CHAPTER 5

Water Quality

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WATER QUALITY

Maintaining water quality in California's waterbodies is important to ensure safe drinking water and to protect recreational, environmental, industrial, and agricultural beneficial uses. In addition to delineation of the area of analysis and a description of the regulatory framework, this chapter presents a summary of existing beneficial uses, key constituents of concern and water quality information related to the Project Area, as well as the potential water quality impacts that could be expected to occur in response to implementing any of the alternatives evaluated in this Draft EIR.

5.1 ENVIRONMENTAL SETTING

Most of the water in the Mammoth Lakes Basin is considered to be of very good or excellent quality. Levels of TDS, algae, bacteria, and other quantitative indicators are very good in comparison to federal drinking water standards (Town of Mammoth Lakes 2008).

Water provided to District service area customers comes from both surface water and groundwater sources. Surface water from Lake Mary is collected, filtered, and disinfected, and groundwater is pumped from nine wells located within the District service area. Depending on the location in the community and the time of year, customers may receive all surface water, all well water, or a combination of the two (MCWD 2008). The District routinely conducts water quality monitoring of untreated groundwater and surface water supplies and treated potable water, and reports any detected contaminants, compliance with drinking water regulations, and health related materials in the annual Consumer Confidence Report (CCR). For example, in 2008 the District conducted over 1000 tests for over 80 constituents that are regulated by the California Department of Public Health. The CCR is required to be sent to all District customers per state regulations. Past annual CCRs are available on the District's website. Surface water in the District's service area is generally of excellent quality, and for most parameters of concern to health officials and water users, the water is of much better quality than required (MCWD 2008).

Water quality concerns in the Project Area are generally related to heavy metals and radioactive elements (principally from geothermal discharges), the sensitivity of lakes and streams to acidification, and the low acid-buffering capacity of native soils and water supplies. These concerns can derive from a variety of non-point sources (e.g., erosion from construction, timber harvesting, and cattle grazing), stormwater runoff, acid drainage from inactive mines, acid content in area precipitation, and individual wastewater disposal (i.e., septic) systems. Nonpoint sources (both natural and human caused) may provide the greatest pollutant loading to surface waters in the area (Lahontan RWQCB 2002).

5.1.1 PHYSICAL CHARACTERISTICS OF SURFACE WATER QUALITY

The physical properties and chemical constituents of water traditionally have served as the primary means for monitoring and evaluating water quality. Evaluating the conditions of water through a water quality standard refers to its physical, chemical, or biological characteristics.

Water quality parameters are numerous, and can be generally classified as mineral parameters, nutrients and organics, particulates and adsorbed metals, and sediment quality parameters (SWRCB 1993). A good general discussion of water quality parameters is provided in Town of

Mammoth Lakes (2008). Mineral parameters include the major anions and cations (calcium, magnesium, sodium, potassium, chloride, sulfate, and bicarbonate), trace elements (boron, fluoride, and bromide), silica, alkalinity, hardness, TDS, and electrical conductivity (EC). Nutrient and organic parameters include nitrate, ammonia, total Kjeldahl nitrogen, total and dissolved phosphorus, total organic carbon, chlorophyll, and color. Particulates and adsorbed metals include total suspended solids (TSS), turbidity, arsenic, barium, selenium, aluminum, cadmium, chromium, copper, iron, mercury, manganese, lead, and zinc (SRWCB 1993). The quantity of a material in the environment and its characteristics determine the degree of availability as a pollutant in surface water. Downstream receiving waters can assimilate a limited quantity of various constituent element inputs before reaching thresholds beyond which the measured amount of an increased constituent can become a pollutant.

5.1.2 BENEFICIAL USES AND SURFACE WATER QUALITY ASSOCIATED WITH PROJECT AREA WATERBODIES

The Project Area is within the jurisdiction of the Lahontan RWQCB, one of nine regional boards administered under the SWRCB that implement the Clean Water Act (CWA) in California. The mandates of the CWA are implemented through state water policies, which include water quality objectives, principles, and guidelines (see Section 5.2.1). These in turn are contained in formal Water Quality Control Plans (Basin Plans) adopted by the regional boards that identify beneficial uses of water resources, and feasible water quality goals.

Beneficial uses are critical to water quality management in California. State law defines beneficial uses of California's waters that may be protected against quality degradation to include (but not limited to) "*...domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves*" (Water Code Section 13050(f)). Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning. According to RWQCB (1998), significant points concerning the concept of beneficial uses are:

- All water quality problems can be stated in terms of whether there is water of sufficient quantity or quality to protect or enhance beneficial uses.
- Beneficial uses do not include all of the reasonable uses of water. For example, disposal of wastewaters is not included as a beneficial use. This is not to say that disposal of wastewaters is a prohibited use of waters of the state; it is merely a use, which cannot be satisfied to the detriment of beneficial uses. Similarly, the use of water for the dilution of salts is not a beneficial use although it may, in some cases, be a reasonable and desirable use of water.
- The protection and enhancement of beneficial uses require that certain quality and quantity objectives be met for surface water and groundwater (RWQCB 1998).
- Fish, plants, and other wildlife, as well as humans, use water beneficially.

Water quality monitoring is conducted to determine whether it is sufficient to protect or enhance beneficial uses. Because of the difficulties of sampling in remote terrain and severe weather, and ongoing funding constraints, detailed monitoring data are available for only a few of the Lahontan Region's waters (Lahontan RWQCB 2005a). However, some ambient water quality monitoring in the Lahontan Region has been funded primarily by the state’s Surface Water Ambient Monitoring Program (SWAMP), which was initiated in 2000 (SWRCB 2006a).

During the first five years of the SWAMP program (2000–2005), the USGS collected water samples on a quarterly basis at about 30 streams throughout the region, with site-specific sampling generally conducted from one to four times per calendar year.

5.1.2.1 LAKE MARY

According to Lahontan RWQCB (2005a), designated beneficial uses for Lake Mary include: (1) municipal and domestic supply; (2) agricultural supply; (3) navigation; (4) water contact and non-contact recreation; (5) commercial and sportfishing; (6) cold freshwater habitat; (7) wildlife habitat; and (8) aquatic spawning, reproduction, and development.

Lake Mary is a high elevation, oligotrophic lake located in an alpine cirque (a deep, steep-walled basin on a mountain) that receives inflows from snowmelt runoff. As such, it is much less prone to pollutant constituent loading than lower elevation waterbodies that receive inflows from surrounding areas that are developed or otherwise disturbed. Lake Mary water quality is considered to be very good or excellent, and Lake Mary is not presently identified as an impaired waterbody on the 2006 California Section 303(d) List (SWRCB 2006).

In addition to water quality monitoring conducted by the District, additional sampling has been conducted in Lake Mary. As part of a two-year screening survey of contaminant accumulation in fish from California lakes and reservoirs that is being performed as part of the SWAMP, Lake Mary was identified as a targeted waterbody (Davis et al. 2009). Sampling was conducted on Lake Mary rainbow trout in 2007 and fish samples were tested for several contaminants including mercury, dieldrin, chlordanes, DDTs, and PCBs. Davis et al. (2009) report that the thresholds selected for these comparisons were Office of Environmental Health Hazard Assessment's (OEHHA) (Klasing and Brodberg 2008) fish contaminant goals and advisory tissue levels. Levels found in Lake Mary fish were well below threshold values identified for each sampled contaminant (Davis et al. 2009).

Surface water from Lake Mary is diverted to the District's water filtration plant where it is filtered through granular media filters before being chlorinated and distributed throughout the District's service area for drinking water and other municipal and industrial purposes (MCWD 2008). To ensure that tap water is safe to drink, the EPA and the California Department of Public Health's Division of Drinking Water and Environmental Management (DDWEM) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems, and the District regularly monitors the levels of these contaminants to determine compliance with primary and secondary drinking water standards.

With one exception, none of the alternatives evaluated in this Draft EIR result in significant or potentially significant hydrologic impacts associated with changes to the frequency of filling Lake Mary, the date on which Lake Mary is filled, or the duration (extending from April 1) at which Lake Mary is at minimum WSEL prior to September 15. The exception is the Permit 17332 Bypass Flow Requirements Alternative, which results in potentially significant impacts to Lake Mary hydrology. However, for all alternatives evaluated in this Draft EIR (including the Permit 17332 Bypass Flow Requirements Alternative) these changes would not be expected to significantly affect Lake Mary's assimilative capacity, or increase the need for water treatment to maintain current levels of drinking water quality. Additionally, because land use changes in the areas from which Lake Mary receives inflow are not anticipated to occur in the future, the quality of water flowing into Lake Mary also is not expected to change. Consequently, none of the alternatives evaluated in this Draft EIR would be expected to reduce the quality of water in Lake Mary, or create a public health concern by reducing the quality of water diverted to the

Lake Mary WTP for drinking water purposes. Potential impacts to water quality in Lake Mary are not further evaluated in this Draft EIR.

Surface water from Lake Mary has been diverted on a seasonal basis into Bodle Ditch, which is not identified in the Basin Plan and is not identified as an impaired waterbody on the 2006 California Section 303(d) List (SWRCB 2006). From Lake Mary, water flows into Lake Mamie, over Twin Falls, into Twin Lakes and downstream into Mammoth Creek, which is identified in the Basin Plan and is identified as an impaired waterbody on the 2006 California Section 303(d) List (SWRCB 2006).

5.1.2.2 LAKE MAMIE AND TWIN LAKES

Designated beneficial uses for Lake Mamie and Twin Lakes are the same as those identified for Lake Mary, except for agricultural supply (Lahontan RWQCB 2005a). Lake Mamie is not identified as an impaired waterbody on the 2006 California Section 303(d) List (SWRCB 2006).

Presently, Twin Lakes is identified as an impaired waterbody on the 2006 California Section 303(d) List, with potential pollutants/stressors including nitrogen and phosphorus (SWRCB 2006). However, samples taken as part of the SWAMP Program between 2001 and 2005 at the outlet of Twin Lakes did not violate the water quality objectives for nitrogen and total orthophosphate (Lahontan RWQCB 2007). After review of the available data and as part of proposed Section 303(d) List changes for the Lahontan Region identified in 2008, Lahontan RWQCB staff concluded that the nitrogen/phosphorus waterbody-pollutant combination should be removed from the Section 303(d) List because the original listing was flawed and there is no evidence that applicable water quality standards for the pollutant are being exceeded (Lahontan RWQCB 2009). It is anticipated that a revised California Section 303(d) List will be adopted by the SWRCB in 2010 (SWRCB 2010).

As previously discussed in Chapter 2 – Proposed Project and Alternatives, the District has no authority to store water or regulate flow from the Lake Mamie or Twin Lakes, nor does the District have jurisdiction of ownership of the dam structures. The USFS manages Lake Mamie and Twin Lakes as flow-through systems with no managed drawdown of the lakes. Any potential USFS diversion to or drawdown from storage in these lakes will be pursuant to future resolution of USFS-initiated water rights application processes for Lake Mamie (Application 31365) and Twin Lakes (Application 31366) and upon SWRCB approval of the storage rights.

None of the alternatives evaluated in this Draft EIR affect USFS storage operations at either Lake Mamie or Twin Lakes. Consequently, this Draft EIR does not evaluate potential water quality impacts in Lake Mamie and Twin Lakes associated with implementation of the project alternatives or the No Project Alternative.

5.1.2.3 MAMMOTH CREEK

According to Lahontan RWQCB (2005a), designated beneficial uses for Mammoth Creek include: (1) municipal and domestic supply; (2) agricultural supply; (3) freshwater replenishment; (4) groundwater recharge; (5) water contact and non-contact recreation; (6) commercial and sportfishing; (7) cold freshwater habitat; (8) wildlife habitat; (9) rare, threatened, or endangered species; (10) migration of aquatic organisms; and (11) aquatic spawning, reproduction, and development.

In 1998, the SWRCB classified Mammoth Creek as "partially supporting" its designated beneficial uses, meaning that water quality in Mammoth Creek is impairing one or more of the beneficial uses. Accordingly, Mammoth Creek was considered limited (i.e., impaired) under Section 303(d) of the CWA. The 2006 California Section 303(d) List indicated that water quality in Mammoth Creek is impaired due to mercury from unknown sources, and metals from natural sources, nonpoint source, and other urban runoff.

Water quality in Mammoth Creek is influenced by surface water runoff and storm drainage from development associated with the Town of Mammoth Lakes. Runoff from paved surfaces and an incomplete storm drain system are believed to contribute to water quality concerns in Mammoth Creek. The Mammoth Lakes Storm Drainage Master Plan includes remedial actions to correct existing storm drainage deficiencies and improve water quality (Town of Mammoth Lakes 2008).

Mammoth Creek as a whole was originally listed for "Metals" in the early 1990s on the basis of fish tissue data from the SWRCB's Toxic Substances Monitoring Program (TSMP). The TSMP results included "Elevated Data Levels" (EDLs) for several metals (e.g., silver and zinc). EDLs were statistically high compared to other data statewide, but did not exceed human fish consumption criteria, including the then-applicable OEHHA criteria (Lahontan RWQCB 2009). In 1998, the SWRCB provided the opportunity to remove listings for TSMP data that did not exceed human consumption criteria (Lahontan RWRCB 2006). Mammoth Creek was not recommended to be delisted for "Metals" at the time because of a concern that stormwater, as well as natural sources, might be contributing to metals in the creek.

In 2002, Mammoth Creek as a whole was listed for mercury based on fish tissue samples collected downstream of the Twin Lakes outlet (Lahontan RWQCB 2009a). The Lahontan RWQCB (2006) disagreed with the proposed listing of Mammoth Creek for mercury, based on concerns about limitations associated with the 1992 sampling data that was relied upon and OEHHA criteria, and on the probability that mercury in fish tissue and ambient water samples come largely or entirely from natural sources. Lahontan RWQCB (2006) states that water samples collected by the USGS between 2001 and 2004 had total recoverable mercury concentrations in excess of California Toxics Rule standards. Mammoth Creek is located within the volcanic Long Valley Caldera and is continuous with geothermally influenced Hot Creek. While there was some 19th century gold mining in the Mammoth Creek watershed, the extent of mercury use in connection with mining is unknown. Any human sources of mercury in Mammoth Creek are likely to be small in proportion to natural sources, and TMDL development to control anthropogenic sources may not result in significant improvement in the levels of mercury found in fish tissue (Lahontan RWQCB 2006).

In 2006, the SWRCB again listed the entirety of Mammoth Creek for mercury due to exceedance of a newer OEHHA "screening value" for tissue. However, SWRCB staff did not identify exceedances of human consumption criteria for other metals (Lahontan RWQCB 2009). Lahontan RWQCB (2006) further suggested that that SWRCB should not list Mammoth Creek for mercury during the 2006 update cycle, but rather the SWRCB should address mercury in waters of the Long Valley Caldera and other volcanic/geothermal areas in its forthcoming methylmercury policy. For purposes of reviewing the 303(d) List as part of a 2010 Integrated Report assessment, Mammoth Creek was divided into three segments, including: (1) Mammoth Creek from the headwaters to the Twin Lakes outlet; (2) Mammoth Creek from the Twin Lakes outlet to Old Mammoth Road; and (3) Mammoth Creek from Old Mammoth Road to Highway 395.

The 2010 Integrated Report (SWRCB 2010) assessment identified several proposed changes for the Lahontan Region. SWRCB is proposing to delist mercury in Mammoth Creek from the headwaters to the Twin Lakes outlet because it was determined that: (1) there is no fish passage between the headwaters of Mammoth Creek and downstream segments extending to the Twin Lakes outlet; (2) there are no tissue samples available for this headwaters segment; (3) water samples do not violate standards; and (4) the number of available water samples does not meet the minimum sample number requirement of the policy (Lahontan RWQCB 2009; SWRCB 2010). Regarding a similar assessment addressing consideration of potential "metals" delisting for all three segments of Mammoth Creek, it was determined that: (1) no additional new listings for specific metals are being recommended on the basis of tissue or water data; and (2) the general "metals" listing should be removed because: (a) the mercury listing for the upper Mammoth Creek reach segment from the headwaters to the Twin Lakes outlet was based on fish tissue samples collected downstream, below a fish passage barrier and applicable water quality standards for mercury are not being exceeded (Lahontan RWQCB 2009; SWRCB 2010); and (b) a more specific listing for mercury is in place for the downstream Mammoth Creek segments extending from the Twin Lakes outlet to Highway 395 (SWRCB 2010).

The 2010 Integrated Report (SWRCB 2010) recommends that the existing 303(d) listing for mercury remain in place for two segments of Mammoth Creek: (1) Mammoth Creek (Twin Lakes outlet to Old Mammoth Road); and (2) Mammoth Creek (Old Mammoth Road to Highway 395) based on assessment of SWAMP data (see summary above), data submitted by stakeholders, and data affecting the status of 2006 Section 303(d) listings. The proposed 2010 changes identify the need for a TMDL addressing mercury in Mammoth Creek from the Twin Lakes outlet to Old Mammoth Road and for Mammoth Creek from Old Mammoth Road to Highway 395, both of which are projected for completion by 2019 (SWRCB 2010).

As part of the proposed changes for the Lahontan Region, SWRCB (2010) also is recommending the following additions: (1) iron and TDS in the 2.6 mile reach segment of Mammoth Creek extending from the headwaters to Twin Lakes; (2) iron, manganese, phosphate and TDS in the 6.0 mile reach segment of Mammoth Creek extending from Old Mammoth Road to Highway 395; and (3) iron and manganese in the 1.9 mile reach segment of Mammoth Creek extending from Twin Lakes outlet to Old Mammoth Road. Generally, the lines of evidence used by both the Lahontan RWQCB and the SWRCB to support the proposed listings relied upon either exceedance of aquatic life criteria or exceedance of a California Maximum Contaminant Level (MCL). For manganese, phosphate and TDS, there are no state or federal standards or criteria for the protection of freshwater aquatic life. Although there are no aquatic life criteria for phosphate and TDS, concentrations in some samples reportedly exceeded Lahontan Basin Plan objectives. The aquatic life criteria for iron (4-day average of 1000 (µg/L) was not exceeded. However, some of the samples exceeded the California MCL for iron (300 µg/L) and manganese (50 µg/L), but not for TDS (500 µg/L). The proposed 2010 changes identify the need for a TMDL addressing iron in Mammoth Creek from Twin Lakes to Old Mammoth Road by 2012, iron, manganese and TDS in the remaining two Mammoth Creek reach segments by 2021, and phosphate in the reach segment from Old Mammoth Road to Highway 395 by 2021 (SWRCB 2010).

Regarding some of the proposed changes for Mammoth Creek, the pollutant-specific lines of evidence presented in the 2010 Integrated Report (SWRCB 2010) indicate some differences between Lahontan RWQCB and SWRCB findings. Although reported to meet listing policy criteria for both sample size limits and the minimum number of measured exceedances needed to place a water segment on the 303(d) List for toxicants (SWRCB 2004), many of the sample sizes used as the basis of the listing determinations were relatively small (ranging from about 10 to 17 samples collected quarterly over the 2001 to 2005 sampling period). In some cases (e.g., TDS in Mammoth Creek from the headwaters to the Twin Lakes outlet), annual averages were calculated from 2 to 4 samples per year. The Lahontan RWQCB concluded that proposed listings for manganese, phosphate and TDS in Mammoth Creek from Old Mammoth Road to Highway 395 were not warranted because the available data were not temporally representative. The Lahontan RWQCB line of evidence associated with this conclusion states that the data did not satisfy the data quantity requirements of Section 6.1.5 of the Water Quality Control Policy (SWRCB 2004) because "…*quarterly samples do not capture the full range of seasonal and annual variability in streamflows and constituent concentrations expected in streams of the Lahontan Region*." However, after review of the regional board decision, the SWRCB determined that the referenced data did satisfy the data quality requirements specified in Section 6.1.5 of the Water Quality Control Policy (SWRCB 2004) and, thus, these waterbody-pollutant combinations should be placed on the 303(d) List because applicable water quality standards for these pollutants are being exceeded (SWRCB 2010). Listing decisions regarding the aforementioned proposed changes and others are pending, and a revised California Section 303(d) List is expected to be adopted by the SWRCB during 2010 (SWRCB 2010).

The Lahontan RWQCB has established selective water quality objectives for certain surface waterbodies in the Project Area (see **Table 5-1**). As indicated in the Basin Plan, some narrative and numerical water quality objectives are directed toward protection of surface waters in specific areas. To the extent of overlap, these site-specific water quality objectives supersede the "Water Quality Objectives Which Apply to All Surface Waters" described in the Basin Plan for the Lahontan Region. For Mammoth Creek at the Twin Lakes outlet, and Mammoth Creek at Old Mammoth Road, the selective standards include criteria for total dissolved solids (TDS), chlorine, nitrogen (as nitrate), total nitrogen, and orthophosphate. Additional criteria that address sulfate, fluoride, and boron have been established for Mammoth Creek at Highway 395 (Lahontan RWQCB 2005a).

Table 5-1. Lahontan RWQCB Water Quality Objectives for Mammoth Creek

Surface Waters	Objective (mg/L) [1,2]							
	TDS	**Cl**	**SO4**	**F**	**B**	**NO3-N**	**Total N**	**PO4**
Mammoth Creek (Twin Lakes Bridge)	60 90	0.6 1.0	-	-	-	0.4 0.8	0.5 1.0	0.03 0.05
Mammoth Creek (Old Mammoth Road)	85 115	0.8 1.4	-	-	-	0.4 0.8	0.6 1.0	0.27 0.50
Mammoth Creek (At Highway 395)	75 100	1.0 1.4	6.0 11.0	0.10 0.30	0.03 0.05	0.4 0.8	0.6 1.0	0.11 0.22

[1]Annual average value/90th percentile value.
[2] Objectives are as mg/L and are defined as follows:
B - Boron; NO3-N - Nitrogen as Nitrate; SO4 - Sulfate; TDS - Total Dissolved Solids
Cl - Chloride; PO4 - Dissolved Orthophosphate; F - Fluoride
Source: Lahontan RWQCB 2005a.

In July 1999, SWAMP sampled several water quality parameters at two locations along Mammoth Creek (see **Table 5-2**). In general, the quality of water in Mammoth Creek, as measured by its dissolved mineral content, reportedly is very good above Highway 395. Other water quality indicators such as dissolved oxygen, dissolved and suspended solids, and the presence of human, animal, or other chemical waste vary based on season, the use of pasture land adjacent to Mammoth Creek, and activity within the Town of Mammoth Lakes.

Table 5-2. Mammoth Creek Water Quality Conditions

Sampled Analyte	Location 1[a]	Location 2[b]
	Mammoth Creek (Above Substation)	Mammoth Creek (Near Valentine Reserve)
Sulfate	2.3 mg/L	5.3 mg/L
Magnesium	1.9 mg/L	5.9 mg/L
Hardness as CaCO3	25 mg/L	57 mg/L
Calcium	6.8 mg/L	13 mg/L
Specific Conductance	53.2 µS/cm	130.2 µS/cm
Turbidity	1.0 NTU	0.5 NTU
pH	8	8
Alkalinity as CaCO3	30 mg/L	90 mg/L
Dissolved Oxygen	7.2 mg/L	8.3 mg/L
Water Temperature	62.6°F	56.3°F

[a] Location 1 sampled on June 30, 1999.
[b] Location 2 sampled on July 27, 1999.
Source: BDAT 2010

More recently, four sites along Mammoth Creek were sampled between 2000 and 2005 as part of the SWAMP to assess whether Mammoth Creek water quality objectives are being met. These sites included: (1) Mammoth Creek at Twin Lakes; (2) a Mammoth Creek tributary running through the Snowcreek Golf Course; (3) Mammoth Creek at Old Mammoth Road; and (4) Mammoth Creek at Highway 395 (Lahontan RWQCB 2007). Two sites (e.g., Mammoth Creek at Twin Lakes, Mammoth Creek at Highway 395) were sampled between two and four times per year from August 2001 through August 2005, and sampling at the remaining two sites (e.g., Mammoth Creek tributary, Mammoth Creek at Old Mammoth Road) occurred less often (Lahontan RWQCB 2007). At the four Mammoth Creek sites sampled, Lahontan RWQCB (2007) reports that potential water quality exceedances were observed for TDS, PO4, DO, FC, pH, Cl, F, and SO4 (see **Table 5-3**). Site-specific sampling results are summarized below.

- **Mammoth Creek Tributary** - Annual average TDS values from 2003–2005 were 86, 85, and 82 mg/L, respectively, compared to the Basin Plan criterion of 85 mg/L.
- **Mammoth Creek at Twin Lakes** - From 2001–2005, annual average TDS values were 100, 67, 84, 83, and 72 mg/L, respectively, compared to the Basin Plan criterion of 60 mg/L.
- **Mammoth Creek at Old Mammoth Road** - Annual average TDS values for 2001 were 109 mg/L, and for 2003–2005 were 127, 108, and 97 mg/L, respectively, compared to the Basin Plan criterion of 85 mg/L. TDS values were not available for this site in 2002.
- **Mammoth Creek at Highway 395** - Annual average TDS values for 2000–2005 were 117, 100, 81, 94, 92, and 85 mg/L, respectively, compared to the Basin Plan criterion of 75 mg/L.

The annual averages reported for TDS at the Mammoth Creek sites are comprised of only one to four samples each, and therefore may not accurately reflect true average conditions (Lahontan RWQCB 2007). Further, many of the TDS exceedances are marginal. As an example, at the Mammoth Creek tributary site, the annual average TDS values exceeded the Basin Plan's criterion only once (for year 2003), and that annual average was based on a single sample that barely exceeded the criterion (i.e., result of 86 mg/L compared to Basin Plan objective of 85 mg/L). Also, the average of all eight TDS samples collected at the tributary site from 2003–2005 was 84 mg/L, which suggests compliance with the Basin Plan's objective of 85 mg/L.

Table 5-3. Water Quality Monitoring Results for Mammoth Creek (2000-2005) Comparing the Number of Exceedances to Basin Plan Criteria

Station Name	pH	DO	TDS	FC	Cl	F	SO4	B	NO3	TN	PO4	Pesticides	Total Number of Data Points
Mammoth Creek Tributary	0/8	0/8	1/3	2/5	1/3	NA	NA	NA	0/3	0/3	0/3	-	36
Mammoth Creek at Twin Lakes	2/15	5/15	5/5	0/5	1/5	NA	NA	NA	0/5	0/5	0/4	-	59
Mammoth Creek at Old Mammoth Road	0/8	3/9	4/4	1/5	0/4	NA	NA	NA	0/4	0/4	0/3	-	41
Mammoth Creek at Hwy 395	0/20	3/14	6/6	3/5	0/6	1/5	2/5	0/6	0/6	0/6	4/6	-	85
Total Potential Exceedances	2	11	16	6	2	1	2	0	0	0	4	-	44 / 221

B – Boron
Cl – Chloride
DO – Dissolved Oxygen
F – Flouride
FC – Fecal Coliform Bacteria
NO3 – Nitrate
PO4 - Orthophosphate
SO4 – Sulfate
TDS – Total Dissolved Solids
TN – Total Nitrogen
Source: Lahontan RWQCB 2007

Therefore, while TDS at the tributary site is reported as having a potential exceedance in 2003, the weight of evidence suggests that TDS is not a substantial problem at this site (Lahontan RWQCB 2007). Overall averages for three sites along Mammoth Creek indicate that TDS may be an issue of concern for Mammoth Creek. While these TDS levels are not known to adversely affect the designated beneficial uses, they may exceed the Basin Plan's numeric objectives. Because it is unlikely that additional data is available from other sources, the Lahontan RWQCB (2007) states that additional sampling is required to accurately characterize average TDS concentrations at these sites.

Potential exceedances were also observed for chloride (Cl) at two Mammoth Creek sites, and for fluoride (F) and sulfate (SO4) at one site (Lahontan RWQCB 2007). However, the results for these three analytes are based on very low sample sizes, and the calculated annual averages probably do not accurately represent ambient conditions. While two data points (e.g., Twin Lakes site in 2001, tributary site in 2003) are reported as potential exceedances, the weight of evidence indicates that Cl is not a significant issue at Mammoth Creek (Lahontan RWQCB 2007).

Lahontan RWQCB (2007) reports that one potential exceedance for F and two potential exceedances for SO4 also were observed at the Highway 395 site, but in all three cases the annual averages were comprised of a single sample, which probably does not accurately reflect true average conditions. The single-sample results only marginally exceeded the Basin Plan's annual average criteria, and all other results for F and SO4 at the Mammoth Creek sites for

2000–2005 suggest compliance with Basin Plan objectives. While the three data points discussed above for the Highway 395 site (e.g., fluoride in 2000, sulfate in 2001 and 2005) are reported here as potential exceedances, the weight of evidence indicates that F and SO4 are not issues of concern in Mammoth Creek (Lahontan RWQCB 2007).

Potential exceedances for orthophosphate (PO4) were observed at one site (e.g., Mammoth Creek at Highway 395), in four out of six years sampled. However, the data for PO4 are inconclusive, and more detailed investigation is required to accurately characterize ambient levels of PO4 at the site (Lahontan RWQCB 2007).

Some of the California Toxics Rule (CTR) criteria for metals also were investigated at the Mammoth Creek sites as part of the SWAMP sampling program. None of the sites sampled exceeded CTR aquatic life criteria (Lahontan RWQCB 2007). However, thirteen of the 42 samples collected for mercury (Hg) exceeded the CTR human health criteria. These exceedances were present at three site locations (e.g., Mammoth Creek tributary, Mammoth Creek at Old Mammoth Road, Mammoth Creek at Highway 395). While the CTR human health criterion for total Hg (i.e., 0.05 µg/L) was exceeded in thirteen samples, the California drinking water standard (Primary MCL = 2 µg/L) was met in all cases (Lahontan RWQCB 2007).

Lahontan RWQCB (2007) also reports that potential exceedances of the Basin Plan's region-wide objective for minimum DO concentration (i.e., 8.0 mg/L) were observed at three of the Mammoth Creek sites – Mammoth Creek at Twin Lakes, Mammoth Creek at Old Mammoth Road, and Mammoth Creek at Highway 395. Most of the "low" DO measurements occurred during the summer and autumn months. Lahontan RWQCB (2007) further states that, due to the naturally wide diurnal and seasonal fluctuations in DO concentration, these results should not be considered conclusive and more frequent sampling would be required to accurately characterize DO concentrations at these sites.

Several potential exceedances of the Basin Plan's objectives for fecal coliform bacteria (FC) were observed at the Mammoth Creek sites. All of the potential exceedances were observed during the summer or autumn months. While these results are reported as potential exceedances, they are based on single samples, and the Basin Plan advises collecting FC samples at least five times in a 30-day period for comparison to the 30-day log mean criterion. Therefore, the results should not be considered conclusive and more detailed investigation would be required to accurately characterize ambient levels of FC bacteria at these sites (Lahontan RWQCB 2007).

During August 2002 and July 2004, potential exceedances of the Basin Plan's region-wide objective for pH occurred at Mammoth Creek at Twin Lakes. Those two pH values were 8.8 and 8.6 pH units, respectively, compared to the Basin Plan's objective of 8.5. The Basin Plan acknowledges that some waters of the Region may have natural pH levels outside of the 6.5 to 8.5 range, and further investigation would be required to accurately characterize ambient pH levels at this site (Lahontan RWQCB 2007).

CALIFORNIA TROUT-EASTERN SIERRA PROGRAM

As part of the Sierra Watershed Alliance, CalTrout and the Eastern Sierra Water Watchers have recently implemented a community-based volunteer program to monitor water quality in Mammoth Creek (e.g., ambient conditions including water temperature, DO, pH, electrical conductivity and turbidity, BMI, and stream walk surveys to conduct visual assessments for use as screening tools to help focus more detailed investigations). Published reports regarding this water quality monitoring program are pending.

5.1.2.4 HOT CREEK

According to Lahontan RWQCB (2005a), designated beneficial uses for Hot Creek are the same as for Mammoth Creek, with the additions of industrial service supply and aquaculture, and the subtraction of freshwater replenishment.

Hot Creek was formerly listed as "impaired" on the SWRCB's 303(d) list due to high ambient levels of metals, primarily because fish in Hot Creek were found to contain high concentrations of silver and nickel (Lahontan RWQCB 1994). However, these metals are mostly naturally occurring, and are due in part to geothermal sources (Lahontan RWQCB 1994; Sierra Nevada Alliance 2006). For similar reasons described above for Mammoth Creek, during 2002 Hot Creek was delisted for metals during the 303(d) List update cycle (SWRCB 2006). No impairments for Hot Creek were identified on the 2006 303(d) List, or on the proposed 2010 Section 303(d) List for the Lahontan Region.

The Lahontan RWQCB has established selective water quality objectives for Hot Creek. The selective standards for Hot Creek (see **Table 5-4**) include criteria for TDS, chlorine, sulfate, floride, boron, nitrogen (as nitrate), total nitrogen, and orthophosphate (Lahontan RWQCB 2005a).

Table 5-4. Lahontan RWQCB Water Quality Objectives for Hot Creek

Surface Water	Objective (mg/L) [1,2]							
	TDS	Cl	SO4	F	B	NO3-N	Total N	PO4
Hot Creek (at County Rd)	<u>275</u> 380	<u>41.0</u> 60.0	<u>24.0</u> 35.0	<u>1.80</u> 2.80	<u>1.80</u> 2.60	<u>0.2</u> 0.4	<u>0.3</u> 1.5	<u>0.65</u> 1.22

[1]Annual average value/90th Percentile Value.
[2]Objectives are as mg/L and are defined as follows:
B - Boron; NO3-N - Nitrogen as Nitrate; SO4 - Sulfate; TDS - Total Dissolved Solids
Cl - Chloride; PO4 - Dissolved Orthophosphate; F - Fluoride
Source: Lahontan RWQCB 2005a.

The USGS (2007) further reports that the quality and water temperature of Hot Creek is generally acceptable for sustaining aquatic organisms, including a robust population of wild trout. Nevertheless, very rapid changes in thermal spring discharge can sometimes raise water temperatures high enough to kill fish and other organisms if they are present in the immediate area. Hot Creek flows entering the thermal area are relatively pure, but flows leaving the area are higher in dissolved substances because the mineralized hot spring water mixes with streamflow (USGS 2007). Hot Creek contains moderate to high concentrations of geothermal trace elements, including boron, fluoride, arsenic, and antimony (DWR 1967; USGS 1984 in SWRCB 1993).

Because the hot spring water is naturally enriched in dissolved minerals, it is reported to be rich in sodium bicarbonate and contains high concentrations of arsenic, boron, and fluoride, all in excess of safe drinking-water standards (USGS 2007). Historical data also indicate that Hot Creek has high (0.26 mg/l mean) concentrations of phosphate (SWRCB 1993). Both the hot springs and the Hot Creek Fish Hatchery reportedly are significant sources of phosphorus, which has resulted in abundant growth of algae and macrophytes in Hot Creek (USGS 1984 in SWRCB 1993).

Since at least 1981, evidence of eutrophication has been observed in the reach of Hot Creek below the fish hatchery. USGS (1984) reports abundant growth of aquatic vascular plants and algae in Hot Creek were observed during 1981/1982 field activities. In recent years, luxuriant macrophytic growth has been observed throughout the springbrook reaches of Hot Creek, and extending below the confluence of Mammoth and Hot creeks (Jellison et al. 2007). However, evidence suggests that the presence of dense aquatic macrophyte communities in this reach of Hot Creek may be due to nutrient inputs resulting from Hot Creek Fish Hatchery operations and from natural sources.

In response to a request from the Lahontan RWQCB to address potential effects of Hot Creek Fish Hatchery operations, CDFG entered into an interagency agreement with the University of California to conduct stressor identification studies in Mammoth and Hot creeks (Jellison et al. 2007). Annual bioassessment monitoring of benthic macroinvertebrates (BMI), as well as water quality and sediment sampling, was conducted from 2000 through 2006. The spatial extent of the studies was limited to that of existing benthic macroinvertebrate data from Mammoth and Hot Creeks in the vicinity of the hatchery (see **Table 5-5**).

Table 5-5. BMI Sampling Sites in Mammoth Creek and Hot Creek from 2000 through 2006

Site Code	Site Description	Years Sampled						
		2000	2001	2002	2003	2004	2005	2006
HC-ABS	AB Springbrook Upstream of the Hatchery		X	X	X	X	X	X
HC-CDS	CD Springbrook Upstream of the Hatchery		X	X	X	X	X	X
HC-H3	Hot Creek below Settling Pond#1 Outflow			X	X	X	X	X
HC-H2	Hot Creek below Hatchery and Settling Ponds	X	X		X	X	X	X
MC-H1	Mammoth Creek above MC-H2				X	X	X	X
MC-H2	Mammoth Creek above MC-H4					X	X	X
MC-H4	Mammoth Creek near Confluence with Hot Creek	X	X	X	X	X	X	X
HC-UH7	Hot Creek Immediately below Confluence with Mammoth Creek					X	X	X
HC-H7	Hot Creek above Hatchery II Discharge	X	X	X	X	X	X	X
HC-H8	Hot Creek below Hatchery II Discharge	X	X	X	X	X	X	X
HC-H9	Hot Creek between H8 and the Downstream Property Line of Hot Creek Ranch	X**	X**				X	X
HC-H10	Hot Creek near the Downstream Property Line of Hot Creek Ranch						X	X
***The 2000 and 2001 Hot Creek Ranch site is closest to the current site, HC-H9. Source: Jellison et al. 2007*								

High nutrient content of spring source waters or organic loadings from the hatchery may promote the growth of macrophytes or filamentous algae that diminish the periphyton community through shading. Jellison et al. (2007) concluded that "…*hatchery metabolic waste products contribute significantly to nitrogen enrichment*" and that dissolved inorganic phosphorus concentrations remain in excess of plant growth requirements in Hot Creek waters throughout the area studied (i.e. through lower Hot Creek Ranch). Reportedly, the hatchery source springs also are high in nitrate.

Based on the available evidence and the scientific literature, Jellison et al. (2007) conclude that total suspended solids in hatchery discharges are likely to be a secondary cause of the impacts in Hot Creek. The stressor identification study recommended that implementation of appropriate pond maintenance and solids removal would reduce these sediment-related effects, and that additional water quality measurements need to be conducted to address remaining uncertainties. CDFG is coordinating with Lahontan RWQCB staff to implement facility improvements in an effort to reduce the observed in-stream effects.

Analyses conducted for the Hot Creek Fish Hatchery in CDFG's EIR/EIS for its Fish Hatchery and Stocking Program (2010) indicate that the maximum nitrate (0.81 mg/L and total nitrogen (1.76 mg/L N) concentrations in undiluted hatchery discharges from the settling ponds have the potential to exceed the Basin Plan-specific annual average nitrate (0.2 mg/L) and total nitrogen (0.13 mg/L N) water quality objectives applicable to Hot Creek. However, the geothermal springs that are the source water supply for the hatchery and Hot Creek also are high in nitrogen, and often represent the majority of the concentrations present in the hatchery discharges. Nitrate is often higher in the springs than in the hatchery discharges, and the incremental increases in nitrogen associated with the hatchery are primarily in the form of total nitrogen. Therefore, it is believed that a majority of the nutrients would flow downstream of the hatchery via Hot Creek regardless of whether or not the hatchery was present (CDFG 2010).

Although available phosphorus data (i.e., orthophosphate and total phosphorus) are more limited than nitrogen data, CDFG (2010) reports that orthophosphate concentrations in Hot Creek increase to a lesser degree than nitrate and total nitrogen. Maximum orthophosphate and nitrate concentrations are reportedly similar in the source water and hatchery water, whereas the maximum hatchery total nitrogen concentrations are up to 2.6 times higher than source water concentrations. The orthophosphate concentrations in both the hatchery discharges and source water are lower than the Basin Plan objectives applicable to Hot Creek. Moreover, phosphate in Hot Creek spring water is present at sufficient concentrations such that aquatic algae growth is not limited by changes in phosphate concentrations (Jellison et al. 2007). Additionally, CDFG (2010) reports that the majority of orthophosphate in hatchery discharge water (i.e., greater than 75%) is contributed by the naturally elevated phosphate concentrations in the Hot Creek spring source water supply.

CDFG (2010) concludes that water quality effects of hatchery discharges on nutrient biostimulation in receiving waters would result in a less-than-significant impact because: (1) numeric water quality criteria/objectives do not exist for nutrients, and the narrative objective with regard to excessive biostimulation is not exceeded due to hatchery discharges beyond the zone of initial mixing; and (2) degradation of water quality with regard to nutrients would not be of a frequency or magnitude that it would cause adverse effects on non-aquatic life beneficial uses of the receiving waters. However, CDFG is coordinating with Lahontan RWQCB staff to implement facility improvements and changes in hatchery settling pond operations (settling pond flow routing in series versus parallel), and to remove solids from the settling ponds in an effort to reduce the observed in-stream effects. Additionally, the Lahontan RWQCB and CDFG are conducting studies and developing response actions to address the potential contributions of nutrients from the hatchery discharges to better understand the biostimulation conditions in Hot Creek downstream of the Hot Fish Creek Hatchery (CDFG 2010).

The Hot Creek Fish Hatchery has been in operation since 1931, and is currently operating under NPDES Permit No. CA0102776. In May 2009, the Lahontan RWQCB issued Time Schedule Order (TSO) No. R6V-2009-0016 to the discharger, CDFG, to develop and implement a compliance plan for the Hot Creek Fish Hatchery. Based on the data provided in CDFG's self-monitoring reports, the wastewater discharged from the hatchery was in chronic violation of its effluent limitations for flow and nitrate + nitrite as Nitrogen (Lahontan RWQCB 2009). In response to these chronic violations, the Lahontan RWQCB prepared a draft TSO pursuant to Water Code Section 13300. The TSO provided a schedule for CDFG to develop, submit, and implement methods of compliance that may include pollution prevention activities and constructing new treatment facilities. The TSO also provided interim effluent limitations for flow and nitrite + nitrate as Nitrogen. Additionally, the draft TSO identified a sampling and monitoring plan at multiple sampling and monitoring points throughout the facility (Lahontan RWQCB 2009).

In February 2010, the Lahontan RWQCB issued an administrative civil liability complaint to CDFG alleging that numerous violations of the effluent discharge limitations specified in National Pollutant Discharge Elimination System (NPDES) Permit No. CA0102776 for the Hot Creek Fish Hatchery occurred from August 14, 2006 through May 4, 2009. The complaint identified 16 serious violations[1] and 74 chronic violations[2], most of which are related to the exceedance of nitrate and nitrite over the average monthly effluent limit specified in Board Order No. R6V-2006-0027, NPDES Permit No. CA0102776 (Lahontan RWQCB 2010). In April 2010, the Lahontan RWQCB adopted Board Order R6V-2010-0016, which affirmed the liability described in the February complaint and ordered enforcement actions (Lahontan RWQCB 2010a).

5.2 REGULATORY SETTING

Responsibility for surface water quality in California is shared between federal, state and local agencies. The EPA, SWRCB, Lahontan RWQCB, Mono County and the Town of Mammoth Lakes regulate water quality in the Project Area (Town of Mammoth Lakes 2007). The SWRCB and the Lahontan RWQCB are responsible for the water rights and water quality functions of the state. The DDWEM also issues permits to domestic water suppliers for use of surface water or groundwater as a drinking water source. The following section describes the federal, state, and local regulatory framework for water quality requirements.

5.2.1 FEDERAL CLEAN WATER ACT

The federal CWA is a comprehensive set of statutes aimed at maintaining and restoring the chemical, physical and biological integrity of the nation's waters. The CWA is the foundation of surface water quality protection in the United States[3]. The CWA contains a variety of regulatory and non-regulatory tools to significantly reduce direct pollutant discharges into waters of the United States, to finance municipal wastewater treatment facilities, and to manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "*the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water*." While initial authority for the implementation and enforcement of the CWA rests with the EPA, the CWA places the primary responsibility for the control of surface water pollution and for

[1] Water Code Section 13385(h)(2) provides that a "serious violation" occurs if a discharge exceeds the effluent limitations (1) by 40% or more for a Group I pollutant, as specified in Appendix A to Section 123.45 of Title 40, Code of Federal Regulations; or (2) by 20% or more for a Group II pollutant, as specified in Appendix A to Section 123.45 of Title 40, Code of Federal Regulations.

[2] Water Code Section 13385(i) states that "*… a mandatory minimum penalty of three thousand dollars ($3,000) shall be assessed for each violation whenever the person does any of the following four or more times in any period of six consecutive months, except that the requirement to assess the mandatory minimum penalty shall not be applicable to the first three violations: (A) Violates a waste discharge requirement effluent limitation; (B) Fails to file a report pursuant to Section 13260; (C) Files an incomplete report pursuant to Section 13260; (D) Violates a toxicity effluent limitation contained in the applicable waste discharge requirements where the waste discharge requirements do not contain pollutant-specific effluent limitations for toxic pollutants.*"

[3] http://www.epa.gov/watertrain/cwa/

planning the development and use of water resources with the states. In California, the overall regulation, protection and administration of water quality is carried out by the SWRCB.

The CWA requires states to adopt water quality standards for waterbodies and have those standards approved by the EPA. Water quality standards consist of designated beneficial uses for a particular waterbody, along with water quality criteria necessary to support those uses. Water quality criteria are set concentrations or levels of constituents (e.g., lead, suspended sediment, and fecal coliform bacteria) or narrative statements which represent the quality of water supporting a particular use. Because California has not established a complete list of water quality criteria acceptable to the EPA, Region 9 of the EPA has established numeric water quality criteria for toxic constituents in the form of the CTR, described below.

When designated beneficial uses of a particular waterbody are being compromised by water quality, Section 303(d) of the CWA requires identifying and listing that water body as impaired. Once a water body has been deemed impaired, a TMDL must be developed for each impairing water quality constituent.

5.2.2 FEDERAL ANTIDEGRADATION POLICY

Water quality in the Project Area is subject to the federal antidegradation policy which was enacted pursuant to the Clean Water Act. (40 CFR, § 131.12.) The antidegradation policy establishes general narrative water quality standards which apply where other water quality standards do not address a particular pollutant.

The federal antidegradation policy applies to reductions in water quality which occurred or threatened to occur after the policy was adopted in November 1975. Water quality objectives must, at a minimum, be consistent with the federal antidegradation policy, but other considerations may call for setting objectives which provide a higher level of water quality. Water quality objectives must also protect the beneficial uses designated for protection, even if 1975 water quality was not adequate to protect those uses. (40 C.F.R. § 131.11(a); Cal. Water Code § 13241(a).)

Water quality standards include an antidegradation policy and implementation method (EPA 2009). As described by the EPA (2009), the antidegradation policy establishes a three-part test for determining when reductions in water quality may be permitted.

- **Tier 1** - The first tier of protection under the antidegradation policy requires that "*existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained*." (40 CFR § 131.12(a)(1).) An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur (EPA 2009). Additionally, where an existing use is established, it must be protected even if it is not listed in the water quality standards as a designated use. Tier 1 requirements are applicable to all surface waters (EPA 2009).
- **Tier 2** – The second tier applies to situations where water quality exceeds the level necessary to support fish, shellfish, wildlife and recreation. In that situation, the federal antidegradation policy requires that existing water quality be maintained unless it finds that: "*...allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully....*" *(40 CFR § 131.12(a)(2).)*

- **Tier 3** – The third tier provides that: "*Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.*" *(40 CFR § 131.12(a)(3), emphasis added.)* Except for certain temporary changes, water quality cannot be lowered in such waters. Outstanding National Resource Waters (ONRWs) generally include the highest quality waters of the United States. However, the ONRW classification also offers special protection for waters of exceptional ecological significance (i.e., those which are important, unique, or sensitive ecologically). Decisions regarding which water bodies qualify to be ONRWs are made by States and authorized Indian Tribes (EPA 2009).

Antidegradation implementation procedures identify steps and questions that must be addressed when regulated activities are proposed that may affect water quality. The specific steps to be followed depend upon which tier, or tiers, of antidegradation apply (EPA 2009).

SWRCB Resolution No. 68-16, the "Statement of Policy with Respect to Maintaining High Quality of Waters in California", satisfies the requirement that the State have a policy which, at a minimum, is consistent with the federal antidegradation policy (SWRCB 1987). The SWRCB (1987) has interpreted Resolution No. 68-16 to incorporate the federal antidegradation policy in situations, where the federal antidegradation policy is applicable, to ensure consistency with federal CWA requirements.

5.2.3 CALIFORNIA TOXICS RULE

As part of the CTR, the EPA has promulgated numeric water quality criteria for priority toxic pollutants and other provisions for water quality standards to be applied in receiving waters with human health or aquatic life designated uses in California. The EPA promulgated this rule based on the EPA administrator's determination that the numeric criteria are necessary in California to protect human health and the environment. The rule fills a gap in California water quality standards that was created in 1994, when a state court overturned the state's water quality control plans containing water quality criteria for priority toxic pollutants. Therefore, California was without numeric water quality criteria for many priority toxic pollutants as required by the CWA, necessitating this action by the EPA. These federal criteria are legally applicable in California for inland surface waters, enclosed bays, and estuaries under the CWA.

CTR criteria are applicable to the receiving waterbody and calculated based upon the probable hardness values of the receiving waters for evaluation of acute (and chronic) toxicity criteria. At higher hardness values for the receiving water, copper, lead, and zinc are more likely to be complexed (bound with) components in the water column. This, in turn, reduces the bioavailability and resulting potential toxicity of these metals. The CTR criteria do not apply directly to discharges of urban runoff, but rather to specified receiving waters.

5.2.4 PORTER-COLOGNE WATER QUALITY ACT

The federal CWA places the primary responsibility for the control of water pollution and for planning the development and use of water resources with each state. Enacted in 1969 and amended in 2010, the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) designates the SWRCB and the RWQCBs as the principal agencies with responsibility for the control of water quality in California. Under the Porter-Cologne Act, the SWRCB is required to adopt water quality policies, plans, and objectives that protect state waters for public use and enjoyment. In their respective regions, the RWQCBs engage in several water quality functions.

One of the most important is preparing and periodically updating Water Quality Control Plans (WQCPs), which specify the beneficial uses to be protected within a particular region. RWQCBs also regulate pollutant or nuisance discharges that may affect either surface water or groundwater, including non-point source discharges to surface water. Additionally, the SWRCB, in acting on water rights applications, may establish terms and conditions in water rights permits to help implement WQCPs.

5.2.5 LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD BASIN PLAN

Pursuant to the Porter-Cologne Act, the primary mechanism by which maintenance and control of water quality is accomplished is a region-specific water quality control plan, or basin plan. Water quality objectives, as defined by the Porter-Cologne Act (California Water Code Division 7, Section 13050(h)), are the "*limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses or the prevention of nuisance within a specific area*." Thus, water quality objectives are intended to protect the public health and welfare, and to maintain or enhance water quality in relation to the existing and/or potential beneficial uses of the water (LRWQCB 1994a). Under the CWA (40 CFR 131.10[g]), exceptions to water quality objectives can be granted if the source of the pollutant is natural. Beneficial uses are a controlling factor in establishing water quality objectives for a particular waterbody, or group of waterbodies. Beneficial uses are identified during the development of a water quality control plan, and the level of water quality needed to protect and maintain those uses is determined.

In the Project Area, the Lahontan RWQCB is responsible for establishing water quality standards and objectives that protect the beneficial uses of various waters in the region, as well as for protecting surface and groundwater from both point and non-point sources of pollution. The Lahontan RWQCB adopted the Basin Plan for the Lahontan Region in 1994. The Basin Plan has since been amended several times. The Basin Plan designates the beneficial uses of receiving waters, including those within the Project Area.

The Non-Degradation Objective of the LRWQCB Basin Plan requires the ongoing maintenance of existing high quality waters in the region. In addition to the Non-Degradation Objective, numerical and narrative water quality objectives have been developed for the following constituents: ammonia, bacteria (coliform), bio-stimulatory substances, chemical constituents, chlorine (total residual), color, dissolved oxygen, floating materials, oil and grease, non-degradation of aquatic communities and populations, pesticides, pH, radioactivity, sediment, settleable materials, suspended materials, taste and odor, temperature, toxicity, and turbidity. The numerical and narrative objectives apply to all surface waters in the Lahontan Region.

In 2009, the Lahontan RWQCB undertook a triennial review of the Basin Plan. One of the priority actions identified from this review was the need for a Basin Plan update, which is scheduled to be completed in 2012 (Lahontan RWQCB 2009). Potential revisions are anticipated to include, but are not limited to addressing new and revised SWRCB plans and policies, CTR standards, clarification of bacteria objectives, a nonpoint source plan, as well as the Surface Water Ambient Monitoring Program (Lahontan RWQCB 2009).

5.2.6 STRATEGIC PLAN FOR THE STATE WATER RESOURCES CONTROL BOARD AND THE REGIONAL WATER QUALITY CONTROL BOARDS

The water resource protection efforts of the SWRCB and the RWQCBs are guided by a five year Strategic Plan, and one of the key components of the plan involves a watershed management approach for water resources protection (Lahontan RWQCB 2002). To protect water resources, the

Strategic Plan states that point and nonpoint source discharges, ground and surface water interactions, and water quality/water quantity relationships must be considered within a watershed context. The plan includes a Watershed Management Initiative (WMI) Chapter for each Regional Board. The WMI is designed to integrate various surface and groundwater regulatory programs while promoting cooperative, collaborative efforts within a watershed by supporting the development of local solutions with participation of multiple affected parties (Lahontan RWQCB 2005). Sections of the WMI are updated annually.

The Lahontan Region was one of three pilot regions selected by the EPA and the SWRCB to develop a process to integrate program priorities with watershed considerations. Under the California Unified Watershed Assessment prepared in accordance with the federal Clean Water Action Plan, the entire Owens River watershed is designated as a 'Category 1' Priority. Although the Strategic Plan and WMI are non-regulatory workplans, the upper reaches of the Owens River system, including Mammoth and Hot creeks, have been selected as a target subwatershed for this effort (Lahontan RWQCB 2005).

5.2.7 Water Quality Management Plan for National Forest System Lands in California

In 1981, pursuant to CWA Section 208, the SWRCB: (a) certified the USFS Water Quality Management Plan for National Forest System Lands in California, including its BMPs; (b) designated USFS as the water quality management agency for implementing the plan; and (c) executed a management agency agreement with the USFS. The BMPs were updated in 2000.

The Lahontan RWQCB, SWRCB, USFS, and others are in the process of updating the Water Quality Management Plan for National Forest System lands in California, anticipated for SWRCB approval by January 2011 (SWRCB 2009). This plan will replace the existing Water Quality Management Plan, which was originally certified by the SWRCB in 1981 (SWRCB 2009). The revised plan may address legacy problem sites, impaired waterbodies, monitoring programs, adaptive management, needed future actions, and reporting. In addition, the revised plan is anticipated to include BMP modules for selected activities on USFS lands that may impact water quality (e.g., timber harvest, forest roads, off-highway vehicles, recreation areas, and grazing) (SWRCB 2009).

5.2.8 Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) and associated amendments serve to control water quality constituent concentrations of treated water that is delivered to users of municipal drinking water supply systems. The DDWEM is designated by the EPA as the primary agency authorized to develop drinking water standards for human health protection, and to administer and enforce the requirements of the SDWA in California. Public water systems are required to monitor for regulated contaminants in their drinking water supply. California's drinking water standards (e.g., MCLs) are the same or more stringent than the federal standards, and include additional contaminants not regulated by the EPA. Like the federal MCLs, California's primary MCLs address health concerns, while secondary MCLs address esthetics, such as taste and odor. The California SDWA is administered by DDWEM primarily through a permit system.

5.2.9 Drinking Water Supply Permits

Under the California SDWA, with some exceptions, water supply permits are required for drinking water supply systems. Water supply permit applications must demonstrate that source water quality can be treated to drinking water standards. Water quality provisions within the permit are enforceable by the DDWEM or a county agency with delegated authority.

5.2.10 Town of Mammoth Lakes Storm Drain Master Plan

In May 2005, the Town of Mammoth Lakes updated its 1984 Storm Drain Master Plan (Town of Mammoth Lakes 2005). The Storm Drain Master Plan was primarily formulated to remedy local drainage and erosion problems and accommodate projected buildout by establishing a program to rehabilitate existing development areas, while also providing policies, standards, and procedures to guide future development (Town of Mammoth Lakes 2008). The Storm Drain Master Plan strives to retain or improve natural streams where possible, and also includes guidelines for erosion control in the Mammoth Lakes area.

5.3 Environmental Consequences

Each of the waterbodies in the Project Area has multiple beneficial uses, and exists within an established regulatory framework that mandates specific water quality requirements and related concerns. Although a limited degree of water quality impairment has been identified within the Project Area, the District's surface water diversions do not directly contribute to the amount or rate of constituent loading in receiving waterbodies. However, analyses of potential changes in water quality that could result from implementation of the Proposed Project Alternative or another alternative are conducted in this Draft EIR by examining whether reductions in assimilative capacity, or dilution potential, would be expected to occur.

To assess the potential impacts that would be expected to occur as a result of implementing any of the alternatives considered in this Draft EIR, the discussion presented below addresses the methodology used, identifies surface water quality impact indicators and significance criteria, and includes an analysis of alternative comparisons.

5.3.1 Impact Assessment Methods

In California, numerous environmental documents have been published over the past 15 years that have addressed potential impacts on water quality. A review of the water quality methods and significance criteria used in those previous documents was undertaken to determine appropriate methods and significance thresholds for this Draft EIR. Some of the documents consulted included:

- Programmatic EIS for the Central Valley Project Improvement Act
- Programmatic EIS for the CALFED Bay-Delta Program
- Los Vaqueros Reservoir EIR/EIS
- Delta Wetlands EIR/EIS
- Trinity River Mainstream Fisheries Restoration Program EIS
- Freeport Regional Water Project EIR/EIS
- Environmental Water Account EIS/EIR
- Oroville Facilities Relicensing FERC Project No. 2100 EIR
- Lower Yuba River Accord EIR/EIS
- P.L. 101-514 USBR/EDCWA CVP Water Supply Contract EIS/EIR
- Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement (Monterey Plus) EIR

For these documents, hydrologic modeling data served as the primary assessment tool for the evaluation of potential project-related water quality impacts. Potential water quality impacts were evaluated using results (e.g., instream flows, reservoir releases and reservoir storage levels) simulated by DWR/Reclamation's mass-balance hydrology and water operations model. Potential impacts to water quality were determined through an evaluation of the degree of hydrologic change between the basis of comparison and the project alternatives, as compared to thresholds of significance relating to designated beneficial uses, exceedance of existing water quality standards, and degradation of water quality.

Applying the same conceptual principles regarding beneficial uses, dilution potential for constituents of concern and assimilative capacity of receiving waters that were the basis of the methods and significance thresholds used in the aforementioned environmental documents, the following methods were developed for the water quality impact assessment conducted for this Draft EIR. As previously discussed, the proposed project would not involve any construction-related activities and, thus, potential water quality-related impacts would be associated with operations-related changes only. The analysis relies on changes in Mammoth Creek and Hot Creek flows to determine potential water quality effects that could occur as a result of the proposed project.

The MCWD Model was used to evaluate the potential hydrologic effects of the Proposed Project Alternative and other alternatives, from Lake Mary downstream to the USGS Hot Creek Flume Gage.

5.3.1.1 MAMMOTH CREEK AND HOT CREEK

Water quality constituent concentrations are usually highly correlated with stream flow, and flow is strongly weather-dependent. Thus, constituent loads, calculated as pollutant concentration multiplied by stream flow, have a large weather-dependent variance component (Stow and Borsuk 2003). Water quality constituents on the 303(d) List are candidates for TMDL development, which generally focuses on either reducing the load of pollutants into a waterbody, or increasing the dilution of pollutants (Reclamation 2010).

A TMDL is defined as the total quantity of a pollutant that can be assimilated by a receiving waterbody while achieving the water quality standard, and is expressed as the sum of all point source and non-point source loads (EPA 2007). Although completion of many TMDLs for Mammoth Creek is not anticipated until 2019, some of the analytical principles associated with flow and water quality relationships recommended by the EPA for use in TMDL development also may be applied for impact assessment purposes in this Draft EIR.

A TMDL technical analysis often relies on an accurate understanding of the flow regime of the waterbody under consideration (Pickett 2004). Hydrology is often critical to modeling nonpoint source pollution because water flow and routing are the basic transport mechanisms for most pollutants (ODEQ 2010a). According to the EPA (2008), while temporal variations in water quality can be affected by source activity, they are more often related to environmental conditions such as weather and resulting flow patterns. When the source of a pollutant is fairly constant in its frequency and magnitude, low flow (i.e., the period of minimum dilution) is typically the critical condition for the receiving water (EPA 2010; EPA et al. 2002). Dilution is the primary mechanism by which the concentrations of contaminants (e.g., mercury) from point and some non-point sources are reduced. However, during a low flow event, there is less water available to dilute effluent loadings, resulting in higher in-stream concentration of pollutants (EPA 2010). Evaluating the relationship between water quality, flow and seasonality can be done using a variety of techniques including visual comparison of graphed time series data, regression analyses, or the use of flow duration curves (EPA 2008).

Two common methods used to calculate stream flows for water quality standards include the hydrologically-based design flow method, and the biologically-based design flow method.

Originally developed by the USGS to evaluate relationships between water supply and high flows, the hydrologically-based design flow method is presently used by most states because design flow statistics such as the 7Q10 (the lowest 7-day average flow that occurs on average once every 10 years) are used to define low flow for the purpose of setting permit discharge limits (EPA 2010). The advantage of this method is that it utilizes extreme value analytical techniques (e.g., log-Pearson Type III flow estimating technique) supported by past engineering and statistical practice (EPA 2010). Statistical measures of low flow discharge (e.g., 7Q10) are usually required, but may not accurately assess future flows where water withdrawals are increasing over time or where flow is regulated by an impoundment (Pickett 2004). Another disadvantage of this method is that it is independent of biological considerations and it cannot easily utilize site-specific durations and frequencies that are sometimes specified in aquatic life criteria (EPA 2010).

A biologically-based design flow method was developed by the EPA, which examines all low flow events within a period of record, even if several occur in one year. The biologically-based design flow is intended to examine the actual frequency of biological exposure (EPA 2010). The method directly uses site-specific durations (i.e., averaging periods) and frequencies specified in the aquatic life criteria. Because biologically-based design flows are based on durations and frequencies specified in water quality criteria for individual pollutants and whole effluents, they can be based on the available biological, ecological, and toxicological information concerning the stresses that aquatic organisms, ecosystems, and their uses can tolerate (EPA 2010). However, this method is empirical, not statistical, because it deals with the actual flow record itself, not with a statistical distribution that is intended to describe the flow record (EPA 2010).

According to the EPA (2008), it is not always feasible or necessary to use watershed or receiving water models. Approaches to TMDL development that do not involve a water quality model are typically based on statistical analysis of ambient data or on an empirical calculation representing land-based processes (EPA 2008). As compared to water quality modeling approaches, they typically include a more simplified representation of watershed and receiving water processes (EPA 2008). However, modeling for a TMDL requires an accurate flow balance (Pickett 2004). Once a TMDL is developed and adopted, compliance with the TMDL may depend on how instream flows are managed. Pollutant allocations may depend on the flow levels used in the TMDL development, and further reductions in flow may allow standards to be exceeded. This may occur due to loss of dilution, shallower flow, slower stream velocities, or loss of cool groundwater inflows (Pickett 2004). While approaches (e.g., load duration curves, statistical analyses or mass balance analyses) not involving a water quality model might not quantitatively track the transport of loads as a water quality model can, EPA (2008) suggests that the TMDL analysis still involves a thorough data analysis and source evaluation to identify critical loading conditions for significant sources in the watershed and helps to identify key areas for management. Even though the analysis may not employ a quantitative link between various pollutant sources and particular stream reach segments, by understanding the contributions and impacts of all sources in the watershed, the analysis is still holistic (EPA 2008).

In developing TMDLs for impaired waterbodies, the EPA (2007) identifies a commonly applied approach of using load duration curves as a diagnostic tool identifying magnitude and frequency of concerns across various flows. Although the duration curve alone does not consider specific fate and transport mechanisms, which may vary depending on watershed and pollutant characteristics, the duration curve is appropriate in cases where flow is a primary driver in pollutant delivery mechanisms. Use of a duration curve in flow-induced nonpoint source situations more generally reflects actual loadings than in cases where flow is only one of many components influencing the overall loading. Some TMDLs focus on the average or median flow exceedance value, potentially resulting in allocations that are not protective enough during higher flow events. For this reason, EPA (2007) suggests that it is appropriate to apply the entire duration curve in the context of the TMDL.

Many states have begun to use load duration curves as a more robust method for setting TMDL targets, and an advantage of the duration curve framework in TMDL development is the ability to provide meaningful connections between allocations and implementation efforts (EPA 2007). Because the flow duration interval serves as a general indicator of hydrologic condition (e.g., wet versus dry, and to what degree), allocations and reduction targets can be linked to source areas, delivery mechanisms and an appropriate set of management practices. Traditional approaches towards TMDL development tend to focus on targeting a single value, which depends on a water quality criterion and design flow (EPA 2007). However, the single number concept does not work well when dealing with impairments caused by non-point source pollutant inputs (e.g., naturally occurring mercury, iron, manganese, phosphate and TDS). One of the more important concerns regarding nonpoint sources is variability in stream flows, which often causes different source areas and loading mechanisms to dominate under different flow regimes. EPA (2007) further suggests that TMDL development should consider factors that ensure adequate water quality across a range of flow conditions.

In consideration of aforementioned flow-related applications used in TMDL development, potential water quality effects to surface receiving waterbodies associated with the Proposed Project Alternative or another alternative are evaluated based on changes in the receiving water. As discussed in Chapter 4 - Hydrology, streamflow quantity and timing are critical components of water supply, water quality, and the ecological integrity of river systems (Poff et al. 1997). Streamflow, which is strongly correlated with many critical physicochemical characteristics of rivers, can be considered a master variable that limits the distribution and abundance of riverine species (Power et al. 1995 and Resh et al. 1988 in Poff et al. 1997) and regulates the ecological integrity of flowing water systems.

The five components of the flow regime used to characterize the entire range of flows and specific hydrologic phenomena (e.g., floods and low flows) that are vital to the integrity of river ecosystems include: (1) magnitude; (2) frequency; (3) duration; (4) timing; and (5) rate of change of hydrologic conditions (Poff et al. 1997). Changes to these components associated with the Proposed Project Alternative or other alternatives, relative to the Existing Condition, are evaluated and described in Chapter 4 - Hydrology. These evaluations are applicable to water quality in Mammoth and Hot creeks, and the specific methods include calculation of the following parameters.

- Cumulative exceedance probability distributions of daily flows at the OMR, OLD395 and USGS Hot Creek Flume gages under each of the alternatives, and under the Existing Condition, during each month of the 20-year evaluation period.

- Time series of daily flows at the OMR, OLD395 and USGS Hot Creek Flume gages under each of the alternatives, under the Existing Condition, and under the index of unimpaired conditions as a benchmark reference, during each runoff year over the 20-year evaluation period.
- The number of days that daily flows equal or exceed the flood flow value (Q_{20}) at the OMR Gage over the 20-year evaluation period under each of the alternatives, and under the Existing Condition.
- Total number of events (irrespective of duration) that daily flows equal or exceed the channel maintenance and flushing flow value ($Q_{1.75}$) at the OMR and USGS Hot Creek Flume gages over the 20 years included in the evaluation period under each of the alternatives, and under the Existing Condition.
- Total number of days that daily flows equal or exceed the channel maintenance and flushing flow value ($Q_{1.75}$) at the OMR and USGS Hot Creek Flume gages over the 20 years included in the evaluation period under each of the alternatives, and under the Existing Condition.

Water quality impact assessment methods additionally focus on the seasonal low flow period, which generally extends from August through February in Mammoth and Hot creeks. This additional focus is based upon the consideration that the potential for water quality impacts to occur would be emphasized during the low flow season due to potential decreased dilution capability.

In addition to contaminants, other water quality parameters such as turbidity and water temperature have the potential to affect fish populations in Mammoth and Hot creeks. Disturbance-related turbidity is not expected to increase under any of the alternatives because construction or alteration of features within the Mammoth and Hot Creek corridors that could result in the delivery of sediment to the creeks would not occur. However, as described in Chapter 4 – Hydrology, the $Q_{1.75}$ flow value is an indicator of high flows that occur on a relatively frequent interval (i.e., once every 1.75 years), and is an indicator of channel maintenance and flushing flows. As such, flows at this level (109.7 cfs at the OMR Gage in Mammoth Creek and 129.4 cfs at the USGS Flume Gage in Hot Creek) cleanse the stream bed of fine sediments, and consequently would produce temporary episodes of increased turbidity. Therefore, the frequency and duration of occurrence of these flow values are evaluated regarding potential impacts associated with any of the project alternatives, relative to the Existing Condition.

Similarly, the potential to exacerbate flooding in Mammoth Creek and associated potential increased contaminant loading due to stormwater runoff is evaluated by comparing the difference in the number of days of flows at the OMR Gage exceeding the stormwater drain design flow Q_{20} value (141 cfs).

Water temperature-related changes are important to consider because such changes may result in direct effects to water quality by changing the concentrations of molecules (e.g., O_2), as well as the rate at which molecular reactions occur between chemical constituents. Temperature also plays a role in how quickly certain physical, chemical and biological reactions occur. For example, the respiration and metabolic rates of most aquatic organisms tend to increase in warmer water. Increased water temperature also can accelerate oxygen demand and bacterial respiration associated with decomposition of organic matter. However, as discussed in Chapter 6 – Fisheries and Aquatic Resources, over the range of water temperatures and discharge levels examined in Mammoth Creek, water temperature appears to be more closely associated with air temperature than with stream flow. Statistical comparisons of mean daily water temperatures with stream flows showed a weak correlation (r = 0.37). Furthermore, a positive correlation (i.e., increased water temperature associated with increased stream flow) was observed rather than the expected negative association. By contrast, water temperature was strongly correlated (r = 0.90) with average air temperature (i.e., average of daily maximum and minimum), as recorded by the USFS at Mammoth Lakes. Because of the greater influence of air temperature on water temperatures in Mammoth Creek rather than flow levels, water temperature increases in Mammoth Creek would not be expected to occur under any of the project alternatives and, therefore, additional specific water temperature analyses are not presented in this Draft EIR.

5.3.2 IMPACT INDICATORS AND SIGNIFICANCE CRITERIA FOR WATER QUALITY

Impact indicators and thresholds of significance are developed to assess potential impacts of the any of the alternatives on surface water quality within the potentially affected Project Area. These thresholds of significance are consistent with CEQA Guidelines Section 15065(a):

- Existing adopted water quality standards would be violated.
- Beneficial uses of water would be substantially adversely affected.
- Substantive undesirable effects on public health or environmental receptors would occur.
- Discharge associated with the project would create pollution, contamination or nuisance as defined by Section 13050 of the California Water Code.
- Water quality conditions would be otherwise degraded.

Water quality standards and criteria applicable to this Draft EIR are those intended to protect the beneficial uses, including human consumption, designated by the Lahontan RWQCB, or are the general standards and criteria established by SWRCB for surface waters in California. Because the change in water quality that should be considered substantial is not known, judgment must be applied to establish an appropriate significance threshold.

For variables with numerical water quality criteria, the numerical limits are assumed to adequately protect beneficial uses and provide the basic measure of an allowable limit that will adequately protect beneficial uses. However, in California, the establishment of numerical objectives for specific waterbodies is uncommon and, thus, an alternative approach for determining significance is required.

Section 304(a)(l) of the Clean Water Act requires the EPA to publish and periodically update ambient water qua1ity criteria. Water quality criteria are levels of individual pollutants, or water quality characteristics, or descriptions of conditions of a water body that, if met, will generally protect the designated use(s). Water quality criteria published pursuant to Section 304(a) of the CWA are based solely on data and scientific judgments on the relationship between (pollutant) concentrations and environmental (and human health) effects and do not reflect consideration of economic impacts or the technological feasibility of meeting the criteria values in ambient water (EPA 2003). Although these criteria are not rules and do not have regulatory impact, these criteria present scientific data and guidance of the environmental effects of pollutants which can be useful to derive regulatory requirements based on considerations of water quality impacts. Examples identified in the 1986 EPA Quality Criteria for Water (Gold Book) include:

- Freshwater Aquatic Life - Combined effect of color and turbidity should not change the compensation point more than 10% from its seasonally established norm, nor should such a change take place in more than 10% of the biomass of photosynthetic organisms below the compensation point.
- Solids (Suspended, Settleable) and Turbidity - Freshwater fish and other aquatic life: Settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10% from the seasonally established norm for aquatic life.

In the potentially affected Project Area, the Hot Creek Fish Hatchery NPDES Permit No. CA0l02776 issued by the Lahontan RWQCB states:

- The dissolved oxygen concentration… shall not be depressed by more than 10%.
- Concentrations of floating material shall not be altered to the extent that such alterations are discernable at the 10% significance level.
- 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% significance level.
- Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses, and increases in turbidity shall not exceed natural levels by more than 10%.

Natural variability is difficult to describe with a single value, but it is assumed that 10% of the specified numerical criterion (for variables with numerical criteria) or 10% of the mean value (for variables without numerical criteria) would be a reasonable representation of natural variability that would be expected to occur without causing a significant impact (Reclamation and DWR 2005). Simulated monthly changes that are less than 10% of the numerical criterion or less than 10% of the measured or simulated mean value of the variable would not be considered significant water quality impacts because the simulated change would not be greater than natural variability. Because a water quality model with a capability to address numeric limits specified in the Lahontan Basin Plan is not available for the Mammoth Creek system, monthly changes of 10% or more in Mammoth Creek and Hot Creek flows, addressing dilution capabilities, are used to determine whether significant water quality impacts have the potential to occur.

5.3.2.1 MAMMOTH CREEK AND HOT CREEK

Impact indicators are used to assess potential operational-related effects of the Proposed Project Alternative or other alternatives on water quality, relative to the Existing Condition. For the water quality impact assessment, impact indicators based on MCWD Model output serve as the quantitative basis to evaluate whether potentially significant impacts would occur.

Differences between the Proposed Project Alternative (or other alternatives), relative to the Existing Condition, of a specific impact indicator do not necessarily constitute a potentially significant impact. Impact determinations are based on consideration of all evaluated impact indicators. An impact is considered potentially significant if implementation of the Proposed Project Alternative or other alternatives would adversely impact water quality in Mammoth Creek or Hot Creek, in consideration of all evaluated impact indicators.

Potential water quality impacts to Mammoth and Hot creeks would be considered significant if substantial differences in the magnitude, frequency, duration, timing and rate of change of flow occur under any of the alternatives relative to the Existing Condition, in consideration of the following.

- ❑ Monthly cumulative exceedance probability distributions of daily flows at the OMR, OLD395 and USGS Hot Creek Flume gages over of the 20-year evaluation period.
- ❑ Trends in the time series of daily flows at the OMR, OLD395 and USGS Hot Creek Flume gages relative to the Existing Condition, and to the index of unimpaired conditions as a benchmark reference, during each runoff year over the 20-year evaluation period.
- ❑ The number of days that daily flows equal or exceed the flood flow value (Q_{20}) at the OMR Gage over the 20-year evaluation period.
- ❑ Total number of events (irrespective of duration) that daily flows equal or exceed the channel maintenance and flushing flow value ($Q_{1.75}$) at the OMR and USGS Hot Creek Flume gages over the 20 years included in the evaluation period.
- ❑ Total number of days that daily flows equal or exceed the channel maintenance and flushing flow value ($Q_{1.75}$) at the OMR and USGS Hot Creek Flume gages over the 20 years included in the evaluation period.

Water quality impact assessment methods additionally focus on the seasonal low flow period, which generally extends from August through February in Mammoth and Hot creeks. Therefore, in addition to the above impact indicators, an additional impact indicator and significance criterion pertaining to any of the alternatives, relative to the Existing Condition is:

- ❑ Average monthly flow differences of 10% or more during the seasonal low flow period at the OMR, OLD395 and USGS Hot Creek Flume gages over the 20 years included in the evaluation.

5.3.3 ANALYSIS OF ALTERNATIVE COMPARISONS

5.3.3.1 ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT ALTERNATIVE COMPARED TO THE EXISTING CONDITION

Model output for the comparison of the Proposed Project Alternative relative to the Existing Condition is presented in Appendix D-1, and is summarized below.

Impact Consideration 5.3.3.1-1. Potential to Reduce Surface Water Quality in Mammoth Creek and Hot Creek

Changes to the components of the flow regime associated with the Proposed Project Alternative, relative to the Existing Condition, are evaluated and described in Chapter 4 - Hydrology. The conclusions are applicable to water quality in Mammoth Creek and Hot Creek. Substantial differences would not occur between the Proposed Project Alternative and the Existing Condition for the following.

- ❑ The magnitude, frequency, duration, timing and rate of change of hydrologic conditions at the OMR, OLD395 and USGS Hot Creek Flume gages.
- ❑ Flow variability, relative to the index of unimpaired flow as a benchmark reference, at the OMR, OLD395 and USGS Hot Creek Flume gages.

- The occurrence of flood flows represented by the flood flow index value (Q_{20}) at the OMR Gage, the associated flooding or exceedance of storm drain design flows, and the rate or level of chemical contaminant or other pollutant input to Mammoth Creek.
- The frequency and duration of channel maintenance and flushing flows represented by the index value of $Q_{1.75}$ at the OMR and USGS Hot Creek Flume gages, and the associated temporary episodes of increased turbidity.

As described in Water Quality Assessment Methods (Section 5.3.1), the water quality impact assessment also focuses on the seasonal low flow period (generally from August through February) due to the potential for decreased dilution capability during this period. During the seasonal low flow period under the Proposed Project Alternative relative to the Existing Condition, average monthly flow differences over the 20-year evaluation period: (1) range from a 4.1% (0.6 cfs) increase during August to no change during November through February at the OMR Gage; (2) range from a 3.1% (0.6 cfs) increase during August to no change during November through February at the OLD395 Gage; and (3) range from a 1.0% (0.6 cfs) increase during August to no change during November through February at the USGS Hot Creek Flume Gage. Thus, reductions in average monthly flows of 10% or more do not occur at the OMR, OLD395, or USGS Hot Creek Flume gages during the seasonal low flow period over the 20 years included in the evaluation.

Therefore, in consideration of the entire suite of analyses and evaluations described above, potential impacts to water quality in Mammoth Creek and Hot Creek are less than significant under the Proposed Project Alternative, relative to the Existing Condition.

Impact Determination 5.3.3.1-1 – Less Than Significant

Mitigation Measure 5.3.3.1-1 – None Required

5.3.3.2 Environmental Impacts of Bypass Flow Requirements Alternative No. 2 Compared to the Existing Condition

Model output for the comparison of Bypass Flow Requirements Alternative No. 2 (BFR Alt 2) relative to the Existing Condition is presented in Appendix D-2, and is summarized below.

Impact Consideration 5.3.3.2-1. Potential to Reduce Surface Water Quality in Mammoth Creek and Hot Creek

Conclusions regarding changes to the components of the flow regime associated with BFR Alt 2, relative to the Existing Condition, are evaluated and described in Chapter 4 – Hydrology, and are applicable to water quality evaluation for Mammoth Creek and Hot Creek. Substantial differences would not occur between BFR Alt 2 and the Existing Condition for the following.

- The magnitude, frequency, duration, timing and rate of change of hydrologic conditions at the OMR, OLD395 and USGS Hot Creek Flume gages.
- Flow variability, relative to the index of unimpaired flow as a benchmark reference, at the OMR, OLD395 and USGS Hot Creek Flume gages.
- The occurrence of flood flows represented by the flood flow index value (Q_{20}) at the OMR Gage, the associated flooding or exceedance of storm drain design flows, and the rate or level of chemical contaminant or other pollutant input to Mammoth Creek.

- The frequency and duration of channel maintenance and flushing flows represented by the index value of $Q_{1.75}$ at the OMR and USGS Hot Creek Flume gages, and the associated temporary episodes of increased turbidity.

During the seasonal low flow period under BFR Alt 2 relative to the Existing Condition, average monthly flow differences over the 20-year evaluation period: (1) range from a 7.8% (0.7 cfs) increase during August to a 2.4% (0.2 cfs) increase during November at the OMR Gage; (2) range from a 6.2% (0.7 cfs) increase during September to a 2.5% (0.2 cfs) increase during November at the OLD395 Gage; and (3) range from a 1.4% (0.7 cfs) increase during September to a 0.4% (0.2 cfs) increase during November at the USGS Hot Creek Flume Gage. Thus, reductions in average monthly flows of 10% or more do not occur at the OMR, OLD395, or USGS Hot Creek Flume gages during the seasonal low flow period over the 20 years included in the evaluation.

Therefore, in consideration of the entire suite of analyses and evaluations described above, potential impacts to water quality in Mammoth Creek and Hot Creek are less than significant under BFR Alt 2, relative to the Existing Condition.

Impact Determination 5.3.3.2-1 – Less Than Significant

Mitigation Measure 5.3.3.2-1 – None Required

5.3.3.3 Environmental Impacts of the Permit 17332 Bypass Flow Requirements Alternative Compared to the Existing Condition

Model output for the comparison of the Permit 17332 Bypass Flow Requirements Alternative (P-17332 BFR Alt) relative to the Existing Condition is presented in Appendix D-3, and is summarized below.

Impact Consideration 5.3.3.3-1. Potential to Reduce Surface Water Quality in Mammoth Creek and Hot Creek

Changes to the components of the flow regime associated with P-17332 BFR Alt, relative to the Existing Condition, are evaluated and described in Chapter 4 – Hydrology. The conclusions are applicable to water quality in Mammoth Creek and Hot Creek. Substantial differences would not occur between P-17332 BFR Alt and the Existing Condition for the following.

- The magnitude, frequency, duration, timing and rate of change of hydrologic conditions at the OMR, OLD395 and USGS Hot Creek Flume gages.
- Flow variability, relative to the index of unimpaired flow as a benchmark reference, at the OMR, OLD395 and USGS Hot Creek Flume gages.
- The occurrence of flood flows represented by the flood flow index value (Q_{20}) at the OMR Gage, the associated flooding or exceedance of storm drain design flows, and the rate or level of chemical contaminant or other pollutant input to Mammoth Creek.
- The frequency and duration of channel maintenance and flushing flows represented by the index value of $Q_{1.75}$ at the OMR and USGS Hot Creek Flume gages, and the associated temporary episodes of increased turbidity.

During the seasonal low flow period under P-17332 BFR Alt relative to the Existing Condition, average monthly flow differences over the 20-year evaluation period: (1) range from a 6.7% (0.6 cfs) increase during September to no change during January at the OMR Gage; (2) range from a

5.3% (0.6 cfs) increase during September to no change during January at the OLD395 Gage; and (3) range from a 1.5% (0.9 cfs) increase during August to no change during January at the USGS Hot Creek Flume Gage. Thus, reductions in average monthly flows of 10% or more do not occur at the OMR, OLD395, or USGS Hot Creek Flume gages during the seasonal low flow period over the 20 years included in the evaluation.

Therefore, in consideration of the entire suite of analyses and evaluations described above, potential impacts to water quality in Mammoth Creek and Hot Creek are less than significant under P-17332 BFR Alt, relative to the Existing Condition.

Impact Determination 5.3.3.3-1 – Less Than Significant

Mitigation Measure 5.3.3.3-1 – None Required

5.3.3.4 ENVIRONMENTAL IMPACTS OF THE NO PROJECT ALTERNATIVE COMPARED TO THE EXISTING CONDITION

As discussed in Chapter 2 – Proposed Project and Alternatives, the No Project Alternative in this Draft EIR is analyzed at the existing level of development (i.e., current utilization of permitted surface water supplies) and at a future level of development (i.e., projected utilization of permitted surface water supplies at maximum buildout in 2025) to address conditions that would reasonably be expected to occur in the foreseeable future if the proposed project was not approved.

Model output for the comparison of the No Project Alternative (Existing Level of Demand) relative to the Existing Condition is presented in Appendix D-4, and model output for the comparison of the No Project Alternative (Future Level of Demand) relative to the Existing Condition is presented in Appendix D-5. Model outputs are summarized below.

NO PROJECT ALTERNATIVE (EXISTING LEVEL OF DEMAND) COMPARED TO THE EXISTING CONDITION

Impact Consideration 5.3.3.4-1. Potential to Reduce Surface Water Quality in Mammoth Creek and Hot Creek

Conclusions regarding changes to the components of the flow regime associated with No Project Alternative (Existing Level of Demand), relative to the Existing Condition, are evaluated and described in Chapter 4 – Hydrology, and are applicable to the evaluation of water quality in Mammoth Creek and Hot Creek. Substantial differences would not occur between No Project Alternative (Existing Level of Demand) and the Existing Condition for the following.

- The magnitude, frequency, duration, timing and rate of change of hydrologic conditions at the OMR, OLD395 and USGS Hot Creek Flume gages.
- Flow variability, relative to the index of unimpaired flow as a benchmark reference, at the OMR, OLD395 and USGS Hot Creek Flume gages.
- The occurrence of flood flows represented by the flood flow index value (Q_{20}) at the OMR Gage, the associated flooding or exceedance of storm drain design flows, and the rate or level of chemical contaminant or other pollutant input to Mammoth Creek.
- The frequency and duration of channel maintenance and flushing flows represented by the index value of $Q_{1.75}$ at the OMR and USGS Hot Creek Flume gages, and the associated temporary episodes of increased turbidity.

During the seasonal low flow period under No Project Alternative (Existing Level of Demand) relative to the Existing Condition, average monthly flow differences over the 20-year evaluation period: (1) range from a 1.1% (0.1 cfs) increase during September to no change during the remaining months of the period at the OMR Gage; (2) range from a 0.9% (0.1 cfs) increase during September to no change during the remaining months of the period at the OLD395 Gage; and (3) range from a 0.2% (0.1 cfs) increase during September to no change during the remaining months of the period at the USGS Hot Creek Flume Gage. Thus, reductions in average monthly flows of 10% or more do not occur at the OMR, OLD395, or USGS Hot Creek Flume gages during the seasonal low flow period over the 20 years included in the evaluation.

Therefore, in consideration of the entire suite of analyses and evaluations described above, potential impacts to water quality in Mammoth Creek and Hot Creek are less than significant under No Project Alternative (Existing Level of Demand), relative to the Existing Condition.

Impact Determination 5.3.3.4-1 – Less Than Significant

Mitigation Measure 5.3.3.4-1 – None Required

NO PROJECT ALTERNATIVE (FUTURE LEVEL OF DEMAND) COMPARED TO THE EXISTING CONDITION

Impact Consideration 5.3.3.4-2. Potential to Reduce Surface Water Quality in Mammoth Creek and Hot Creek

Changes to the components of the flow regime associated with the No Project Alternative (Future Level of Demand), relative to the Existing Condition, are evaluated and described in Chapter 4 – Hydrology. The conclusions are applicable to water quality in Mammoth Creek and Hot Creek. Substantial differences would not occur between the No Project Alternative (Future Level of Demand) and the Existing Condition for the following.

- The magnitude, frequency, duration, timing and rate of change of hydrologic conditions at the OMR, OLD395 and USGS Hot Creek Flume gages.
- Flow variability, relative to the index of unimpaired flow as a benchmark reference, at the OMR, OLD395 and USGS Hot Creek Flume gages.
- The occurrence of flood flows represented by the flood flow index value (Q_{20}) at the OMR Gage, the associated flooding or exceedance of storm drain design flows, and the rate or level of chemical contaminant or other pollutant input to Mammoth Creek.
- The frequency and duration of channel maintenance and flushing flows represented by the index value of $Q_{1.75}$ at the OMR and USGS Hot Creek Flume gages, and the associated temporary episodes of increased turbidity.

During the seasonal low flow period under the No Project Alternative (Future Level of Demand) relative to the Existing Condition, average monthly flow differences over the 20-year evaluation period: (1) range from a 4.1% decrease during August (0.6 cfs) and October (0.3 cfs) to a 6.7% (0.6 cfs) decrease during September and January at the OMR Gage; (2) range from a 3.1% (0.6 cfs) decrease during August to a 7.4% (0.5 cfs) decrease during December and February at the OLD395 Gage; and (3) range from a 0.7% (0.3 cfs) decrease during October to a 1.3% (0.6 cfs) decrease during January at the USGS Hot Creek Flume Gage. Thus, reductions in average monthly flows of 10% or more do not occur at the OMR, OLD395, or USGS Hot Creek Flume gages during the seasonal low flow period over the 20 years included in the evaluation.

Therefore, in consideration of the entire suite of analyses and evaluations described above, potential impacts to water quality in Mammoth Creek and Hot Creek are less than significant under the No Project Alternative (Future Level of Demand), relative to the Existing Condition.

Impact Determination 5.3.3.4-2 – Less than Significant

Mitigation Measure 5.3.3.4-2 – None Required

5.4 MITIGATION MEASURES

No potentially significant adverse impacts would occur to water quality under the Proposed Project Alternative or any of the other alternatives. Thus, no mitigation measures are required.

5.5 POTENTIALLY SIGNIFICANT UNAVOIDABLE IMPACTS

No potentially significant unavoidable adverse impacts would occur to water quality under the Proposed Project Alternative or any of the other alternatives.

5.6 CUMULATIVE IMPACTS

For CEQA, the purpose of the cumulative impact analysis is to determine whether the incremental effects of the Proposed Project Alternative would be expected to be "cumulatively considerable" when viewed in connection with the effects of past projects, other current projects, and probable future projects (PRC Section 21083, subdivision (b)(2)).

Some of the projects or programs listed below contain components that cannot be directly, incrementally assessed by application of the MCWD Model. Therefore, a supplemental, qualitative cumulative impact analysis also is conducted to evaluate potential cumulative impacts to surface water quality. For analytical purposes of this EIR, the projects that are considered well-defined and "reasonably foreseeable" are described in Chapter 3 – Overview of Analytical Approach (also see Chapter 3 for a full description of the cumulative impact assessment methods). Only projects that could affect surface water quality are considered in this section.

Although many of the proposed projects/programs described in Chapter 3 could have project-specific impacts that will be addressed in future project-specific environmental documentation, future implementation of these projects/programs is not expected to result in cumulative impacts to water quality that could be affected by the Proposed Project Alternative. For this reason, only the limited number of projects that have the potential to cumulatively impact surface water quality in the Project Area are specifically considered qualitatively in the cumulative impacts analysis. The manner in which these projects could contribute to potentially significant cumulative impacts to surface water quality is briefly summarized below.

5.6.1 QUALITATIVE ANALYSIS OF PAST, PRESENT AND FUTURE PROJECTS

- ❑ **2007 Town of Mammoth Lakes General Plan Update**

  Water quality goals identified in the Town of Mammoth Lakes General Plan (2007) are to: (1) conserve and enhance the quality and quantity of Mammoth Lakes' water resources; and (2) minimize erosion and sedimentation. The General Plan also identifies special study areas, which involve the development of area-specific comprehensive plans to aid in future planning. The Mammoth Creek Corridor is designated as one area of focused study. Identification of threats to, and opportunities for, enhancement of water quality are among the major issues of focused study. Implementation measures in the updated plan serve to: (1) protect existing surface water from pollutants associated with new development; (2) minimize erosion and siltation through drainage control and control of the rate or amount of surface runoff to reduce the potential for flooding; and (3) prevent polluted runoff from exceeding the capacities of existing and planned capacities of stormwater drainage systems. The water quality provisions identified in the Town of Mammoth Lakes General Plan are designed to be protective and, thus, would not contribute to significant adverse cumulative water quality impacts in the Project Area.

Quantitative analysis is presented in 5.6.2.1 below.

- **2007 Snowcreek VIII Master Plan Update**

If not properly designed, constructed and maintained over the long-term, the Snowcreek VIII project could increase the rate of urban pollutant introduction into the municipal stormwater system, as well as into Mammoth Creek receiving waters. However, the Final EIR Addition (Town of Mammoth Lakes 2009) for the Snowcreek VIII Master Plan Update identified several mitigation measures that would reduce potential impacts resulting from Snowcreek VIII project operations on receiving water quality in Mammoth Creek to a less-than-significant level. The project applicant also is required to consult with the Town of Mammoth Lakes regarding identification and implementation of a suite of stormwater quality BMPs designed to address stormwater pollutants within the Project Area. Therefore, it is anticipated that implementation of the mitigation measures identified in the Final EIR and in the Final EIR Addition will minimize or avoid long-term discharge of pollutants into local receiving waters (e.g., Mammoth Creek).

- **2009 Mono County General Plan - Land Use Element**

The Mono Country General Plan's Land Use Element (2009) identifies a general water quality goal to "*maintain and enhance the scenic, recreational, and environmental integrity of the Mammoth vicinity*." More specifically, Policy No. 3 of Objective C is to "*preserve, maintain and enhance surface and groundwater resources in the planning area*." The water quality provisions of Mono Country General Plan are designed to be protective and, thus, would not contribute to significant adverse cumulative water quality impacts in the Project Area.

- **Ongoing Forest Plan Revision on the Inyo National Forest**

The Sierra Nevada Forest Plan Amendment EIS (2004) was prepared to address several issues, including: (1) old forest ecosystems and associated species; (2) aquatic, riparian, and meadow ecosystems and associated species; (3) fire and fuels; (4) noxious weeds; and (5) lower westside hardwood forest ecosystems. Active management to reduce wildfire risks also concomitantly poses risks to aquatic resources, although these risks may be less than those associated with large, catastrophic wildfires (Kattelmann 1996 in USFS 2004). It may be argued that the use of fuels treatments to reduce severe fire potential in former low and mixed-severity fire regime areas, such as low and mid-elevation forests of the Sierra Nevada, could help reduce fire-associated erosion and sedimentation (Hessburg and Agee 2003, Elliot and Miller 2002 in USFS 2004). Management treatments could have minimal adverse effects on aquatic ecosystems and water quality if they are carefully designed and implemented according to best management practices (BMPs) (MacDonald and Stednick 2003 in USFS 2004).

Building upon the above, it is anticipated that actions identified in the pending Forest Plan Revision related to watershed management, construction, restoration, or fuel management activities (e.g., mechanical treatment and prescribed fire) would incorporate BMPs and other water quality impact avoidance measures, as appropriate. As an example of other ongoing USFS actions, presumably guided by the management direction and provisions of the existing Forest Plan, treatment methods to reduce hazardous fuels (e.g., brush and trees) in the Sherwin Creek, Mammoth Creek and Mammoth Scenic Loop areas surrounding the Mammoth Lakes community are planned during the fall of 2010 (USFS 2010). It also is anticipated that other, general water quality provisions of the Forest Plan Revision would be designed to be protective and, thus, would not contribute to significant adverse cumulative water quality impacts in the Project Area.

- **Ongoing Mammoth Meadows Restoration Project**

The project is designed to reduce soil erosion, protect meadow function and restore degraded riparian meadow areas as a result of a non-maintained and historical irrigation system (i.e., Bodle Ditch) that has created erosion and negative impacts to local hydrology (USFS 2009; USFS 2010). Originating at Mammoth Creek above Lake Mary, Bodle ditch system was constructed in 1879 and supplied water and power to Mill City for both mining and domestic use (Town of Mammoth Lakes 2008a). Mammoth Meadows supplied feed for both local cattle destined for Mill City and Mammoth City, and large herds en route to Reno from the Owens Valley.

The old grade control structures within Bodle Ditch through Mammoth Meadow are failing and leading to ditch bank erosion (USFS 2009). The project would fill in the gullied road through the meadows, and stabilize it to prevent future erosion. It would also repair or replace grade stabilization structures in Bodle Ditch (USFS 2009). Improved erosion control and meadow function, including sediment capture, may improve nutrient and pollutant removal functions in Mammoth Meadows. Although Bodle Ditch is not believed to have surface flows that drain into receiving waters located downstream of Mammoth Meadows, improved erosion control and filtration functions of the meadows could potentially be beneficial to water quality if subsurface seepage occurs and/or surface runoff does flow into Mammoth Creek during storm events.

- **Ongoing Lake Mary Road Bicycle Lanes and Off-Street Bicycle Paths Project**

The Final Environmental Assessment (EA) (2001) for the Lake Mary Road Bicycle Lanes and Off-Street Bicycle Paths Project will comply with the Mammoth Lakes Storm Drainage Master Plan, Corps' water quality permit requirements and USFS, CDFG and Lahontan RWQCB approvals. The Final EA identified a number of mitigation measures to address both: (1) near-term construction-related impacts associated with project implementation; and (2) long-term impacts associated with runoff and drainage, thereby reducing water quality impacts from stormwater, surface water runoff, wetland and riparian habitat disturbance to less than significant levels. Permanent off-street water quality control including waterbars, revegetation of construction slopes, and culverts are incorporated into the engineering design to control storm and snowmelt runoff and prevent pollutants from reaching down-slope streams (Town of Mammoth Lakes and USFS 2001). Construction of the bicycle paths appears to be a phased process. Although project approvals were completed several years ago, the clearing of riparian vegetation for the bike path near the upper reach of Bodle Ditch has occurred relatively recently. Regardless, it is anticipated that implementation of the mitigation measures identified in the Final EA will minimize or avoid long-term siltation and/or the input of other pollutants into local receiving waters (e.g., Mammoth Creek).

5.6.2 QUANTITATIVE ANALYSIS OF PAST, PRESENT AND FUTURE PROJECTS

5.6.2.1 FUTURE DISTRICT SURFACE WATER DIVERSIONS

Potential cumulative impacts to surface water quality can be identified and characterized using the same quantitative methods, impact indicators and significance criteria as those identified for the direct impact analyses discussed above in Section 5.3. Water demands associated with maximum buildout projections extending to 2025 identified in the above-mentioned documents have been incorporated into the quantitative component of the surface water quality cumulative impact analyses.

Model output for the comparison of the Proposed Project Alternative Future Level of Demand relative to the Existing Condition is presented in Appendix D-6, and is summarized below.

Cumulative Impact Consideration 5.6.2.1-1. Potential to Reduce Surface Water Quality in Mammoth Creek and Hot Creek

Changes to the components of the flow regime associated with the Proposed Project Alternative Future Level of Demand, relative to the Existing Condition, are evaluated and described in Chapter 4 – Hydrology. The conclusions are applicable to water quality in Mammoth Creek and Hot Creek. Substantial differences would not occur between the Proposed Project Alternative Future Level of Demand and the Existing Condition for the following.

- ❑ The magnitude, frequency, duration, timing and rate of change of hydrologic conditions at the OMR, OLD395 and USGS Hot Creek Flume gages.
- ❑ Flow variability, relative to the index of unimpaired flow as a benchmark reference, at the OMR, OLD395 and USGS Hot Creek Flume gages.
- ❑ The occurrence of flood flows represented by the flood flow index value (Q_{20}) at the OMR Gage, the associated flooding or exceedance of storm drain design flows, and the rate or level of chemical contaminant or other pollutant input to Mammoth Creek.
- ❑ The frequency and duration of channel maintenance and flushing flows represented by the index value of $Q_{1.75}$ at the OMR and USGS Hot Creek Flume gages, and the associated temporary episodes of increased turbidity.

The water quality impact assessment also focuses on the seasonal low flow period (generally from August through February) due to the potential for decreased dilution capability during this period. During the seasonal low flow period under the Proposed Project Alternative Future Level of Demand relative to the Existing Condition, average monthly flow differences over the 20-year evaluation period: (1) range from a 0.7% (0.1 cfs) decrease during August to a 5.6% (0.5 cfs) decrease during January at the OMR Gage; (2) range from a 0.5% (0.1 cfs) decrease during August to a 6.1% (0.5 cfs) decrease during January at the OLD395 Gage; and (3) range from a 0.2% (0.1 cfs) decrease during August to a 1.1% (0.5 cfs) decrease during January at the USGS Hot Creek Flume Gage. Thus, reductions in average monthly flows of 10% or more do not occur at the OMR, OLD395, or USGS Hot Creek Flume gages during the seasonal low flow period over the 20 years included in the evaluation.

Therefore, in consideration of the entire suite of analyses and evaluations described above, potential impacts to water quality in Mammoth Creek and Hot Creek are less than significant under the Proposed Project Alternative Future Level of Demand, relative to the Existing Condition.

Cumulative Impact Determination 5.6.2.1-1 – Less than Significant

Mitigation Measure 5.6.2.1-1 – None Required

No potentially cumulatively significant water quality adverse impacts would occur. Thus, the Proposed Project Alternative does not have an incremental effect that is "cumulatively considerable".