwise move directly into streams through groundwater (Dahlgren 1998, Castelle et. al. 1994).

Lake Tahoe West used the WEPP model to evaluate how different vegetation management and fire scenarios would impact surface water quality (i.e., sediment and phosphorus loads) in 20 watersheds in the Lake Tahoe West planning area, which overlaps the PTEIR program area, over a 100-year period (Dobre and Long 2020, Eliot et al. 2019). These models incorporated current conditions, thinning, prescribed fire, wildfire, and road system management. Modeled results indicate that thinning of forests in the WUI and across the landscape would result in little risk to surface water quality when analyzed at large landscapes over long periods. Modeled results also suggest a small increase in very fine (<16 micron) sediments and total phosphorus yields following uniform thinning without the implementation of SPRs. Sediment delivery supplied by traffic on access roads to support thinning operations increased during active use and loads returned to undisturbed levels shortly after activities ceased. Treatments could pose localized risks to surface water quality in some highly erodible watersheds (e.g., Blackwood, Ward, Meeks, General, and Eagle) that produce large sediment loads under current conditions; however, careful analysis, design, and monitoring specific to site conditions would help to offset risks and reduce the uncertainty associated with treatments. While modeling indicated that treatment could pose a minor risk to surface water quality, these models incorporated treatment scenarios over watershed scales rather than the Tahoe PTEIR program scale (900–1,300 acres per year and typical maximum number of acres to be treated would be 1,250 acres), small watersheds, program-specific SPRs to reduce significant adverse effects to surface water quality, and restoration of aspen, meadow, riparian, and wet areas (e.g., removal of conifers in these areas). These program-specific scenarios would reduce the impacts of thinning of forests and traffic on access roads associated with manual and mechanical treatment activities.

Later treatment activities under the proposed program would include manual and mechanical treatment activities to reduce fuel loading within the program area. Manual treatment activities are unlikely to result in substantial ground disturbance or adverse effects to surface water quality since chipped woody material would create ground cover/soil litter that would protect the forest floor from disturbance. Mechanical treatment activities would potentially disturb and/or compact soils, resulting in soil erosion that would transport sediment and nutrients, but implementation of SPRs, riparian protection measures for WLPZs and other watercourse protection zones included in the CFPRs and

Timber Waiver (Lahontan RWQCB 2019a) (SPR HYD-3), and TRPA and Timber Waiver (Lahontan RWQCB 2019a) requirements for SEZs (SPR HYD-4) would substantially avoid or minimize suspended sediment and nutrient transport following treatment activities by minimizing soil disturbance and preserving riparian vegetation buffers that filter suspended sediments and associated nutrients from surface runoff.

The mechanical vegetation removal activities used for forest fuel reduction would involve the use of heavy equipment and would likely create ground disturbance. Vegetation removal, equipment traffic, and yarding and transport activities within the program area could loosen and disturb soils and remove ground surface litter in some areas, exposing the soil surface and facilitating erosion. Heavy equipment may compact soils in some areas, reducing the capacity to infiltrate or filter runoff. The SPRs incorporate relevant elements of the CFPRs pertaining to erosion control and protection of waterbodies to ensure these protections are implemented consistently in both commercial and non-commercial operations.

SPR HYD-3 specifies later treatment activities would adhere to multiple requirements that would minimize the soil disturbance, compaction, and potential soil erosion from manual and mechanical treatment activities. The use of heavy equipment would be limited to loading logs onto trucks or the use of backhoes during some treatments to minimize soil disturbance and compaction. Burn piles created by hand treatment crews would not be placed within WLPZs to prevent the production of hydrophobic compounds from burning of organic material that would limit infiltration, to prevent the production of fine organic particles or ash near water bodies, and to avoid altering vegetation conditions within WLPZs that contribute to filtering surface runoff into water bodies and protecting water quality (SPR HYD-3 and SPR GEO-7). As described in the protection measure for WLPZs (SPR HYD-3), large areas of bare soil following treatment activities within WLPZs would be stabilized with mulch, grass seeding, or soil stabilizers. Such actions to reduce bare soil and increase surface roughness and protect the surface from impact of raindrops would decrease the velocity of surface runoff, increase infiltration of surface runoff, decrease soil particle detachment, and minimize soil erosion that could transport sediment and nutrients (Stednick 2010, Harrison et al. 2016, Neary et al. 2005, Robichaud et al. 2010).

The proximity of the program area to surface waters is an important factor in controlling sediment delivery. Past research on stream buffers found that the majority of erosion features within 30 feet of a stream delivered sediment to the stream, while 95 percent of erosion features further than 30 feet from a stream did not (Rashin et al. 2006). Therefore, the most effective water quality protections are avoidance of sensitive areas and providing undisturbed buffers between work areas and water bodies. Later treatment activities under the proposed program would incorporate the watercourse protections defined in 14 CCR Section 916.5 of the CFPRs and Attachment B of the Timber Waiver (Lahontan RWQCB 2019a) (SPR HYD-3) and SEZ requirements (SPR HYD-4) defined under TRPA Code of Ordinances Section 61.1.6.C. and Attachment N of the Timber Waiver (Lahontan RWQCB 2019a). These rules establish work buffers based on beneficial uses of the water body and slope, with larger buffers established on water bodies with more beneficial uses and steeper slopes. Additionally, SPR BIO-1 requires that a qualified RPF or biologist identify sensitive habitats such as wetlands, wet meadows, or riparian areas as well as a suitable buffer area for avoidance during project activities. This buffer would act as a filter to slow runoff from adjacent treatment areas, allow infiltration of stormwater, and trap sediment and nutrients that could otherwise be carried into surface waters.

Furthermore, SPRs would be implemented to reduce erosion in treatment areas and minimize impacts related to mechanical treatments on steep slopes. SPR GEO-1 and SPR GEO-2 limit ground disturbance during precipitation and restrict heavy equipment operation over saturated soils, when such activity could produce ruts where sediment-laden runoff could concentrate. Equipment operation would be limited on steep or unstable slopes (SPR GEO-7). If treatment is proposed on a slope greater than 50 percent, an RPF or licensed geologist would evaluate the treatment area for unstable areas, determine the potential for erosion and landslide, and identify measures that would be implemented to reduce erosion (SPR GEO-8). Additionally, highly disturbed areas would be stabilized with mulch and/or slash generated by vegetation management activities (SPR GEO-3) and treatment areas would be inspected for erosion and remediated prior to the rainy season and following the first large storm or rainfall event (SPR GEO-4) to minimize soil erosion and the potential transport of sediment and nutrients.

Manual and mechanical treatment activities would thin trees and remove understory, but not all trees would be removed within the treatment area and overstory and understory canopy within WLPZs and SEZs would be

maintained in accordance with CFPR requirements (14 CCR Sections 956.4 and 956.5) (see Section 2.5, "Standard Project Requirements and Forest Practice Rules"). Preservation of sufficient overstory and understory canopy would decrease surface runoff and minimize transport of associated sediment and nutrients by intercepting precipitation, releasing it as throughfall, and providing more time for precipitation to infiltrate into soils (Stednick 2010). To further protect streams and riparian habitats and avoid increases in water temperature, later treatment activities under the PTEIR would implement SPR BIO-4, which would avoid or minimize streamside vegetation loss. These WLPZ and SEZ protections would maintain riparian shading, reduce or eliminate the effects of shade reduction on stream water temperatures, and continue to support beneficial uses of the surface waters in the program area.

The equipment used for mechanical vegetation removal treatments would require the use of fuels and lubricants. Treatments implemented under the Tahoe PTEIR would control the potential risks of spills and leaks through application of SPRs, including SPR HYD-3, which requires that equipment be fueled and serviced outside of WLPZs/SEZs and wet areas, and SPR HAZ-1, which requires that all equipment be maintained and regularly inspected for leaks. Implementation of these SPRs would prevent spills of fuels and lubricants onto soils that could be carried by runoff into adjacent waterbodies or groundwater.

Finally, the Tahoe PTEIR and later treatment activities would not alter any applicable federal, TRPA, state, or local water quality regulations. Later treatment activities under the Tahoe PTEIR would comply with all applicable water quality regulations (SPR HYD-1), including the specific conditions in the Timber Waiver (Lahontan RWQCB 2019a) for fuel reduction and fire prevention activities. General requirements and prohibitions specified in the Timber Waiver include: prohibitions on the discharge of wastes (e.g., petroleum products, soil, silt, sand, clay, rock, felled trees, slash, sawdust, bark, ash, and pesticides) to surface waters and the deposition of wastes in locations where such materials may be discharged to surface waters; a requirement to notify the Water Board of detections of discharge within 24 hours; mandatory compliance with category-specific eligibility including monitoring and reporting requirements; required monitoring of equipment for leaks and removal from service if necessary to protect water quality; immediate containment of all spills and spilled materials and/or proper disposal of contaminated soils; and a requirement to keep an adequate emergency spill kit at the project site at all times that equipment is used. The Lahontan RWQCB enforces the Timber Waiver and staff will be allowed reasonable access onto property as required under the Timber Waiver. The Timber Waiver includes supplemental requirements for water quality protection (e.g., prohibitions on creating or causing erosion, destabilizing streambanks, increasing water temperature, disturbing non-target riparian vegetation, concentrating surface runoff, or burning slash in SEZs, and limits on equipment use in SEZs and on saturated soils) to ensure that project activities do not conflict with the Basin Plan. In addition, timber harvest and vegetation management activities conducted under the Timber Waiver must be conducted in accordance with any design features, management actions, mitigation measures, and monitoring plans developed as part of complying with CEQA, NEPA, the FPRs, and/or TRPA environmental analysis requirements. Many of the Timber Waiver conditions and requirements are similar to and consistent with applicable SPRs and CFPR requirements described previously.

While manual and mechanical treatment activities would potentially disturb and/or compact soils and potentially transport sediment and nutrients due to subsequent soil erosion, SPRs and other applicable requirements to protect water bodies, WLPZs, and SEZs, limit equipment use on wet soils and steep slopes, stabilize highly disturbed areas, and prevent spill or leaks from equipment would minimize the transport of sediment, nutrients, and chemicals to water bodies. The SPRs, CFPRs, and Timber Waiver requirements and the conditions prescribed by them have been designed by regulatory and land management agencies specifically to protect water quality and meet applicable standards, so manual and mechanical activities implementing these required measures would not be anticipated to degrade surface or groundwater quality or to result in alterations of water quality indicators that would exceed numerical standards. Thus, manual and mechanical treatments implemented under the PTEIR would have a **less-than-significant** impact on water quality.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.12-2: Substantially Degrade Water Quality Through the Implementation of Prescribed Burning

The proposed program includes prescribed burning (i.e., pile burning and understory burning) treatment activities to reduce wildfire risk, mostly within the WUI. All prescribed burn treatments implemented under the proposed program would integrate SPRs into treatment design to protect water bodies, reduce the size and placement of burn piles, limit intensity of prescribed burns, and maintain the overstory and understory canopy. Implementation of SPRs would minimize the risk of substantial degradation to water quality from prescribed burning activities. Therefore, this impact would be **less than significant**.

Later treatment activities may include pile burning (i.e., burning of materials that have been removed during manual or mechanical treatment) and understory burning (i.e., removal by fire of understory fuels and downed wood). Understory burns are designed to be low-severity burns in confined areas, which leave fine fuels such as litter and small woody debris partially charred and consumed, and little mineral soil exposed (Lewis et al. 2006, Cawson et al. 2012). Unburned areas with litter adjacent to patches of understory burn areas with exposed mineral soils retain the capacity to control erosion by trapping sediment in surface runoff and reducing runoff through infiltration (Harrison et al. 2016).

Nutrient concentrations in surface waters (e.g., nitrogen and phosphorus) and subsurface waters have remained low after prescribed fires and pile burning during case studies in the Lake Tahoe Basin (Stevens et al. 2004, Busse et al. 2001). Although the nutrients in streams have remained low in case studies, changes in the soil properties after pile burning and prescribed fire are expected to include: lower total carbon and total nitrogen; increased calcium, magnesium, potassium, and inorganic nitrogen; and higher pH (Busse et al. 2014). Lake Tahoe West WEPP Model results, as previously described in Impact 3.12-1, indicate that understory and pile burns across the landscape would result in minimal risk to surface water quality when analyzed at large landscapes over long periods (Dobre and Long 2020). Fine sediment and phosphorus loads due to prescribed burning were lower than wildfires. The reduced loads were attributed to low burn severities and increased residual ground cover. Treatments could pose localized risks to surface water quality in some highly erodible watersheds (e.g., Blackwood, Ward, Meeks, General, and Eagle) that produce large sediment loads under current conditions; however, careful analysis, design, and monitoring specific to site conditions could help to mitigate risks and reduce the uncertainty associated with treatments. While modeling results indicated that treatment could pose little risk to surface water quality, these models did not incorporate treatment scenarios at the Tahoe PTEIR program scale (900–1,300 acres per year and typical maximum number of acres to be treated would be 1,250 acres), small watersheds, program specific SPRs to reduce significant adverse effects to surface water quality, and restoration of aspen, meadow, riparian, and wet areas that would involve conifer removal in these areas. These program-specific scenarios would reduce the impacts of thinning and prescribed burning. The proposed program would include prescribed burning treatments in a manner that minimizes the potential for degradation of water quality. The goal of understory burns is to conduct a low intensity burn that only burns the targeted fuel types (i.e., ground and litter fuels) and preserves overstory and understory canopy. The existing groundcover vegetation would be partially retained in a mosaic pattern in forest and shrub communities. While the amount of vegetation remaining following a prescribed burn varies, up to 70 percent of the vegetation typically remains (described in Section 2.4.4, "Prescribed Burning"), so there would be sufficient surface roughness for the remaining vegetation to reduce runoff velocities, protect the surface from impact of raindrops, provide time for infiltration, and minimize erosion of soils. Although pile burning would result in localized high severity burn conditions that may produce hydrophobic compounds on soils and locally reduce infiltration, pile burn sites would be limited in size (SPR GEO-6) and dispersed throughout the landscape with unburned areas between each pile to act as buffers to reduce hydrologic connectivity and to provide sufficient area for surface runoff to infiltrate into soil between pile sites. SPR HYD-1 would require compliance with all applicable Basin Plan requirements and other provisions within the Timber Waiver adopted by the Lahontan RWQCB, including pile burning specifications to ensure a less than significant impact on water quality, the requirement to leave areas burned within a Waterbody Buffer Zone (WBBZ; i.e., riparian buffer similar to a WLPZ, as defined in the Timber Waiver, Attachment B) in a condition such that waste, including ash, soils, and/or debris will not discharge into a waterbody, and general conditions as described in Impact 3.12-1. Additionally, SPR HYD-3 and the Timber Waiver prohibit the placement of burn piles

within WLPZs, as defined by 14 CCR Section 956.5 of the CFPRs, to prevent fine organic particle or ash production near water bodies. SPR HYD-4 and the Timber Waiver prohibit the alteration of vegetation within SEZs that filter surface runoff into water bodies to protect surface water quality.

Understory burning would be conducted when fuel moisture and environmental conditions allow for effective understory and ladder fuel control while reducing the risk of high severity burns (SPR GEO-10). All prescribed burns also would include the development and implementation of a CAL FIRE burn plan with fire behavior modeling and submittal of the burn plan to appropriate air quality management districts (described in Section 3.4 "Air Quality" and SPR AQ-3). No ignition points would be located within WLPZs (SPR HYD-3). Overall, the SPRs and other requirements would reduce the potential for escaped fire or severe burns and preserve unburned vegetated islands, WLPZs, and SEZs that reduce sediment and nutrient transport from runoff originating in treatment areas by providing surface roughness to reduce runoff velocities, area for runoff to infiltrate into soils, and vegetation to filter fine sediment and nutrients from runoff before it reaches water bodies. Additionally, the Tahoe PTEIR and later treatment activities implemented under the proposed program would not alter any applicable federal, TRPA, state, or local water quality regulations. Later treatment activities would comply with all TRPA and State water quality regulations (SPR HYD-1), including conditions of the Timber Waiver that are applicable to fuel reduction and fire prevention activities. These waivers include supplemental requirements for water quality protection to ensure that project activities do not conflict with the Basin Plan.

Flammable liquids (i.e., gasoline and diesel) and iron/phosphorous based hydrocarbon gelling agents would be used to assist with fire ignition. All accelerants used are assumed to fully combust during the ignition phase of prescribed burning and therefore would not be carried by runoff into adjacent waterbodies or groundwater. Potential risks of spills and leaks would be reduced by implementation of SPR HYD-3, which requires that no fire ignition will occur within watercourse protection zones, and SPR HAZ-1, which requires that all equipment be maintained and regularly inspected for leaks.

Later treatment activities under the Tahoe PTEIR would include prescribed understory burning and pile burning within the program area. Later treatment activities would implement SPRs that include fire behavior modeling (for understory burns); limiting burning to times when fuel moisture and environmental conditions allow for effective fuel reduction while reducing the risk of high severity burns; and measures to protect water bodies. While later treatment activities using prescribed burning would potentially increase sediment and nutrient transport in runoff from burned areas, implementation of SPRs and other requirements described above would preserve unburned areas and vegetation. Preservation of these areas will intercept and filter sediment and nutrients in runoff before it reaches water bodies and minimize the potential for surface and ground water quality degradation and alterations of water quality indicators that would exceed numerical standards. Thus, prescribed understory burning and pile burning implemented under the proposed program have a **less-than-significant** impact on water quality.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.12-3: Substantially Alter the Existing Drainage Pattern of a Treatment Site or Area

Treatments implemented under the Tahoe PTEIR would involve ground disturbing activities, including the construction of skid trails and compaction of the ground by heavy equipment, which could temporarily alter surface water runoff. To avoid or minimize these effects, later treatment activities would incorporate SPRs to protect the soil and vegetation in WLPZs and SEZs, stabilize exposed soil near water bodies prior to the beginning of rain, and maintain existing drainage systems. With inclusion of the SPRs, treatments implemented under the proposed program could result in minor, temporary disturbance to surface drainage but would not substantially alter the existing drainage pattern of a treatment site or area. This impact would be **less than significant.**

Silviculture activities (e.g., reconstruction or grading of existing roads, compaction of surfaces, and canopy removal) have the potential to alter the hydrology of a watershed by compacting soils, potentially creating areas of imperviousness, and concentrating and increasing road surface runoff (Lewis et al. 2001, EPA 2005, Reid and Lewis

2007). The magnitude of the silviculture and fuel management activities affects runoff and erosion rates. Commercial thinning and yarding have a greater potential to increase runoff, erosion, and sediment yields because of the more extensive removal of the forest canopy; greater ground disturbance due to skid trails, cable rows, and landings; greater ground disturbance due to more intensive harvest; need for extensive road access; and increase in heavy truck traffic (Robichaud et al. 2010). Impacts to runoff and associated sediment production are lower when the scale of projects is smaller, as with non-commercial thinning operations which have relatively small and short-term impacts on runoff and associated sediment production even over large areas (Robichaud et al. 2010). Low severity prescribed burns have a low potential for increasing peak flows and erosion rates (Robichaud et al. 2010). Furthermore, the potential increases in erosion and sediment yield can be minimized by reducing the area and amount of soil disturbance, establishing buffer strips along stream channels, and minimizing overland flow by restoring severely disturbed areas (Robichaud et al. 2010).

As previously discussed, treatments implemented under the Tahoe PTEIR would not alter the course of any river, stream, or drainage feature and would not require temporary or permanent road construction, so there would be no changes to existing drainage patterns from these activities. Later treatment activities including the construction of skid trails and compaction of the ground by heavy equipment would alter surface water runoff locally, but the area that would potentially experience compaction would be relatively small compared to the surrounding uncompacted area, and implementation of SPRs would further minimize the potential for compaction and alterations to drainage patterns within those areas. SPR HYD-1 would require compliance with all applicable requirements of the Timber Waiver adopted by the Lahontan RWQCB as described in Impact 3.12-1 and 3.12-2, including operable soil conditions and equipment ground pressures that would protect water quality by preventing soil compaction and deformation. Compliance with the Timber Waiver would also include limits on the use of new or existing skid trails. SPR GEO-1 and SPR GEO-2 would limit ground disturbance during precipitation or heavy equipment operation over saturated soils, when such activity would be more likely to compact soils or produce ruts where runoff could concentrate. SPR HYD-3 and SPR HYD-4 prohibit equipment driven in wet areas or WLPZs and SEZs except over existing roads or watercourse (water body) crossings to further limit soil compaction that would alter the existing drainage conditions or adversely impact water quality. SPR HYD-3 and SPR GEO-3 also require stabilization mulching, rip-rap, grass seeding, or soil stabilizers, prior to the beginning of the rainy season, of areas within WLPZs and SEZs that are exposed to treatment activities. Such stabilization methods would counteract potential soil compaction and changes to site drainage patterns by increasing surface roughness, reducing the surface runoff velocity, and increasing infiltration. Potential compaction and associated changes in the drainage patterns would be limited on steep or unstable slopes since SPR GEO-7 limits the operation of equipment in these areas. Potential changes in the drainage patterns also would be minimized by SPR GEO-5 that prescribes waterbreaks on compacted and/or bare linear treatment areas capable of generating surface runoff to divert surface runoff into adjacent areas where it can infiltrate naturally. SPR GEO-5 would address potential unavoidable changes in soil compaction due to later treatment activities by limiting the extent surface runoff from compacted soil would travel and preventing potential unavoidable compaction from substantially altering the overall existing drainage pattern within a treatment area. Finally, SPR HYD-5 prohibits the diversion of runoff or disturbance of existing drainage systems to avoid impacts from program activities adjacent to roadways, which typically have existing roadway drainage or stormwater management systems. Overall, there would be only minor or temporary changes in surface drainage patterns from later treatment activities under the Tahoe PTEIR with the protections provided by these SPRs, such that there would not be a substantial change in the drainage pattern of a treatment site or area and there would be a **less-than-significant** impact.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.12-4: Substantially Change the Amount of Surface Water in Any Water Body or Substantially Reduce the Amount of Water Otherwise Available for Public Water Supplies

Later treatment activities may include water drafting for dust abatement during dry season projects. While water drafting would alter the amount of water in a water body, implementation of SPR BIO-5 would require that water drafting operations follow requirements, including minimum flow requirements of the stream, maximum diversion rates, and maximum pool volume reduction. Therefore, later treatment activities that involve water drafting would not substantially change the amount of surface water in any water body or reduce the amount of water available for public water supply. This impact would be **less than significant**.

Later treatment activities may require a water supply for dust abatement during some projects. The water supplied for dust abatement typically would be supplied from municipal sources (i.e., fire hydrants) in the urban interface. On rare occasions water drafting from water bodies may be required. Water drafting involves the siphoning of stream flow into a water truck. Pools are often targeted for water drafting sites because they have sufficient volume to permit the necessary diversion rates. Water drafting would temporarily alter the amount of surface water in a water body as it is withdrawing water from the stream. However, implementation of SPR BIO-5 requires water drafting operations to follow CFPR requirements in 14 CCR Section 963.7(l), which includes protections to avoid dewatering waterbodies and maintain aquatic life downstream, measures to minimize generation or transport of sediment by water drafting operations, and streamflow monitoring requirements. The standards require that the source stream during drafting shall be at least 2 cubic feet per second, the diversion rate shall not exceed 10 percent of the surface flow, and pool volume reduction shall not exceed 10 percent. Thus, implementation of SPR BIO-5 would protect the beneficial uses of domestic and municipal water supply and aquatic life. Overall, with implementation of SPR BIO-5, later treatment activities that include water drafting would not substantially change the amount of surface water in any water body or substantially reduce the amount of water available for public water supplies by limiting water drafting to only occasional small volumes of water. The Tahoe PTEIR also would not include the creation of any impervious surfaces that would interfere with groundwater recharge and result in decreased public groundwater supply. Proposed vegetation treatment activities would reduce the number of trees within the program area that could result in minimal localized increases in groundwater recharge within the program area (Troendle et al. 2010).

Lake Tahoe West model results indicate that forest thinning would increase water yield, which could result in small increases in water availability in streams, groundwater, wetlands, and Lake Tahoe (Lake Tahoe West 2020). Additionally, the Tahoe PTEIR and later treatment activities would not alter any applicable federal, TRPA, state, or local regulations pertaining to surface water management, and implementation of SPR HYD-1 would require later treatment activities to comply with surface water management or other public water supply protections specified by these regulations. For these reasons, this impact would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.12-5: Discharge Pollutants into Surface Waters, or Any Substantial Alteration of Surface Water Quality, Including but Not Limited to Nutrients, Temperature, Dissolved Oxygen, or Turbidity

Later treatment activities would have no direct discharge into surface waters and treatments would retain 75 percent surface cover within riparian areas and restore degraded aspen, meadow, and riparian areas (i.e., conifer removal in these areas) that would intercept and filter surface runoff that may contain sediment and nutrients following treatments, so there would not be a substantial alteration of surface water quality. Retention of 75 percent surface cover and preservation of overstory and understory canopy would minimize changes in solar radiation that would alter temperature conditions in water bodies. The retention of surface cover and preservation of canopy would also minimize and filter surface runoff that would potentially transport sediment or nutrients from treatment areas and provide more time for runoff to infiltrate. While there is potential for surface runoff from treatment areas to contain concentrations of pollutants greater than background conditions and alter surface water quality, later treatment activities under the proposed program would implement SPRs to minimize the surface runoff and transport of these pollutants into water bodies. Additionally, incorporation of SPRs into all treatments would further minimize the risk of detrimental water quality alterations, including nutrients, temperature, dissolved oxygen, and turbidity. This impact would therefore be **less than significant.**

Later treatment activities would potentially include manual treatments, mechanical treatments, prescribed burning, retreatments, biomass disposal, and access and hauling activities. There would be no direct discharge of wastes into surface waters from these treatment activities.

Water temperature effects in managed forest ecosystems are primarily associated with summer stream temperature increases, particularly if silviculture is conducted near streams. In small to intermediate-sized streams in forested regions, incoming solar radiation represents the dominant form of energy input during the summer (Beschta et al. 1987, Sullivan et al. 1990). Stream heating in excess of natural levels associated with silviculture arises primarily from local increases in the amount of solar radiation directly on streams due to either the removal of streamside vegetation or to stream widening caused by increased sedimentation (EPA 1999). As discussed under Impacts 3.12-1 and 3.12-2, WLPZ and SEZ would be delineated based on CFPRs and TRPA Code of Ordinance and SPRs would be implemented to minimize any potential impacts to water temperature from treatment activities. SPR HYD-1 would require compliance with all applicable general requirements and other provisions within the Timber Waiver adopted by the Lahontan RWQCB as described in Impact 3.12-1, including requirements to retain and protect vegetation along water bodies, or within or bordering meadows and wet areas. SPR HYD-3 specifies later treatment activities would also adhere to overstory and understory vegetation retention guidelines, including retention of 75 percent of surface cover and undisturbed area in WLPZs. SPR HYD-4 includes similar requirements to minimize streamside disturbance and protect vegetation within SEZs. As such, the removal of vegetation near surface water that would change water temperatures in water bodies would be minimized. Additionally, later treatment activities would implement SPR HYD-3, SPR HYD-4, and SPR BIO-4 to retain or improve riparian habitat function and minimize streamside vegetation loss that could reduce stream shading and increase temperatures. Overall, preservation of vegetation in WLPZs and SEZs through implementation of SRPs in later treatment activities would maintain riparian shading, reducing or eliminating potential shade reductions on stream water temperature and continue to support beneficial uses of water and aquatic life.

Surface runoff from burned areas may carry increased levels of sediment, nutrients, metals, and certain organic pollutants. As previously described in Impacts 3.12-1 and 3.12-2, Lake Tahoe West model results, which overlap the program area, indicate that thinning, prescribed burns, and traffic on access roads in the WUI would result in small increases of fine sediment and phosphorus loads which over the long-term would be of minimal risk to water quality (Dobre and Long 2020, Eliot et al. 2019). Studies in the Lake Tahoe Basin indicate that the concentrations of soluble reactive phosphorus did not significantly increase in stream waters after prescribed fires (Stevens et al. 2004). Combustion of plants and natural materials releases metals, nitrogen compounds, phosphorus, calcium, magnesium, and potassium and toxic organic and inorganic compounds (Wallbrink et al. 2004, Crouch et al. 2006). The vegetation removal and mechanical yarding and transport activities also would potentially loosen and disturb soils, remove

ground surface litter in some areas, and expose the soil surface to erosion by surface runoff. Phosphorus is associated with sediments, so sediment increases in surface runoff would also potentially increase nutrients (i.e., phosphorous) concentrations in receiving water bodies (Stednick 2010). Heavy equipment that compacts soils would also potentially increase the amount of surface runoff by reducing infiltration of runoff. Overall, surface runoff would potentially alter water quality if the concentrations of sediment, nutrients, metals, and/or organic and inorganic compounds in surface runoff is greater than typical background conditions following treatment activities. Elevated nutrient concentrations in runoff would potentially increase phytoplankton or periphyton (i.e., algae) growth in water bodies, leading to increased variations in pH and dissolved oxygen from photosynthesis and respiration by the algae. Potential water quality changes would be greatest in small, shallow water bodies where surface runoff comprises a larger percentage of the water.

While there is potential for surface runoff from treatment areas to contain concentrations of sediment, nutrients, metals, and certain organic pollutants greater than background conditions and alter surface water quality, later treatment activities under the PTEIR would implement SPRs to minimize the surface runoff and transport of sediment, nutrients, metals, and certain organic pollutants into water bodies. As previously discussed under Impacts 3.12-1, 3.12-2, and 3.12-3, compliance with Timber Waiver and other water quality requirements of the Lahontan RWQCB (SPR HYD-1) would limit the locations where and conditions when treatment activities would occur to protect water quality. SPR HYD-3 and SPR HYD-4 require later treatment activities to identify and protect WLPZs and SEZs and adhere to multiple requirements that would minimize the soil disturbance, compaction, and potential soil erosion from treatment activities. Other SPRs would limit when treatment activities could occur and limit heavy equipment operation over saturated soils and on steep and unstable slopes to reduce erosion from treatment areas (SPR GEO-1, SPR GEO-2, SPR GEO-7, and SPR GEO-8). In addition to implementation of SPRs minimizing the production of pollutants (e.g., sediment, fuels and lubricants) from treatment areas, SPRs incorporated into later treatment activities under the PTEIR would also minimize the transport of pollutants outside of treatment areas where they could alter water quality. Potential risks of equipment spills and leaks would be reduced by implementation of SPR HYD-3, which requires that equipment be fueled and serviced outside of WLPZs, SEZs and wet areas, and SPR HAZ-1, which requires that all equipment be maintained and regularly inspected for leaks. SPR BIO-1 requires that a qualified RPF or biologist identify sensitive habitats such as wetlands, wet meadows, or riparian areas as well as a suitable buffer area for avoidance during project activities. SPR HYD-3 and SPR HYD-4 also both contain provisions that require establishment of buffer zones around water bodies, with larger buffers established on water bodies with more beneficial uses and steeper slopes. Vegetated buffer zones have been shown to be effective at reducing surface runoff and transport of sediment, nutrients, metals, and certain organic pollutants that would alter water quality by increasing surface roughness, slowing runoff, providing time for runoff to infiltrate into soil, and trapping sediment and nutrients that would otherwise be carried into water bodies (Rashin et al. 2006). SPR HYD-3 and SPR GEO-6 would also limit the size of burn piles and their distribution within a treatment area so there would be unburned areas between pile sites for surface runoff to infiltrate into soil and minimize the surface runoff that would need to be filtered by vegetated buffer zones along water bodies.

Later treatment activities would also potentially provide an ecological benefit to the program area by implementing restoration of aspen, meadow, riparian, and wet areas. Protection and enhancement of these habitats would potentially minimize water quality degradation from treatment activities since they function to reduce surface runoff velocities, increase the retention of surface runoff and its infiltration into soils, and increase the filtration of surface runoff to minimize transport of sediment and nutrients into water bodies. An increase in aspen, meadow, riparian, and wet areas under later treatment activities would potentially improve water quality by increasing the infiltration and trapping more sediment than occurs under existing conditions. Finally, later treatment activities would potentially result in a long-term benefit to water quality by significantly reducing the threat of high severity wildfire in treated areas that would a) potentially produce significant amounts of erosion and transport sediments into water bodies during storm events after high severity burns; and b) eliminate vegetated areas that minimize transport of sediments into water bodies.

Furthermore, the Tahoe PTEIR would not alter or revise any applicable federal, TRPA, state, or local regulations pertaining to discharge into surface waters and surface water quality, so later treatment activities would be required to meet discharge standards specified by these regulations (SPR HYD-1). Overall, with the implementation of SPRs, the treatment activities used in later treatment activities under the PTEIR would not substantially alter water quality. All existing protections for

surface water would remain in place and later treatment activities would minimize changes in riparian shading of water bodies and the production and transport of sediments from treatment areas that could otherwise alter water temperature, nutrients, dissolved oxygen, and turbidity. As a result, this impact would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.12-6: Discharge Contaminants to Groundwater or Any Alteration of Groundwater Quality

Later treatment activities would integrate SPRs into treatment design to prevent discharge of contaminants into groundwater and protect groundwater quality. Therefore, this impact would be **less than significant.**

As discussed above under Impacts 3.12-1, 3.12-2, and 3.12-5 later treatment activities would avoid or minimize the potential risks of spills and leaks of equipment through application of SPRs (SPR HYD-3 and SPR HAZ-1), preventing the risk of groundwater contamination and alter groundwater quality. Dust suppressants (i.e., non-toxic chemical dust suppressant emulsion polymers and organic materials) used to minimize dust during treatment activities would be non-toxic and would not negatively impact water quality because the project implementer will not over-water exposed areas such that application results in run-off of the suppressants (SPR AQ-4). Additionally, flammable liquids (i.e., gasoline and diesel) and iron/phosphorous based hydrocarbon gelling agents are assumed to fully combust during the ignition phase of prescribed burning. The Tahoe PTEIR would not alter any applicable federal, TRPA, state, or local regulations pertaining to discharge to groundwater and groundwater quality and later treatment activities would be required to meet discharge standards specified by these regulations. For these reasons, this impact would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.12-7: Result in an Effect on Drinking Water Sources

Later treatment activities would integrate effective SPRs into treatment design to protect drinking water sources. Therefore, this impact would be **less than significant.**

Beneficial uses of surface water and groundwater in the Lake Tahoe Basin include domestic water supply (i.e., drinking water). Drinking water supplies within the program area include groundwater, streams, other lakes, and Lake Tahoe. As discussed in Impacts 3.12-1, 3.12-2, 3.12-5, and 3.12-6, the implementation of SPRs would protect surface and groundwater drinking water sources. These measures also include controlling the potential risks of spills and leaks of equipment, protection of WLPZs and SEZs, avoiding construction of new roads, and compliance with water quality regulations. The Tahoe PTEIR would not alter any applicable federal, TRPA, state, or local regulations pertaining to source water protection. Implementation of SPR HYD-1 would require later treatment activities to comply with the source water protections specified by these regulations. For these reasons, this impact would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.

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