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5.2.2 Water Quality

This section describes the water quality resources in the four Big Creek Alternative Licensing Process (ALP) Projects vicinity, including Project reservoirs, forebays and associated bypass reaches. Potential effects to these resources resulting from current Project operations, and environmental impacts resulting from implementation of new environmental measures recommended in the Proposed Action are identified.

Methods

This assessment of water quality resources was based on a review of relevant information, agency and other stakeholder consultation, field studies, and laboratory analysis of water samples collected in the four Big Creek ALP Projects vicinity. A summary of agency and stakeholder consultation is provided in Section 4.0, Consultation. Detailed descriptions of the study methods are provided in the Final Technical Study Plan Package for the Big Creek ALP (SCE 2001; Volume 4, SD-B (Books 6 and 21)). Study results are provided in the 2002 Technical Study Report Package (TSRP) for the Big Creek Hydroelectric System (SCE 2003; Volume 4, SD-C (Books 7-10, 21 and 22)), and the 2003 TSRP for the Big Creek Hydroelectric System (SCE 2004a; Volume 4, SD-D (Books 11-17 and 23)).

In 2000 and 2001, a water temperature-monitoring program was conducted in bypass stream reaches, augmented stream reaches, and reservoirs in the vicinity of the four Big Creek ALP Projects. A detailed description of study methods and results used in that program is provided in CAWG 5, Water Temperature Monitoring TSR (SCE 2004a; Volume 4, SD-D (Books 12 and 23)). Hourly stream temperature data was collected during the warmer months (May through October) in 2000 (an Above Normal Water Year) and 2001 (a Dry Water Year).

Water quality studies were conducted in 2002 to characterize the physical and chemical properties of water upstream, within and downstream of Project reservoirs, forebays and diversions. The study included a review of existing data, in-situ water quality measurements, and field collection and laboratory analysis of water quality samples. Field data were collected from spring through fall at monitoring stations located in streams, reservoirs and small to moderate-size impoundments in the Project vicinities (CAWG 4, Chemical Water Quality, 2002 TSR (SCE 2003; Volume 4, SD-C (Books 8 and 21))).

In 2003, additional water quality studies were completed including: a) measurements of dissolved gas saturation levels during spill conditions below Mammoth Pool Dam; b) collection and analysis of fish tissue and fish liver samples from Mammoth Pool Reservoir for concentrations of total mercury and silver; c) qualitatively characterizing potential sediment and contamination sources; and d) review of any additional water quality information from the USDA-FS and CDFG (CAWG 4, Chemical Water Quality, 2003 TSR (SCE 2004a; Volume 4, SD-D (Books 12 and 23))).

Analysis Criteria

Potential water quality issues were identified by comparison of water quality study results to water quality regulatory standards. The four Big Creek ALP Projects are subject to the water quality standards set forth in:

- The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region, the Sacramento River Basin and the San Joaquin River Basin
- Drinking water standards, set in Title 22 of the California Code of Regulations, Division 4, which are applicable to surface waters that are designated for municipal water supply
- Water Quality Standards, Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California, commonly referred to as the California Toxics Rule (CTR)
- National Recommended Water Quality Criteria, commonly referred to as the National Toxics Rule (NTR)

The appropriate water quality standards that apply to specific water bodies is typically based on the beneficial use of the study waters as designated in the Basin Plan. The Basin Plan designates existing beneficial uses for waterbodies, which are source waters to Millerton Lake, located downstream of the four Big Creek ALP Projects. The Basin Plan designates a number of beneficial uses for the waters in the vicinity of the four Big Creek ALP Projects including: municipal and domestic supply, agricultural supply, hydropower generation, contact water recreation, non-contact water recreation, warm freshwater habitat, cold freshwater habitat, and wildlife habitat. The Basin Plan also specifies a water temperature thermal heating criteria which states, "Natural water temperatures shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration does not adversely affect beneficial uses. At no time or place shall the temperature be increased more than 5°F (2.8°C) above the natural receiving water."

Applicable water quality criteria for the four Big Creek ALP Projects are listed in Table 5.2.2-1. These criteria were compared to the results of the water quality study to identify locations of potential water quality resource issues. Table 5.2.2-2 provides a summary of water quality resource issues in the vicinity of the four Big Creek ALP Projects that were identified by the study. None of the waterbodies in the vicinity of the four Projects have been designated by the California State Water Resources Control Board (State Water Board) as water-quality impaired waterbodies (State Water Board 1998).

To compare water temperatures in bypass streams with the Basin Plan, three criteria were evaluated: (1) mean daily water temperatures exceeding a daily mean 20°C criteria for trout; (2) maximum daily temperatures exceeding the maximum daily 24°C

temperature evaluation criteria for trout; and (3) mean daily water temperatures increasing by 5°F or more. Reaches where downstream temperatures increased by more than 5°F were further evaluated to determine if the observed daily mean temperatures exceeded the 20°C temperature evaluation criteria for trout (Table 5.2.2-3). The evaluation criteria for cold water fish (trout) was determined by the CAWG during the development of the CAWG study plans. Attachment C: Limiting Factors describes the criteria (Volume 4 (Book 5)).

5.2.2.1 Affected Environment

Existing water quality characteristics found in the vicinity of the four Big Creek ALP Projects are described below. Surface waters are low in mineral and nutrient content, which is characteristic of regions composed of granitic bedrock with shallow infertile granitic soils of the western Sierra Nevada. These waters tend to be very clear and of high quality. Project reservoirs are oligotrophic (limited primary productivity) due to their size and depth, and the relatively infertile granitic soils of their drainage area. Reservoir stratification is generally weak to moderate with temperatures ranging from 6°C to 25°C, depending on water depth and season.

Monitoring results indicate that waters in the Project vicinities consistently have low alkalinity levels, indicating that the water has minimal capacity to buffer changes in pH. This condition is reflected in the neutral to slightly acidic pH values (below the Basin Plan criteria of 6.5) measured in the Project vicinities.

An overview of water quality resource issues identified during the water quality studies are provided in Table 5.2.2-2. The water quality conditions specific to waters in the vicinity of each Project are discussed below.

Mammoth Pool (FERC Project No. 2085)

Water quality results are summarized in Tables CAWG 4-4 through CAWG 4-15 and Appendix G and J of the CAWG 4, Chemical Water Quality, 2002 TSR (SCE 2003; Volume 4, SD-C (Books 8 and 21)). Of the 43 parameters measured, seven parameters at some sampling locations did not meet the state or federal criteria (Table 5.2.2-2), as described below.

pH – Measurements of pH ranged between 6.26 and 8.28. Values of pH levels were generally compliant with the minimum pH Basin Plan criterion of 6.5, with the exception of values reported from one station in the Mammoth Pool Reservoir. The non-compliant readings were obtained below the 45-meter water depth during July and August. There were no cases of pH exceeding the 8.5 maximum criterion.

Alkalinity – Alkalinity values ranged between 8 and 34 mg/L. The Basin Plan does not specify an alkalinity criterion. In general, the NTR recommends a minimum alkalinity value of 20 mg/L, based on the U.S. Environmental Protection Agency (USEPA's) 1976 Red Book criterion. However, the Red Book also recommends that natural alkalinity not be reduced by more than 25% from natural background conditions. Although some

alkalinity values did not meet the EPA criteria (as described above), the low values were consistent with the naturally low background alkalinity values found in the waters in the vicinity of the four Big Creek ALP Projects including measurements upstream of Project facilities.

Dissolved Oxygen (DO) – DO concentrations ranged from 4.19 to 10.5 mg/L. DO concentrations varied considerably by location and by season due to site-specific conditions, and as a function of water temperature. DO was below the minimum criterion of 7.0 mg/L at all three monitoring stations and throughout the water column in Mammoth Pool Reservoir during the July, August and September of 2002 sampling events. DO values below 7.0 mg/L were also observed in Ross Creek.

Mercury - Mercury concentrations in water samples from Mammoth Pool Reservoir ranged from 0.04 to 0.23 µg/L. While these values do not exceed the Drinking Water standard of 2 µg/L (inorganic Mercury) or the EPA's recommended ambient water quality criterion of 0.77 µg/L, some values did exceed the CTR criterion of 0.05 µg/L (total mercury). All samples from the bypass streams in the vicinity of the Mammoth Pool Project were non-detectable for mercury with the exception of one value measured from Rock Creek. The sources of mercury are unknown. However, mercury is a naturally occurring, widely distributed element. The study results indicate that low concentrations of mercury were found in many of the water samples collected from the four Big Creek ALP Projects vicinity waters, including measurements both upstream and downstream of Project facilities.

TPH - Total Petroleum Hydrocarbons (TPH) as diesel concentrations were detected in two samples, at concentrations of 50 and 610 µg/L, from Mammoth Pool Reservoir. Only one measurement exceeded the taste and odor threshold criterion of 100 µg/L. The taste and odor threshold criterion is applicable to waters that are designated for municipal use. The only municipal water use in the vicinity of the Project is at the powerhouses. SCE supplies the Mammoth Pool, Big Creek No. 8 and Big Creek No. 3 powerhouses with domestic non-potable water by diverting a small portion of water from the penstocks or flowline.

Fish Tissue Mercury Concentrations – Samples of fish tissue from non-hatchery origin trout species were analyzed for total mercury. Mercury concentrations were detected in fish tissue samples ranging from 0.0237 to 0.661 mg/kg. Two samples exceeded the EPA's water quality methylmercury screening level criterion of 0.30 mg/kg. Analysis for total mercury, rather than methyl mercury, was performed on the fish tissue samples. Methyl mercury is the toxic form of mercury that is of interest and scientific studies have established that greater than 95% of the mercury in freshwater fish is in the form of methyl mercury. Laboratory analytical quantification of total mercury concentrations in samples is inclusive of methyl mercury (CAWG 4, Chemical Water Quality, 2003 TSR (SCE 2004a; Volume 4, SD-D (Books 12 and 23))).

Water Temperature

The results of the water temperature monitoring indicates that water temperatures in three bypass stream reaches did not always meet Basin Plan objectives: (1) San Joaquin River from Mammoth Pool to Dam 6; (2) Ross Creek from diversion to San Joaquin River; and (3) Rock Creek from diversion to the San Joaquin River. Water temperature monitoring results indicate that mean daily water temperatures between upstream and downstream monitoring sites occasionally had increased by 5°F or more. Mean daily water temperatures above the preliminary temperature criteria (evaluation criteria) for trout of 20°C were also exceeded in these three stream reaches. Some maximum daily water temperatures exceeded the preliminary temperature criteria (evaluation criteria) for trout of 24°C in the San Joaquin River from Mammoth Pool to Dam 6. The water temperature monitoring results are summarized in Table 5.2.2-3. The reaches that exceeded both the 5°F temperature warming criteria and the 20°C evaluation criteria are discussed below.

- San Joaquin River, Mammoth Pool to Dam 6
 - In 2000, a mean daily water temperature of 20°C was exceeded on 34 days and the maximum daily water temperature of 24°C was exceeded on 2 days (Section 5.2.4, Aquatic Resources).
 - In 2001, a mean daily water temperature of 20°C was exceeded on 65 days and a daily maximum water temperature of 24°C was exceeded on 3 days (Section 5.2.4, Aquatic Resources).
 - In 2001, water temperature warming of 5°F or more occurred on 34 of the 133 days monitored. Mean daily water temperatures exceeded the 20°C evaluation criteria for trout on 23 of the 34 days (Table 5.2.2-3).
- Ross Creek, Diversion to San Joaquin River
 - In 2001, a mean daily water temperature of 20°C was exceeded on 49 days (Section 5.2.4, Aquatic Resources).
 - In 2001, water temperature warming of 5°F or more occurred on 47 of the 73 days monitored. Mean daily water temperatures exceeded the 20°C evaluation criteria for trout on 21 of the 47 days (Table 5.2.2-3).
- Rock Creek, Diversion to San Joaquin River
 - In 2000 the mean daily water temperature of 20°C was exceeded on 7 days (Section 5.2.4, Aquatic Resources).
 - In 2001, the mean daily water temperature of 20°C was exceeded on 40 days (Section 5.2.4, Aquatic Resources).

- In 2001, water temperature warming of 5°F or more occurred on 17 of the 103 days monitored. Mean daily water temperatures exceeded the 20°C evaluation criteria for trout on 16 of the 17 days (Table 5.2.2-3).

Big Creek Nos. 1 and 2 (FERC Project No. 2175)

Water quality results are summarized in Tables CAWG 4-4 through CAWG 4-15 and Appendix G and J of the CAWG 4, Chemical Water Quality, 2002 TSR (SCE 2003, Volume 4, SD-C (Books 8 and 21)). Of the 43 parameters measured, eleven parameters at some sampling locations did not meet the state or federal criteria (Table 5.2.2-2). These parameters are described below.

pH – Measurements of pH ranged between 4.69 and 8.68. Values of pH less than the minimum criterion of 6.5 occurred in bypass reaches in the Project vicinity, but also upstream of Project facilities. In Huntington Lake, values ranged between 5.16 and 7.21, and the non-compliant readings were generally found in the middle to lower water column.

Alkalinity – Alkalinity values between 2 and 30 mg/L. The Basin Plan does not specify an alkalinity criterion. Although some alkalinity values did not meet the EPA's criteria (as described above) at several stations in the Project vicinity, the low values were consistent with the naturally low background alkalinity measured both upstream and downstream of Project facilities.

Dissolved Oxygen (DO) – DO concentrations ranged from 5.23 and 11.62 mg/L. DO concentrations below the minimum criterion of 7.0 mg/L were measured at all three monitoring stations in Huntington Lake during the July and August 2002 sampling events. In July 2002 nearly all measurements were below 7.0 mg/L, whereas in August 2002 only measurements deeper than 25 meters in depth were less than 7.0 mg/L. DO values below 7.0 mg/L were also observed in Dam 4 Forebay and Ely Creek. However, the low DO concentration in Ely Creek at a concentration of 5.29 mg/L was measured upstream of the diversion and is not considered to be Project-related.

Copper – Copper concentrations ranged between non-detectable to a 1.54 µg/L. The Drinking Water standard for total copper is 1 mg/L, based on the secondary MCL for drinking water. All copper analytical results met the Basin Plan objective. However, the CTR and NTR have established a more stringent dissolved copper criterion for the protection of freshwater aquatic life. The CTR and NTR set acute and chronic criteria that are hardness-dependent and must be calculated on a sample-by-sample basis. The CTR dissolved copper criterion was exceeded in Big Creek downstream of Dam 4 (the measurement of 1.54 µg/L exceeded the calculated criterion of 1.24 µg/L) and in Balsam Creek downstream of the diversion (the measurement of 1.54 µg/L exceeded the calculated criterion of 1.25 µg/L). The sources of copper at these locations are unknown.

Iron – Iron concentrations ranged from non-detectable to a 0.67 mg/L. The Basin Plan taste and odor threshold criterion of 0.3 mg/L for iron was exceeded at two stations in

Big Creek; downstream of Dam 4 (0.35 mg/L) and upstream of Dam 5 (0.39 mg/L), and in Ely Creek upstream of the diversion (0.67 mg/L). All values met the USEPA's 1.0 mg/L criterion for the protection of freshwater aquatic life. The taste and odor threshold criterion is applicable to waters that are designated for municipal use. Surface water is diverted from Big Creek below Huntington Lake to supply drinking water to the community of Big Creek. No water quality problems associated with this domestic water supply have been reported (Andrew McMillan, pers. comm). SCE also supplies their powerhouses with domestic non-potable water by diverting a small portion of water from the penstocks or flowline.

Manganese - Manganese concentrations ranged from non-detectable to a 0.07 mg/L. The Basin Plan taste and odor threshold criterion of 0.05 mg/L for manganese was exceeded on one occasion above the diversion on Ely Creek (0.07 mg/L). The taste and odor threshold criterion is applicable to waters that are designated for municipal use.

Lead – Lead concentrations ranged between non-detectable to a 0.63 µg/L. The Drinking Water standard for total lead is 15 µg/L. There were no analytical results that exceeded this criterion. However, for the protection of freshwater aquatic life the CTR and NTR have established stringent lead criteria. The CTR and NTR have set acute and chronic dissolved lead criteria that are hardness dependent and must be calculated on a sample-by-sample basis. The dissolved lead chronic criterion was exceeded in Big Creek downstream of Dam 4 (the reported 0.63 µg/L exceeded the calculated criterion of 0.19 µg/L) and in Balsam Creek downstream of the diversion (the reported 0.34 µg/L exceeded the calculated criterion of 0.19 µg/L). The sources of lead at these locations are unknown.

Mercury - Mercury concentrations were detected in the majority of the study sites and ranged from non-detectable to 0.37 mg/L, encompassing all stations during all sampling events. While these values do not exceed the Drinking Water standard of 2 µg/L or the EPA's recommended ambient water quality criterion of 0.77 µg/L, some values do exceed the CTR criterion of 0.05 µg/L. Values non-compliant with the CTR were observed in Huntington Lake, Ely Creek upstream of the diversion, and Rancheria Creek upstream of Portal powerhouse. The sources of mercury are unknown. However, mercury is a naturally occurring, widely distributed element.

Nitrate/Nitrite - The USEPA Drinking Water standard of 10 mg/L for nitrate/nitrite was exceeded in Big Creek upstream of Dam 5 (12 mg/L). No elevated concentrations were detected at upstream sample sites (or at any other station in the Project area) and no likely source is known that could contribute nitrates in this stream reach.

TPH – TPH as diesel was detected in one sample collected from Huntington Lake, at a concentration of 180 µg/L. The concentration in this sample was above the Basin Plan taste and odor threshold criterion of 100 µg/L. The taste and odor threshold criterion is applicable to waters that are designated for municipal use.

Water Temperature

The results of the water temperature monitoring indicates that water temperatures in four bypass stream reaches did not always meet Basin Plan objectives: (1) Big Creek from Huntington Lake to Dam 4; (2) Big Creek from Dam 4 to Dam 5; (3) Balsam Creek from diversion to Big Creek; and (4) Ely Creek from diversion to Big Creek. Water temperature monitoring results indicate that mean daily water temperatures between upstream and downstream monitoring sites sometimes increased by 5°F or more. In addition, mean daily water temperatures above the evaluation criteria for trout of 20°C and maximum temperature evaluation criteria of 24°C were exceeded in the Big Creek Dam 4 to Dam 5 stream reach. The water temperature monitoring results are summarized in Table 5.2.2-3. The reaches that exceeded both the 5°F temperature warming criteria and the mean daily and maximum daily temperature evaluation criteria are discussed below.

- Big Creek, Dam 4 to Dam 5
 - In 2001, a mean daily water temperature of 20°C was exceeded on 39 days and a daily maximum water temperature of 24°C was exceeded on 2 days (Section 5.2.4, Aquatic Resources).
 - In 2001, water temperature warming of 5°F or more occurred on 171 of the 183 days monitored. Mean daily water temperatures exceeded the 20°C evaluation criteria for trout on 4 of the 171 days (Table 5.2.2-3).

Big Creek Nos. 2A, 8 and Eastwood (FERC Project No. 67)

Water quality results are summarized in Tables CAWG 4-4 through CAWG 4-15 and Appendix G and J of the CAWG 4, Chemical Water Quality Report, 2002 TSR (SCE 2003; Volume 4, SD-C (Books 8 and 21)). Of the 43 parameters measured, 15 parameters at some sampling locations did not meet the state or federal criteria (Table 5.2.2-2), as described below.

pH – Measurements ranged between 4.76 and 8.87. Values of pH less than the minimum criterion of 6.5 occurred in waters upstream and downstream of Project facilities. In Florence and Shaver lakes, the non-compliant readings were generally found in the middle to lower water column. A few pH measurements exceeded the maximum pH criterion of 8.5, including the South Fork San Joaquin River upstream of the San Joaquin River confluence (8.77), Pitman Creek above the diversion (8.66), Bolsillo Creek downstream of the diversion (8.74) and North Fork Stevenson Creek above the Tunnel 7 (Gate 2) outlet (8.87).

Alkalinity - Alkalinity values ranged between 2 and 26 mg/L. The Basin Plan does not specify an alkalinity criterion. In general, the NTR recommends a minimum alkalinity value of 20 mg/L, based on the USEPA's 1976 Red Book criterion. However, the Red Book also recommends that natural alkalinity not be reduced by more than 25% from natural background conditions. Although some alkalinity values did not meet the EPA's

criteria (as described above) at several stations in the Project area, the low values were consistent with the naturally low background alkalinity measured both upstream and downstream of Project facilities.

Dissolved Oxygen - DO concentration ranged from 4.50 to 12.33 mg/L. In Florence Lake, during July and August 2002 DO values below 7.0 mg/L were measured throughout the water column, and in September 2002 low DO values were only observed in the lower water column. In Shaver Lake during July 2002, DO values below 7.0 mg/L were measured throughout the water column, and in August and September 2002 the low DO values were only observed lower in the water column. DO values below 7.0 mg/L were measured in Project streams at locations both upstream and downstream of Project facilities.

Arsenic – Arsenic concentrations ranged from non-detectable to a 32 µg/L. The Drinking Water standard for arsenic is 50 µg/L based on the State MCL. All arsenic analytical results met the Basin Plan objective. In February 2002, the USEPA adopted a new, lower MCL criterion - 10 µg/L for drinking water. Values exceeding this criterion were observed at Camp 62 Creek (32 µg/L, upstream of the South Fork San Joaquin River confluence), Pitman Creek (14 and 20 µg/L, upstream of Dam 4) and three stations in the South Fork San Joaquin River (Mono Crossing (14 µg/L), downstream of Rattlesnake Crossing (13 µg/L), and upstream of the San Joaquin River confluence (12 µg/L). The sources of arsenic at these locations are unknown. However, arsenic is a naturally occurring, widely distributed metallic element. Its occurrence does not suggest a relationship to Project features.

Copper – Copper concentrations ranged from non-detectable to a 7.78 µg/L. The Drinking Water standard for total copper is 1 mg/L, based on the MCL for drinking water. All copper analytical results met the Basin Plan objective. However, the CTR and NTR have established a more stringent dissolved copper criterion for the protection of freshwater aquatic life. The CTR and NTR set acute and chronic criteria that are hardness-dependent and must be calculated on a sample-by-sample basis. The dissolved copper criterion was exceeded in Shaver Lake on two occasions: 7.78 µg/L and 2.0 µg/L (Big Creek upstream of Big Creek Powerhouse No. 8 (1.05 µg/L), Tombstone Creek downstream of the diversion (6.1 µg/L) and Hooper Creek (0.58 µg/L)). The sources of copper at these locations are unknown and are unlikely to be Project-related.

Iron - Iron concentrations ranged from non-detectable to a 0.49 mg/L. The Basin Plan taste and odor threshold criterion of 0.30 mg/L for iron was exceeded at the following eight stations: Mono Forebay (0.32 mg/L), Stevenson Creek downstream of Shaver Lake Dam (0.40 mg/L), Stevenson Creek upstream of the San Joaquin River confluence (0.30 mg/L), South Fork San Joaquin River downstream of Florence Lake Dam (0.30 mg/L), South Fork San Joaquin River downstream of Rattlesnake Crossing (0.35 mg/L), Balsam Creek upstream of the diversion (0.31 mg/L), Crater Creek upstream of the South Fork San Joaquin River confluence (0.49 mg/L), and Hooper Creek upstream of the South Fork San Joaquin River confluence (0.40 mg/L). However, all values met the

USEPA's 1.0 mg/L criterion for the protection of freshwater aquatic life. The taste and odor threshold criterion is applicable to waters designated for municipal use.

Manganese - Manganese concentrations ranged from non-detectable to a 0.12 mg/L. The Basin Plan taste and odor threshold criterion of 0.05 mg/L for manganese was exceeded on one occasion in Stevenson Creek below the Shaver Lake Dam (0.12 mg/L). The taste and odor threshold criterion is applicable to waters designated for municipal use.

Lead - Lead concentrations ranged between non-detectable and 0.70 µg/L. The Drinking Water standard for total lead is a 15 µg/L. No analytical results exceeded this criterion. However, the CTR and NTR have established more stringent lead criteria for the protection of freshwater aquatic life. The CTR and NTR have set acute and chronic dissolved lead criteria that are hardness dependent and must be calculated on a sample-by-sample basis. The dissolved lead chronic criterion was exceeded on one occasion at one station in Shaver Lake (2.70 µg/L), on two occasions in Camp 62 Creek downstream of the Chinquapin Creek confluence (0.70 and 0.47µg/L), and on one occasion in Camp 62 Creek upstream of the South Fork San Joaquin River confluence (0.61 µg/L). The sources of lead at these locations are unknown.

Silver – Silver concentrations ranged between non-detectable and 0.26 µg/L. The secondary MCL Drinking Water standard for silver is a 100 µg/L. No analytical results exceeded this criterion. However, the CTR and NTR have established more stringent silver criteria, for the protection of freshwater aquatic life. The CTR and NTR have set acute dissolved silver criteria that are hardness dependent and calculated on a sample-by-sample basis. The dissolved silver criteria were exceeded at one station in Mono Creek location (0.26 µg/L). The sources of silver at these locations are unknown.

Zinc - Zinc concentrations ranged between non-detectable and 13.69 µg/L. The secondary MCL Drinking Water standard for zinc is a 5 µg/L. No analytical results exceeded this criterion. However, the CTR and NTR have established more stringent zinc criteria for the projection of freshwater aquatic life. The CTR and NTR have set acute dissolved zinc criteria that are hardness dependent and calculated on a sample-by-sample basis. The dissolved zinc criteria were exceeded at one station in Hooper Creek location (13.69 µg/L). The sources of zinc at these locations are unknown.

Mercury – Mercury concentrations ranged from non-detectable to a 0.42 µg/L. While these values do not exceed the Drinking Water standard of 2 µg/L, or the EPA's recommended ambient water quality criterion of 0.77 µg/L, some values do exceed the CTR criterion of 0.05 µg/L. Values non-compliant with the CTR were observed in Shaver and Florence lakes (all sampling stations and most sampling events), Mono Forebay, Bear Forebay, Balsam Forebay, North Fork Stevenson Creek, Stevenson Creek, Tombstone Creek, North Slide Creek, South Slide Creek, Mono Creek, and Camp 62 Creek. The sources of mercury are unknown. However, mercury is a naturally occurring, widely distributed element. The study results indicate that low concentrations of mercury were found in many of the water samples collected from the

four Big Creek ALP Project vicinity waters, including measurements both upstream and downstream of Project facilities.

Nitrate/Nitrite - The Basin Plan objective of 10 mg/L for nitrate/nitrite was exceeded in Big Creek upstream of Big Creek Powerhouse No. 8 (20 mg/L). No elevated concentrations were detected at upstream sample sites (or at any other station in the Project area) and no likely source of nitrates is known that could contribute nitrates in this stream reach.

TPH - Samples from Shaver Lake and Florence Lake were analyzed for total petroleum hydrocarbons (TPH- diesel and gasoline). On June 2002, TPH-diesel measurements exceeding the taste and odor threshold criterion of 100 µg/L were observed on one occasion in Florence Lake (1,800 µg/L), and in three samples from Shaver Lake at concentrations of 1100 µg/L, 140 µg/L, and 160 µg/L.

MTBE - Samples from Shaver Lake and Florence Lake were analyzed for methyl tertiary butyl ether (MTBE). MTBE concentrations exceeding the Basin Plan criterion - 5 µg/L were observed in Shaver Lake in July 2002 (5.5 µg/L, 8.8 µg/L and 9.9 µg/L) and August 2002 (10 µg/L, 7.8 µg/L, and 7.2 µg/L). The MTBE criterion is a Drinking Water standard.

Turbidity – Turbidity measurements above the Basin Plan were measured in Hooper Creek downstream of the diversion (36 and 16 NTUs), in Camp 62 Creek downstream of the diversion (11 NTUs), and in Balsam Creek downstream of the forebay (29 NTU). Turbidity exceedences in Camp 62 Creek and Balsam Creek occurred only once and are not considered Project-related. The Basin Plan states, “Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: where natural turbidity is between 0 and 5 NTUs, increases shall not exceed 1 NTU, where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20%, where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs, and where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%.” To determine compliance with this criterion, comparisons of turbidity measurements below Project features were compared to those obtained above Project features.

Water Temperature

The results of the water temperature monitoring indicates that water temperatures in 10 bypass stream reaches and one diversion ditch did not always meet Basin Plan objectives: (1) South Fork San Joaquin River, Florence to Mammoth Pool; (2) Big Creek, Dam 5 to the San Joaquin River; (3) Stevenson Creek, Shaver Lake Dam to the San Joaquin River; (4) North Fork Stevenson Creek from the Tunnel 7 Outlet to Shaver Lake; (5) Pitman Creek Diversion to Big Creek; (6) Bear Creek Diversion to South Fork San Joaquin River; (7) Mono Diversion to South Fork San Joaquin River; (8) Bolsillo Creek Diversion to South Fork San Joaquin River; (9) Camp 62 Creek Diversion to South Fork San Joaquin River; (10) Crater Creek Diversion to South Fork San Joaquin River; and (11) Crater Creek Diversion ditch to Florence Lake. Water temperature

monitoring results indicate that mean daily water temperatures between upstream and downstream monitoring sites had increased by 5°F or more. In addition, mean daily water temperatures above the preliminary temperature criteria (evaluation criteria) for trout of 20°C were exceeded in two bypass reaches: South Fork San Joaquin River from Florence to Mammoth Pool; and Big Creek from Dam 5 to San Joaquin River. The water temperature monitoring results are summarized in Table 5.2.2-3. The reaches that exceeded both the 5°F temperature warming criteria and the mean daily and maximum daily temperature evaluation criteria are discussed as follows:

- South Fork San Joaquin River, Florence Lake to Mammoth Pool
 - In 2001, a mean daily water temperature of 20°C was exceeded on 26 days (Section 5.2.4, Aquatic Resources).
 - In 2001, water temperature warming of 5°F or more occurred on 76 of the 76 days monitored. Mean daily water temperatures exceeded the 20°C evaluation criteria for trout on 7 of the 76 days (Table 5.2.2-3).
- Big Creek, Dam 5 to the San Joaquin River
 - In 2001, a mean daily water temperature of 20°C was exceeded on 11 days (Section 5.2.4, Aquatic Resources).
 - In 2001, water temperature warming of 5°F or more occurred on 12 of the 184 days monitored. However, a mean daily water temperature of 20°C was not exceeded on any of these days.

Big Creek No. 3 (FERC Project No. 120)

Water quality results are summarized in Tables CAWG 4-4 through CAWG 4-15 and Appendix G and J of the CAWG 4, Chemical Water Quality, 2002 TSR (SCE 2003; Volume 4, SD-C (Books 8 and 21)). Of the 43 parameters measured, six parameters at some sampling locations did not meet the state or federal criteria (Table 5.2.2-2), as described below.

pH - Measurements ranged between 5.44 and 8.66. Values of pH less than the minimum criterion of 6.5 occurred in waters in Project vicinity, both upstream and downstream of Project facilities. Measurements less than the minimum criterion of 6.5 occurred in Dam 6 Forebay in June, July and August 2002. One pH measurement exceeding the maximum pH criterion of 8.5 was observed in the San Joaquin River upstream of Big Creek Powerhouse No. 3 in the fall of 2002 (8.66).

Alkalinity – The range of alkalinity values measured in the vicinity of the Project are between 6 and 14 mg/L. The NTR recommends a minimum alkalinity value of 20 mg/L, based on the USEPA's 1976 Red Book criterion. However, the Red Book also recommends that natural alkalinity not be reduced by more than 25% from natural background conditions. Although, some alkalinity values did not meet the EPA's criteria

at several stations in the Project area, the low values were consistent with the naturally low background alkalinity measured both upstream and downstream of Project facilities.

Dissolved Oxygen - DO concentrations ranged from 5.75 to 10.37 mg/L. DO below the minimum criterion of 7.0 mg/L was observed in Dam 6 Forebay during the July, August and September 2002 sampling events. In July and August, nearly all measurements were below 7.0 mg/L. In September the top two meters of the water column in Dam 6 Forebay were slightly below the criterion (6.72 and 6.86 mg/L).

Copper - Copper concentrations ranged from non-detectable to a 1.63 µg/L. The Drinking Water MCL standard for total copper is 1 mg/L. All copper analytical results met the Basin Plan objective. However, the CTR and NTR have established more stringent dissolved copper criteria for the protection of freshwater aquatic life. The CTR and NTR set acute and chronic criteria that are hardness-dependent and calculated on a sample-by-sample basis. The dissolved copper criteria were exceeded in Dam 6 Forebay on one occasion (1.63 µg/L). The sources of copper at these locations are unknown.

Silver - Silver concentrations ranged from non-detectable to a 0.34 µg/L. The secondary MCL Drinking Water standard for silver is 100 µg/L. No analytical results exceeded this criterion. However, the CTR and NTR have established more stringent silver criteria, for the protection of freshwater aquatic life. The CTR and NTR have set acute dissolved silver criteria that are hardness dependent and calculated on a sample-by-sample basis. The dissolved silver criterion was exceeded on one occasion in the San Joaquin River downstream of Stevenson Creek (0.34 µg/L). The source of silver at this location is unknown.

Mercury – Mercury concentrations ranged from non-detectable to 0.09 µg/L. Mercury concentrations in the Project vicinity were non-detectable, with the exception of one measurement in the San Joaquin River upstream of Big Creek Powerhouse No. 3 (0.09 µg/L). While this value does not exceed the Drinking Water standard of 2 µg/L, or the EPA's recommended ambient water quality criterion of 0.77 µg/L, it does exceed the CTR criterion of 0.05 µg/L. The sources of mercury are unknown. However, mercury is a naturally occurring, widely distributed element. The study results indicate that low concentrations of mercury were found in many of the water samples collected from the four Big Creek ALP Project vicinity waters, including measurements both upstream and downstream of Project-facilities.

Water Temperature

The results of water temperature monitoring indicate that water temperatures in the bypass stream reach along the San Joaquin River from Dam 6 to Redinger Lake did not always meet Basin Plan objectives. Water temperature monitoring results indicate that mean daily water temperatures between upstream and downstream monitoring sites occasionally increased by 5°F or more. Water temperatures above the preliminary mean daily criteria (evaluation criteria) for trout of 20°C and the maximum daily preliminary criteria (evaluation criteria) for trout of 24°C were exceeded in this stream

reach. The water temperature monitoring results are summarized in Table 5.2.2-3. The exceedences are discussed below.

- San Joaquin River, Dam 6 to Redinger Lake
 - In 2000, a mean daily water temperature of 20°C was exceeded on four days (CAWG 5, Water Temperature Monitoring, (SCE 2004a; Volume 4, SD-D (Books 12 and 23)) and Water Temperature Modeling (SCE 2004b; Volume 4, SD-E (Books 18 and 23)).
 - In 2001, a mean daily water temperature of 20°C was exceeded on 70 days and a daily maximum water temperature of 24°C was exceeded on three days (CAWG 5, Water Temperature Monitoring (SCE 2004a; Volume 4, SD-D (Books 12 and 23)).
 - In 2000, water temperature warming of 5°F or more occurred on one of the 64 days monitored (Table 5.2.2-3).
 - In 2001, water temperature warming of 5°F or more occurred on six of the 163 days monitored (Table 5.2.2-3).

5.2.2.2 Impacts of Proposed Action

This section identifies and discusses potential impacts on water quality under current Project operations (No Action Alternative) and discusses the environmental impacts resulting from implementation of new environmental measures recommended in the Proposed Action. These new environmental measures include higher minimum instream flows, implementation of a temperature monitoring program, implementation of a flow monitoring program and development and implementation of a Sediment Management Plan.

Potential Resource Issues

A four-step approach was used to identify potential resources issues. In some cases, potential resource issues are caused by naturally occurring conditions and are not Project-related. The first step was to compare water quality parameters measured in the vicinity of the four Big Creek ALP Projects to water quality objectives identified in the Basin Plan and other pertinent regulatory documents (Table 5.2.2-1). If the parameters measured in the Project vicinities met Basin Plan objectives, it was concluded that the Project did not have an adverse effect on water quality. If measured values did not meet water quality objectives, the second step was to compare water quality upstream and downstream of Project facilities in relationship to the operations of the Projects to determine if the potential impact was Project-related. If deemed Project-related, the third step was to assess whether the potential impact reduced beneficial uses and whether the effect was controllable. If beneficial uses were reduced due to controllable Project effects, the fourth step was to identify measures that may be reasonably applied to control impacts to beneficial uses.

An examination of water quality sampling results from waters in the vicinity of the four Projects identified several constituents that did not meet regulatory water quality objectives (Table 5.2.2-2). These include alkalinity, pH, DO, temperature, mercury (in water), methylmercury (in fish tissue), arsenic, copper, iron, manganese, lead, silver, zinc, nitrate/nitrite, turbidity, MTBE and TPH-diesel. The following categorizes and describes each water quality parameter/potential resource issue in question. The discussion on these potential resource issues is separated into three categories based on whether the deviations from Basin Plan objectives are considered to be Non-Project-related, Project-related and non-controllable, or Project-related and controllable.

5.2.2.3 Non-Project Related Effects

pH

The Basin Plan objective for pH was not met at numerous locations associated with the four Big Creek Projects. The pH values observed in the vicinity of the four Big Creek Projects were often below the lower limit of 6.5 and a few values were above the upper limit of 8.5. Low pH values were observed both upstream and downstream of Project facilities, indicating that the low pH conditions are generally not Project-related. The low pH in streams that flow from the base of reservoirs and forebays appears to reflect the lower pH values observed in the lower water column of these waterbodies. High pH values in streams were only measured at five locations and were only slightly above the upper limit ranging from 8.66 to 8.77. These high pH values were observed both upstream and downstream of Project facilities indicating that they are generally not Project-related.

Alkalinity

Alkalinity is usually the primary factor that controls the pH values and buffering capacity of a given water system. Surface waters within granitic watersheds (such as the vicinity of the four Big Creek ALP Projects) typically have more acidic pH values due to their low alkalinity. Alkalinity values less than 10 mg/L are considered very low and the pH of these waters is very susceptible to acid inputs (Wetzel 2001). The alkalinity of surface waters within the Project area is generally very low (<10 mg/L on average), contributing to the observed low pH values. Low pH values of the vicinity of the four Big Creek Projects are not Project-related or controllable.

Dissolved Oxygen

The Basin Plan specifies that the DO concentrations in waters designated Cold Freshwater Habitat (COLD) by the Basin Plan should not fall below 7.0 mg/L. Dissolved oxygen concentrations below the Basin Plan objective were observed in Ross Creek at some stream monitoring stations. Ross Creek is an ephemeral stream which experiences low DO levels as the stream dries-up upstream of the diversion during the warm summer months. This is a naturally occurring condition in Ross Creek and is not a Project-related effect.

Arsenic

Detectable arsenic concentrations ranging from 2.0 µg/L to 32 µg/L were observed in the Project vicinity. The Drinking Water standard of 10 µg/L for arsenic was exceeded at three locations during the 2002 water quality study. Values exceeding this criterion were observed at Camp 62 Creek (upstream of the South Fork San Joaquin River confluence), Pitman Creek (upstream of Dam 4) and the South Fork San Joaquin River (at Mono Crossing, downstream of Rattlesnake Crossing, and upstream of the San Joaquin River confluence). Arsenic is a naturally occurring, widely distributed metallic element. The sources of arsenic at these locations are unknown but likely not Project-related.

Copper

The secondary MCL Drinking Water standard for total copper is 1 mg/L and all samples collected and analyzed complied with this objective. However, theoretical dissolved copper concentrations reported as J-qualified trace values by the analytical laboratory exceeded the calculated CTR and NTR hardness-based water quality criteria in seven samples collected from the vicinity of the Big Creek Nos. 1 and 2, Big Creek Nos. 2A, 8 and Eastwood, and Big Creek No. 3 projects. The J-qualified trace values ranged from 0.81 to 7.78 mg/L. These small concentrations do not adversely impact water quality in the Project vicinities. The sources of copper at these locations are unknown but likely not Project-related.

Iron and Manganese

The Basin Plan objectives for total iron (0.3 mg/L) were exceeded at two locations associated with the Big Creek Nos. 1 and 2 Project (Table 5.2.2-2). The Basin Plan objective for total manganese (0.05 mg/L) was exceeded at one location associated with the Big Creek Nos. 1 and 2 Project (Table 5.2.2-2). The Basin Plan objectives for total iron (0.3 mg/L) were exceeded at six locations associated with Big Creek Nos. 2A, 8 and Eastwood Project (Table 5.2.2-2). The Basin Plan objective for total manganese (0.05 mg/L) was exceeded at two locations associated with Big Creek Nos. 2A, 8 and Eastwood Project (Table 5.2.2-2). These objectives are secondary MCLs for drinking water based on a taste and staining threshold for iron and on a taste and odor threshold for manganese. These criteria are of aesthetic rather than toxicological significance. Both iron and manganese naturally occur in the watershed.

The USEPA criterion for total iron concentrations in water, published in the Red Book for the protection of freshwater aquatic life, is 1.0 mg/L (EPA 1976). There were no iron concentrations exceeding 1.0 mg/L observed in the vicinity of the four Projects. Therefore, iron concentrations do not represent a risk to aquatic organisms and do not impact beneficial uses of the water associated with the four Big Creek Projects. No aquatic life criterion has been developed for manganese.

Iron and manganese are common in the rocks surrounding the four Big Creek ALP Projects and are therefore, commonly found in surface water. Therefore, some of the

iron and manganese detected in the water samples is attributable to background sources and is not considered Project-related.

SCE also supplies their powerhouses with domestic non-potable water by diverting a small portion of water from the penstocks or flowline. No mitigation measures are recommended under the Proposed Action.

Lead

The Drinking Water standard for total lead is 15 mg/L and all samples collected and analyzed complied with this objective. However, theoretical dissolved lead concentrations reported as J-qualified trace values by the analytical laboratory exceeded the calculated CTR and NTR hardness-based water quality criteria in five samples collected from the vicinity of Big Creek Nos. 1 and 2, and Big Creek Nos. 2A, 8 and Eastwood. The J-qualified trace values ranged from 0.34 to 2.7 µg/l. These small concentrations do not adversely impact water quality in the Project vicinities. The sources of lead at these locations are unknown but likely not Project-related.

Silver

The secondary MCL Drinking Water standard for total silver is 100 µg/L and all samples collected and analyzed complied with this objective. However, theoretical dissolved silver concentrations reported as J-qualified trace values by the analytical laboratory exceeded the calculated CTR and NTR hardness-based water quality criteria in two samples collected from the vicinity of Big Creek Nos. 2A, 8 and Eastwood and Big Creek No. 3. The J-qualified trace values ranged from 0.26 to 0.34 µg/L. These small concentrations do not adversely impact water quality in the Project vicinities. The sources of silver at these locations are unknown but likely not Project-related.

Zinc

The secondary MCL Drinking Water standard for total zinc is 5 mg/L and all samples collected and analyzed complied with this objective. However, theoretical dissolved zinc concentration reported as J-qualified trace values by the analytical laboratory exceeded the calculated CTR and NTR hardness-based water quality criteria in one sample collected from the Big Creek Nos. 2A, 8 and Eastwood Project, at 13.69 µg/l. This sample was collected upstream of the Project facilities indicating that it is not Project-related.

Mercury

The Drinking Water standard of 2 µg/L for mercury was not exceeded in any of the samples from the water quality study. However, the CTR and NTR have established a more stringent criterion of 0.05 µg/L, for protecting freshwater aquatic life. Based on J-qualified trace value from the laboratory analytical results, this criterion was exceeded at the majority of study sites in the Project vicinities (Table 5.2.2-2). The study results indicate that low concentrations of mercury are found in much of the Project vicinity, at locations both upstream and downstream of Project facilities. The widespread, low-

level mercury concentrations found in much of the upper San Joaquin River watershed are not considered Project-related, nor do they adversely impact aquatic resources.

Methylmercury in Fish Tissue

The Basin Plan does not specify a criterion for methylmercury in fish tissue. However, the USEPA has established a screening level criterion of 0.3 mg/kg for methylmercury in fish tissue. The results of a study conducted in Mammoth Pool Reservoir (FERC Project No. 2085) indicates that two of ten fish collected and analyzed contained mercury concentrations in the fish tissue that exceeded the screening level. The source of mercury is not known, but is likely not Project-related. The existing mercury levels at Mammoth Pool Reservoir do not warrant issuance of a public health advisory (Bob Brodberg, Office of Environmental Health Hazard Assessment pers. comm.).

Nitrate/Nitrite

The USEPA Drinking Water standard for nitrate/nitrite (10 mg/L) was exceeded in two bypass reaches (one occurrence at each location) associated with Big Creek Nos. 1 and 2 and Big Creek Nos. 2A, 8 and Eastwood during the 2002 water quality study. The bypass reaches include Big Creek from Dam 4 to Dam 5 and Big Creek from Dam 5 to the San Joaquin River. Nitrate concentrations were not detected at upstream sample sites and no likely Project-related source is known that could contribute nitrates in these stream reaches. The observed exceedances are not considered Project-related.

TPH-Diesel

TPH-diesel measurements exceeding the taste and odor threshold criterion of 100 µg/L were obtained in each of the four Project reservoirs where motorized boating is allowed. The taste and odor threshold criterion is applicable to waters designated for municipal use. The only surface water removed for drinking purposes in the vicinity of the Projects is at the community of Big Creek. This domestic water supply is extensively tested and no water quality problems have been reported (Andrew McMillan, pers. comm.). SCE also supplies the powerhouses with domestic non-potable water by diverting a small portion of water from the penstocks or flowlines.

MTBE

The Basin Plan objective for MTBE (5 µg/L) was exceeded at one location (Shaver Lake) associated with Big Creek Nos. 2A, 8 and Eastwood during July and August of 2002. It is assumed that recreational motorized boating was the source of MTBE in waters. Since MTBE is now banned as a fuel additive, it is expected that it will no longer be introduced into the lake and levels will soon meet Basin Plan standards. The MTBE criterion is a Drinking Water standard. The only surface water removed for drinking purposes in the vicinity of the Projects is at Big Creek, near the community of Big Creek.

5.2.2.4 Project-Related Non-Controllable Impacts

Mammoth Pool (FERC Project No. 2085)

Dissolved Oxygen

The Basin Plan specifies that DO concentrations in waters designated COLD should not fall below 7.0 mg/L. DO concentrations less than 7.0 mg/L were measured in Mammoth Pool Reservoir. This is a natural occurrence in lakes and reservoirs and considered an uncontrollable Project-related effect.

Big Creek Nos. 1 and 2 (FERC Project No. 2175)

Dissolved Oxygen

The Basin Plan specifies that the DO concentrations in waters designated COLD should not fall below 7.0 mg/L. DO concentrations less than 7.0 mg/L were measured in Huntington Lake and Dam 4 Forebay. This is a natural occurrence in lakes and considered an uncontrollable Project-related effect.

Big Creek Nos. 2A, 8 and Eastwood (FERC Project No. 67)

Dissolved Oxygen

The Basin Plan specifies that DO concentrations in waters designated COLD should not fall below 7.0 mg/L. DO concentrations less than 7.0 mg/L were measured in Shaver Lake, Florence Lake, Dam 5 Forebay, Mono Forebay, Bear Forebay, and Balsam Forebay. This is a natural occurrence in lakes and reservoirs and is considered an uncontrollable Project-related effect.

Big Creek No. 3 (FERC Project No 120)

Dissolved Oxygen

The Basin Plan specifies that the DO concentrations in waters designated COLD should not fall below 7.0 mg/L. DO concentrations less than 7.0 mg/L were measured in Dam 6 Forebay. This is a natural occurrence in lakes and reservoirs and is considered an uncontrollable Project-related effect.

5.2.2.5 Project-Related Controllable Impacts

Mammoth Pool (FERC Project No. 2085)

Water Temperature

Three bypass stream reaches in the vicinity of the Mammoth Pool Project had occurrences when the mean daily water temperature exceeded the evaluation criteria

for trout, and downstream stream water temperatures increased by more than 5°F and exceeded the evaluation criteria for trout, including:

- San Joaquin River, Mammoth Pool Dam to Dam 6
- Rock Creek, diversion to the San Joaquin River
- Ross Creek, diversion to the San Joaquin River

Under the Proposed Action, three environmental measures are recommended to address compliance with temperature objectives in the Basin Plan. These measures include higher minimum instream flow requirements, implementation of a Temperature Monitoring and Management Plan and implementation of a Flow Monitoring and Reservoir Water Level Measurement Plan. An increase in minimum instream flow will provide a net benefit by improving aquatic habitat as described in Section 5.2.4, Aquatic Resources, and reducing water temperatures in the downstream reaches, when cooler water is available for release from upstream reservoirs and diversions.

Big Creek Nos. 1 and 2 Project (FERC Project No. 2175)

Water Temperature

The bypass stream reach along Big Creek between Dam 4 to Dam 5 had occurrences when the mean daily water temperature exceeded the evaluation criteria for trout, and downstream stream water temperatures increased by more than 5°F and exceeded the evaluation criteria for trout. Under the Proposed Action, three environmental measures are recommended to address compliance with temperature objectives in the Basin Plan. These measures include higher minimum instream flow requirements, Temperature Monitoring and Management Plan and implementation of a Flow Monitoring and Reservoir Water Level Measurement Plan. An increase in minimum instream flows will provide a net benefit by improving aquatic habitat as described in Section 5.2.4, Aquatic Resources, and reducing water temperatures in downstream reaches, when cooler water is available for release from upstream reservoirs and diversions.

Big Creek Nos. 2A, 8 and Eastwood Project (FERC Project No. 67)

Dissolved Oxygen

Non-compliant dissolved oxygen concentrations were observed at monitoring stations in the South Fork San Joaquin River, Pitman Creek, Stevenson Creek, Mono Creek and Bear Creek. Under the Proposed Action, two environmental measures are recommended to address compliance with the DO objective in the Basin Plan. These measures include higher minimum instream flow requirements and implementation of a flow monitoring program. Higher instream flows will result in lower instream water temperatures, which in turn will result in increased oxygen concentrations in the affected stream reaches, providing a benefit to the Project waters.

Turbidity

The Basin Plan objective for turbidity was exceeded at Hooper Creek in the reach between the diversion and the South Fork San Joaquin River. This elevated turbidity level has been attributed to current sediment management practices. Under the Proposed Action, SCE will implement the recommended sediment management prescriptions, as described in the Sediment Management Prescriptions (SCE 2007; Volume 4, SD-H (Book 20)), to address compliance with the turbidity objective in the Basin Plan. The sediment management prescription includes the operation of the Hooper Diversion low-level outlet during the spring run-off period in Wet Water Years to allow sediment pass through and reduce the accumulation of sediment behind the diversion dam. Background turbidity levels are higher during the spring run-off period and therefore, operation of the low-level outlet for sediment pass through operations will not result in an increased turbidity level, which could result in an adverse impact to downstream waters. Sediment pass-through and the reduction of sediment accumulation behind the diversion dam will provide a benefit to the Project waters.

Water Temperature

Two bypass stream reaches in the vicinity of the Big Creek Nos. 2A, 8 and Eastwood Project had occurrences when mean daily temperatures exceed the 20°C evaluation criteria for trout, and downstream water temperatures increased by more than 5°F, including:

- Big Creek, Dam 5 to the San Joaquin River
- South Fork San Joaquin River, Florence to Mammoth Pool

Under the Proposed Action, three environmental measures are recommended to address compliance with temperature objectives in the Basin Plan. These measures include higher minimum instream flow requirements, Temperature Monitoring and Management Plan and implementation of a Flow Monitoring and Reservoir Water Level Measurement Plan. An increase in minimum instream flow will provide a net benefit by improving aquatic habitat as described in Section 5.2.4, Aquatic Resources, and reducing water temperatures in the downstream reaches, when cooler water is available for release from upstream reservoirs and diversions.

Big Creek No. 3 Project (FERC Project No.120)

Water Temperature

The bypass stream reach of the San Joaquin River between Dam 6 and Redinger Lake had occurrences when the mean daily water temperature exceeded the 20°C evaluation criteria for trout, and downstream stream water temperatures increased by more than 5°F. Under the Proposed Action, three environmental measures are recommended to address compliance with temperature objectives in the Basin Plan. These measures include higher minimum instream flow requirements, implementation of a temperature

monitoring program and implementation of a flow monitoring program. An increase in minimum instream flow will provide a net benefit by improving aquatic habitat as described in Section 5.2.4, Aquatic Resources, and reducing water temperatures in the downstream reaches, when cooler water is available for release from upstream reservoirs and diversions.

5.2.2.6 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts to water quality resources under the Proposed Action.

TABLES

Table 5.2.2-1. Water Quality Criteria.

Analyte	Units	State and Federal Criteria			
		Basin Plan	CA TOXIC RULE	NATIONAL TOXIC RULE	EPA NRAWQC
Alkalinity (as CaCO ₃)	mg/L	ns	ns	Narr ²	Narr ²
Ammonia as NH ₃	mg/L	ns	ns	1 ³	1 ³
Arsenic – Total	µg/L	50	340/150	340/150	340/150
Benzene	µg/L	1	1.2	--	2.2
Bicarbonate (as CaCO ₃)	mg/L	ns	ns	ns	ns
Biochemical Oxygen Demand	mg/L	ns	ns	ns	ns
Boron – Total	mg/L	ns	ns	ns	ns
Calcium	mg/L	ns	ns	ns	ns
Carbonate (as CaCO ₃)	mg/L	ns	ns	ns	ns
Chloride	mg/L	250	ns	ns	860/230
Chlorophyll-a	mg/L	ns	ns	ns	ns
Copper – Total	mg/L	1	0.0015/0.0013 ⁴	0.0015/0.0013 ⁴	0.0015/0.0013 ⁴
Ethyl-benzene	µg/L	300	3,100	3,100	530
Fecal Coliform (3x5)	MPN/ 100 mL	200	ns	ns	ns
Fluoride	mg/L	2	ns	ns	ns
Hardness (as CaCO ₃)	Calc	ns	ns	ns	ns
Hydroxide (as CaCO ₃)	mg/L	ns	ns	ns	ns
Iron – Total	mg/L	0.3	ns	ns	1
Lead – Total	µg/L	15	4.9/0.19 ⁴	4.9/0.19 ⁴	4.9/0.19 ⁴
Magnesium	µg/L	ns	ns	ns	ns
Manganese – Total	µg/L	50	ns	ns	ns
Mercury – Total	µg/L	2	0.05	ns	1.4/0.77
Methylmercury in fish tissue	mg/kg	ns	ns	ns	0.30
Methyl-tertiary-butyl Ether (MtBE)	µg/L	5	ns	ns	ns
Molybdenum – Total	µg/L	ns	ns	ns	ns
Nitrate (NO ₃)/ Nitrite (NO ₂)	mg/L	10	ns	ns	10
Nitrogen- Total Kjeldahl (TKN)	mg/L	ns	ns	ns	ns
Ortho-phosphate (o-PO ₄ -P)	mg/L	ns	ns	ns	ns
Oxygen, dissolved	mg/L	7.0	ns	ns	8.0
pH	unitless	6.5-8.5	ns	ns	6.5-9.0

Table 5.2.2-1. Water Quality Criteria.

Analyte	Units	State and Federal Criteria			
		Basin Plan	CA TOXIC RULE	NATIONAL TOXIC RULE	EPA NRAWQC
Potassium	mg/L	ns	ns	ns	ns
Silver	µg/L	100	0.07 ⁴	0.07 ⁴	0.07 ⁴
Sodium	mg/L	ns	ns	ns	ns
Sulfate (SO ₄)	mg/L	250	ns	ns	ns
Toluene	µg/L	150	ns	ns	ns
Total Coliform (3x5, 6 hr hold)	MPN/ 100 mL	ns	ns	ns	ns
Total Dissolved Solids	mg/L	500	ns	ns	ns
Total Petroleum Hydrocarbons (as gasoline and as diesel)	µg/L	ns	ns	Narr ⁵	Narr ⁵
Total Suspended Solids	mg/L	ns	ns	ns	ns
Turbidity	NTU	Narr ⁶	ns	ns	Narr ⁷
Xylenes – Total	µg/L	1750	ns	ns	ns
Zinc – Total	mg/L	5	.017/.017 ⁴	.017/.017 ⁴	.017/.017 ⁴

¹Number of exceedences includes potential resource issues. Total number of points sampled = sample points multiplied by number of times sampled.

²The alkalinity of Project waters is naturally very low - this is a common condition for rivers and lakes that drain granitic basins (Wetzel 2001). The minimum 20 mg/L value was recommended in the USEPA's 1976 'Red Book'. However, the 'Red Book' also recommends that natural alkalinity not be reduced by more than 25%. The 'Red Book' states: "This avoids the problem of establishing standards on waters where natural alkalinity is at or below 20 mg/L. For such waters, alkalinity should not be further reduced."

³The criterion for ammonia is dependent on the ambient pH and temperature conditions. The criterion of 1.0 mg/L is an average value based on a range of values that vary according to pH and temperature conditions. The actual criterion for a given sample would depend on the ambient pH and temperature during sample collection.

⁴The criteria for copper, lead, silver, and zinc are expressed in terms of the dissolved metal in the water column. The criteria are also expressed as a function of hardness and decrease as hardness decreases. The values of criteria given in this table are based on a hardness of 10 mg/L. The actual criteria for a given sample would be calculated based on the associated hardness of that sample.

⁵From Compilation of Water Quality Goals – TPH-diesel: Taste & odor threshold and USEPA SNARL = 100 ug/L. TPH-gasoline: Taste & odor threshold and proposed USEPA SNARL = 5 ug/L.

⁶Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: Where natural turbidity is between 0 and 5 NTUs, increases shall not exceed 1 NTU, and where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20%.

⁷From the 1976 'Red Book' – "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." This is an instantaneous maximum.

Ns - no standard available

Table 5.2.2-2. Overview of Water Quality Resource Issues in the Four Big Creek ALP Projects Vicinity.

	Alkalinity	Arsenic	Copper	Iron	Lead	Manganese	Mercury, water	Mercury, fish tissue	MTBE	Nitrate/nitrite	Dissolved Oxygen	pH	Silver	Temperature	Turbidity	TPH-diesel	Zinc
Mammoth Pool (FERC Project No. 2085)																	
Mammoth Pool Reservoir							X	X			X	X				X	
San Joaquin River (Mammoth Pool Dam to Mammoth PH)	X													X			
Ross Creek											X			X			
Rock Creek							X							X			
Big Creek Nos. 1 and 2 (FERC Project No. 2175)																	
Huntington Lake	X						X				X	X					X
Dam 4 Forebay	X										X	X					
Rancheria Creek	X						X					X					
Big Creek (HL to Dam 4)	X						X										
Big Creek (Dam 4 to Dam 5)	X		X	X	X					X		X		X			
Balsam Creek (Div to Big Ck)			X		X							X					
Ely Creek				X		X	X				X	X					
Big Creek Nos. 2A, 8 and Eastwood (FERC Project No. 67)																	
Shaver Lake	X		X		X		X		X		X	X					X
Florence Lake	X						X				X	X					X
Dam 5 Forebay	X										X	X					
Mono Forebay				X			X				X	X					
Bear Forebay							X				X	X					
Balsam Forebay	X						X				X	X					
SFSJR (Florence Lake to Mammoth Pool)	X	X		X							X	X		X			
Big Creek (Dam 5 to SJR)	X		X							X		X		X			
Balsam Creek (Forebay to Div)				X								X			X		
Pitman Creek (Div to Big Ck)		X									X	X					
NF Stevenson Creek	X						X					X					
Stevenson Creek				X		X	X				X	X		X			
Crater Creek	X			X								X					
Crater Creek Diversion Channel	X																
Tombstone Creek			X				X					X					
North Slide Creek							X					X					
South Slide Creek							X				X	X					
Hooper Creek			X	X								X			X		X
Mono Creek							X				X	X	X				
Bear Creek											X	X					
Chinquapin Creek												X					
Camp 62 Creek		X			X		X					X			X		
Bolsillo Creek	X											X					
Big Creek No. 3 (FERC Project No. 120)																	
San Joaquin River (Dam 6 toPH3)	X						X				X	X	X				
Dam 6 Forebay	X		X								X	X					

Table 5.2.2-3. Comparison of Daily Mean Temperature Between Downstream and Upstream Water Temperature Monitoring Locations¹

Downstream Site	When Diverting																			Upstream Comparison Site	Reference Table ¹	
	2000			Days Temperature Increase is >2.8°C (5°F) and Daily Mean is							2001			Days Temperature Increase is >2.8°C (5°F) and Daily Mean is								
	Days >2.8°C (5°F)	No. Days Monitored	% Days >2.8°C (5°F)	≤ 15°C	>15°C and ≤ 16°C	>16°C and ≤ 17°C	>17°C and ≤ 18°C	>18°C and ≤ 19°C	>19°C and ≤ 20°C	> 20°C	Days >2.8°C (5°F)	No. Days Monitored	% Days >2.8°C (5°F)	≤ 15°C	>15°C and ≤ 16°C	>16°C and ≤ 17°C	>17°C and ≤ 18°C	>18°C and ≤ 19°C	>19°C and ≤ 20°C			> 20°C
Mammoth Pool Project (FERC Project No. 2085)																						
SJR Mammoth Pool Reach Downstream of Mammoth Pool Dam	37	46	80%	6	7	4	4	16	0	0	34	133	26%	0	0	2	8	5	7	12	SJR Upstream of Mammoth Pool Site	Table CAWG 5-122
SJR Mammoth Pool Reach Upstream of Rock Creek	33	46	72%	15	3	0	15	0	0	0	21	132	16%	0	0	0	4	6	9	2	SJR Upstream of Mammoth Pool Site	Table CAWG 5-126
SJR Mammoth Pool Reach Upstream of Ross Creek	28	46	61%	16	0	0	9	1	2	0	34	133	26%	0	0	0	1	2	8	23	SJR Upstream of Mammoth Pool Site	Table CAWG 5-130
SJR Mammoth Pool Reach Upstream of Mammoth Pool Powerhouse	22	41	54%	16	0	0	6	0	0	0	33	133	25%	0	0	0	1	3	8	21	SJR Upstream of Mammoth Pool Site	Table CAWG 5-134
Rock Creek Upstream of SJR Confluence	0	138	0%	0	0	0	0	0	0	0	17	103	17%	0	0	0	0	1	0	16	Rock Creek at Diversion Dam	Table CAWG 5-142
Ross Creek Upstream of SJR Confluence	0	11	0%	0	0	0	0	0	0	0	47	73	64%	2	2	2	2	9	9	21	Ross Creek at Diversion Dam	Table CAWG 5-146
Big Creek Nos. 1 and 2 (FERC Project No. 2175)																						
Big Creek Downstream of Dam 1	37	108	34%	37	0	0	0	0	0	0	32	149	21%	7	25	0	0	0	0	0	Big Creek Upstream of Huntington Lake	Table CAWG 5-177
Big Creek Canyon Site	3	102	3%	3	0	0	0	0	0	0	7	149	5%	7	0	0	0	0	0	0	Big Creek Upstream of Huntington Lake	Table CAWG 5-190
Big Creek Upstream of Powerhouse 1	1	108	1%	1	0	0	0	0	0	0	21	177	12%	21	0	0	0	0	0	0	Big Creek Upstream of Huntington Lake	Table CAWG 5-202
Big Creek Downstream of Dam 4	24	101	24%	24	0	0	0	0	0	0	66	177	37%	51	12	2	1	0	0	0	Big Creek Upstream of Huntington Lake	Table CAWG 5-222
Big Creek Downstream of Dam 4	41	128	32%	41	0	0	0	0	0	0	135	183	74%	62	24	28	20	1	0	0	Big Creek Upstream of Powerhouse 1	Table CAWG 5-220
Big Creek Upstream of Balsam Creek	33	129	26%	11	5	6	7	4	0	0	166	183	91%	41	21	13	12	17	23	39	Big Creek Upstream of Powerhouse 1	Table CAWG 5-236
Big Creek Upstream of Powerhouse 2	80	154	52%	28	13	21	8	8	2	0	171	183	93%	47	22	17	44	24	15	2	Big Creek Upstream of Powerhouse 1	Table CAWG 5-252
Ely Creek Upstream of Big Creek Confluence ⁽²⁾	1	121	1%	1	0	0	0	0	0	0	0	94	0%	0	0	0	0	0	0	0	Ely Creek at Diversion	Table CAWG 5-307
Balsam Creek Upstream of Big Creek Confluence ⁽²⁾	0	127	0%	0	0	0	0	0	0	0	10	183	5%	7	2	1	0	0	0	0	Balsam Creek at Diversion Dam	Table CAWG 5-302
Big Creek Nos. 2A, 8 and Eastwood (FERC Project No. 67)																						
SFSJR Downstream of Florence Lake Dam	4	77	5%	4	0	0	0	0	0	0	7	50	14%	0	2	5	0	0	0	0	SFSJR Upstream of Florence Lake	Table CAWG 5-15
SFSJR Downstream of Jackass Meadow	42	113	37%	41	1	0	0	0	0	0	4	57	7%	1	3	0	0	0	0	0	SFSJR Upstream of Florence Lake	Table CAWG 5-20
SFSJR Upstream of Hooper Creek	30	107	28%	30	0	0	0	0	0	0	1	57	2%	1	0	0	0	0	0	0	SFSJR Upstream of Florence Lake	Table CAWG 5-21
SFSJR Upstream of Crater Creek	34	109	31%	33	1	0	0	0	0	0	25	76	33%	25	0	0	0	0	0	0	SFSJR Upstream of Florence Lake	Table CAWG 5-22
SFSJR Upstream of Bear Creek	15	85	18%	15	0	0	0	0	0	0	30	76	39%	23	7	0	0	0	0	0	SFSJR Upstream of Florence Lake	Table CAWG 5-23
SFSJR Upstream of Mono Hot Spring	27	114	24%	26	1	0	0	0	0	0	5	37	14%	0	0	3	2	0	0	0	SFSJR Upstream of Florence Lake	Table CAWG 5-24
SFSJR Upstream of Camp 62 Creek	35	114	31%	32	3	0	0	0	0	0	52	74	70%	9	8	17	10	8	0	0	SFSJR Upstream of Florence Lake	Table CAWG 5-25
SFSJR Upstream of Bolsillo Creek	37	114	32%	31	3	2	1	0	0	0	56	74	76%	8	9	15	15	7	2	0	SFSJR Upstream of Florence Lake	Table CAWG 5-26
SFSJR Upstream of Camp 61 Creek	41	95	43%	19	8	3	5	5	1	0	54	67	81%	1	9	8	16	11	7	2	SFSJR Upstream of Florence Lake	Table CAWG 5-27
SFSJR Upstream of Mono Creek	45	95	47%	17	5	9	8	4	2	0	60	73	82%	0	9	9	17	14	8	3	SFSJR Upstream of Florence Lake	Table CAWG 5-28
SFSJR Upstream of Warm Creek	-	0	-	-	-	-	-	-	-	-	35	52	67%	0	4	9	17	5	0	0	SFSJR Upstream of Florence Lake	Table CAWG 5-29
SFSJR Upstream of Rattlesnake Creek	23	51	45%	11	5	5	1	1	0	0	62	76	82%	11	12	11	15	10	3	0	SFSJR Upstream of Florence Lake	Table CAWG 5-30
SFSJR Upstream of Hoffman Creek	22	78	28%	10	1	5	5	1	0	0	61	76	80%	13	12	17	10	8	1	0	SFSJR Upstream of Florence Lake	Table CAWG 5-31
SFSJR Upstream of SJR Confluence	74	76	97%	35	7	9	8	9	6	0	76	76	100%	2	11	19	12	10	15	7	SFSJR Upstream of Florence Lake	Table CAWG 5-44
Pitman Creek Upstream of Big Creek Confluence	0	44	0%	0	0	0	0	0	0	0	8	61	13%	8	0	0	0	0	0	0	Pitman Creek Upstream of Diversion	Table CAWG 5-216
NF Stevenson Creek Upstream of Shaver Lake	42	147	29%	9	16	14	3	0	0	0	59	150	39%	43	8	7	1	0	0	0	NF Stevenson Creek Downstream of Tunnel 7	Table CAWG 5-313
Crater Creek Upstream of SFSJR Confluence	30	41	73%	28	2	0	0	0	0	0	8	38	21%	8	0	0	0	0	0	0	Crater Creek at Diversion	Table CAWG 5-81
Crater Creek Diversion Inflow to Florence Lake	5	41	12%	5	0	0	0	0	0	0	14	38	37%	14	0	0	0	0	0	0	Crater Creek at Diversion	Table CAWG 5-84

Table 5.2.2-3. Comparison of Daily Mean Temperature Between Downstream and Upstream Water Temperature Monitoring Locations¹

Downstream Site	When Diverting																				Upstream Comparison Site	Reference Table ¹
	2000			Days Temperature Increase is >2.8°C (5°F) and Daily Mean is							2001			Days Temperature Increase is >2.8°C (5°F) and Daily Mean is								
	Days >2.8°C (5°F)	No. Days Monitored	% Days >2.8°C (5°F)	≤ 15°C	>15°C and ≤ 16°C	>16°C and ≤ 17°C	>17°C and ≤ 18°C	>18°C and ≤ 19°C	>19°C and ≤ 20°C	> 20°C	Days >2.8°C (5°F)	No. Days Monitored	% Days >2.8°C (5°F)	≤ 15°C	>15°C and ≤ 16°C	>16°C and ≤ 17°C	>17°C and ≤ 18°C	>18°C and ≤ 19°C	>19°C and ≤ 20°C	> 20°C		
Big Creek Nos. 2A, 8 and Eastwood (FERC Project No. 67) (continued)																						
Bear Creek Downstream of Diversion	0	74	0%	0	0	0	0	0	0	0	0	107	0%	0	0	0	0	0	0	0	Bear Creek Upstream of Diversion	Table CAWG 5-88
Bear Creek Upstream of SFSJR Confluence	2	116	2%	2	0	0	0	0	0	0	5	108	5%	4	1	0	0	0	0	0	Bear Creek Upstream of Diversion	Table CAWG 5-89
Mono Creek Downstream of Diversion	0	128	0%	0	0	0	0	0	0	0	0	85	0%	0	0	0	0	0	0	0	Mono Creek Upstream of Diversion	Table CAWG 5-94
Mono Creek Upstream of SFSJR	60	108	56%	39	21	0	0	0	0	0	71	122	58%	22	29	20	0	0	0	0	Mono Creek Upstream of Diversion	Table CAWG 5-96
Camp 62 Creek Upstream of SFSJR Confluence	-	-	-	-	-	-	-	-	-	-	54	54	100%	52	2	0	0	0	0	0	Camp 62 Creek at Diversion	Table CAWG 5-100
Camp 62 Creek Upstream of SFSJR Confluence	-	-	-	-	-	-	-	-	-	-	27	27	100%	27	0	0	0	0	0	0	Chinquapin Creek at Diversion	Table CAWG 5-102
Bolsillo Creek Upstream of SFSJR Confluence ⁽²⁾	21	152	14%	21	0	0	0	0	0	0	0	116	0%	0	0	0	0	0	0	0	Bolsillo Creek at Diversion	Table CAWG 5-106
Big Creek Downstream of Dam 5	37	94	39%	9	14	12	2	0	0	0	55	177	31%	19	20	16	0	0	0	0	Big Creek Upstream of Huntington Lake	Table CAWG 5-273
Big Creek Upstream of Powerhouse 8	31	68	46%	4	7	6	5	5	4	0	112	177	63%	30	10	32	20	10	6	4	Big Creek Upstream of Huntington Lake	Table CAWG 5-287
Big Creek Downstream of Dam 5	26	121	21%	6	11	7	2	0	0	0	5	184	3%	4	0	1	0	0	0	0	Big Creek Upstream of Powerhouse 2	Table CAWG 5-272
Big Creek Upstream of Powerhouse 8	14	94	15%	0	0	1	4	5	4	0	12	184	7%	0	3	4	3	2	0	0	Big Creek Upstream of Powerhouse 2	Table CAWG 5-286
Stevenson Creek Downstream of Shaver Lake Dam	43	128	34%	30	13	0	0	0	0	0	44	108	41%	31	13	0	0	0	0	0	Stevenson Creek Upstream of Shaver Lake	Table CAWG 5-319
Stevenson Creek at Railroad Grade	36	106	34%	36	0	0	0	0	0	0	47	122	39%	47	0	0	0	0	0	0	Stevenson Creek Upstream of Shaver Lake	Table CAWG 5-323
Stevenson Creek Upstream of SJR	68	127	54%	37	6	15	4	3	3	0	115	113	102%	57	18	25	12	3	0	0	Stevenson Creek Upstream of Shaver Lake	Table CAWG 5-327
Stevenson Creek Downstream of Shaver Lake Dam	18	147	12%	5	13	0	0	0	0	0	21	179	12%	8	13	0	0	0	0	0	NF Stevenson Creek Upstream of Shaver Lake	Table CAWG 5-318
Stevenson Creek at Railroad Grade	0	117	0%	0	0	0	0	0	0	0	15	179	8%	15	0	0	0	0	0	0	NF Stevenson Creek Upstream of Shaver Lake	Table CAWG 5-322
Stevenson Creek Upstream of SJR	1	127	1%	0	0	0	0	0	1	0	34	179	19%	17	5	6	1	0	5	0	NF Stevenson Creek Upstream of Shaver Lake	Table CAWG 5-326
Big Creek No. 3 (FERC Project No. 120)																						
SJR Downstream of Dam 6	-	0	-	-	-	-	-	-	-	-	0	184	0%	0	0	0	0	0	0	0	SJR Upstream of Mammoth Pool Powerhouse	Table CAWG 5-155
SJR Upstream of Stevenson Creek	0	61	0%	0	0	0	0	0	0	0	0	184	0%	0	0	0	0	0	0	0	SJR Upstream of Mammoth Pool Powerhouse	Table CAWG 5-161
SJR Downstream of Big Creek Powerhouse 3	1	64	2%	0	1	0	0	0	0	0	6	163	4%	0	1	4	1	0	0	0	SJR Upstream of Mammoth Pool Powerhouse	Table CAWG 5-169

Footnote:

¹Water temperature data used for this evaluation is provided in the data tables contained in the CAWG 5 Water Temperature Monitoring Technical Study Report (provided in Volume 3, SD-D) and can be found in the CAWG-5 Table No. designations indicated in this table.

²Water temperature monitoring was conducted when diversions were not diverting.